Western Underground
Gas Storage Pty. Ltd.

TXU

WELL COMPLETION REPORT

Iona Obs-2

PPL2
ONSHORE OTWAY BASIN,
VICTORIA

VOLUME 1 OF 2
TEXT, TABLES, FIGURES, APPENDICES
& ENCLOSURES 1-3

October 1999

Copy 3 of 6

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VOLUME 1

CONTENTS

FIGURES

TABLES

TABLES (continued)

APPENDICES

VOLUME 1
ENCLOSURES

Enclosure 1. Formation Evaluation Log (mudlog) by Halliburton

Enclosure 2. Well Composite Log by PetroVal Australasia Pty Ltd

Enclosure 3. Well Composite Log - Reservoir Section by PetroVal Australasia Pty Ltd

VOLUME 2
ENCLOSURES

Enclosure 4a. Field Logs – BHC Sonic -GR 1:200
Enclosure 4b. Field Logs – BHC Sonic-GR 1:500

Enclosure 5a. Field Logs - PEX – HALS 1:200 Resistivity Curves
Enclosure 5b. Field Logs - PEX – HALS 1:500 Resistivity Curves
Enclosure 5c. Field Logs - PEX – HALS 1:200 Nuclear Curves
Enclosure 5d. Field Logs - PEX – HALS 1:500 Nuclear Curves

Enclosure 6a Field Logs-Dipmeter (SHDT) 1:200
Enclosure 6a Processed Logs-Dipmeter (SHDT) 1:200

Enclosure 7. Field Logs - Check Shot Survey

Enclosure 8a. Field Logs - CBL - CCL -GR 1:200
Enclosure 8b. Field Logs - CBL - CCL -GR 1:500

Enclosure 9a. Field Logs - Perforation Record 1:200
Enclosure 9b Field Logs-Production packer setting depth

Enclosure 10. Composite Well logs Measured Depth 1:200 – Validated Log Data Set - Platform Express and BHC-GR

Enclosure 11 Synthetic seismogram seismic tie through Iona Obs-2

1.0 INTRODUCTION

Iona Obs-2 was designed as an appraisal well for the Iona Gas-field. The location of the Iona field is shown on Figure 1.1. It was planned to complete the well and use the well-bore as an observation well for the purpose of monitoring reservoir pressure and gas/water contact movement during gas injection and withdrawal cycles. The well was also to be equipped to handle the disposal of produced water.

The well was located at the northern edge of the field and was intended to monitor water influx from the east and west along, and adjacent to the northern bounding fault. The location of the well on the Iona site is shown on Figure 1.2. Iona Obs-2 was designed to be drilled as a vertical well to intersect the Waarre C1 sand in the depleted section of the reservoir.

The well was designed to be cased, completed and suspended with tubing to surface and a permanent well-head installed. A packer was to be set between the Waarre C1 and Waarre B sandstones to enable monitoring of the C1 and water disposal into the B sand. There was no intention to inject gas or withdraw gas from the well-bore.

On drilling the well the objective was achieved and the Waarre C1 Sandstone was intersected and the top 1.5 m of sand was gas filled and the current gas/water contact was clearly visible on the logs. Clean sand of the Waarre Formation was intersected below the gas/water contact and the current swept zone was also clearly visible on the logs. Having achieved its objective the well was perforated at the bottom of the swept zone from 1302.0 to 1303.5 m MDKB to enable monitoring of the C1 reservoir pressure. The well was also perforated from 1327.5 to 1332.5 m MDKB to allow disposal of produced water through perforations into the Waarre B Sandstone during withdrawal cycles.

2.0 WELL HISTORY

2.1 LOCATION DATA

Basin:	Otway, onshore western Victoria
Lease:	PPL-2
Surface Coordinates:	5728778.2 metres north 677216.0 metres east
Surface Elevation:	Ground Level (GL): 104.5 metres AHD Kelly Bushing (KB): 109.5 metres AHD (Datum) (All depths relative to KB unless otherwise stated)
Bottom Hole Coordinates:	5728775.56 metres north 677210.43 metres east
Coordinate system	Australian Map Grid 66, Zone 54 Central Meridian: 141 East

OTWAY BASIN - GAS FIELD LOCATION MAP

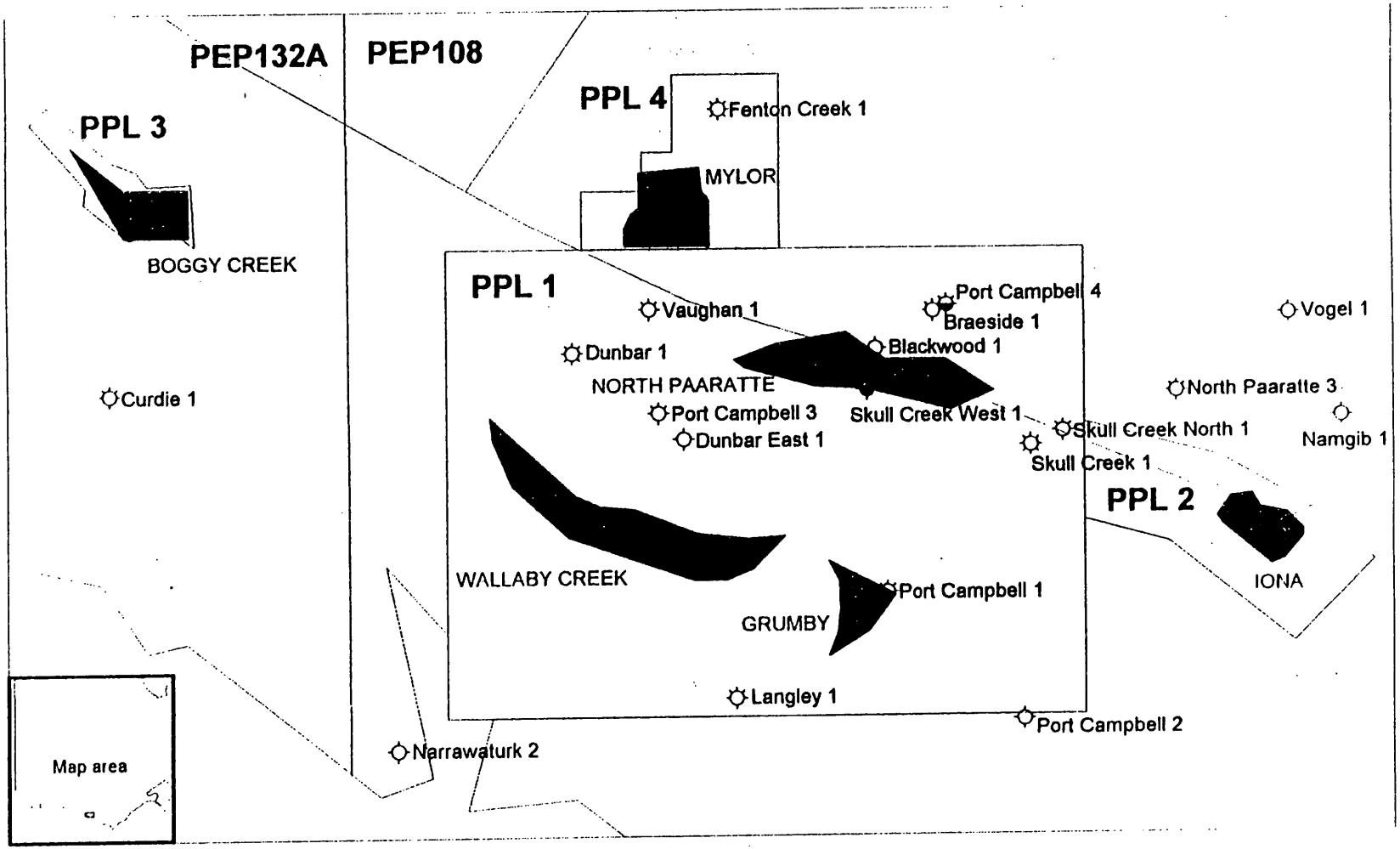

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Figure 1.1

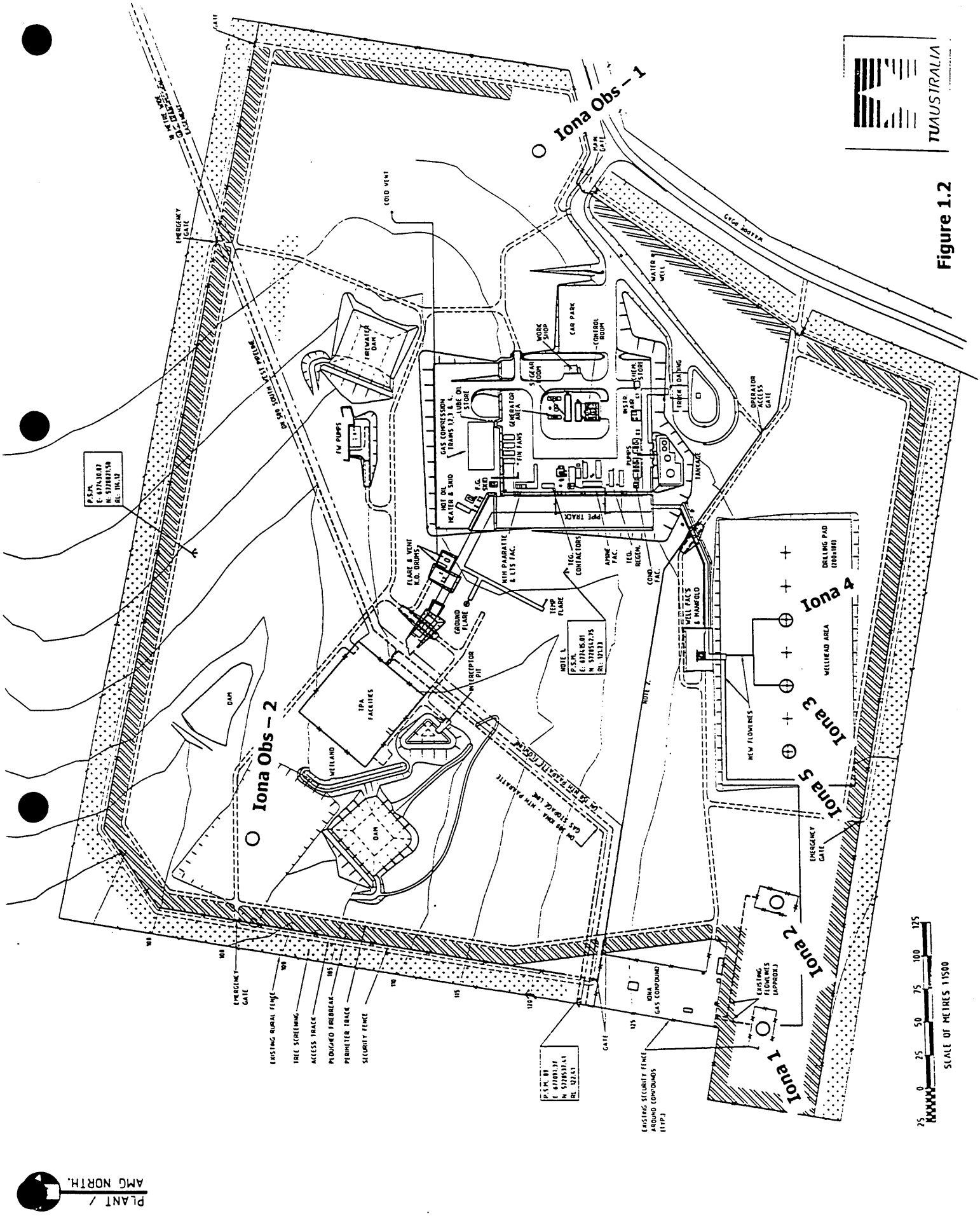


Figure 1.2

PLANT / AMG NORTH.

2.2 GENERAL DATA

Well Name:	Iona Obs-2
Classification:	Observation Well/Water disposal well for the Western Underground Gas Storage Project
Operator:	Western Underground Gas Storage Pty Ltd ("WUGS")
Property Owner:	Western Underground Gas Storage Pty Ltd
Nearest Town:	The coastal township of Port Campbell, approximately 7 km south of the Gas Field.
Nearest Well:	Iona-1 located approx.0.3 km from surface location.
Final Total Depth:	Driller: 1355 m Logger: 1355 m
Spud date:	10:00 hrs on 12 May 1999.
TD reached:	19:45 hrs on 19 May 1999.
Days to Drill:	7.41 days
Date well completed:	24:00 hrs on 23 May 1999
Rig Released:	24:00 hours May 23, 1999
Well Status:	Suspended Observation Well/Water Injection well

2.3 WELL SUMMARY

Table 2.1 Well Summary

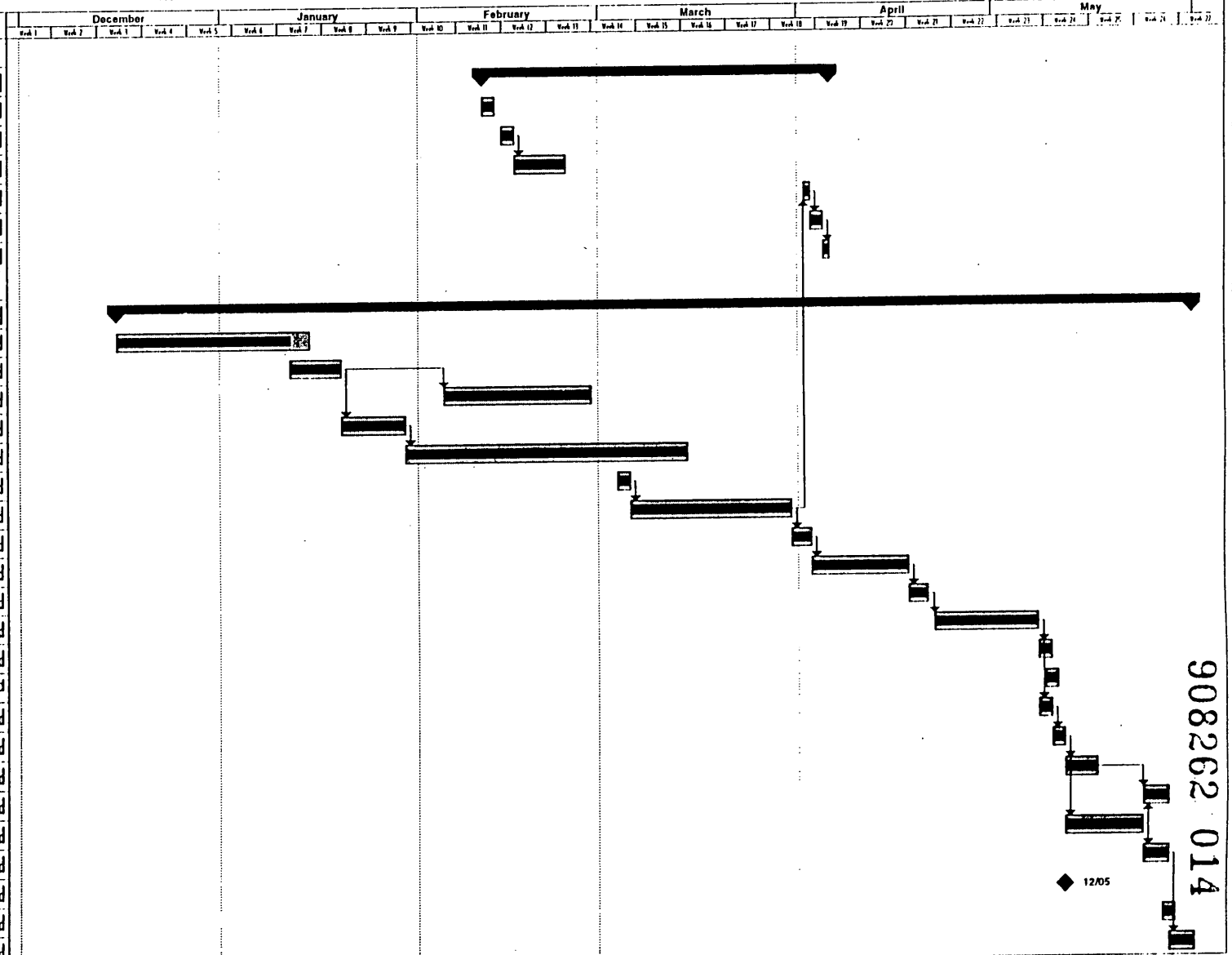
WELL NAME	Iona Obs-2		
DESIGNATION	Observation/Water Disposal Well		
BASIN	Otway		
OPERATIONS BASE	Kelly Down Consultants, St. Leonard's, Sydney		
FIELD OPERATIONS BASE	On site @ Iona , Waarre Rd, Port Campbell, Vic.		
DRILLING CONTRACTOR	OD&E		
RIG	Rig 30		
RT to GL	4.98 m		
GL to MSL	104.5 m		
TOTAL DEPTH (M DKB)	1355.0 m KB (driller depth)		
RIG MOBILISED	10 May 1999		
SPUD DATE	12 May 99 @ 10:00 hrs		
8 ½" HOLE SECTION TD Depth/Time	629 m @ 14:45 hrs 13 May 99		
6" HOLE SECTION TD Depth/Time	1355 m @ 19:45 hrs 19 May 99		
SPUD TO TOTAL DEPTH TIME	7 Days 9.75 hrs		
COMPLETION INSTALLED	23 May 99 @ 2400 hrs		
SPUD TO WELL SUSPENDED	11 Days 14.0 hrs		
CASING STRINGS	13 3/8 "	Conductor	10 m
	7 "	Surface Casing	626 m
	4 ½ "	Production Casing	1355 m
FINAL WELL STATUS	Suspended with a single string 2 3/8" Vam Ace 13% Chrome Tubing completion, with a 4 ½" BWB Packer. Perforations – 1302.0 m to 1303.5 m 1327.5 m to 1332.5 m		

2.4 OVERALL PROJECT TIMING

The overall project schedule and timing is shown on Figure 2.1 and shows the actual performance times for the major activities over the entire project, from site construction activity, through drilling and workover to completion, clean up and well handover.

WESTERN UNDERGROUND STORAGE - DEVELOPMENT DRILLING PROJECT. PHASE 1

ID	Task Name	Duration
1		
2	EXISTING WELLS (Provisional programme -IBA)	54d
3	CONDUCT GYRO SURVEY IONA 2	2d
4	MOBILISE WORKOVER RIG to IONA 1	2d
5	WORKOVER IONA 1 (Change Tubing)	8d
6	REPERFORATE IONA 2	1d
7	CONDUCT WELL TEST ON IONA 2	2d
8	CONDUCT WELL TEST ON IONA 1	1d
9		
10	NEW WELLS	167d
11	WELL PLANNING & LOCATION APPROVALS	30d
12	CONSTRUCT OBS-1 WELL SITE	8d
13	DRILL OBSERVATION 1 WELL & COMPLETE	23d
14	CONSTRUCT OBS-2 WELL SITE	10d
15	CONSTRUCT I/W DRILLING PAD	44d
16	MOVE RIG TO I/W DRILLING PAD & PREPARE TO SPUD	2d
17	DRILL I/W WELL IONA 4 (SLOT 3) COMPLETE & CLEAN UP	25d
18	REPOSITION RIG OVER IONA 3 (SLOT 5)	3d
19	DRILL I/W WELL IONA 3 (SLOT 5) COMPLETE & TEST	15d
20	RESPOSITION RIG OVER IONA 5 (SLOT 7)	3d
21	DRILL & COMPLETE I/W WELL IONA 5 & IONA-5 (ST1)	16d
22	TEST IONA 5 W. ESSO XMAS TREE . SUSPEND WELL W. XXN AND BPV	2d
23	INSTALL XMAS TREE ON IONA 4 . COMMISSION & HANDOVER	2d
24	CONSTRUCT NEW ACCESS ROAD TO OBS 2 (VIA WESTERN TRACK)	2d
25	MOVE RIG TO OBS-2 WELL SITE	2d
26	PREPARE & STORE SURPLUS PIPE STOCK ON I/W PAD	5d
27	PREP & STORE SURP. COPMPLETION STOCK IN DRILLING CONTAINER	4d
28	DRILL OBS-2 WELL & COMPLETE, & HANDOVER TO OPERATIONS	12d
29	DEMOBILISE RIG 30 FROM OBS 2 SITE	4d
30	HANDOVER IONA 3 TO OPERATIONS	1d
31	INSTALL XMAS TREE ON IONA 5 . COMMISSION & HANDOVER	2d
32	CONDUCT SITE CLEAN UP OPERATIONS	4d



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Project: Western Underground Storage
Date: Wed 4/08/99

Task | Milestone | Rolled Up Task | Rolled Up Progress
Progress | Summary | Rolled Up Milestone

Project Status

wugs_schedule280599 Page 1

KDC For WUGS

Figure 2.1

2.5 CONTRACTORS

Table 2.2 Contractors

PROJECT MANAGERS	Kelly Down Consultants Pty Ltd
DRILLING	OD&E
LOCATION SURVEY	T. G Freeman and Associates
SITE CONSTRUCTION	Walter Mellis
WATER SUPPLY	Trucked in by Walter Mellis
FUEL SUPPLY	Supplied by Drilling Contractor
SUPPLY BASE	Max Nelson Storage yard (Cobden)
CEMENTING	Halliburton
MUD SYSTEM - Drilling Fluids - Solids Control	 Baroid Via Drilling Contractor
MUD LOGGING	Halliburton
ELECTRIC LOGGING	Schlumberger
DRILLING TOOLS	Tasman Oil Tools
DIRECTIONAL DRILLING	Sperry/Halliburton
GYRO SERVICES	Gyrodata via Halliburton
MWD	Halliburton
CASING SERVICES	Premium Casing
CORING	Corepro
CASING & TUBING	Marubeni/Sumitomo
WELLHEADS - Drilling Spools - Xmas Trees - Miscellaneous Flanges/Xovers	 - Wood Group/Gearhart - Wood Group/Keamey Engineering - Gearhart & Baker Oil Tools
COMPLETION SERVICES - Slickline - Completion components - TCP perforating - Lubricator	 - Halliburton - Halliburton - Schumberger - Expertest
WELL TESTING	Halliburton
ENVIRONMENTAL - Waste Disposal	 Timboon Plumbing
FUEL SUPPLY	
RIG CAMP	Camp Cooriemungle
TRUCKING	Max Nelson Transport (Cobden)
CRANE SERVICES	Timboon Engineering
COMMUNICATIONS - Landlines - E Mail/Internet	 - Telstra - Big Pond

3.0 DRILLING DATA

3.1 WELL STATUS

The following figures illustrate the suspended condition of the wellhead, completion, and other pertinent data at the time of well handover from drilling to production. Figure 3.1 is the Wellhead Diagram, Figure 3.2 is the Completion Diagram and Figure 3.3 is the Handover Certificate.

3.2 OPERATIONAL SUMMARY

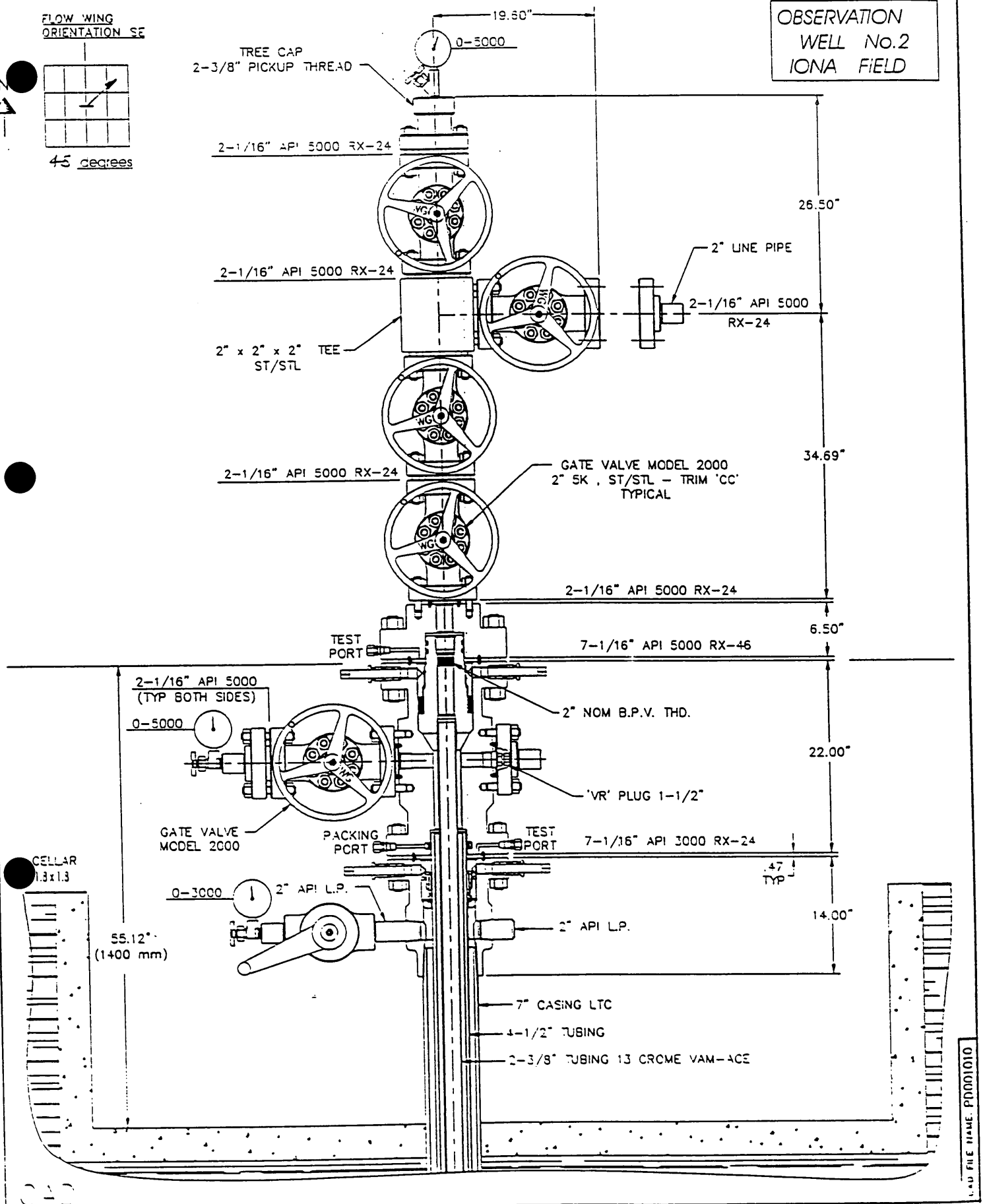
3.2.1 Logistics and Planning

Kelly Down Consultants ("KDC") managed the drilling and completion of the Iona Obs-2 well on behalf of WUGS as part of the project to drill and complete three injector/withdrawal wells, two observation wells, and the re-completion of the two existing wells.

Materials and logistics were managed out of the KDC Sydney offices with the input of the rig site team. Periodic visits to the well site by the materials and logistics coordinator ensured that inventory and service records were managed properly.

Mud and cement chemicals were supplied by Halliburton, from their Cheltenham facility. Directional drilling surveying and ("MWD") equipment was provided by Halliburton from a number of locations mainly Perth and Darwin. The large distances and subsequent mobilisation times meant that it was often economically attractive to leave equipment on stand by in between jobs (such as casing running equipment) rather than truck equipment back and forth to the site.

The first site visit to assess lease building requirements took place on 21 December 1998. The Iona gas field site is set in a rural part of South West Victoria, approximately seven kilometers north of the township of Port Campbell. Two existing wells, Iona 1 and Iona 2, had commenced production at the site in 1992 and 1994 respectively. The new facilities for gas production/injection and processing were to be built on a large site encompassing the existing wells. The overall site area for the WUGS gas plant is approximately 0.5 km x 0.6 km. All the new wells and the two existing wells have their surface locations within the security fence at the perimeter of the site.



WOOD GROUP

Wood Group Pressure Control

KELLY DOWN - WESTERN UNDERGROUND GAS STORAGE
WELLHEAD AND XMAS TREE OBSERVATION WELLS
CASING PROGRAM: 7" x 4-1/2" x 2-3/8"

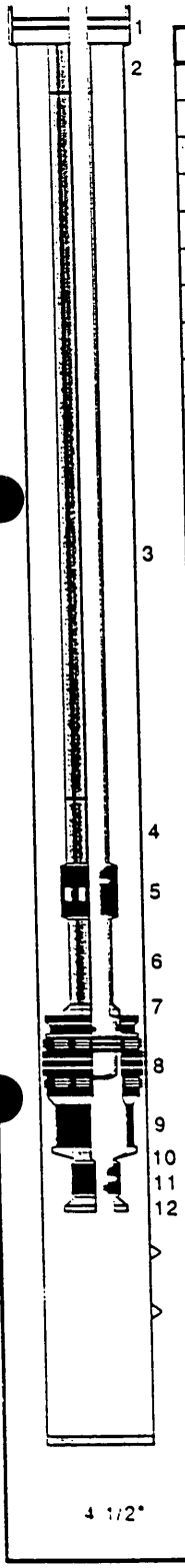
Drawn By:	Date:	Scale:	Drawing Number:
R.C.	14-05-1999	N.T.S.	PD-001010

Figure 3.1

HALLIBURTON

Australian Completions

WELL : Iona Observation Well #2
DATE : 22nd May 1999



Depth	Length	No.	DESCRIPTION	O.D.	I.D.	PART / No
	4.12		Elevation			
4.12	0.15	1	Woodgroup Tubing Hanger - 2 3/8" EUE x 2 3/8" Vam Ace BxB			
			Compression 12,000 Lbs			
4.27	1.70	2	Pup Jt - 2 3/8" 4.6 ppf Vam Ace 13 Cr	2.375	1.995	
5.97	2.50		Pup Jt - 2 3/8" 4.6 ppf Vam Ace 13 Cr	2.375	1.995	
8.47	4.63		Pup Jt - 2 3/8" 4.6 ppf Vam Ace 13 Cr	2.375	1.995	
13.10	1279.43	3	Tubing - 2 3/8" 4.6 ppf Vam Ace 13 Cr	2.375	1.995	
1292.53	1.24	5	SSD - 2 3/8" Vam Ace P x P w/ 1.875 profile 9 Cr	3.250	1.875	621 XD 18701
			[Open Down - Flow area 2.770 sq in]			
			[Positioning Tool - 42 BO 116]			
1293.77	9.61	6	Tubing - 2 3/8" 4.6 ppf Vam Ace 13 Cr	2.375	1.995	
		7	Seal Assembly - consisting of :			
1303.38	0.37		J-slot locator - 2 3/8" Vam Ace B x 2 1/14 " 12 UN P	3.094	1.920	212 J 25503-B
1303.75	0.35		Seal Unit - RTR - 2 1/4" -12 UN B x P 13 Cr	2.573	1.920	812RTR 25501-F
1304.10	0.12		Mule Shoe Guide - 2 1/4" - 12 UN B 13 Cr	2.520	1.920	212 G 25501-F
1304.22			End of tubing			
1303.59	0.67	8	Packer - 4 1/2" BWB - 13 CR - 13.5 - 15.1 #	3.640	2.555	812 BWB 45103
1304.26	2.44	9	Millout Extension - 3 1/8" 10UNS-2 B x B 13 Cr	3.640	2.750	812 MOE 25502
1306.70	0.09	10	Crossover - 3 1/8" 10 UNS-2 P x 2 3/8" Vam Ace P 13 Cr	3.640	1.956	892 PPC 32008
1306.79	0.34	11	XN' Nipple - 2 3/8" Vam Ace B x P 13 Cr	2.726	1.791	811 XN 18757
			[1.875" Packing Bore]			
1307.13	0.19	12	Wireline Reentry Guide - 2 3/8" Vam Ace B 13 Cr	3.530	1.994	812 M 1004
1307.32			End Of Tubing			
			Perforations at 1302.0m to 1303.5m			
			Perforations at 1327.5m to 1332.5m			
			Perforation Gun type and detail:2 7/8" HSD Casing guns, 6SPF,			
			60deg phasing, 15.5 gram J RMX charges			
			Notes:			
			Tubing Pick Up Weight: 25,000 lb. Slack Off Weight: 25,000 lb			
			Block Weight: 7,000 lb			

Figure 3.2

WELL HANDOVER & STATUS RECORD

TUBAL STRALIA
WESTERN UNDERGROUND GAS STORAGE

Detail	Description		Distribution	
			Name	Company
Field / Country:	Iona - Australia			
Well No:	Cbs-2		Barry Scott	WUGS
Well Surface Co-ordinates:	5728773.2 N; 377216.0 E		Kurt Matheson	ITU Australia
Well TD Co-ordinates:	Vertical hole - max deviation 1.0 deg		David Hessa	Woodside Secretari
Maximum Inclination:	1.0 deg @ 4881139 m MDRKB		Colin Stuart	KDC
Well Drilled by :	CD&E Rig 30 - Drilling Management KDC ltd		Jim Slater	KDC
Rig Floor Elevations:	KB to GL: 4.98 m	GL to MSL: 104.5 m		
Well TD/PBTD	TD: 1355 m MDRKB	PBTD: 1341 m MDRKB		
Well Type:	Single Completion water disposal/observation			
Purpose of handover	Handing new well to Production Operations			
Handover from:	WUGS Drilling -			
Handover to:	Wugs Operations -			
HANDOVER DATE:	May 27 1999			

WELL STATUS (All depths MDRKB unless stated otherwise)

Item	Description	Status at handover	Pressure Status	Size/type/rating	Comments / Remarks
	Xmas Tree	Installed	Bled to Zero above BPV	2 1/16" 5,000 psi	Wood Group T Tree
1	Swab Valve	Closed	0 psi above/below	2 1/16"" API 5,000 psi	
2	Tree upper master valve	Closed	0 psi	2 1/16"" API 5,000 psi	
3	Tree lower master valve	Closed	0 psi above/below	2 1/16"" API 5,000 psi	
4	Flow Wing valve	Closed	0 psi above/below	2 1/16"" API 5,000 psi	
5	Kill Wing Valve	Closed	0 psi above/below	2 1/16" API 5,000 psi	
6	Tree BPV	Installed	0 psi above/below		
7	Tree cap	Installed			5,000 psi gauge installed
8	IA annulus valve	Closed			5,000 psi gauge installed
9	IA annulus valve outer	Not installed			
10	IB annulus valve	Closed			5,000 psi gauge installed
11	Last rec.flow / FTHP	NA			Well completed below GWC.
12	Well fluid	Brine	0 psi		
13	IA Annulus	8.6 ppg 3% KCL Inhibited brine	0 psi	2 x 208 Litre drums inhibitor	CCAT 2748 Barcid Inhibitor
14	Wireline clugs installed?	No			
15	Perforated Interval	Open		1525 m to 1535 m	2 7/8" HSD guns 60 deg. 5 spf. 34cm
16	Injection Tubing	2 3/8" 4.6 ppf L80-13Cr VAM ACE		ID: 1.995" Drift: 1.901"	
17	Nipple Profile	XN @ 1307 m		ID: 1.791"	
18	Sliding Sleeve	2 3/8" SSD @ 1293 m		ID: 1.875"	
19	Production Packer	4 1/2" BWB @ 1304 m		ID: 2.688"	
20	Production Casing	4 1/2" 13.5 ppf N80 LTC		D: 3.920" Drift: 3.795"	
21	Minimum restriction	XN nipple 1.791" ID @ 1307 m			
22	Wellhead Type	7" x 4-1/2" x 2-3/8"	5,000 psi rated		Wood Group Slip & Seal Type

Remarks:

Well handed to WUGS Operations following completion of drilling program.
Tree cap installed on Xmas tree.
Steel Cellar installed, with ground level grating.
Handwheels locked with looped chain.. Lower Master)
Temporary protective steel cage installed around well.
Name Plate installed on cage.
Cellar drain not installed to avoid run off into drains (Mckenzie s dam.

Signatures:

Well accepted by: ..... Signed: ..... Date:

Well handed over by: ..... Signed: ..... Date:

Figure 3.3

3.2.2 Site Preparation

Site construction for Iona Obs-2 commenced in early February 1999. The lease area was on a sloping paddock to the north of the main drilling pad . A construction contractor was appointed to cut and fill the site, and lay down a 600 mm limestone/sandstone base for the drilling rig with an access road off the main site gate. Rig crew accommodation facilities were provided remote from the site at Camp Cooriemungle, approximately seven kilometers north of Iona. Site construction included the installation of a 1.8m x 1.8m x 1.8m deep cellar and 5m of 13 3/8" conductor pipe cemented in place.

Of particular concern throughout construction was adherence to the environmental management plan for the project, which stressed the minimisation of noise and dust levels. This necessitated the spraying of water, which had to be trucked into site from nearby water sources, as dam water on the WUGS site itself was reserved for gas plant construction requirements. A turkeys nest or small dam was eventually built to store trucked water for mud mixing. A water well was planned to be drilled on site by the gas plant construction group but this was delayed and as a result, water was trucked into the drilling site.

A schematic of the overall site showing the location of Iona Obs-1 within the site boundary is shown on Figure 1.2 below.

3.2.3 Mobilisation

OD&E Rig 30 was mobilised from Sale in eastern Victoria on January 21, 1999 where it had been used to drill a well for Roma Petroleum NL. Iona Obs-2 was the final well drilled in the five well program and was drilled after Iona-5.

Rig 30 is an Ideco H-725-D electric rig with four 600 kW generators powered by four CAT 3412 PCTA diesel engines. The generators were replaced with quiet generators for the duration of the project to meet noise guidelines provided in the environmental management plan.

The rig is a triple rig with a Dreco floor-mounted cantilever mast with a nominal hook gross load capacity of 510,000 lbs. The limiting performance factor of the rig was the mud pumps. Only two Gardner Denver PZ-8 (800 HP) pumps provided by the drilling contractor.

Iona Obs-2 was drilled during May as the last in a sequence of 5 new wells. The rig was moved from the main drilling/injector pad to the Iona Obs-2 site via an access track around the site perimeter.

3.2.4 Pre Spud

The Iona Obs-2 pre-spud meeting was held at the rig site on May 12, 1999. All key drilling and subsurface personnel attended at the rig site meeting, which focused on lessons learned from Iona Obs-1 and other wells.

3.2.5 8 ½" Hole Section

After a full safety briefing with the rig crews, Iona Obs-2 was spudded at 10:00 hrs on May 12, 1999. An 8 ½" hole was drilled using a KCL/PHPA/Polymer fresh water mud system. The PHPA was used to inhibit the reactive clays present within the Tertiary and Late Cretaceous claystones, i.e. in the Gellibrand marl, Pember mudstone and Paaratte Formation.

Drilling proceeded without incident to 629 m. The 7" casing was run and cemented with a lead slurry of 160 sx G cement with 2.5 percent Bentonite and 0.05 gals/sx CFR-3, followed by a tail slurry of 150 sx G neat at 15.8 ppg, back to surface. A slip and seal weld type 7 1/16" Wood Group casing head was run with the 7" casing. After installing and testing the Braden-head, the blow out preventers ("BOP's") were rigged up and tested to 3000 psi.

3.2.6 6" Hole section

The 6" hole was drilled vertically to intersect the interpreted gas water contact. The section was drilled without incident to 1043 m where tight hole on a connection warranted a short trip to the shoe. On pulling to the shoe several loose connections were noted in the string, therefore the bit was pulled to surface and changed out enabling the rest of the string to be inspected. The section was then drilled to 1302 m when a further precautionary trip was made to check the drill string. The section was drilled to a final total depth of 1355 m, and an EMS (multi-shot) survey was dropped prior to tripping out of the hole.

Logging of the 6" hole went without incident.

3.2.7 4 ½" Production String

A 4 ½" 13.5 lb/ft N80 LTC production string was run to 1355 m and cemented in place with a 12.8 ppg lead slurry and 15.8 ppg class G tail. The top plug was bumped at 2500 psi, held pressure for 10 minutes, and the floats tested by bleeding back 1 bbl. After waiting on cement the BOP's were lifted and the Wood Group slip and seal casing hanger installed. The tubing head was then landed and pressure tested to 3000 psi. The BOP's were then re-installed and tested in preparation for running the 2 3/8" completion string.

3.2.8 Clean up and Perforate

A 4 ½" casing scraper and 3 ¾" junk mill was run on a dedicated 2 3/8" tubing work string to ensure the cased hole was clean and circulated to brine prior to running the completion. A 3% KCL brine was circulated at total depth preceded by a clean up sweep. After tripping with the work string, a cement bond log ("CBL/VDL") confirmed good cement bond and isolation across the Waarre sandstones.

After installing a shooting nipple across the BOP's, the intervals 1327.5 m to 1332.5 m and 1302 to 1303.5 m were perforated using 2 7/8" high shot density ("HSD") 60° phasing, 6 shots per foot, 34 gm charge guns, in an 8.7 ppg density brine.

3.2.9 Completion

A 4 ½" Otis BWB packer and tailpipe assembly was run on electric line and after depth correlation was set at 1304 m using a Baker type explosive setting tool. The 2 3/8" 4.6 lb/ft L80 13% Chrome tubing was run with a J slot locater on the bottom, to the top of the packer. After circulating the well to inhibited brine, the tubing was spaced out and latched onto the packer. The tubing hanger was landed and locked down, and annulus, tubing, and hanger seals tested. After recovery of the tubing landing joint, a back pressure valve ("BPV") was set in the tubing hanger, and the BOP's nippled down.

A 2 1/16" bore Wood Group composite Xmas tree was installed on the tubing head spool and tested to 3000 psi and the back pressure valve recovered from the well. The well was completed at 2400 hrs on May 23, 1999.

3.3 DAILY OPERATIONS

3.3.1 Daily Drilling Reports

The details of the daily activities during rig up and drilling operations for the Iona Obs-2 well are presented in the Daily Drilling Reports in Appendix 1.

3.3.2 Time Depth curve

The daily cost estimates can be found in graphical format in the time depth curve in Figure 3.4.

3.3.3 Definitive Survey

An electronic multishot ("EMS") survey was dropped through drillpipe at final total depth. The results are presented as the definitive survey for the well in Appendix 2.

3.3.4 Directional Drilling

Iona Obs-2 encountered no angle problems.

3.3.5 Iona Obs-2 Time Performance

Iona Obs-2 was spudded at 10:00 hrs on May 12, 1999, with OD&E Rig 30. This was the last well drilled in the 1999 drilling program and was the second observation well. The well was drilled and completed in 11 days and 14 hours.

The following charts illustrate the time performance.

3.3.6 Time Analysis

Table 3.1 Time Summary

ACTIVITY	HOURS	DAYS
Rig move	48.00	2.00
Rig up	10.00	0.42
Drilling	90.00	3.75
Bit Trip	23.00	0.96
Wiper trip	17.00	0.71
Survey	2.50	0.10
Circulate and condition	10.00	0.42
Change BHA	4.50	0.19
Casing & Cementing	23.50	0.98
Wellhead & BOP's	24.50	1.02
Coring	0.00	0.00
Logging	21.50	0.90
Wash & Ream	12.00	0.50
Fishing	0.00	0.00
Rig Repairs	2.00	0.08
Completion	37.00	1.54
Miscellaneous	7.00	0.29
TOTAL	**336**	**14.00**

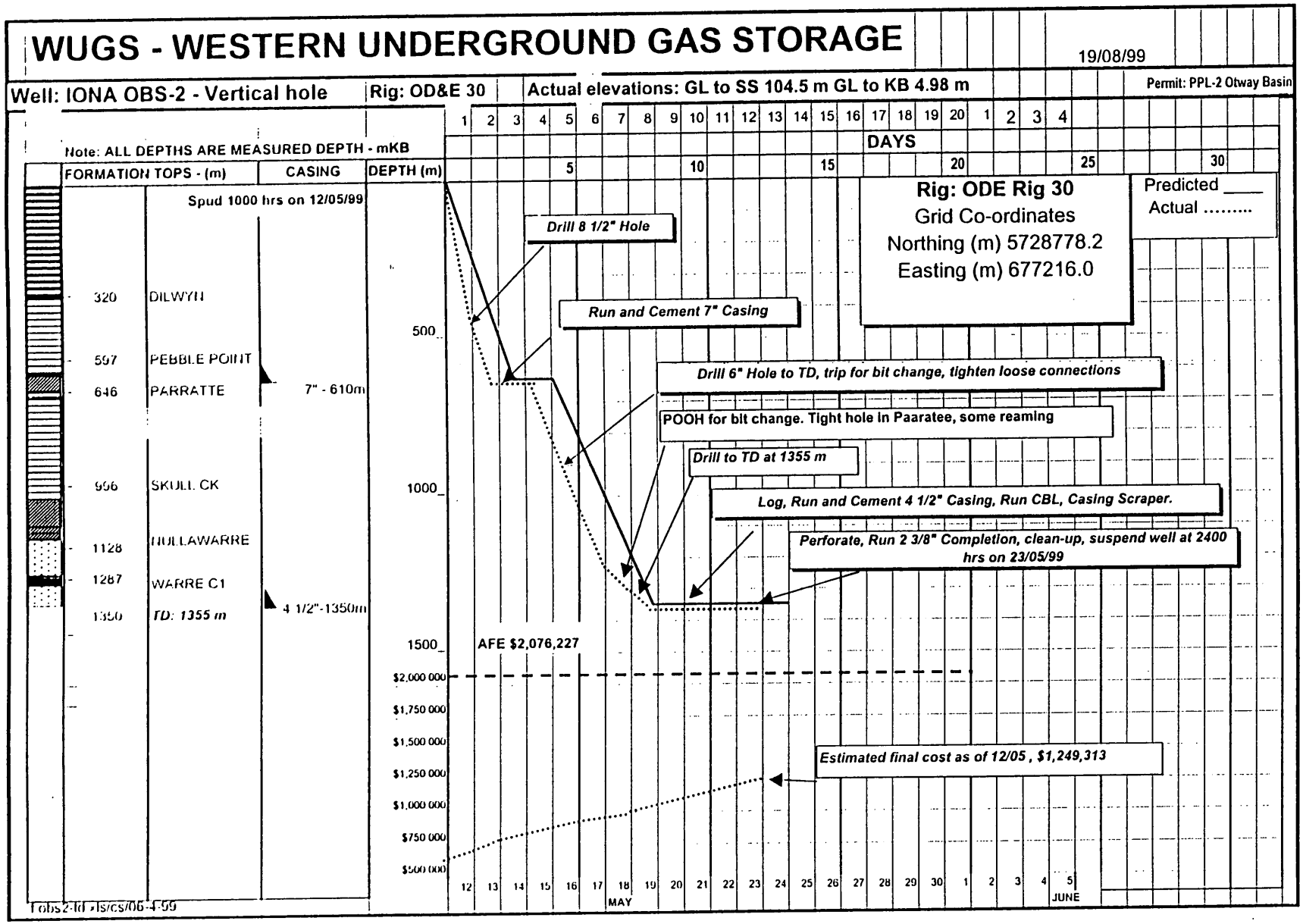


Figure 3.4

Time Performance Charts

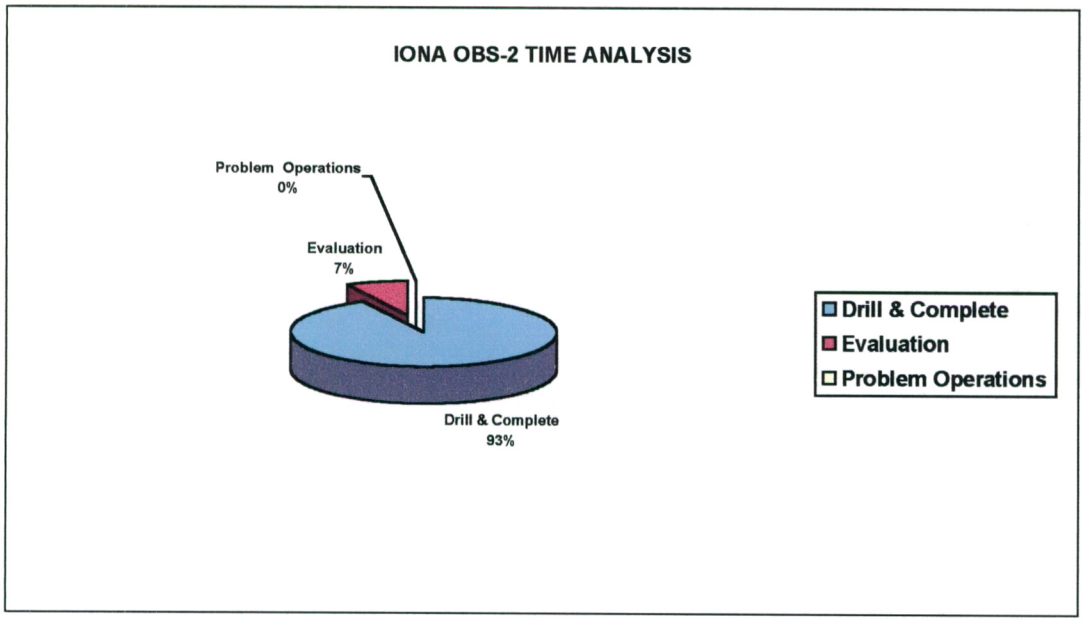


FIGURE 3.5a - OVERALL PERFORMANCE CHART

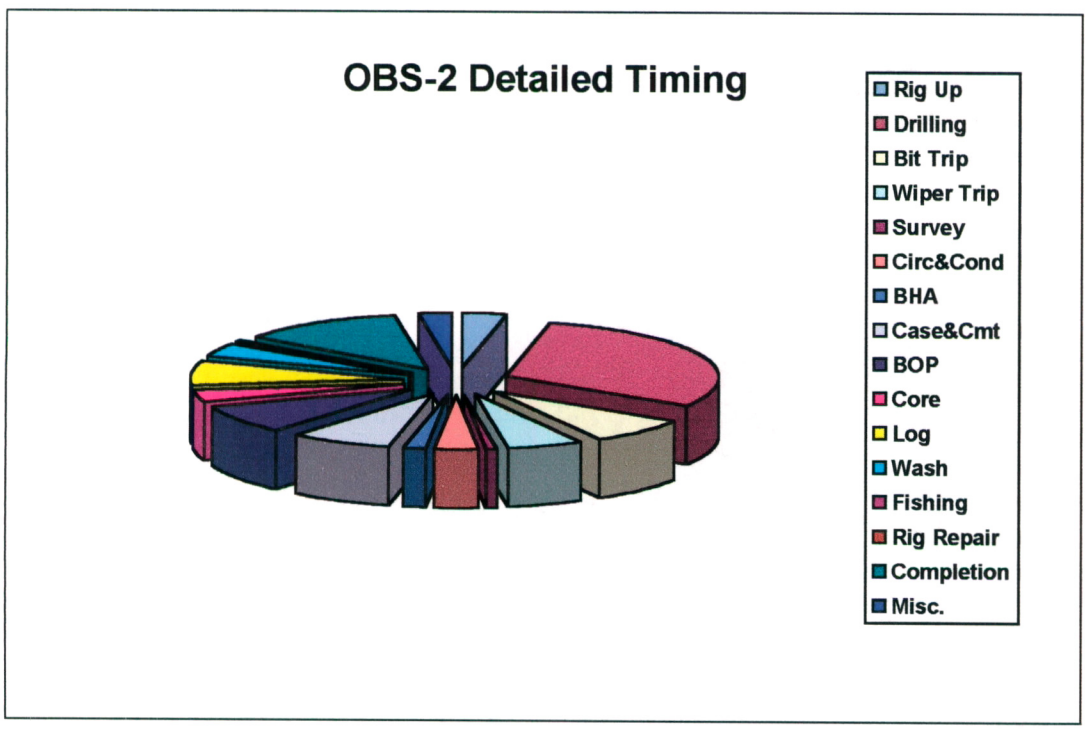


FIGURE 3.5b - DETAILED PERFORMANCE CHART

3.4 BHA SUMMARY

Table 3.2 presents the BHA's run in Iona Obs-2 well and Table 3.3 summarizes the Bit record.

Table 3.2 BHA Summary

Hole Size (ins)	BHA Description	Length (m)	Depth in (m)	Depth out (m)
8 ½"	8 ½" Tricone Bit + B/S + 2 x 6 ½" DC + 1 x X/O + 1 x SS + 1 x X/O + 9 x 6 ½" DC + 1 x X/O + 6 x 4 ¾" DC .	163.19	10	629
6"	6" Tricone Bit + 1 x NBS + 1 x Pony DC + 1 x SS + 1 x 4 ¾" DC + 1 x SS + 5 x 4 ¾" DC + 20 HWDP + 1 x JAR + 10 x HWDP	348.4	629	1043
6"	6" Tricone Bit + 1 x NBS + 1 x Pony DC + 1 x SS + 1 x 4 ¾" DC + 1 x SS + 5 x 4 ¾" DC + 20 HWDP + 1 x JAR + 10 x HWDP	348.4	1043	1302
6"	6" Tricone Bit + 1 x NBS + 1 x NM DC + 1 x SS + 6 x 4 ¾" DC + 20 HWDP + 1 x JAR + 10 x HWDP	345.0	1302	1355

BIT RECORD

The Table shown below provides details of the drill bits used to drill Iona Obs-2

BIT No.	Size (ins)	Make	Type	IADC Code	Serial No.	Jets 32nds	Depth Out (m)	Drilled (m)	Hrs	ROP (m/hr)	WOB 1000 (lbs)	RPM	Press (psi)	Pump (gpm)	MW (ppg)	Ver. Dev (deg)	Cutting Structure								Remarks
																	I	O	DC	LOC	B/S	G	ODC	POH	
1	8 ½"	HTC	GT-1	1.1.5	A68KB	12,12,12	629	619	21	34.7	8/15	90/140	1800	400	8.9	0.25	2	1	WT	A	E	1/16	WT	TD	
2	6	HTC	STR09	4.3.7	N92YX	14.14.14	1043	414	26	16	8/15	120/140	1800	367	8.9	0.5	5	2	WT	A	E	1	WT	TH	POOH to check loose tool joints
3	6	HTC	STR-09	4.3.7	N93YX	14,14,14	1355	312	35.5	7.3	10/20	90/120	1800	320	9.1	0.5	2	2	WT	A	E	1	WT	TD	

DULL CHARACTERISTICS

BC	Broken Cone	ER	Erosion	PN	Plugged Nozzle
BT	Broken Teeth/Cutters	FC	Flat Crested Wear	RG	Rounded Gauge
BU	Balled Up	HC	Heat Checking	RO	Ring Out
CC	Cracked Cone	JD	Junk Damage	SD	Shirttail Damage
CD	Cone Dragged	LC	Lost Cone	SS	Self-Sharpening Wear
CI	Cone Interference	LN	Lost Nozzle	TR	Tracking
CR	Cored	LT	Lost Teeth/Cutters	WO	Wash Out in Bit
CT	Chipped Teeth/Cutters	OC	Off Centre Wear	WT	Worn Teeth/Cutters

FM	Formation Change
HP	Hole Problems
HR	Hours on Bit
FT	Footage
PP	Pump Pressure
PR	Penetration Rate
TD	Total Depth
TQ	Torque

REASON PULLED

TW	Twist Off	LOG	Run Logs
WC	Weather Conditions	RIG	Rig Repair
WO	Washout - Drillstring	CM	Condition Mud
BHA	Change Bottomhole Assy	CP	Core Point
DMF	Downhole Motor Failure	DP	Drill Plug
DSF	Drillstring Failure	CSG	Casing Point
DST	Drill Stem Test	MSC	Miscellaneous
DTF	Downhole tool failure		

Table 3.3

3.5 CASING AND CEMENTING REPORT

3.5.1 8 1/2" Hole Section : 7" Surface Casing (Surface to 739 m RT)

Table 3.4 7" Surface Casing Tally

WELL NAME :	Iona Obs-2		**DATE RUN :**		13/05/99
ELEVATIONS :	**R.T. :**	4.98 m	**M.S.L. :**	109.5 m	**T.D. :** 629 m
STRING TYPE :	7" Surface		**RKB TO TOP OF LAST SPOOL :**		

SURFACE CASING & EQUIPMENT RECORD AS RUN FROM TOP TO BOTTOM

Size O.D. (ins)	Weight (lb/ft)	No. of Joints	Thread Type	Length (m)	From (m)	To (m)	Remarks
7"	26	1	LTC	0.39	626.25	625.86	Shoe Joint
7"	26	2	LTC	24.0	625.86	601.58	Shoe Track
7"	26	1	LTC	0.28	601.58	601.3	Float Collar
7'	26	1	LTC	602.52	601.3	-1.22	7" Casing
			Tally Total :	627.19	Casing Landed at :		626.25m

CASING SPOOL TYPE :	WG	**SIZE :**	7" x 4 ½" x 2 3/8"		
CENTRALISERS AT :	2 on shoe joint, 1ea on joints 2-7 and 1 per second joint to 41 m below KB.				
SCRATCHERS AT :	Cement basket located at 50m				

Table 3.5 Surface Casing cement details

DRILLING FLUID PRIOR TO CEMENTING :	9.1ppg Weighted KCL / PHPL
PREFLUSH, SPACER DETAILS :	30 bbl, 8.3 ppg Drill Water ahead of cement.

CLASS	No. SX	ADDITIVE	FUNCTION	QUANTITY OF ADDITIVE (lbs / gal)	%	HOW ADDED BLEND OR MIX WATER	REMARKS
'G'	161	Aquagel CFR-3L NF-1	Gel Extender Friction Reducer Anti-Foam	415 lb 10 gal 10 gals	2.5 2gals/10 bbl 1	Blend Mix Water Mix Water	Lead Slurry.
'G'	150	CaCl	Accelerator	141 lb	0.35	Mix Water	Tail Slurry – no losses

THEORETICAL TOP OF CEMENT (m) :	Surface	**AVERAGE SLURRY WEIGHT (ppg) :**	Lead 12.8 Tail 15.8
DISPLACEMENT FLUID :	8.3 ppg Fresh water	**DISPLACEMENT RATE (bbl/min) :**	6.2 (Rig pumps)
PLUG BUMPED WITH (psi) :	Bumped – 2500	**DISPLACEMENT VOLUME (bbl) :**	Calculated 76 Actual 77
REMARKS :	Good returns – 21 bbs returns at surface, floats held.		

3.5.2 6" Hole Section : 4 1/2" Production Casing (Surface to 1568 m RT)

Table 3.6 4 1/2" Production Casing Tally

WELL NAME :	Iona Obs-2		**DATE RUN :**		8/02/99
ELEVATIONS :	**R.T. :**	4.98 m	**M.S.L. :** 109.5 m	**T.D. :**	1355 m
STRING TYPE :	4 1/2" Production		**RKB TO TOP OF LAST SPOOL :**		4.90m

SURFACE CASING & EQUIPMENT RECORD AS RUN FROM TOP TO BOTTOM

Size O.D. (ins)	Weight (lb/ft)	No. of Joints	Thread Type	Length (m)	From (m)	To (m)	Remarks
4 ½"	13.5	1	LTC	0.6	1354.8	1354.20	Shoe
4 ½"	13.5	1	LTC	12.07	1354.2	1342.13	Shoe Track
4 ½"	13.5	1	LTC	0.61	1342.13	1341.52	Float Collar
4 ½"	13.5	112	LTC	1350.43	1341.52	-8.91	7" Joints
Tally Total :				1363.71	Casing Landed at :		1354.8

CASING SPOOL TYPE :	WG	**SIZE :**	7" x 4 ½" x 2 3/8"		
CENTRALISERS AT :	1353/1350/1342/1305/1281/1258/1232/1208/1164/1160/1112/1088/1064/1040 1003/955/919/883/847/811/775				
SCRATCHERS AT :	Nil.				

3.5.3 4½" Production Casing Cement Details

Table 3.7 Production Casing Cement Details

DRILLING FLUID PRIOR TO CEMENTING :	9.0ppg Weighted KCL / PHPL						
PREFLUSH, SPACER DETAILS :	20 bbl, 8.5 ppg Mudflush.						
CLASS	**No. SX**	**ADDITIVE**	**FUNCTION**	**QUANTITY OF ADDITIVE (lbs / gal)**	**%**	**HOW ADDED BLEND OR MIX WATER**	**REMARKS**
'G'	84	Econolite HR-6-L MF-1	Extender Retarder Anti-foam	48 gal 2 gal 165 lbs	.55 gals/sx .03 gals/sx 0.5 lb/8.5 bbl	Mix Water Mix Water Mix Water	Lead Slurry.
'G'	101	Halad 413 L	Water loss control	28 gals		Mix Water	Tail Slurry –no losses

THEORETICAL TOP OF CEMENT (m) :	Surface	**AVERAGE SLURRY WEIGHT (ppg) :**	Lead 12.5 Tail 15.8
DISPLACEMENT FLUID :	8.3 ppg Fresh water	**DISPLACEMENT RATE (bbl/min) :**	5.0 (Rig pumps)
PLUG BUMPED WITH (psi) :	Bumped – 2500	**DISPLACEMENT VOLUME (bbl) :**	Calculated 67.5 Actual 68
REMARKS :	Good returns, spacer at surface when plug bumped.		

3.6 DRILLING FLUID RECAP

The tables in this section outline the mud properties used in the various hole sections.3.6.1 8 ½" Surface Hole Section : 10.1 to 629 m (12 to 13 May 1999).

The 8 ½ " hole section was drilled using freshwater with a KCL/EZ-MUD / Polymer mud system. EZ-MUD (PHPA) was used to stabilise the borehole wall and inhibit clay gumbo rings from forming. This proved effective and no downtime was lost due to dealing with gumbo. Some downhole seepage losses were seen across the Dilwyn sands, which were controlled with the addition of Barofibre. A centrifuge was run continuously in the section, in combination with the rig's linear motion shakers and did an adequate job of solids removal. No hole problems occurred during running and cementing of the 7" casing.

Table 3.8 8 ½ " Hole Mud details and properties

8 ½ " Hole Section Details		
Bit Size	∅	8 1/2"
Depth	m	629
Casing Size	∅	7"
Depth	m	627
Drilled metres	m	624
Days		2

8 ½ " Hole Mud Details		
Volume used	bbls	579
Dilution rate	bbl/m	0.07
Consumption rate	bbl/m	0.8
Mud Cost/bbl	A$	24.24
Mud Cost/m	A$	19.62
Interval mud cost	A$	12,243

8 ½ " Hole Interval Mud Properties – KCL/Polymer				
Days		**1**	**2**	**3**
Date		12/05/99	13/5/99	14/5/99
Depth	M	433	629	629
Density	Ppg	8.9	8.9	8.9
Funnel viscosity	Sec/lt	43	42	50
Plastic Viscosity	Cps	9	10	10
Yield Point	Lbs/100ft²	13	16	19
Gels 10" / 10'	Lbs/100ft²	4/8	6/11	7/14
Filtrate API	Ml/30 min	8.6	8.2	8.0
Cake	32nd in	1/0	1/0	1/0
PH		9	8.7	8.3
Sand	%	0.7	0.35	0.25
Solids	%	2.9	2.9	2.8
MBT	Me/ml mud	7.0	8.0	8.0
Temperature	°C	32	37	18

8 ½" Hole Interval Mud Products					
Mud Products	**Function**	**Unit Size**	**Unit Quantity**	**Total Cost US$**	**Cost % of Total**
BARACOR 129	Sulfide Remover	25 Kg Sx	3	194.94	1.6
BARITE	Weighting agent	25 kg Sx	62	443.92	3.6
BAROFIBRE	Lost Circ. Material	25 LB bag	6	346.74	2.8
CITRIC ACID	Acid	25 Kg bag	4	248.20	2.0
EZ MUD	Shale stabiliser	50 Lb bag	10	1754.40	14.0
PAC-R	Filtration control	25 Kg bag	7	1328.81	10.9
Potassium Chloride	Shale inhibition	25 Kg bag	145	1885.00	15.4
Potassium Hydroxide	Shale inhibitor	20 Kg Pail	3	131.85	1.1
XCD Polymer	Viscosity & suspension	25 Kg bag	12	5673.12	46.3
Soda Ash	Alkalinity	25 Kg bag	1	15.00	0.1
Sodium Bicarbonate	Viscosity	25 Kg bag	4	68.40	0.5
Walnut Fine	Lost circulation	25 Kg bag	5	152.60	1.25
			Total:	**$12,243.22**	**100.00**

3.6.2 6" Production Hole Section : 629 m to 1355 m (15 to 19 May 1999)

The same mud system used in the 8 ½ " section was carried over to the 6". The section was drilled using freshwater with a KCL/EZ-MUD / Polymer mud system. EZ-MUD (PHPA) was used to stabilise the borehole wall and inhibit the shales of the Paaratte Formation. Mud properties were maintained by the addition of new pre-mixed mud. LCM sweeps were pumped to clear a bald bit. Mud properties for the drilling phase are shown below.

Table 3.9 6" Hole Mud details and properties

6 " Hole Section Details		
Bit Size	∅	6"
Depth	m	1355
Casing Size	∅	4 ½ "
Depth	m	1355
Drilled metres	m	726
Days (drilling/coring)		4

6" Hole Mud Details		
Volume used	bbls	974.0
Dilution rate	bbl/m	0.63
Consumption rate	bbl/m	1.34
Mud Cost/bbl	A$	56.68
Mud Cost/m	A$	27.79
Interval mud cost	A$	20,177.21

6 " Hole Interval Mud Properties – KCL/Polymer					
Days		**4**	**5**	**6**	**7**
Date		15/05/99	16/05/99	17/05/99	18/05/99
Depth	M	782	1043	1228	1302
Density	Ppg	9.0	8.9	9.0	9.2
Funnel viscosity	Sec/lt	43	46	45	49
Plastic Viscosity	Cps	9	12	10	11
Yield Point	Lbs/100ft²	15	21	21	24
Gels 10" / 10'	Lbs/100ft²	5/13	7/14	7/14	9/20
Filtrate API	Ml/30 min	7.0	6.0	5.8	6.2
Cake	32nd in	½	1/2	1/2	½
PH		9.1	9.0	9.0	9.0
Sand	%	0.25	0.20	0.20	0.05
Solids	%	3.6	2.5	3.5	4.5
MBT	Me/ml mud	7	8	8	8
Temperature	°C	27	39	39	41

6 " Hole Interval Mud Properties – KCL/Polymer					
Days		**8**	**9**	**Section TD reached on 19 May. Well suspended on 23 May.**	
Date		19/05/99	20/05/99		
Depth	M	1355	1355		
Density	Ppg	9.2	9.2		
Funnel viscosity	Sec/lt	50	52		
Plastic Viscosity	Cps	13	13		
Yield Point	Lbs/100ft²	26	26		
Gels 10" / 10'	Lbs/100ft²	10/20	10/20		
Filtrate API	Ml/30 min	6.0	6.0		
Cake	32nd in	½	½		
PH		8.9	8.9		
Sand	%	0.05	0.05		
Solids	%	4.7	4.7		
MBT	Me/ml mud	8	8		
Temperature	°C	39	39		

6 " Hole Interval Mud Products					
Mud Products	**Function**	**Unit Size**	**Unit Quantity**	**Total Cost US$**	**Cost % of Total**
ALDACIDE G	Biocide	25 l. Can	2	362.88	1.8
BARACARB 100	Lost Circ. Material	25 Kg bag	48	570.72	2.8
BARACARB 25	Lost Circ. Material	25 Kg bag	130	1384.50	6.9
BARACARB 600	Lost Circ. Material	25 Kg bag	5	31.50	0.20
BARACIDE	Sulfide Remover	25 Kg can	1	181.44	0.90
BARACOR 129	Lost Circ. Material	25 Kg can	7	454.86	2.30
BARITE	Weighting agent	25 kg Sx	163	1167.08	5.80
BAROFIBRE	Lost Circ. Material	25 LB bag	29	1675.91	8.3
EZ- MUD DP	Shale stabiliser	50 Lb bag	12	2105.28	10.40
PAC-R	Filtration control	25 Kg bag	6	1138.98	6.10
Potassium Chloride	Shale inhibition	25 Kg bag	185	2405.00	11.90
Potassium Hydroxide	Shale inhibitor	20 Kg Pail	2	30.00	1.30
XCD Polymer	Viscosity & suspension	25 Kg bag	16	7564.16	37.50
Soda Ash	Alkalinity	25 Kg bag	2	30.00	0.10
Sodium Bicarbonate	Viscosity	25 Kg bag	1	17.16	0.08
Walnut Fine	Lost circulation	25 Kg bag	27	824.00	4.00
			Total:	**$20177.21**	**100.00**

3.6.3 6" Completion Section : 726 m (20 to 23 May 1999)

After reaching total depth at 1355 m. the hole was logged and preparations made for running the 4 ½" production casing. This was run and installed without problems. A simple completion brine of 3% KCL was used. A Baraklean (detergent) pill was pumped to ensure hole was clean prior to running the completion. Prior to setting the completion a fresh volume of 3% KCL mixed with Coat 2748 corrosion inhibitor was circulated to the well.

Table 3.10 6 " Hole Interval Completion Section details

6 " Hole Interval Completion Section – Mud Costs					
Mud Products	**Function**	**Unit Size**	**Unit Quantity**	**Total Cost US$**	**Cost % of Total**
BARAKLEAN FL	Detergent	180 Kg drum	2	2903.90	55.70
KCL –TECH	Salt	25 Kg sack	98	137.94	26.40
Potassium Hydroxide	Increase pH	20 Kg pail	2	87.90	1.70
Coat 2748	Inhibitor	208 Litre drums	1	850.00	16.20
			Total:	**$5216.74**	**100.00**

3.7 COMPLETION SUMMARY

The details of the completion for Iona Obs-2 are shown in the completion status diagram. The completion primary function was to facilitate the monitoring of the gas water interface in the reservoir. This was to be achieved through pressure observations of the 2 3/8" tubing x 4 ½" production casing annulus, and other logging methods, based on perforations positioned at the original gas water contact, at the base of the swept zone. The secondary function of the well was to facilitate produced water disposal down the tubing and into the aquifer.

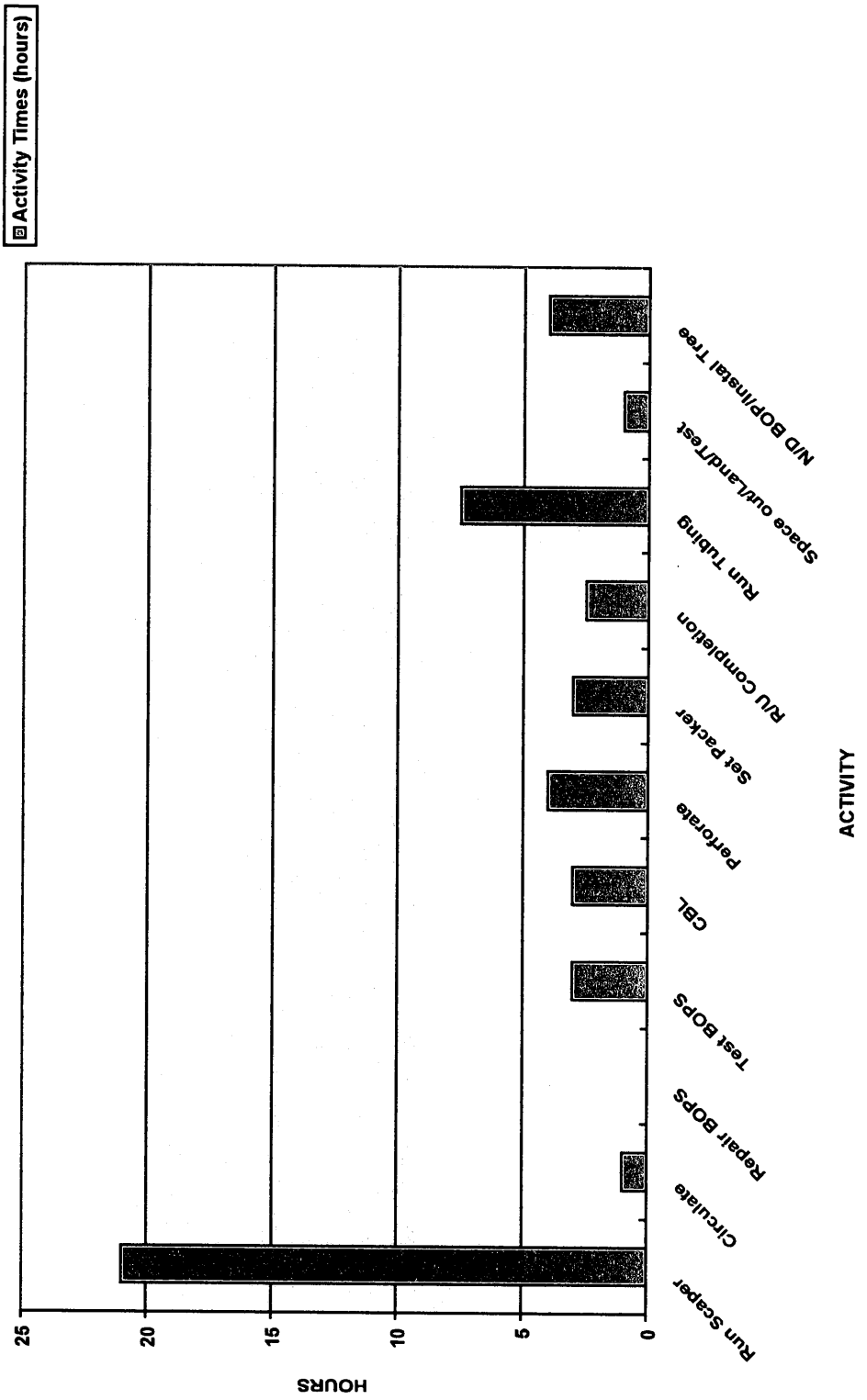
Completion times achieved were as follows:

Table 3.11 Completion Times

Activity	Hours
Run Scraper	21.0
Circulate Completion Brine	1.0
Repair BOP's	0.0
Test BOP's	3.0
Run Cement Bond Log	3.0
Perforate	4.0
Set Packer on wireline	3.0
Prepare to rum completion	2.5
Run Tubing	7.5
Spaceout/Land & test tubing	1.0
Nipple down BOP's, install Xmas Tree	4.0

Two scraper runs were performed, before and after perforating. The completion performance was 20% faster than on the deviated Iona Obs-1 well. The completion was handed over with the back pressure valve removed and the xmas tree valves closed.

FIGURE 3.6: OBS-2 COMPLETION TIME PERFORMANCE



3.8 LESSONS LEARNED

Table 3.12 Incident Report No 1

Western Underground Gas Storage	**INCIDENT REPORT/LESSON**

Report No: 1	**Date: 22 May 1999**	**Prepared By: Colin Stuart**
Well: Iona Obs-2	**Operator: WUGS**	**Rig: OD&E Rig 30**

INCIDENT/LESSON
Performance improvement

WELL DATA/OPERATIONS PRECEEDING INCIDENT/LESSON

EVALUATION OF INCIDENT (Cause, were procedures/orders followed?),

A substantial improvement in drilling and completion performance was achieved on Iona Obs 2 compared with Iona Obs-1. This was achieved by the team learning from the experiences on Iona Obs-1, documenting the lessons learned, and then applying them.

REMEDIAL WORK CARRIED OUT

RECOMMENDATIONS

4.0 FORMATION SAMPLING AND TESTING

4.1 CUTTINGS

Cuttings were collected at three metre intervals from surface to TD. Detailed cuttings descriptions are presented in Appendix 3.

4.2 CORES

4.2.1 Conventional Core

No conventional cores were cut.

4.2.2 Sidewall Cores

No sidewall cores were acquired in Iona Obs-2.

4.3 TESTING

No drill stem tests or wireline formation tests were carried out in Iona Obs-2.

4.4 SAMPLE ANALYSIS

No palynological, petrography or geochemical analyses were carried out on samples from Iona Obs-2.

4.5 LOGGING AND SURVEYS

4.5.1 Mud Logging

A standard Halliburton skid mounted unit for continuous recording of depth, penetration rate, mud gas, pump rate, and mud volume data as well as mud chromatographic analysis was operated from surface to total depth. Rate of penetration, total gas and chromatography were recorded and plotted on the Formation Evaluation Log (Mud Log) and are presented in Enclosure 1.

4.6 WIRELINE LOGGING

Wireline logging was carried out by Schlumberger Seaco using a standard truck mounted MAXIS unit. The logging suite consisted of two logging runs and a velocity check shot survey as follows.

Table 4.1 Wireline Logging Enclosure Numbers

LOG	Interval (mKB)	Enclosure No.
Run-1 PEX (HALS)-BHC-GR 1:200 and 1:500	25.0 to 1355	4&5
Run-2 Dipmeter (SHDT)1:200 and 1:500	1050 to 1355	6
Run-3 Check Shot Survey	25 to 1355	7
CBL-CCL-GR 1:200	250 to 1337.5	8
Perforation record/ Packer Setting	1250 to 1337.5	9

Details of the log depth intervals for each log run are as follows:

Table 4.2 Details of Wireline Logs run

LOG	Logging/ Processing Date	Depth Logger (mKB)	Depth Driller (mKB)	Top Log Interval	Bottom Log Interval	Max Temp Deg. C
Resistivity Curves HLLD, HLLS, RXOZ, SP, GR, Caliper: 1:200 & 1:500	20/05/99 20/05/99	1355	1355	25	1355	51,52
BHC SONIC: 1:200 & 1:500	20/05/99 20/05/99	1355	1355	25	1355	51,52
NUCLEAR CURVES Neutron (TNPH), Density (RHOZ), Pe (PEFZ), GR, Caliper: 1:200 & 1:500	20/05/99 20/05/99	1355	1355	25	1355	51,52
CBL – VDL – GR – CCL: 1:500,1:200	22/05/99 22/05/99	1337.5	1355	250	1337.5	53
PRODUCTION PACKER SETTING: 1:200	23/05/99 23/05/99	1337.5	1355	1250	1337.5	
PERFORATION RECORD: 1:200	22/05/99 22/05/99	1337.5	1355	1250	1337.5	
DIPMETER: 1:200 (SHDT)	20/05/99 20/05/99	1355	1355	1050	1355	51,52
OFFSET CHECKSHOT SURVEY	20/05/99 20/05/99	1355	1355	25	1355	51,52

5.0 GEOLOGY

5.1 STRATIGRAPHY

The stratigraphic section penetrated in Iona Obs-2 is shown in Table 5.1. Formation tops were picked on the basis of cuttings descriptions, rate of penetration and wireline logs and by correlation to Iona-1 and Iona-2. Unless otherwise stated all depths are referenced to the Kelly Bushing MDKB and based on the original field logs.

Table 5.1 Stratigraphic section Iona Obs-2

Stratigraphic Unit	Depth			Thickness
	MDKB (m)	TVDKB (m)	TVDSS (m)	(m)
Ground Level	4.98	4.98	-109.5	
Heytesbury and Nirranda Groups (undifferentiated)				321.1
Narrawaturk Marl	176.8	176.8	67.3	101
Mepunga Formation	277.8	277.8	168.3	43.3
Wangerrip Group				325.9
Dilwyn Formation	321.1	321.1	211.6	188.9
Pember Mudstone	510.0	510.0	400.5	71.0
Pebble Point Formation	581.0	581.0	471.5	66.0
Sherbrook Group				708.0
Paaratte Formation	653.5	653.5	544.0	352.5
Skull Creek Member	999.0	999.0	889.5	131.0
Nullawarre Greensand	1130.0	1130.0	1020.5	86.0
Belfast Mudstone	1216.0	1216.0	1106.5	53.0
Flaxman Formation	1269.0	1269.0	1159.5	24.7
Top C1 sand	1293.7	1293.7	1184.2	10.0
Base C1 sand	1303.7	1303.7	1194.2	0.8
Top C2 sand	1304.5	1304.5	1195.0	16.5
Base C2 sand	1321.0	1321.0	1211.5	6.1
Top B sand	1327.1	1327.1	1217.6	14.9
Base B sand	1342.0	1342.0	1232.5	13.0
Total Depth (Driller)	1355.0	1355.0	1245.5	
Total Depth (Logger)	1355.0	1355.0	1245.5	

5.2 LITHOLOGY

Detailed descriptions of each interval sampled are included in Appendix 3 and a summary of each interval is included on the mudlog in Appendix 1. The core petrography report is included in Appendix 4 and Core chip descriptions described on site are included in Appendix 6. The following is a summary of the lithological units observed in Iona Obs-2.

5.2.1 Heytesbury and Nirranda Groups (Surface – 321.1 metres)

5.2.1.1 Port Campbell Limestone

No Port Campbell Limestone was recorded in the well.

5.2.1.2 Gellibrand Marl / Clifton Limestone/ Narrawaturk Marl

From the surface to 292.8 metres the lithology was predominantly marl and the contact between the Gellibrand Marl and the Narrawaturk Marl was difficult to determine. A probable top from the gamma ray log was picked at 176.8 metres. The predominant lithology observed was

Marl: medium greenish grey to brownish grey, very soft, sticky, occasionally silty, common to abundant fossil fragments, massive with trace pyrite and coaly fragments towards the base. The Cilfton Limestone could not be identified or was not present and the boundary between the Gellibrand Marl and the Narrawaturk Marl could not be positively identified on logs.

5.2.1.3 Mepunga Formation (277.8 – 321.1 m)

Sandstone: medium to dark brownish grey, fine to coarse, dominantly coarse, poorly sorted, subangular to subrounded, dominantly subrounded quartz, common iron oxide and limonite coating of grains, rare glauconite, trace pyrite, trace mica, nil to moderate calcareous cement, fair visual porosity.

5.2.2 Wangerrip Group (321.1 – 653.5 m)

5.2.2.1 Dilwyn Formation (321.1 – 510.0 m)

Sandstone: off white to translucent, fine to coarse, dominantly coarse, poorly to moderately sorted, subangular to subrounded, dominantly subrounded quartz, common brown and orange iron oxide stain, occasional pyrite, occasional glauconite, trace mica, good intergranular porosity, interbedded with

Claystone: medium to dark brownish grey, abundant silt, micromicaceous, massive, soft, dispersive.

5.2.2.2 Pember Mudstone (510.0 – 581.0 m)

Claystone: medium to dark brownish grey to grey, nil to moderately silty, trace to common glauconite, trace pyrite, micromicaceous, massive, soft, dispersive.

5.2.2.3 Pebble Point Formation (581.0 – 653.5 m)

Sandstone: light grey to light brownish grey, clear to translucent grains, unconsolidated to friable, predominantly medium to coarse grains, occasionally granule, dominantly coarse, sub angular to sub rounded occasionally rounded, common iron oxide and iron stained quartz, moderate sphericity, moderate to well

sorted quartz, nil to common argillaceous matrix, trace to rare nodular pyrite, rare to minor skeletal fragments, friable to firm, good to excellent inferred porosity, interbedded with.

Claystone: medium to dark grey to brownish black in part, soft, dispersive, common to abundant quartz silt to fine sand, grading to arenaceous claystone, nil to trace carbonaceous specks, minor to common glauconite pellets oxidised in part, trace pyrite, trace to rare mica, slightly calcareous, massive, firm to moderately hard..

5.2.3 Sherbrook Group (653.5 – 1355.0 m)

5.2.3.1 Paaratte Formation (653.5 – 999.0 m)

Sandstone: light grey to light brownish grey, clear to translucent grains, unconsolidated to friable, predominantly medium occasionally coarse grains, sub angular to sub rounded occasionally rounded, moderate sphericity, poorly to moderately sorted quartz, nil to common multicoloured, orange, yellow, greyish blue hard lithic volcanic and siliceous grains, trace to rare nodular pyrite, nil to trace calcareous, moderate to good inferred porosity, interbedded with

Claystone: light to medium grey, soft to firm, dispersive, fissile, laminated, abundant argillaceous matrix, common to abundant very fine sand, common to abundant carbonaceous specks, common mica, trace pyrite, grading to Silty Claystone

Coal: trace to rare specks and laminae, black, soft to firm

5.2.3.2 Skull Creek Mudstone (999.0 – 1130.0 m)

Siltstone: light to grey to brownish grey interbedded with greyish white laminations in part, soft to firm, dispersive, abundant argillaceous matrix, abundant very fine sand, common to abundant coal specks and laminae, minor mica, trace pyrite, grading to Clayey Siltstone, interbedded with minor to common

Sandstone: very light grey to white, soft, friable, very fine to fine, sub angular to sub rounded, poorly sorted, abundant clay matrix grading to argillaceous sandstone, rare mica, trace to rare pyrite, trace orange lithics, nil to poor visible porosity grading to

Sandstone: light grey to light brownish grey to white, clear to translucent grains, unconsolidated to friable, predominantly fine to coarse occasional very coarse to pebble grains, predominantly angular to sub rounded occasionally rounded, poor to moderate sphericity, moderately sorted, trace to rare pyrite cement, moderate to good inferred porosity.

5.2.3.3 Nullawarre Greensand (1130.0 – 1216.0 m)

Sandstone: light brownish grey to dark yellowish green, clear to translucent grains commonly coated with glauconite, unconsolidated to friable, predominantly fine to medium occasionally coarse, predominantly angular to sub rounded, occasionally rounded and polished grains, poor to moderate sphericity, moderately sorted, common to

abundant glauconite grains, rare skeletal fragments, trace foraminifera infilled with glauconite, trace to rare pyrite nodules, good inferred porosity.

5.2.3.4 Belfast Mudstone (1216.0 – 1269.0 m)

Claystone: medium to dark grey to greenish black to occasionally yellowish grey in part, soft to firm, dispersive, rare to minor quartz silt, minor to common , occasionally abundant disseminated and nodular glauconite, rare coal specks, rare mica, trace pyrite

5.2.3.5 Flaxmans Formation (1269.0 – 1293.7 m)

Claystone: medium to dark grey to greenish black to occasionally yellowish grey in part, soft to firm, dispersive, rare to minor quartz silt, minor to common , occasionally abundant disseminated and nodular glauconite, rare coal specks, rare mica, trace pyrite

Sandstone: light brownish grey to greyish brown to dark yellowish green in part, clear to translucent grains commonly coated with glauconite, unconsolidated to friable, predominantly fine to medium occasionally coarse, predominantly angular to sub rounded, occasionally rounded and polished grains, poor to moderate sphericity, moderately sorted, common to abundant glauconite grains, rare skeletal fragments, trace foraminifera infilled with glauconite, trace to rare pyrite nodules, good inferred porosity.

5.2.4 Waarre Formation

5.2.4.1 Unit C (1293.7 – 1327.1 m)

Sandstone: light brownish grey to very light grey, fine to coarse, dominantly medium, moderately to well sorted, subangular to subrounded, firm to friable, predominantly loose and unconsolidated, trace pyrite, good to excellent visual porosity.

Claystone: medium to dark grey, soft to firm, dispersive, rare to minor carbonaceous laminations and specks, trace pyrite, trace resin

Coal: black, moderately hard, conchoidal fracture, vitreous.

5.2.4.2 Unit B (1327.1 – 1342.0 m)

Calcareous Sandstone: very light grey to white, fine to coarse occasionally very coarse, fair sphericity, moderately to well sorted, subangular to subrounded, firm to friable, predominantly loose and unconsolidated, 30 to 40 percent calcareous matrix, trace pyrite, common white to very light grey argillaceous matrix, trace carbonaceous fragments, grading to.

Sandstone: light brownish grey to very light grey, fine to coarse, dominantly medium, moderately to well sorted, subangular to subrounded, firm to friable, predominantly loose and unconsolidated, trace pyrite, good visual porosity

Claystone: medium to dark grey, soft to firm, dispersive, rare to minor carbonaceous laminations and specks, trace pyrite, trace resin

5.2.4.3 Unit A (1342.0 – 1355.0 m TD)

Sandstone: light brownish grey to very light grey, fine to coarse, dominantly medium, moderately to well sorted, subangular to subrounded, firm to friable, predominantly loose and unconsolidated, trace pyrite, good visual porosity

Claystone: medium to dark grey, soft to firm, dispersive, rare to minor carbonaceous laminations and specks, trace resin

6.0 VELOCITY SURVEY

6.1 SEISMIC CALIBRATION AND RESULTS

A velocity or checkshot survey was carried out by Schlumberger as part of the open hole-logging program in Iona-Obs-2. The source used for the survey was an airgun, with shots fired into the mud pit used during the drilling of the well.

A total of 19 levels including one at sea level datum was acquired in the survey. A single shot was used where a good first break was encountered on the records. Additional shots were fired at locations where the signal was poor. The data was then enhanced by stacking the shots together to obtain an acceptable first break on the record. Quality of the data obtained was generally good except for the records from near the surface casing shoe and at the sea level datum where casing and surface noises masked good records.

The data was processed by Schlumberger at their Melbourne processing centre. First breaks were picked from the edited data and corrections applied to obtain a set of time versus depth values below the seismic reference datum which was mean sea level.

6.2 DATA CORRECTIONS

The corrections applied consisted of the following:

6.2.1 Correction for shot and geophone geometry

The mud pit where the source was located is offset from the well head so the travel path of the wave as it travels from the source point is not vertical. A correction was made to the travel time values of the checkshot data to account for the non-vertical path so as to obtain a corrected vertical time from source for each checkshot.

6.2.2 Correction for datum

The checkshot survey was acquired at a near surface location. The reference datum for the Iona 3D Seismic Survey is sea level. The travel time from the surface source to datum has to be subtracted from the corrected vertical time derived above to match the datum used in the seismic survey. The datum correction consists of two components:

A weathering or statics component, which is the delay in time as a result of the seismic wave travelling in the weathered zone near the surface. The weathered zone generally has a lower velocity than the sub-weathered zone.

An elevation component, which takes into account the elevation above the datum where the source is located and the sub-weathered zone velocity.

For ease of computation, the static and elevation correction is replaced by a term called the replacement velocity, which represents the average velocity of the energy from the source travelling to datum.

The shot acquired at datum was used for correcting the checkshot data. This yielded a datum correction of 63.8 msec for the well that was used in the generation of Schlumberger's Geogram. An uphole was also acquired after completion of the drilling of Iona-Obs-2. The uphole yielded a sea level correction of 67.8 msec from the surface.

The corrected checkshot data was used to calibrate the sonic logs processed from the BHCS logging run in the well. A vertical impedance log was then derived from the calibrated sonic and the depth corrected density log recorded. Three Ricker wavelets with predominant frequencies of 25, 30 and 35 Hertz respectively were convolved with the impedance log to produce the synthetic seismograms. Further details of the calibration, checkshot corrections and synthetic seismogram generation can be found in the accompanying Schlumberger Well Seismic Edit and Geogram Report. (Appendix 4)

6.3 RESULTS

The derived synthetic seismogram matched the seismic data very well at the bottomhole location of the Iona Obs-2 well. The match at the shallower horizons is not as good but this is not unexpected because the frequency content of the synthetic has not been optimised to match the shallower horizons. Enclosure 11 shows the synthetic seismogram spliced onto the seismic section through the well annotated with the tops encountered. The synthetic confirmed that the event mapped as the Top Waarre C was an accurate tie to the 3D seismic.

Table 6.1 compares the Prognosed Depths and the Actual Well Depths for the main horizons encountered in the well. At the Waarre C horizon, the actual depth in Iona Obs-2 is slightly deeper than predicted. Two reasons can be postulated for the incorrect prognosis. The original prognosis was made on the assumption that there was no velocity gradient over the field and that the average velocity in Iona-1 and Iona-2 was representative of the total field area. The results of the well indicate this assumption to be incorrect and showed that a velocity gradient occurs between Iona -1 & 2 and Iona Obs-2. The average velocity to the top of the Waarre C horizon is slightly greater over the Iona Obs-2 location than that measured at Iona-1 & 2. Another reason could be the statics in the area may not have been resolved with sufficient accuracy. It should be noted that the error in estimating the top of the Waarre C is about 7 metres, which must be considered within the limit of accuracy of the seismic technique.

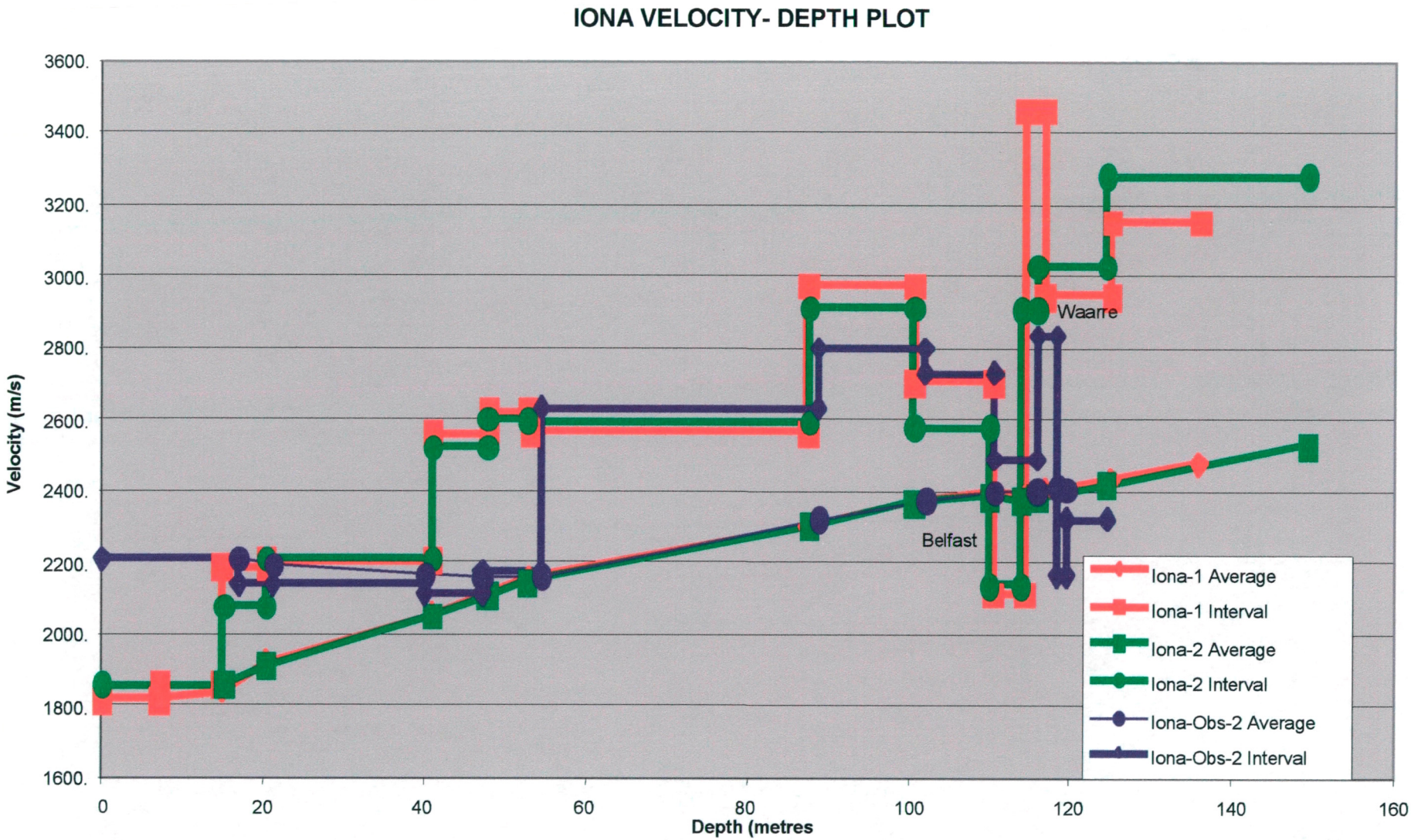
There is a scatter in the difference between the actual and predicted depths for the shallower horizons. The errors are not considered here to be of importance as they are not zones of interest in the well and have not been rigorously mapped. No sonic log was recorded in the shallow section in the well.

Table 6.1 Comparison of Prognosed and Actual Depths

Formation Tops	Original Prognosis(metres TVD subsea)	Actual Depth (metres TVD subsea)	Difference
Heytesbury Group	Surface	Surface	
Narrawaturk Marl	73	67.3	-5.7
Mepunga Formation	157	168.3	11.3
Dilwyn Formation	210	211.6	1.6
Pember Mudstone	418	400.5	-17.5
Pebble Point Formation	487	471.5	-15.5
Paaratte Formation	536	544.0	8
Skull Creek Member	886	889.5	3.5
Nullawarre Greensand	1018	1020.5	2.5
Belfast Mudstone	1114	1106.5	-7.5
Waare Formation			
D unit	1154	1159.5	5.5
Top C1 Sand	1177	1184.2	7.2
Base C1 Sand	NP*	1194.2	
Top C2 Sand	1186	1195.0	9
Base C2 Sand	NP	1211.5	
Top B Sand	NP	1217.6	
Base B Sand	NP	1232.5	
Total Depth	1240	1245.5	5.5
NP Depth not prognosed*			

Figure 6.1 is a plot that compares the measured average velocities and interval velocities from the Iona-1, 2 and Iona Obs-2 wells. The figure shows a very similar average velocity trend to the top Waarre C, but marginally higher at Iona Obs-2 compared to Iona-1 & 2. The interval velocities encountered are also very similar except towards the base of the Tertiary and within the Belfast Formation. The interval velocity in the Belfast is higher in Iona Obs-2 compared to Iona 1 & 2.

FIGURE 6.1



7.0 PETROPHYSICS

7.1 DATABASE

Field logs were acquired by Schlumberger using the Platform Express equipment. Tool measurements included, nuclear, resistivity and sonic. Schlumberger carried out a number of post-logging services including:

- Borehole environment corrections;
- Shoulder bed corrections (except for Iona-1);
- Estimation of true formation resistivity, ***Rt*** (except for Iona-1);
- Conversion to true vertical depth, KB datum; and,
- Data re-sampling to a consistent 0.1 metre depth step.

The processed log data was supplied in LAS format. This data was loaded into the ***G-Pick*** software system for subsequent display and interpretation.

The ambient and overburden core data, including measurement of porosity, permeability and grain density were key punched and also loaded into the system. The core data matches log depth within an acceptable tolerance. A psuedo log, 'PHIO', was created by correcting the ambient core porosity to overburden conditions using the calibration provided by the limited core measurements at overburden pressures.

To evaluate the Waarre Formation a normalised gamma ray log, 'GRN', was calculated as the percentage deflection between the cleanest reservoir and the shale between Waarre B and C sandstones. This corrects for the distortion provided by KCl mud systems and different hole diameters and provides a log comparable with other Iona wells. Thereafter, a 'GRHB' log was calculated as the product of GRN times RHOB with the objective that this may better highlight the transition between reservoir and non-reservoir.

The photo-electric log is distorted due to the effect of barite in the mud system and the sonic log shows a significant gas effect. Both logs were rejected for quantitative analysis.

7.2 PETROPHYSICAL MODEL

The petrophysics were modelled using the ***FAST*** (***F***ormation ***A***nalysis using ***S***tatistical ***T***echniques) computer program which is typical of current log analysis technology based upon inverse, statistical algorithms.

The mineral model was constructed using Illite, Kaolinite, Quartz and Silt which is consistent with the core petrology. The logging tool responses for mineral endpoints were selected from chartbook tables. The clay minerals are defined as the dry clay endpoints and the bound water content is calculated dependent upon the salinity and temperature of the reservoir formation water. Wet clay endpoints are re-computed within the software. The endpoint parameters for the clay minerals expressed as GRHB were determined at first by conversion of average chartbook GR and RHOB and then by trial and error. The parameters for Silt were based on general empirical

evidence that "shales" comprise clay minerals and silt with the latter a mixture of quartz, carbonates, micas and etcetera. The endpoints are generally taken to be between those of quartz and limestone but with an intermediate GR level. The hypothetical "shale" endpoint assumed ~67% wet clays and 33% silt. This provides a reasonable solution of the neutron log.

The Dual Water saturation equation was selected since this is the default for Schlumberger's ELAN software.
The cementation exponent, m^0, was calculated using the equation of Goode and Sen (1988) and this provides a dynamic solution at each data level dependent upon the porosity and CEC. This equation includes a small correction to m^* for the bound water layer in order that the cementation exponent is consistent with principles of the Dual Water equation.

The resistivity of formation water was accepted as 1.0 ohmm at 75 deg.F following analysis of all Iona wells.

7.2.1 Log Analysis Results

The results of the log analysis are shown on the striplog on figure 7.1 and a description of the mnemonics is included below.

There has been production of 8.4 Bcf prior to field shutin at December 1997. The current gas/water contact can be observed at 1,294.5 mTVD-KB (-1,185 metres subsea). There is evidence of residual gas down to 1,305.5 mTVD-KB. A summary of the petrophysics is tabulated as follows:

Iona Observation-2 : Petrophysics Summary			
Unit	***Thickness (metres)***	***Porosity %***	***Water Saturation %***
Flaxman	1.2	26.0	53.1
C - unswept	1.7	26.5	39.2
C - gross	27.6	24.3	-

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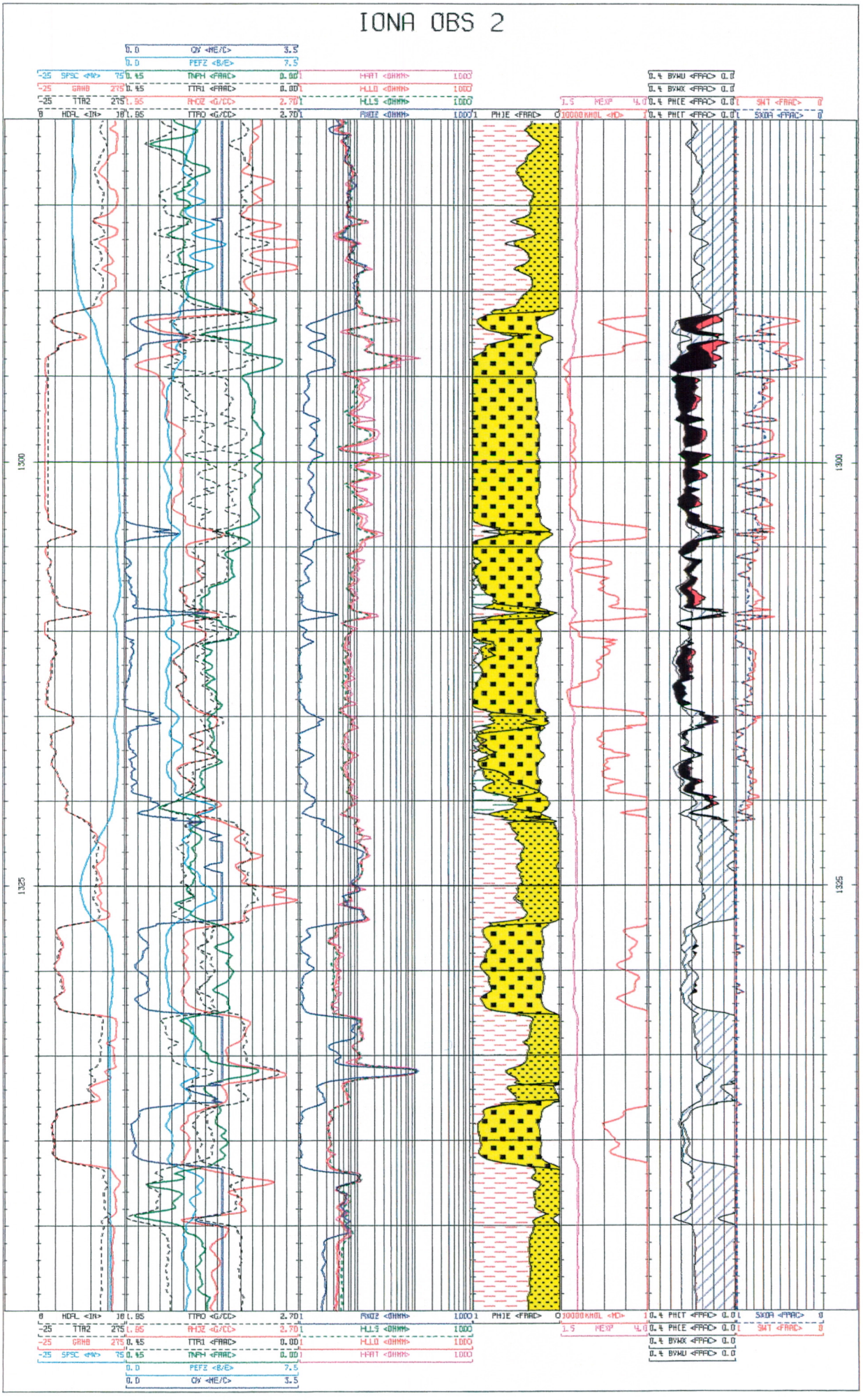


Figure 7.1

7.2.2 FAST – Striplog Description

Track 1:		
	depth scale in metres TVD-KB	
Track 2:		
	CALI / CALS / HCAL	caliper – short dash, black
	TTR2	theoretical gamma ray/density – short dash, black
	GRHB	gamma ray % deflection x density – solid line, red
	SP	spontaneous potential – solid line, cyan
Track 3:		
	TTRO	theoretical density – short dash, black
	RHOZ / RHOB	density – solid line, red
	TTRI	theoretical neutron – short dash, black
	TNPH / NPHI	neutron environment corrected – solid line, green
	PEFZ / PEF / PEF	photoelectric environment corrected – solid line, cyan
	Qv	cation exchange capacity per unit pore volume – solid line, dark blue
Track 4:		
	RXOZ / MSFL / RXO	micro-laterolog – solid line, dark blue
	HLLS / SLLC / LLS	shallow laterolog environment corrected – short dash, green
	HLLD / DLLC / LLD	deep laterolog environment corrected – solid line, red
	HART / RT	true resistivity – solid line, magenta
Track 5:		
	wet Illite	pink clay pattern
	wet Kaolinite	green mudstone pattern
	Silt	siltstone pattern
	Quartz	coarse sandstone pattern
	Phie	effective porosity (white space to left of right margin)
Track 6:		
	KHOL	permeability from Goode & Sen equation – solid line, red; scale: 10 D to 1 mD
	MEXP	cementation m^0 exponent calculated from ϕ_T and Qv - solid line, magenta
Track 7:		
	PHIO	core porosity (ambient data corrected to overburden) – cyan box symbols
	PHIT	total porosity (bound water porosity plus effective porosity) - separation between curves indicates bulk volume of bound water or ϕ_{BW} - shown as diagonal blue hatch
	PHIE	effective porosity - separation between curves indicates *residual hydrocarbons* coloured black
	BVWX	bulk volume of water in the flushed zone - separation between curves indicates *moveable oil* coloured red
	BVWU	bulk volume of water in the unflushed zone - separation between curves indicates *far water* (free water and capillary water)
Track 8:		
	SXO	water saturation in the flushed zone – short dash, dark blue
	SWT	total water saturation in the unflushed zone total porosity – solid line, red
Track 9:		
	depth scale in metres TVD-KB	

APPENDIX 1

Daily Drilling Reports by Kelly Down Pty. Ltd.

908262 053

TU AUSTRALIA

DAILY DRILLING REPORT

RIG : OD & E 30

PERMIT : PPL-2 OTWAY BASIN

WUGS Western Underground Storage Project

DATE:	10-May-99
REPORT No:	1
D.F.S:	
SHOE F.I.T:	

WELL NAME: IONA OBS 2 **STATUS @ 2400 HRS:** Wait on daylight

DEPTH - 2400 HRS:	m	FORMATION:		KB - GL (m):	4.98
DEPTH - PREVIOUS:	m	HOLE SIZE:		SHOE DEPTH:	
24 HR PROGRESS:	m	ACCIDENTS:	NIL	LAST CASING:	

SAFETY MEETINGS: Running casing

MUD PROPERTIES		ADDITIVES
DENSITY (ppg)		
VISCOSITY		
pH		
PV / YP		
GELS 0/10		
WL API / FC (cc)		
SOLIDS %		
SAND %		
CHLORIDES		
KCL (% WT)		
MBT (ppb)		
Pm Pm/Mf		
TEMP (degC)		
HOLE VOL (bbls)		
SURFACE VOL (bbls)		
HOLE LOSSES (bbls)		
MUD CO	Baroid	
MUD ENGINEER	T. Aung	

SOLIDS CONTROL		
UNIT	GPM / HRS	UF / OF
DESILTER		
DESANDER		
MUDCLEANER		
CENTRIFUGE		
SHAKER SCREENS:		

INVENTORY	
BARITE	705 sx
GEL	sx
CEMENT	650 sx
SALT	sx
	sx
DRILLWATER	bbl
DIESEL FUEL	9,000 lts

PUMPS	1	2
TYPE	PZ-8	PZ-8
STROKE	8"	8"
LINER	6"	6"
SPM		
PRESSURE		
GPM		
AV (DP - ft/min)		
AV (DC - ft/min)		
SPR		
SPR PRESS		

DRILLS / BOPS	
LAST BOP DRILL	
LAST FIRE DRILL	
LAST ABN.RIG DRILL	
LAST BOP TEST	
NEXT BOP TEST	
DAYS SINCE LAST LTA	93

BIT DATA		
BIT No.		
SIZE (ins)		
TYPE		
IADC CODE		
SERIAL No.		
NOZZLES		
OUT (m)		
IN (m)		
DRILLED (m)		
HOURS		
CONDITION		
AVG ROP (m/hr)		
WOB (x1000 lbs)		
RPM		
JET VEL (ft/sec)		
HHP @ BIT		

SURVEYS		
DEPTHS	Inc (deg)	Azimuth
MD/ (TVD)		

FORMATION DATA	
TRIP GAS (%)	
CONN.GAS (%)	
B.GAS (%)	
P.PRESS (ppg)	
ECD (ppg)	

TIME ANALYSIS	
1. MOVE RIG	18
2. RIG UP	
3. DRILLING	
4. BIT TRIP	
5. WIPER TRIP	
6. SURVEY	
7. CIRC / COND	
8. CHANGE BHA	
9. CASE & CEMENT	
10. WELLHEAD	
11. BOP'S	
12. L.O.T.	
13. CORING	
14. LOGGING	
15. REAM / WASH	
16. FISH / STUCK	
17. LOSS CIRC	
18. KICK CONTROL	
19 COMPLETION	
20. REP. SUBSURFACE	
21. REP. SURFACE	
22. WELL TEST	
23. W.O. WEATHER	
24. WAIT - daylight	6
25. ABANDON / SUSP	
26. RIG DOWN	
27. W.O. CEMENT	
28. DRILL CEMENT	
29. RIG SERVICE	
30. SLIP & CUT LINE	
TOTAL	24

BHA.: # 4

BHA WEIGHT :	lbs	STRING WT.:	lbs
DP RATING :	lbs - 'G' Grade	MARGIN :	lbs @ 75%
DP RATING :	lbs - 'S' Grade	MARGIN :	lbs @ 75%
TORQUE ON BTM :	amps	DRAG UP :	lbs
TORQUE OFF BTM :	amps	DRAG DOWN :	lbs

CONTINUED ../2

TU AUSTRALIA

DAILY DRILLING REPORT

RIG : OD & E 30

PERMIT : PPL-2 OTWAY BASIN

DATE:	10-May-99
REPORT No:	1
D.F.S:	

WELL NAME: IONA OBS 2

STATUS @ 2400 HRS: Wait on daylight.

FROM	TO	OBS 2 OBS 2	24 HOUR SUMMARY
00:00	18:00	18	Rig down and commenced to move to OBS # 2
18:00	24:00	6	Wait on daylight.
			Note : on 9/5/99 Iona # 5 stk 1 :: well flow
10:50	13:20	2.5	Flowed well through 94/64 choke
			FTHP : 1388psi
			UCP : 1204psig
			UCT : 36 deg C
			GASQ : 54.77MMscfd (Estimated rate across choke.
			Incidents in last 24 Hours Y/N
			(If yes see separate report)
			- Weather : Cold.

DOWNHOLE TOOLS		
Hours	Serial No.	Tool

FORMATION TOPS :

OPERATION TO 0600 HRS : Wait on day light.

PROGRAM - NEXT 24 HRS : *Rig move & rig up.*

TRANSPORTATION	
TRANSPORT-1	
TRANSPORT-2	
TRANSPORT-3	
FORKLIFT	
WATER HAULER	12
CRANE	

PERSONNEL	
CONTRACTOR	20
OPERATOR	3
SERVICE CO	10
TOTAL :	**33**

PROGRAMME COSTS	
DAILY Aus$:	
CUMULATIVE Aus$:	
REPORTED TO :	Colin Stuart
REPORTED BY :	W.Westman / J. Lambert

END OF REPORT

908262 055

TU AUSTRALIA

DAILY DRILLING REPORT

RIG : OD & E 30

PERMIT : PPL-2 OTWAY BASIN

WUGS Western Underground Storage Project

DATE:	11-May-99
REPORT No:	2
D.F.S:	
SHOE F.I.T:	

WELL NAME:	IONA OBS 2	STATUS @ 2400 HRS:	Rigging up
DEPTH - 2400 HRS:	m	FORMATION:	KB - GL (m): 4.98
DEPTH - PREVIOUS:	m	HOLE SIZE:	SHOE DEPTH:
24 HR PROGRESS:	m	ACCIDENTS: NIL	LAST CASING:
SAFETY MEETINGS:	Running casing		

MUD PROPERTIES		ADDITIVES
DENSITY (ppg)		
VISCOSITY		
pH		
PV / YP		
GELS 0/10		
WL API / FC (cc)		
SOLIDS %		
SAND %		
CHLORIDES		
KCL (% WT)		
MBT (ppb)		
Pm Pm/Mf		
TEMP (degC)		
HOLE VOL (bbls)		
SURFACE VOL (bbls)		
HOLE LOSSES (bbls)		
MUD CO	Baroid	
MUD ENGINEER	T. Aung	

SOLIDS CONTROL		
UNIT	GPM / HRS	UF / OF
DESILTER		
DESANDER		
MUDCLEANER		
CENTRIFUGE		
SHAKER SCREENS:		

INVENTORY	
BARITE	705 sx
GEL	sx
CEMENT	650 sx
SALT	sx
	sx
DRILLWATER	bbl
DIESEL FUEL	7,500 lts

PUMPS	1	2
TYPE	PZ-8	PZ-8
STROKE	8"	8"
LINER	6"	6"
SPM		
PRESSURE		
GPM		
AV (DP - ft/min)		
AV (DC - ft/min)		
SPR		
SPR PRESS		

DRILLS / BOPS	
LAST BOP DRILL	
LAST FIRE DRILL	
LAST ABN.RIG DRILL	
LAST BOP TEST	
NEXT BOP TEST	
DAYS SINCE LAST LTA	94

BIT DATA		
BIT No.		
SIZE (ins)		
TYPE		
IADC CODE		
SERIAL No.		
NOZZLES		
OUT (m)		
IN (m)		
DRILLED (m)		
HOURS		
CONDITION		
AVG ROP (m/hr)		
WOB (x1000 lbs)		
RPM		
JET VEL (ft/sec)		
HHP @ BIT		

SURVEYS		
DEPTHS	Inc (deg)	Azimuth
MD/ (TVD)		

FORMATION DATA	
TRIP GAS (%)	
CONN.GAS (%)	
B.GAS (%)	
P.PRESS (ppg)	
ECD (ppg)	

TIME ANALYSIS	
1. MOVE RIG	18
2. RIG UP	
3. DRILLING	
4. BIT TRIP	
5. WIPER TRIP	
6. SURVEY	
7. CIRC / COND	
8. CHANGE BHA	
9. CASE & CEMENT	
10. WELLHEAD	
11. BOP'S	
12. L.O.T.	
13. CORING	
14. LOGGING	
15. REAM / WASH	
16. FISH / STUCK	
17. LOSS CIRC	
18. KICK CONTROL	
19 COMPLETION	
20. REP. SUBSURFACE	
21. REP. SURFACE	
22. WELL TEST	
23. W.O. WEATHER	
24. WAIT - daylight	6
25. ABANDON / SUSP	
26. RIG DOWN	
27. W.O. CEMENT	
28. DRILL CEMENT	
29. RIG SERVICE	
30. SLIP & CUT LINE	
TOTAL	24

BHA.: # 4

BHA WEIGHT :	lbs	STRING WT.:	lbs
DP RATING :	lbs - 'G' Grade	MARGIN :	lbs @ 75%
DP RATING :	lbs - 'S' Grade	MARGIN :	lbs @ 75%
TORQUE ON BTM :	amps	DRAG UP :	lbs
TORQUE OFF BTM :	amps	DRAG DOWN :	lbs

CONTINUED ../2

908262 056

TOUSTRALIA

DAILY DRILLING REPORT

RIG : OD & E 30

PERMIT : PPL-2 OTWAY BASIN

DATE:	11-May-99
REPORT No:	2
D.F.S:	

WELL NAME: IONA OBS 2

STATUS @ 2400 HRS: Rigging up

FROM	TO	OBS 2 OBS 2	24 HOUR SUMMARY
00:00	6:00	6	Wait on daylight
6:00	24	18	Completed Rig move, 80% rigged up

Incidents in last 24 Hours Y/N

(If yes see separate report)

- Weather : Clear & cold.

DOWNHOLE TOOLS

Hours	Serial No.	Tool

FORMATION TOPS :

OPERATION TO 0600 HRS : Continued to rig up, Drilling Rat hole.

PROGRAM - NEXT 24 HRS : *Drill surface hole*

TRANSPORTATION	
TRANSPORT-1	
TRANSPORT-2	
TRANSPORT-3	
FORKLIFT	
WATER HAULER	12
CRANE	

PERSONNEL	
CONTRACTOR	20
OPERATOR	3
SERVICE CO	10
TOTAL :	33

PROGRAMME COSTS	
DAILY Aus$:	
CUMULATIVE Aus$:	
REPORTED TO :	Colin Stuart
REPORTED BY :	W.Westman / J. Lambert

END OF REPORT

908262 057

DAILY DRILLING REPORT

RIG : OD & E 30

PERMIT : PPL-2 OTWAY BASIN

TU AUSTRALIA

WUGS Western Underground Storage Project

DATE:	12-May-99
REPORT No:	3
D.F.S:	0.55
SHOE F.I.T:	

WELL NAME:	IONA OBS 2	STATUS @ 2400 HRS:	Drilling
DEPTH - 2400 HRS:	433 m	FORMATION:	laystone & sand
DEPTH - PREVIOUS:	0 m	HOLE SIZE:	8 1/2"
24 HR PROGRESS:	433 m	ACCIDENTS:	NIL
SAFETY MEETINGS:	Running casing		

KB - GL (m):	4.98	
SHOE DEPTH:		
LAST CASING:		

MUD PROPERTIES		ADDITIVES
DENSITY (ppg)	8.9	baracor X 2
VISCOSITY	43	EZ-mud X 8
pH	9.0	Pac-R X 6
PV / YP	9 / 13	xcd X 10
GELS 0/10	4 / 8	Pot chlor X 125
WL API / FC (cc)	8 . 6	Pot hydro X 1
SOLIDS %	2 . 9	
SAND %	0 . 7	
CHLORIDES	18,500	
KCL (% WT)	3 .2	
MBT (ppb)	7	
Pm Pm/Mf	.08 / .4	
TEMP (degC)	32	
HOLE VOL (bbls)	81	
SURFACE VOL (bbls)	396	
HOLE LOSSES (bbls)	0	
MUD CO	Baroid	
MUD ENGINEER	T. Aung	

SOLIDS CONTROL		
UNIT	GPM / HRS	UF / OF
DESILTER	12	
DESANDER		
MUDCLEANER		
CENTRIFUGE	13	
SHAKER SCREENS:	110	110

INVENTORY	
BARITE	705 sx
GEL	sx
CEMENT	650 sx
SALT	sx
	sx
DRILLWATER	bbl
DIESEL FUEL	25,000 lts

PUMPS	1	2
TYPE	PZ-8	PZ-8
STROKE	8"	8"
LINER	6"	6"
SPM	70	70
PRESSURE		1500
GPM	200	200
AV (DP - ft/min)	163	
AV (DC - ft/min)	326	
SPR		
SPR PRESS		

DRILLS / BOPS	
LAST BOP DRILL	
LAST FIRE DRILL	
LAST ABN.RIG DRILL	
LAST BOP TEST	
NEXT BOP TEST	
DAYS SINCE LAST LTA	95

BIT DATA		
BIT No.	1	
SIZE (ins)	8 1/2"	
TYPE	GT 1	
IADC CODE	1/01/05	
SERIAL No.	A68KB	
NOZZLES	3 X 12	
OUT (m)		
IN (m)		
DRILLED (m)	433	
HOURS	12.5	
CONDITION	IN	
AVG ROP (m/hr)	34.70	
WOB (x1000 lbs)	8 - 15	
RPM	90 - 140	
JET VEL (ft/sec)		
HHP @ BIT		

SURVEYS		
DEPTHS	Inc (deg)	Azimuth
MD/ (TVD)		
50	0	
153	0.50	
298	0.25	

FORMATION DATA	
TRIP GAS (%)	
CONN.GAS (%)	
B.GAS (%)	
P.PRESS (ppg)	
ECD (ppg)	

TIME ANALYSIS	
1. MOVE RIG	
2. RIG UP	10
3. DRILLING	12.5
4. BIT TRIP	
5. WIPER TRIP	
6. SURVEY	1.5
7. CIRC / COND	
8. CHANGE BHA	
9. CASE & CEMENT	
10. WELLHEAD	
11. BOP'S	
12. L.O.T.	
13. CORING	
14. LOGGING	
15. REAM / WASH	
16. FISH / STUCK	
17. LOSS CIRC	
18. KICK CONTROL	
19 COMPLETION	
20. REP. SUBSURFACE	
21. REP. SURFACE	
22. WELL TEST	
23. W.O. WEATHER	
24. WAIT - daylight	
25. ABANDON / SUSP	
26. RIG DOWN	
27. W.O. CEMENT	
28. DRILL CEMENT	
29. RIG SERVICE	
30. SLIP & CUT LINE	
TOTAL	24

BHA.: # 4

BHA WEIGHT :	34,000 lbs	STRING WT.:	54,000 lbs
DP RATING :	lbs - 'G' Grade	MARGIN :	lbs @ 75%
DP RATING :	lbs - 'S' Grade	MARGIN :	lbs @ 75%
TORQUE ON BTM :	amps	DRAG UP :	58 lbs
TORQUE OFF BTM :	amps	DRAG DOWN :	52 lbs

CONTINUED ../2

908262 058

TOAUSTRALIA

DAILY DRILLING REPORT

RIG : OD & E 30

PERMIT : PPL-2 OTWAY BASIN

DATE:	12-May-99
REPORT No:	3
D.F.S:	0.55

WELL NAME: IONA OBS 2

STATUS @ 2400 HRS: Drilling

FROM	TO	OBS 2 OBS 2	24 HOUR SUMMARY
00:00	10:00	10	Continued to rig up, drilled Rat & Mouse hole.
10:00	12:00	2	Drilled to60 m.
12:00	12:30	0.5	Wire line survey.
12:30	16:00	3.5	Drilled to 165 m.
16:00	16:30	0.5	Wire line survey.
16:30	20:00	3.5	Drilled to309 m.
20:00	20:30	0.5	Wire line survey.
20:30	24:00	3.5	Drilled to 433 m.

Incidents in last 24 Hours Y/N
(If yes see separate report)

- Weather : Clear & cold.

DOWNHOLE TOOLS		
Hours	Serial No.	Tool
12.5	47686	String Stab.

FORMATION TOPS :

OPERATION TO 0600 HRS : Drilling at 558 m.

PROGRAM - NEXT 24 HRS : *Drill surface hole, run 7" casing*

TRANSPORTATION	
TRANSPORT-1	
TRANSPORT-2	
TRANSPORT-3	
FORKLIFT	
WATER HAULER	12
CRANE	

PERSONNEL	
CONTRACTOR	20
OPERATOR	3
SERVICE CO	13
TOTAL :	36

PROGRAMME COSTS	
DAILY Aus$:	
CUMULATIVE Aus$:	
REPORTED TO :	Colin Stuart
REPORTED BY :	W.Westman / J. Lambert

END OF REPORT

908262 059

TU AUSTRALIA

DAILY DRILLING REPORT

RIG : OD & E 30

PERMIT : PPL-2 OTWAY BASIN

WUGS Western Underground Storage Project

DATE:	13-May-99
REPORT No:	4
D.F.S:	1.55
SHOE F.I.T:	

WELL NAME:	IONA OBS 2	STATUS @ 2400 HRS:	Running 7" casing.
DEPTH - 2400 HRS:	629 m	FORMATION:	laystone & sand
DEPTH - PREVIOUS:	433 m	HOLE SIZE:	8 1/2"
24 HR PROGRESS:	196 m	ACCIDENTS:	NIL
SAFETY MEETINGS:	Running casing		

KB - GL (m):	4.98	
SHOE DEPTH:		
LAST CASING:		

MUD PROPERTIES		ADDITIVES
DENSITY (ppg)	8.9	baracor X 1
VISCOSITY	42	EZ-mud X 8
pH	8 . 7	Pac-R X 1
PV / YP	10 / 16	xcd X 2
GELS 0/10	6 / 11	Soda ash X 1
WL API / FC (cc)	8 . 2	Pot hydro X 2
SOLIDS %	2 . 9	barafibre X 6
SAND %	0 . 35	Wallnut F X 5
CHLORIDES	18,500	Barite X 62
KCL (% WT)	3 .2	Citric acid X 4
MBT (ppb)	8	
Pm Pm/Mf	.03 / .10	
TEMP (degC)	37	
HOLE VOL (bbls)	76 h2o	
SURFACE VOL (bbls)	402	
HOLE LOSSES (bbls)	0	
MUD CO	Baroid	
MUD ENGINEER	T. Aung	

SOLIDS CONTROL		
UNIT	GPM / HRS	UF / OF
DESILTER	24	
DESANDER		
MUDCLEANER		
CENTRIFUGE	24	
SHAKER SCREENS:	110	110

INVENTORY	
BARITE	643 sx
GEL	42 sx
CEMENT	650 sx
SALT	sx
	sx
DRILLWATER	bbl
DIESEL FUEL	23,000 lts

PUMPS	1	2
TYPE	PZ-8	PZ-8
STROKE	8"	8"
LINER	6"	6"
SPM	70	70
PRESSURE		1800
GPM	200	200
AV (DP - ft/min)	163	
AV (DC - ft/min)	326	
SPR		
SPR PRESS		

DRILLS / BOPS	
LAST BOP DRILL	
LAST FIRE DRILL	
LAST ABN.RIG DRILL	
LAST BOP TEST	
NEXT BOP TEST	
DAYS SINCE LAST LTA	96

BIT DATA		
BIT No.	1	
SIZE (ins)	8 1/2"	
TYPE	GT 1	
IADC CODE	1/01/05	
SERIAL No.	A68KB	
NOZZLES	3 X 12	
OUT (m)		
IN (m)		
DRILLED (m)	629	
HOURS	21	
CONDITION	2-1-E-1/16	
AVG ROP (m/hr)	30.00	
WOB (x1000 lbs)	8 - 15	
RPM	120 - 140	
JET VEL (ft/sec)	360	
HHP @ BIT	278.00	

SURVEYS		
DEPTHS	Inc (deg)	Azimuth
MD/ (TVD)		
628	0.25	

FORMATION DATA	
TRIP GAS (%)	
CONN.GAS (%)	
B.GAS (%)	
P.PRESS (ppg)	
ECD (ppg)	

TIME ANALYSIS	
1. MOVE RIG	
2. RIG UP	
3. DRILLING	8.5
4. BIT TRIP	
5. WIPER TRIP	5.5
6. SURVEY	
7. CIRC / COND	2
8. CHANGE BHA	4
9. CASE & CEMENT	4
10. WELLHEAD	
11. BOP'S	
12. L.O.T.	
13. CORING	
14. LOGGING	
15. REAM / WASH	
16. FISH / STUCK	
17. LOSS CIRC	
18. KICK CONTROL	
19 COMPLETION	
20. REP. SUBSURFACE	
21. REP. SURFACE	
22. WELL TEST	
23. W.O. WEATHER	
24. WAIT - daylight	
25. ABANDON / SUSP	
26. RIG DOWN	
27. W.O. CEMENT	
28. DRILL CEMENT	
29. RIG SERVICE	
30. SLIP & CUT LINE	
TOTAL	24

BHA.: # 1	Bit, BS, 2 X 6/12"dc, XO, STAB, XO, 9 X6 1/2"dc, XO, 6 X 4 3/4" dc		
BHA WEIGHT :	34,000 lbs	STRING WT.:	65 lbs
DP RATING :	lbs - 'G' Grade	MARGIN :	lbs @ 75%
DP RATING :	lbs - 'S' Grade	MARGIN :	lbs @ 75%
TORQUE ON BTM :	amps	DRAG UP :	70 lbs
TORQUE OFF BTM :	amps	DRAG DOWN :	60 lbs

CONTINUED ../2

908262 060

DAILY DRILLING REPORT

RIG : OD & E 30

PERMIT : PPL-2 OTWAY BASIN

DATE:	13-May-99
REPORT No:	4
D.F.S:	1.55

WELL NAME: IONA OBS 2 — STATUS @ 2400 HRS: Running casing

FROM	TO	OBS 2	24 HOUR SUMMARY
00:00	7:30	7.5	Drilled fr 433 to 597 m.
7:30	8:30	1	Circulated hole clean.
8:30	10:30	2	Flow checked, pulled out , wiper trip.
10:30	12:00	1.5	Ran in to 269 m.
12:00	13:00	1	Ran in to 274 m, ream tight hole to 309 m.
13:00	14:00	1	Ran in to 597 m.
14:00	15:00	1	Drilled to 629 m.
15:00	16:00	1	Circulated hole clean, dropped survey, flow checked well.
16:00	20:00	4	Pulled out of hole, laid out all 6 1/2" drill collars.
20:00	21:30	1.5	Rigged up to run 7" casing.
21:30	24:00	2.5	Run 7" casing.

Incidents in last 24 Hours Y/N
(If yes see separate report)

- Weather : Clear & cold.

DOWNHOLE TOOLS

Hours	Serial No.	Tool
21	47686	String Stab.

FORMATION TOPS :

OPERATION TO 0600 HRS : Cemented 7"casing shoe at 626.25 m. 21 bbls cement returns 12.4 ppg. Bumped plug to 2500psi, held 10 minutes, bled back ,float & shoe ok. 05:00 WOC.

PROGRAM - NEXT 24 HRS : *Run & cement 7" casing, WOC, nipple up & test BOP.*

TRANSPORTATION	
TRANSPORT-1	
TRANSPORT-2	
TRANSPORT-3	
FORKLIFT	
WATER HAULER	12
CRANE	

PERSONNEL	
CONTRACTOR	20
OPERATOR	2
SERVICE CO	6
TOTAL :	28

PROGRAMME COSTS	
DAILY Aus$:	
CUMULATIVE Aus$:	
REPORTED TO :	Colin Stuart
REPORTED BY :	W.Westman / J. Lambert

END OF REPORT

908262 061

TU AUSTRALIA

DAILY DRILLING REPORT

RIG : OD & E 30

PERMIT : PPL-2 OTWAY BASIN

WUGS Western Underground Storage Project

DATE:	14-May-99
REPORT No:	5
D.F.S:	2.55
SHOE F.I.T:	

WELL NAME:	IONA OBS 2	STATUS @ 2400 HRS:	Testing BOP
DEPTH - 2400 HRS:	m	FORMATION:	
DEPTH - PREVIOUS:	629 m	HOLE SIZE:	6"
24 HR PROGRESS:	m	ACCIDENTS:	NIL
SAFETY MEETINGS:	Cementing casing.		

KB - GL (m):	4.98
SHOE DEPTH:	626
LAST CASING:	7"

MUD PROPERTIES		ADDITIVES
DENSITY (ppg)	8.9	
VISCOSITY	50	
pH	8 . 3	
PV / YP	10 / 19	
GELS 0/10	7 / 14	
WL API / FC (cc)	8.0	
SOLIDS %	2 . 8	
SAND %	0 . 25	
CHLORIDES	21,000	
KCL (% WT)	3 . 7	
MBT (ppb)	8	
Pm Pm/Mf	.02 / . 75	
TEMP (degC)	18	
HOLE VOL (bbls)	76 h2o	
SURFACE VOL (bbls)	396	
HOLE LOSSES (bbls)	0	
MUD CO	Baroid	
MUD ENGINEER	T. Aung	

SOLIDS CONTROL		
UNIT	GPM / HRS	UF / OF
DESILTER	5	
DESANDER		
MUDCLEANER		
CENTRIFUGE	10	
SHAKER SCREENS:	110	110

INVENTORY	
BARITE	643 sx
GEL	42 sx
CEMENT	50 sx
SALT	sx
	sx
DRILLWATER	bbl
DIESEL FUEL	21,000 lts

PUMPS	1	2
TYPE	PZ-8	PZ-8
STROKE	8"	8"
LINER	6"	6"
SPM		
PRESSURE		
GPM		
AV (DP - ft/min)		
AV (DC - ft/min)		
SPR		
SPR PRESS		

DRILLS / BOPS	
LAST BOP DRILL	
LAST FIRE DRILL	
LAST ABN.RIG DRILL	
LAST BOP TEST	
NEXT BOP TEST	
DAYS SINCE LAST LTA	98

BIT DATA		
BIT No.	2	
SIZE (ins)	6"	
TYPE	STR-09	
IADC CODE	437	
SERIAL No.	N92YX	
NOZZLES	3 x 14	
OUT (m)		
IN (m)	629	
DRILLED (m)		
HOURS		
CONDITION		
AVG ROP (m/hr)		
WOB (x1000 lbs)		
RPM		
JET VEL (ft/sec)		
HHP @ BIT		

SURVEYS		
DEPTHS	Inc (deg)	Azimuth
MD/ (TVD)		

FORMATION DATA	
TRIP GAS (%)	
CONN.GAS (%)	
B.GAS (%)	
P.PRESS (ppg)	
ECD (ppg)	

TIME ANALYSIS	
1. MOVE RIG	
2. RIG UP	
3. DRILLING	
4. BIT TRIP	
5. WIPER TRIP	
6. SURVEY	
7. CIRC / COND	0.5
8. CHANGE BHA	
9. CASE & CEMENT	4.5
10. WELLHEAD	1.5
11. BOP'S	10.5
12. L.O.T.	
13. CORING	
14. LOGGING	
15. REAM / WASH	
16. FISH / STUCK	
17. LOSS CIRC	
18. KICK CONTROL	
19 COMPLETION	
20. REP. SUBSURFACE	
21. REP. SURFACE	
22. WELL TEST	
23. W.O. WEATHER	
24. WAIT - cement	7
25. ABANDON / SUSP	
26. RIG DOWN	
27. W.O. CEMENT	
28. DRILL CEMENT	
29. RIG SERVICE	
30. SLIP & CUT LINE	
TOTAL	24

BHA.: # 2 — Bit, nb stab,pony dc, s stab, 1 x 4 3/4"dc, s stab, 5 x 4 3/4"dc, 20 x 4 3/4"hwdp, Jars, 10 x 4 3/4"hwdp

BHA WEIGHT :	lbs	STRING WT.:	lbs
DP RATING :	lbs - 'G' Grade	MARGIN :	lbs @ 75%
DP RATING :	lbs - 'S' Grade	MARGIN :	lbs @ 75%
TORQUE ON BTM :	amps	DRAG UP :	70 lbs
TORQUE OFF BTM :	amps	DRAG DOWN :	60 lbs

CONTINUED ../2

908262 062

DAILY DRILLING REPORT

RIG : OD & E 30

PERMIT : PPL-2 OTWAY BASIN

DATE:	14-May-99
REPORT No:	5
D.F.S:	2.55

WELL NAME: IONA OBS 2 **STATUS @ 2400 HRS:** Testing BOP.

FROM	TO	OBS 2 OBS 1	24 HOUR SUMMARY
00:00	3:00	3	Run 7" casing. Wash to bttm. Change out last joint for shorter joint. Shoe at 626.25m
3:00	3:30	½	Circulate casing capacity x 2.
3:30	5:00	1½	Head up Howco. Test lines 3000 psi. Pump 20bbls Freshwater spacer followed by Lead
			160sx "G" w/ 2.5% Bentonite and 0.05 gals/sx CFR-3. Followed by 150 sx neat "G" at 15.8ppg.
			Howco displace w/ 76 bbls freshwater. 21 bbls cmt returns. Bump plug 2500 psi 10 mins OK.
			Float Equipment held OK.
5:00	12:00	7	Wait on Cement. Cut conductor. Do 14 bbl Top job.
12:00	13:30	1.5	Back out landing joint and nipple up Bradenhead.
13:30	22:00	8.5	Nipple up BOP.
22:00	24:00	2	Make up cup tester, rigged ul Halco, commenced to test BOP.
			Incidents in last 24 Hours Y/N
			(If yes see separate report)
			- Weather : Heavy rain

DOWNHOLE TOOLS

Hours	Serial No.	Tool
	3123	NB Stab
	914	S Stab
	A384	S Stab
	1400-1074	Drlg Jars

FORMATION TOPS :

OPERATION TO 0600 HRS : Test BOP, run in Making up 6" bha.

PROGRAM - NEXT 24 HRS : *Test BOP, drill ahead.*

TRANSPORTATION	
TRANSPORT-1	
TRANSPORT-2	
TRANSPORT-3	
FORKLIFT	
WATER HAULER	
CRANE	

PERSONNEL	
CONTRACTOR	20
OPERATOR	2
SERVICE CO	8
TOTAL :	30

PROGRAMME COSTS	
DAILY Aus$:	
CUMULATIVE Aus$:	
REPORTED TO :	Colin Stuart
REPORTED BY :	W.Westman / J. Lambert

END OF REPORT

908262 063

TU AUSTRALIA

DAILY DRILLING REPORT

RIG : OD & E 30

PERMIT : PPL-2 OTWAY BASIN

WUGS Western Underground Storage Project

DATE:	15-May-99
REPORT No:	6
D.F.S:	3.55
SHOE F.I.T:	14.4

WELL NAME:	IONA OBS 2	STATUS @ 2400 HRS:	Drilling
DEPTH - 2400 HRS:	782 m	FORMATION:	Claystone, sandstone
DEPTH - PREVIOUS:	629 m	HOLE SIZE:	6"
24 HR PROGRESS:	153 m	ACCIDENTS:	NIL
SAFETY MEETINGS:	Pressure testing		

KB - GL (m):	4.98
SHOE DEPTH:	626
LAST CASING:	7"

MUD PROPERTIES		ADDITIVES
DENSITY (ppg)	9.0	baracor x 2
VISCOSITY	43	Barofibre x 10
pH	9.1	EZ-mud x 6
PV / YP	9 / 15	Pac - R x 2
GELS 0/10	5 / 13	Wall nut - f x 5
WL API / FC (cc)	7.0	XCD x 6
SOLIDS %	3 . 6	Pot Chlor x 70
SAND %	0 . 25	Pot Hydro x 2
CHLORIDES	19,000	
KCL (% WT)	3 . 3	
MBT (ppb)	7	
Pm Pm/Mf	. 07 / . 6	
TEMP (degC)	27	
HOLE VOL (bbls)	82	
SURFACE VOL (bbls)	318	
HOLE LOSSES (bbls)	0	
MUD CO	Baroid	
MUD ENGINEER	T. Aung	

SOLIDS CONTROL		
UNIT	GPM / HRS	UF / OF
DESILTER	8	
DESANDER		
MUDCLEANER		
CENTRIFUGE	7	
SHAKER SCREENS:	140 / 110	140

INVENTORY	
BARITE	643 sx
GEL	42 sx
CEMENT	50 sx
SALT	sx
	sx
DRILLWATER	bbl
DIESEL FUEL	17,000 lts

PUMPS	1	2
TYPE	PZ-8	PZ-8
STROKE	8"	8"
LINER	6"	6"
SPM		125
PRESSURE		1600
GPM		367
AV (DP - ft/min)		369
AV (DC - ft/min)		651
SPR	45	45
SPR PRESS	340	340

DRILLS / BOPS	
LAST BOP DRILL	14-May-99
LAST FIRE DRILL	
LAST ABN.RIG DRILL	
LAST BOP TEST	14-May-99
NEXT BOP TEST	22-May-99
DAYS SINCE LAST LTA	99

BIT DATA		
BIT No.	2	
SIZE (ins)	6"	
TYPE	STR-09	
IADC CODE	4-3-7	
SERIAL No.	N92YX	
NOZZLES	3 x 14	
OUT (m)		
IN (m)	629	
DRILLED (m)	153	
HOURS	7	
CONDITION	IN	
AVG ROP (m/hr)	22.00	
WOB (x1000 lbs)	8 - 15	
RPM	120 - 140	
JET VEL (ft/sec)	300	
HHP @ BIT	150	

SURVEYS		
DEPTHS	Inc (deg)	Azimuth
MD/ (TVD)		

FORMATION DATA	
TRIP GAS (%)	
CONN.GAS (%)	
B.GAS (%)	
P.PRESS (ppg)	
ECD (ppg)	

TIME ANALYSIS	
1. MOVE RIG	
2. RIG UP	
3. DRILLING	7
4. BIT TRIP	4.5
5. WIPER TRIP	3
6. SURVEY	
7. CIRC / COND	1.5
8. CHANGE BHA	
9. CASE & CEMENT	
10. WELLHEA w/ bushing	0.5
11. BOP'S	4.5
12. L.O.T.	1
13. CORING	
14. LOGGING	
15. REAM / WASH	2
16. FISH / STUCK	
17. LOSS CIRC	
18. KICK CONTROL	
19 COMPLETION	
20. REP. SUBSURFACE	
21. REP. SURFACE	
22. WELL TEST	
23. W.O. WEATHER	
24. WAIT - cement	
25. ABANDON / SUSP	
26. RIG DOWN	
27. W.O. CEMENT	
28. DRILL CEMENT	
29. RIG SERVICE	
30. SLIP & CUT LINE	
TOTAL	24

BHA.: # 2	Bit, nb stab,pony dc, s stab, 1 x 4 3/4"dc, s stab, 5 x 4 3/4"dc, 20 x 4 3/4"hwdp, Jars, 10 x 4 3/4"hwdp		
BHA WEIGHT :	30,000 lbs	STRING WT.:	56,000 lbs
DP RATING :	lbs - 'G' Grade	MARGIN :	lbs @ 75%
DP RATING :	lbs - 'S' Grade	MARGIN :	lbs @ 75%
TORQUE ON BTM :	amps	DRAG UP :	58,000 lbs
TORQUE OFF BTM :	amps	DRAG DOWN :	55,000 lbs

CONTINUED ../2

908262 064

DAILY DRILLING REPORT

RIG : OD & E 30

PERMIT : PPL-2 OTWAY BASIN

DATE:	15-May-99
REPORT No:	6
D.F.S:	3.55

TU AUSTRALIA

WELL NAME: IONA OBS 2 **STATUS @ 2400 HRS:** Drilling

FROM	TO	OBS 2 OBS 2	24 HOUR SUMMARY
00:00	4:30	4.5	Test BOP & all surface equipment as per program, 300 psi low 5min, 2500psi hihg 15 min.
4:30	5:00	0.5	Installed wear bushing.
5:00	9:30	4.5	Made up 6" BHA , ran in & laid out 21 singles of dp.Ran in to 588 m.
9:30	10:30	1	Picked up kelly attempt to circulate and clear blocked nozzles of scale from hwdp, no success.
10:30	13:00	2.5	Pulled out cleared scale out of dc,cleaned bit , made up, ran in to 348 m.
13:00	13:30	0.5	Picked up kelly circulated, racked kelly.
13:30	14:00	0.5	Continued to run in to 601 m.
14:00	16:00	2	Drilled cement, float cement & shoe from 601 t0 626 m. Cleaned to bottom at 629, drilled 3 new
			hole to 632 m. Drilled cement with water.
16:00	17:00	1	Displaced hole to balanced mud. Performed FIT. EMW 14.4 ppg.
17:00	24:00	7	Drilled 6" hole from 631 to 782m.

Incidents in last 24 Hours Y/N
(If yes see separate report)

- Weather : Heavy rain

DOWNHOLE TOOLS

Hours	Serial No.	Tool
7	3123	NB Stab
7	914	S Stab
7	A384	S Stab
7	1400-1074	Drlg Jars

FORMATION TOPS : Paaratte 647 m.

OPERATION TO 0600 HRS : Drilling at 888 m.

PROGRAM - NEXT 24 HRS : *Drill ahead*

TRANSPORTATION	
TRANSPORT-1	
TRANSPORT-2	
TRANSPORT-3	
FORKLIFT	
WATER HAULER	12
CRANE	

PERSONNEL	
CONTRACTOR	20
OPERATOR	2
SERVICE CO	8
TOTAL :	**30**

PROGRAMME COSTS	
DAILY Aus$:	
CUMULATIVE Aus$:	
REPORTED TO :	Colin Stuart
REPORTED BY :	W.Westman / J. Lambert

END OF REPORT

908262 065

TUAUSTRALIA

DAILY DRILLING REPORT

RIG : OD & E 30

PERMIT : PPL-2 OTWAY BASIN

WUGS Western Underground Storage Project

DATE:	16-May-99
REPORT No:	7
D.F.S:	4.55
SHOE F.I.T:	14.4

WELL NAME:	IONA OBS 2	STATUS @ 2400 HRS:	Wiper trip
DEPTH - 2400 HRS:	1,043 m	FORMATION:	Claystone, sandstone
DEPTH - PREVIOUS:	782 m	HOLE SIZE:	6"
24 HR PROGRESS:	261 m	ACCIDENTS:	NIL
SAFETY MEETINGS:	Pressure testing		

KB - GL (m):	4.98
SHOE DEPTH:	626
LAST CASING:	7"

MUD PROPERTIES		ADDITIVES
DENSITY (ppg)	8.9	baracor x 2
VISCOSITY	46	Barofibre x 11
pH	9.0	EZ-Mud x 2
PV / YP	12 . 21	Pac - R x 2
GELS 0/10	7 / 17	Barite x 45
WL API / FC (cc)	6.0	XCD x 6
SOLIDS %	2 . 5	Pot Chlor x 65
SAND %	0 . 2	Pot Hydro x 2
CHLORIDES	29,000	Soda ash x 1
KCL (% WT)	5.00	
MBT (ppb)	8	
Pm Pm/Mf	.1/.8	
TEMP (degC)	39	
HOLE VOL (bbls)	112	
SURFACE VOL (bbls)	371	
HOLE LOSSES (bbls)	0	
MUD CO	Baroid	
MUD ENGINEER	T. Aung	

SOLIDS CONTROL		
UNIT	GPM / HRS	UF / OF
DESILTER	24	
DESANDER		
MUDCLEANER		
CENTRIFUGE	24	
SHAKER SCREENS:	140 x 110	140

INVENTORY	
BARITE	598 sx
GEL	42 sx
CEMENT	50 sx
SALT	sx
	sx
DRILLWATER	bbl
DIESEL FUEL	13,000 lts

PUMPS	1	2
TYPE	PZ-8	PZ-8
STROKE	8"	8"
LINER	6"	6"
SPM		125
PRESSURE		1800
GPM		367
AV (DP - ft/min)		411
AV (DC - ft/min)		728
SPR	45	45
SPR PRESS	400	400

DRILLS / BOPS	
LAST BOP DRILL	16-May-99
LAST FIRE DRILL	
LAST ABN.RIG DRILL	
LAST BOP TEST	14-May-99
NEXT BOP TEST	22-May-99
DAYS SINCE LAST LTA	100

BIT DATA		
BIT No.	2	
SIZE (ins)	6"	
TYPE	STR-09	
IADC CODE	4-3-7	
SERIAL No.	N92YX	
NOZZLES	3 x 14	
OUT (m)	1,043	
IN (m)	629	
DRILLED (m)	414	
HOURS	26	
CONDITION	5-2-E-IN	
AVG ROP (m/hr)	16.00	
WOB (x1000 lbs)	10 - 20	
RPM	120 - 140	
JET VEL (ft/sec)	300	
HHP @ BIT	150	

SURVEYS		
DEPTHS	Inc (deg)	Azimuth
MD/ (TVD)		
943	0.50	

FORMATION DATA	
TRIP GAS (%)	
CONN.GAS (%)	
B.GAS (%)	
P.PRESS (ppg)	
ECD (ppg)	

TIME ANALYSIS	
1. MOVE RIG	
2. RIG UP	
3. DRILLING	19
4. BIT TRIP	1.5
5. WIPER TRIP	
6. SURVEY	1
7. CIRC / COND	0.5
8. CHANGE BHA	
9. CASE & CEMENT	
10. WELLHEA w/ bushing	
11. BOP'S	
12. L.O.T.	
13. CORING	
14. LOGGING	
15. REAM / WASH	2
16. FISH / STUCK	
17. LOSS CIRC	
18. KICK CONTROL	
19 COMPLETION	
20. REP. SUBSURFACE	
21. REP. SURFACE	
22. WELL TEST	
23. W.O. WEATHER	
24. WAIT - cement	
25. ABANDON / SUSP	
26. RIG DOWN	
27. W.O. CEMENT	
28. DRILL CEMENT	
29. RIG SERVICE	
30. SLIP & CUT LINE	
TOTAL	24

BHA.: # 2	Bit, nb stab,pony dc, s stab, 1 x 4 3/4"dc, s stab, 5 x 4 3/4"dc, 20 x 4 3/4"hwdp, Jars, 10 x 4 3/4"hwdp		
BHA WEIGHT :	30,000 lbs	STRING WT.:	63,000 lbs
DP RATING :	lbs - 'G' Grade	MARGIN :	lbs @ 75%
DP RATING :	lbs - 'S' Grade	MARGIN :	lbs @ 75%
TORQUE ON BTM :	amps	DRAG UP :	90,000 lbs
TORQUE OFF BTM :	amps	DRAG DOWN :	40,000 lbs

CONTINUED ../2

908262 066

DAILY DRILLING REPORT

RIG : OD & E 30

PERMIT : PPL-2 OTWAY BASIN

DATE:	16-May-99
REPORT No:	7
D.F.S:	4.55

WELL NAME: IONA OBS 2

STATUS @ 2400 HRS: Wiper trip

FROM	TO	OBS 2 OBS 2	24 HOUR SUMMARY
00:00	9:30	9.5	Drilled from 782 to946 m.
9:30	10:00	0.5	Circulated attempted to survey, barrell hung up in hwdp.
10:00	11:00	1	Drilled to 955 m.
11:00	11:30	0.5	Ran wire line survey
11:30	20:00	8.5	Drilled to 1043 m.
20:00	20:30	0.5	Pumped hi-vis sweep circulated hole clean, worked kelly in tight hole, 20 k over pull.
20:30	22:30	2	Pumped out of hole, Laying out singles & reaming kelly down each time from1031 upto 944 m.
22:30	24:00	1.5	Pulled to shoe 20 k over pull. Found loose connection on drill pipe, Continue to pull out
			to check the rest of drill string.
			Incidents in last 24 Hours Y/N
			(If yes see separate report)
			- Weather : Dry Cold.

DOWNHOLE TOOLS

Hours	Serial No.	Tool
26	3123	NB Stab
26	914	S Stab
26	A384	S Stab
26	1400-1074	Drlg Jars

FORMATION TOPS : Paaratte 647 m.

OPERATION TO 0600 HRS : Trip out to check pipe, changed bit ran in & wash & ream to bottom from 955 m. drilling at 1047 m.

PROGRAM - NEXT 24 HRS : *Drill ahead*

TRANSPORTATION	
TRANSPORT-1	
TRANSPORT-2	
TRANSPORT-3	
FORKLIFT	
WATER HAULER	12
CRANE	

PERSONNEL	
CONTRACTOR	20
OPERATOR	2
SERVICE CO	11
TOTAL :	**33**

PROGRAMME COSTS	
DAILY Aus$:	
CUMULATIVE Aus$:	
REPORTED TO :	Colin Stuart
REPORTED BY :	W.Westman / J. Lambert

END OF REPORT

908262 067

TU AUSTRALIA

DAILY DRILLING REPORT

RIG : OD & E 30

PERMIT : PPL-2 OTWAY BASIN

WUGS Western Underground Storage Project

DATE:	18-May-99
REPORT No:	9
D.F.S:	6.55
SHOE F.I.T:	14.4

WELL NAME:	IONA OBS 2	STATUS @ 2400 HRS:	Pulling out for Bit change & wper trip.
DEPTH - 2400 HRS:	1,302 m	FORMATION:	Claystone,
DEPTH - PREVIOUS:	1,228 m	HOLE SIZE:	6"
24 HR PROGRESS:	74 m	ACCIDENTS:	NIL
SAFETY MEETINGS:	working tight hole.		

KB - GL (m):	4.98
SHOE DEPTH:	626
LAST CASING:	7"

MUD PROPERTIES		ADDITIVES
DENSITY (ppg)	9.2	baracor x 2
VISCOSITY	49	Baracarb x130
pH	9.0	Baracarb x 48
PV / YP	11 / 24	Baracor 129 x 2
GELS 0/10	9 / 20	Wallnut-F x 7
WL API / FC (cc)	6 . 2	Barite x 25
SOLIDS %	4 . 5	Pot Chlor x 40
SAND %	0 . 05	Pot hydro x 2
CHLORIDES	29,500	
KCL (% WT)	5 . 3	
MBT (ppb)	8	
Pm Pm/Mf	.1/ . 85	
TEMP (degC)	41	
HOLE VOL (bbls)	136	
SURFACE VOL (bbls)	367	
HOLE LOSSES (bbls)	0	
MUD CO	Baroid	
MUD ENGINEER	T. Aung	

SOLIDS CONTROL		
UNIT	GPM / HRS	UF / OF
DESILTER	21	
DESANDER		
MUDCLEANER		
CENTRIFUGE	24	
SHAKER SCREENS:	140 x 110	140

INVENTORY	
BARITE	573 sx
GEL	42 sx
CEMENT	50 sx
SALT	sx
	sx
DRILLWATER	bbl
DIESEL FUEL	24,000 lts

PUMPS	1	2
TYPE	PZ-8	PZ-8
STROKE	8"	8"
LINER	6"	6"
SPM		125
PRESSURE		1900
GPM		367
AV (DP - ft/min)		325
AV (DC - ft/min)		573
SPR	35	35
SPR PRESS	440	440

DRILLS / BOP	17/05/99
LAST BOP DRILL	16-May-99
LAST FIRE DRILL	
LAST ABN.RIG DRILL	
LAST BOP TEST	14-May-99
NEXT BOP TEST	22-May-99
DAYS SINCE LAST LTA	101

BIT DATA		
BIT No.	3	
SIZE (ins)	6"	
TYPE	STR-09	
IADC CODE	4-3-7	
SERIAL No.	N93YX	
NOZZLES	3 x 14	
OUT (m)	1,302	
IN (m)	1,043	
DRILLED (m)	259	
HOURS	35.5	
CONDITION	tripping	
AVG ROP (m/hr)	7 . 3	
WOB (x1000 lbs)	10 - 20	
RPM	90 - 120	
JET VEL (ft/sec)	256	
HHP @ BIT	56.00	

SURVEYS		
DEPTHS	Inc (deg)	Azimuth
MD/ (TVD)		

FORMATION DATA	
TRIP GAS (%)	
CONN.GAS (%)	
B.GAS (%)	
P.PRESS (ppg)	
ECD (ppg)	

TIME ANALYSIS	
1. MOVE RIG	
2. RIG UP	
3. DRILLING	17.5
4. BIT TRIP	5.5
5. WIPER TRIP	
6. SURVEY	
7. CIRC / COND	1
8. CHANGE BHA	
9. CASE & CEMENT	
10. WELLHEA w/ bushing	
11. BOP'S	
12. L.O.T.	
13. CORING	
14. LOGGING	
15. REAM / WASH	
16. FISH / STUCK	
17. LOSS CIRC	
18. KICK CONTROL	
19 COMPLETION	
20. REP. SUBSURFACE	
21. REP. SURFACE	
22. WELL TEST	
23. W.O. WEATHER	
24. WAIT - cement	
25. ABANDON / SUSP	
26. RIG DOWN	
27. W.O. CEMENT	
28. DRILL CEMENT	
29. RIG SERVICE	
30. SLIP & CUT LINE	
TOTAL	24

BHA.: # 2	Bit, nb stab,pony dc, s stab, 1 x 4 3/4"dc, s stab, 5 x 4 3/4"dc, 20 x 4 3/4"hwdp, Jars, 10 x 4 3/4"hwdp		
BHA WEIGHT :	30,000 lbs	STRING WT.:	75,000 lbs
DP RATING :	lbs - 'G' Grade	MARGIN :	lbs @ 75%
DP RATING :	lbs - 'S' Grade	MARGIN :	lbs @ 75%
TORQUE ON BTM :	amps	DRAG UP :	80,000 lbs
TORQUE OFF BTM :	amps	DRAG DOWN :	74,000 lbs

CONTINUED ../2

908262 068

DAILY DRILLING REPORT

RIG : OD & E 30

PERMIT : PPL-2 OTWAY BASIN

DATE:	18-May-99
REPORT No:	9
D.F.S:	6.55

WELL NAME: IONA OBS 2

STATUS @ 2400 HRS: Pulling out for Bit change & wiper trip.

FROM	TO	OBS 2 OBS 2	24 HOUR SUMMARY
00:00	3:30	3.5	Drilled from 1228 to 1235 m.
3:30	4:00	0.5	Circulated to clean balled bit.
4:00	18:00	14	Drilled to 1302 m.
18:00	18:30	0.5	Circulated hole clean.
18:30	24:00	5.5	Pulled out to 1236 m, circulate & work pipe in tight hole, ream & pull to1078 m, laying out
			19 singles of drill pipe.
			Incidents in last 24 Hours Y/N
			(If yes see separate report)
			- Weather : Dry Cold.

DOWNHOLE TOOLS		
Hours	Serial No.	Tool
61 . 5	3123	NB Stab
61 . 5	914	S Stab
61 . 5	A384	S Stab
61 . 5	1400-1074	Drlg Jars

FORMATION TOPS : Paaratte 647 m. Scull Creek 1006m, Nullawarre 1130 m.

OPERATION TO 0600 HRS : Pulling out, working tight hole, circulating & reaming, laying out pipe by singles.
38 joints pumped out , able to pull last 7 stands into shoe.

PROGRAM - NEXT 24 HRS : *Run in Drill to TD pull out, Log.*

TRANSPORTATION	
TRANSPORT-1	
TRANSPORT-2	
TRANSPORT-3	
FORKLIFT	
WATER HAULER	12
CRANE	

PERSONNEL	
CONTRACTOR	20
OPERATOR	2
SERVICE CO	16
TOTAL :	38

PROGRAMME COSTS	
DAILY Aus$:	
CUMULATIVE Aus$:	
REPORTED TO :	Colin Stuart
REPORTED BY :	W.Westman / J. Lambert

END OF REPORT

908262 069

DAILY DRILLING REPORT

RIG : OD & E 30

PERMIT : PPL-2 OTWAY BASIN

TUAUSTRALIA

WUGS Western Underground Storage Project

DATE:	19-May-99
REPORT No:	10
D.F.S:	7.55
SHOE F.I.T:	14.4

WELL NAME:	IONA OBS 2	STATUS @ 2400 HRS:	Pulling out to Log

DEPTH - 2400 HRS:	1,355 m	FORMATION:	Claystone,	KB - GL (m):	4.98
DEPTH - PREVIOUS:	1,302 m	HOLE SIZE:	6"	SHOE DEPTH:	626
24 HR PROGRESS:	53 m	ACCIDENTS:	NIL	LAST CASING:	7"
SAFETY MEETINGS:	working tight hole.				

MUD PROPERTIES		ADDITIVES
DENSITY (ppg)	9.2	Barafibre x 8
VISCOSITY	50	EZ - Mud x 2
pH	8 . 9	Pac - R x 1
PV / YP	13 / 26	Wallnut -F x 5
GELS 0/10	10 / 20	Barite x 45
WL API / FC (cc)	6.0	
SOLIDS %	4 . 7	
SAND %	0 . 05	
CHLORIDES	27,000	
KCL (% WT)	4 . 9	
MBT (ppb)	8	
Pm Pm/Mf	.I / . 85	
TEMP (degC)	39	
HOLE VOL (bbls)	139	
SURFACE VOL (bbls)	367	
HOLE LOSSES (bbls)	0	
MUD CO	Baroid	
MUD ENGINEER	T. Aung	

SOLIDS CONTROL		
UNIT	GPM / HRS	UF / OF
DESILTER	24	
DESANDER		
MUDCLEANER		
CENTRIFUGE	24	
SHAKER SCREENS:	140 x 110	140

INVENTORY	
BARITE	528 sx
GEL	42 sx
CEMENT	50 sx
SALT	sx
	sx
DRILLWATER	bbl
DIESEL FUEL	21,000 lts

PUMPS	1	2
TYPE	PZ-8	PZ-8
STROKE	8"	8"
LINER	6"	6"
SPM		125
PRESSURE		1800
GPM		320
AV (DP - ft/min)		300
AV (DC - ft/min)		520
SPR	35	35
SPR PRESS	440	440

DRILLS / BOP	17/05/99
LAST BOP DRILL	19-May-99
LAST FIRE DRILL	
LAST ABN.RIG DRILL	
LAST BOP TEST	14-May-99
NEXT BOP TEST	22-May-99
DAYS SINCE LAST LTA	102

BIT DATA		
BIT No.	3	3 RR
SIZE (ins)	6"	6"
TYPE	STR-09	STR-09
IADC CODE	4-3-7	4/03/07
SERIAL No.	N93YX	N93YX
NOZZLES	3 x 14	3 X 14
OUT (m)	1,302	1,355
IN (m)	1,043	1,302
DRILLED (m)	259	53
HOURS	35.5	7.5
CONDITION	tripping	2-4-E-IN
AVG ROP (m/hr)	7 . 3	7.00
WOB (x1000 lbs)	10 - 20	15
RPM	90 - 120	100
JET VEL (ft/sec)	256	215
HHP @ BIT	56.00	49

SURVEYS		
DEPTHS	Inc (deg)	Azimuth
MD/ (TVD)		

FORMATION DATA	
TRIP GAS (%)	
CONN.GAS (%)	
B.GAS (%)	
P.PRESS (ppg)	
ECD (ppg)	

TIME ANALYSIS	
1. MOVE RIG	
2. RIG UP	
3. DRILLING	7.5
4. BIT TRIP	7.5
5. WIPER TRIP	
6. SURVEY	
7. CIRC / COND	1
8. CHANGE BHA	0.5
9. CASE & CEMENT	
10. WELLHEA w/ bushing	
11. BOP'S	
12. L.O.T.	
13. CORING	
14. LOGGING	
15. REAM / WASH	7
16. FISH / STUCK	
17. LOSS CIRC	
18. KICK CONTROL	
19 COMPLETION	
20. REP. SUBSURFACE	
21. REP. SURFACE	
22. WELL TEST	
23. W.O. WEATHER	
24. WAIT - cement	
25. ABANDON / SUSP	
26. RIG DOWN	
27. W.O. CEMENT	
28. DRILL CEMENT	
29. RIG SERVICE	0.5
30. SLIP & CUT LINE	
TOTAL	24

BHA.: # 2	Bit, bs, xo, nmdc, stab,6 x 4 3/4"dc,		
	20 x 4 3/4"hwdp, Jars, 10 x 4 3/4"hwdp		
BHA WEIGHT :	30,000 lbs	STRING WT.:	76,000 lbs
DP RATING :	lbs - 'G' Grade	MARGIN :	lbs @ 75%
DP RATING :	lbs - 'S' Grade	MARGIN :	lbs @ 75%
TORQUE ON BTM :	amps	DRAG UP :	lbs
TORQUE OFF BTM :	amps	DRAG DOWN :	lbs

CONTINUED ../2

908262 070

DAILY DRILLING REPORT

RIG : OD & E 30

PERMIT : PPL-2 OTWAY BASIN

DATE:	19-May-99
REPORT No:	10
D.F.S:	7.55

WELL NAME: IONA OBS 2

STATUS @ 2400 HRS: Pulling out to Log.

FROM	TO	OBS 2 OBS 2	24 HOUR SUMMARY
00:00	5:00	5	Continued to pump out of hole,reaming & circulating to 819 m. hole tight all the way.
5:00	7:30	2.5	Continued to pull out to shoe.
7:30	8:00	0.5	Serviced Rig.
8:00	8:30	0.5	Pickup new BHA.
8:30	12:30	4	Run in to1286 m, wash & ream to 1302 m.
12:30	20:00	7.5	Drilled from 1302 to 1355 m.
20:00	20:30	0.5	Circulated hole clean.
20:30	21:00	0.5	Drop & pump down EMS survey.
21:00	22:30	1.5	Pulled to 1330 m, pumped out & ream from 1330 upto 1248 m.
22:30	24:00	1.5	Pulled out to 671 m, hole in good condition.

Incidents in last 24 Hours Y/N
(If yes see separate report)

- Weather : Dry Cold.

DOWNHOLE TOOLS

Hours	Serial No.	Tool
69	3123	NB Stab
69	914	S Stab
69	A384	S Stab
69	1400-1074	Drlg Jars

FORMATION TOPS : Paaratte 647 m. Scull Creek 1006m, Nullawarre 1130 m.Belfast 1215, Top C1 sand, 1290.

OPERATION TO 0600 HRS : Pulled out of hole, Rigged up Schlomberger, commenced to log.

PROGRAM - NEXT 24 HRS : *Log , Run in,circulate, lay out drill string prepare to run 4 1/2" casing.*

TRANSPORTATION	
TRANSPORT-1	
TRANSPORT-2	
TRANSPORT-3	
FORKLIFT	
WATER HAULER	
CRANE	

PERSONNEL	
CONTRACTOR	20
OPERATOR	2
SERVICE CO	16
TOTAL :	**38**

PROGRAMME COSTS	
DAILY Aus$:	
CUMULATIVE Aus$:	
REPORTED TO :	Colin Stuart
REPORTED BY :	W.Westman / J. Lambert

END OF REPORT

908262 071

DAILY DRILLING REPORT

RIG : OD & E 30

PERMIT : PPL-2 OTWAY BASIN

TU AUSTRALIA

WUGS Western Underground Storage Project

DATE:	20-May-99
REPORT No:	11
D.F.S:	8.55
SHOE F.I.T:	14.4

WELL NAME: IONA OBS 2 **STATUS @ 2400 HRS:** Pulling out laying down drill pipe

DEPTH - 2400 HRS:	1,355 m	FORMATION:		KB - GL (m):	4.98
DEPTH - PREVIOUS:	m	HOLE SIZE:	6"	SHOE DEPTH:	626
24 HR PROGRESS:	m	ACCIDENTS:	NIL	LAST CASING:	7"
SAFETY MEETINGS:					

MUD PROPERTIES		ADDITIVES
DENSITY (ppg)	9.2	Aldacide x 1
VISCOSITY	52	EZ - Mud x 2
pH	8 . 8	Baracarb x 5
PV / YP	12 / 24	Barite x 48
GELS 0/10	8 / 18	Soda ash x 1
WL API / FC (cc)	6.0	Bicarb soda x 1
SOLIDS %	4 . 9	
SAND %	0 . 05	
CHLORIDES	26,500	
KCL (% WT)	4 . 8	
MBT (ppb)	8	
Pm Pm/Mf	.I / . 85	
TEMP (degC)	30	
HOLE VOL (bbls)	139	
SURFACE VOL (bbls)	313	
HOLE LOSSES (bbls)	0	
MUD CO	Baroid	
MUD ENGINEER	T. Aung	

SOLIDS CONTROL		
UNIT	GPM / HRS	UF / OF
DESILTER	2	
DESANDER		
MUDCLEANER		
CENTRIFUGE	3	
SHAKER SCREENS:	140 x 110	140

INVENTORY	
BARITE	480 sx
GEL	42 sx
CEMENT	50 sx
SALT	sx
	sx
DRILLWATER	bbl
DIESEL FUEL	19,000 lts

PUMPS	1	2
TYPE	PZ-8	PZ-8
STROKE	8"	8"
LINER	6"	6"
SPM		
PRESSURE		
GPM		
AV (DP - ft/min)		
AV (DC - ft/min)		
SPR	35	35
SPR PRESS	440	440

DRILLS / BOP	17/05/99
LAST BOP DRILL	19-May-99
LAST FIRE DRILL	
LAST ABN.RIG DRILL	
LAST BOP TEST	14-May-99
NEXT BOP TEST	22-May-99
DAYS SINCE LAST LTA	103

BIT DATA		
BIT No.	3 RR	
SIZE (ins)	6"	
TYPE	STR-09	
IADC CODE	4-3-7	
SERIAL No.	N93YX	
NOZZLES	3 x 14	
OUT (m)	1,355	
IN (m)	1,043	
DRILLED (m)		
HOURS		
CONDITION		
AVG ROP (m/hr)		
WOB (x1000 lbs)		
RPM		
JET VEL (ft/sec)		
HHP @ BIT		

SURVEYS		
DEPTHS	Inc (deg)	Azimuth
MD/ (TVD)		

FORMATION DATA	
TRIP GAS (%)	
CONN.GAS (%)	
B.GAS (%)	
P.PRESS (ppg)	
ECD (ppg)	

TIME ANALYSIS	
1. MOVE RIG	
2. RIG UP	
3. DRILLING	
4. BIT TRIP	
5. WIPER TRIP	8.5
6. SURVEY	
7. CIRC / COND	1
8. CHANGE BHA	
9. CASE & CEMENT	
10. WELLHEA w/ bushing	
11. BOP'S	
12. L.O.T.	
13. CORING	
14. LOGGING	14.5
15. REAM / WASH	
16. FISH / STUCK	
17. LOSS CIRC	
18. KICK CONTROL	
19 COMPLETION	
20. REP. SUBSURFACE	
21. REP. SURFACE	
22. WELL TEST	
23. W.O. WEATHER	
24. WAIT - cement	
25. ABANDON / SUSP	
26. RIG DOWN	
27. W.O. CEMENT	
28. DRILL CEMENT	
29. RIG SERVICE	
30. SLIP & CUT LINE	
TOTAL	24

BHA.:

BHA WEIGHT :	lbs	STRING WT.:	lbs
DP RATING :	lbs - 'G' Grade	MARGIN :	lbs @ 75%
DP RATING :	lbs - 'S' Grade	MARGIN :	lbs @ 75%
TORQUE ON BTM :	amps	DRAG UP :	lbs
TORQUE OFF BTM :	amps	DRAG DOWN :	lbs

CONTINUED ../2

908262 072

DAILY DRILLING REPORT

RIG : OD & E 30

PERMIT : PPL-2 OTWAY BASIN

DATE:	20-May-99
REPORT No:	11
D.F.S:	8.55

WELL NAME: IONA OBS 2

STATUS @ 2400 HRS: Pulling out laying down drill pipe.

FROM	TO	OBS 2 OBS 3	24 HOUR SUMMARY
00:00	1:30	1.5	Continued to pull out of hole.
1:30	16:00	14.5	Log with Schlumberger. Run # 1 hals - peks - bhc. 3:00 to 6:00 hrs
			Run # 2 shdt 7:00 to 10:00 hrs
			Run # 3 sat 10:15 to 15:30 hrs.
16:00	19:00	3	Run in to 1315 m.
19:00	19:30	0.5	Wash & ream from 1315 to 1355 m. 2m of fill.
19:30	20:30	1	Circulated hole clean, conditioned mud.
20:30	24:00	3.5	Pull out laying down pipe.
			Incidents in last 24 Hours Y/N
			(If yes see separate report)
			- Weather : Dry Cold.

DOWNHOLE TOOLS		
Hours	Serial No.	Tool

FORMATION TOPS :

OPERATION TO 0600 HRS :

PROGRAM - NEXT 24 HRS : *Run & cement 4 1/2" casing.*

TRANSPORTATION	
TRANSPORT-1	
TRANSPORT-2	
TRANSPORT-3	
FORKLIFT	
WATER HAULER	
CRANE	

PERSONNEL	
CONTRACTOR	20
OPERATOR	2
SERVICE CO	16
TOTAL :	38

PROGRAMME COSTS	
DAILY Aus$:	
CUMULATIVE Aus$:	
REPORTED TO :	Colin Stuart
REPORTED BY :	W.Westman / J. Lambert

END OF REPORT

908262 073

TU AUSTRALIA

DAILY DRILLING REPORT

RIG : OD & E 30

PERMIT : PPL-2 OTWAY BASIN

WUGS Western Underground Storage Project

DATE:	21-May-99
REPORT No:	12
D.F.S:	9.55
SHOE F.I.T:	

WELL NAME:	IONA OBS 2	STATUS @ 2400 HRS:	Nipple up BOP
DEPTH - 2400 HRS:	1,355 m	FORMATION:	
DEPTH - PREVIOUS:	m	HOLE SIZE:	6"
24 HR PROGRESS:	m	ACCIDENTS:	NIL
SAFETY MEETINGS:			

KB - GL (m):	4.98
SHOE DEPTH:	1,355
LAST CASING:	4 1/2"

MUD PROPERTIES		ADDITIVES
DENSITY (ppg)		
VISCOSITY		Aldacide x 1
pH		
PV / YP		
GELS 0/10		
WL API / FC (cc)		
SOLIDS %		
SAND %		
CHLORIDES		
KCL (% WT)		
MBT (ppb)		
Pm Pm/Mf		
TEMP (degC)		
HOLE VOL (bbls)	66	
SURFACE VOL (bbls)		
HOLE LOSSES (bbls)		
MUD CO	Baroid	
MUD ENGINEER	T. Aung	

SOLIDS CONTROL		
UNIT	GPM / HRS	UF / OF
DESILTER		
DESANDER		
MUDCLEANER		
CENTRIFUGE		
SHAKER SCREENS:	140 x 110	140

INVENTORY	
BARITE	480 sx
GEL	42 sx
CEMENT	sx
SALT	sx
	sx
DRILLWATER	bbl
DIESEL FUEL	17,000 lts

PUMPS	1	2
TYPE	PZ-8	PZ-8
STROKE	8"	8"
LINER	6"	6"
SPM		
PRESSURE		
GPM		
AV (DP - ft/min)		
AV (DC - ft/min)		
SPR		
SPR PRESS		

DRILLS / BOP	17/05/99
LAST BOP DRILL	19-May-99
LAST FIRE DRILL	
LAST ABN.RIG DRILL	
LAST BOP TEST	14-May-99
NEXT BOP TEST	22-May-99
DAYS SINCE LAST LTA	104

BIT DATA		
BIT No.		
SIZE (ins)		
TYPE		
IADC CODE		
SERIAL No.		
NOZZLES		
OUT (m)		
IN (m)		
DRILLED (m)		
HOURS		
CONDITION		
AVG ROP (m/hr)		
WOB (x1000 lbs)		
RPM		
JET VEL (ft/sec)		
HHP @ BIT		

SURVEYS		
DEPTHS	Inc (deg)	Azimuth
MD/ (TVD)		

FORMATION DATA	
TRIP GAS (%)	
CONN.GAS (%)	
B.GAS (%)	
P.PRESS (ppg)	
ECD (ppg)	

TIME ANALYSIS	
1. MOVE RIG	
2. RIG UP	
3. DRILLING	
4. BIT TRIP	
5. WIPER TRIP	
6. SURVEY	
7. CIRC / COND	1.5
8. CHANGE BHA	
9. CASE & CEMENT	15
10. WELLHEA w/ bushing	2
11. BOP'S	5.5
12. L.O.T.	
13. CORING	
14. LOGGING	
15. REAM / WASH	
16. FISH / STUCK	
17. LOSS CIRC	
18. KICK CONTROL	
19 COMPLETION	
20. REP. SUBSURFACE	
21. REP. SURFACE	
22. WELL TEST	
23. W.O. WEATHER	
24. WAIT - cement	
25. ABANDON / SUSP	
26. RIG DOWN	
27. W.O. CEMENT	
28. DRILL CEMENT	
29. RIG SERVICE	
30. SLIP & CUT LINE	
TOTAL	24

BHA.:

BHA WEIGHT :	lbs	STRING WT.:	lbs
DP RATING :	lbs - 'G' Grade	MARGIN :	lbs @ 75%
DP RATING :	lbs - 'S' Grade	MARGIN :	lbs @ 75%
TORQUE ON BTM :	amps	DRAG UP :	lbs
TORQUE OFF BTM :	amps	DRAG DOWN :	lbs

CONTINUED ../2

TU AUSTRALIA

DAILY DRILLING REPORT

RIG : OD & E 30

PERMIT : PPL-2 OTWAY BASIN

DATE:	21-May-99
REPORT No:	12
D.F.S:	9.55

WELL NAME: IONA OBS 2 **STATUS @ 2400 HRS:** Nipple up BOP.

FROM	TO	OBS 2 OBS 2	24 HOUR SUMMARY
00:00	1:00	1	Pick up & break all Kelly connections, rack back.
1:00	3:00	2	Continued to pull out & lay down BHA.
3:00	4:00	1	Laid out Kelly.
4:00	5:00	1	Rigged up to ru 4 1/2" casing.
5:00	5:30	0.5	Pulled wear bushing.
5:30	12:00	6.5	Ran casing to 1335 m.
12:00	13:30	1.5	Reciprocate & circulated casing.
13:30	14:30	1	Safety meeting, rigged up HOWCO cementing lines.
14:30	16:30	2	Pressure test lines to 3000 psi, cement casing as per cementing report.
16:30	22:00	5.5	Pick up BOP, set slip & seal assembly, Rough cut 4 1/2" casing, laid out landing Joint, Nipple down BOP.
22:00	23:30	1.5	Final cut on casing stump, nipple up B section, energize & pressure test to 2000 psi.
23:30	24:00	0.5	Commenced to nipple up BOP.

Incidents in last 24 Hours Y/N
(If yes see separate report)

- Weather : Dry Cold.

DOWNHOLE TOOLS		
Hours	Serial No.	Tool

FORMATION TOPS :

OPERATION TO 0600 HRS : Nipple up BOP. Run in with scraper.

PROGRAM - NEXT 24 HRS : *Nipple up BOP Scraper runs , run cbl,*

TRANSPORTATION	
TRANSPORT-1	
TRANSPORT-2	
TRANSPORT-3	
FORKLIFT	
WATER HAULER	
CRANE	

PERSONNEL	
CONTRACTOR	20
OPERATOR	2
SERVICE CO	14
TOTAL :	36

PROGRAMME COSTS	
DAILY Aus$:	
CUMULATIVE Aus$:	
REPORTED TO :	Colin Stuart
REPORTED BY :	W.Westman / J. Lambert

END OF REPORT

908262 075

DAILY DRILLING REPORT

RIG : OD & E 30

PERMIT : PPL-2 OTWAY BASIN

TU AUSTRALIA — **WUGS** Western Underground Storage Project

DATE:	22-May-99
REPORT No:	12
D.F.S:	9.55
SHOE F.I.T:	

WELL NAME: IONA OBS 2 **STATUS @ 2400 HRS:** Run in with scraper

DEPTH - 2400 HRS:	1,355 m	FORMATION:		KB - GL (m):	4.98
DEPTH - PREVIOUS:	m	HOLE SIZE:		SHOE DEPTH:	1,355
24 HR PROGRESS:	m	ACCIDENTS:	NIL	LAST CASING:	4 1/2"
SAFETY MEETINGS:					

MUD PROPERTIES		ADDITIVES
DENSITY (ppg)	8.7	Baraklean x 2
VISCOSITY	27	Coat-2748 x 1
pH		KCL x 98
PV / YP		Pot hydrx x 2
GELS 0/10		
WL API / FC (cc)		
SOLIDS %		
SAND %		
CHLORIDES		
KCL (% WT)		
MBT (ppb)		
Pm Pm/Mf		
TEMP (degC)		
HOLE VOL (bbls)	66	
SURFACE VOL (bbls)	116	
HOLE LOSSES (bbls)		
MUD CO	Baroid	
MUD ENGINEER	T. Aung	

SOLIDS CONTROL		
UNIT	GPM / HRS	UF / OF
DESILTER		
DESANDER		
MUDCLEANER		
CENTRIFUGE		
SHAKER SCREENS:	140 x 110	140

INVENTORY	
BARITE	480 sx
GEL	42 sx
CEMENT	sx
SALT	sx
	sx
DRILLWATER	bbl
DIESEL FUEL	15,000 lts

PUMPS	1	2
TYPE	PZ-8	PZ-8
STROKE	8"	8"
LINER	6"	6"
SPM		
PRESSURE		
GPM		
AV (DP - ft/min)		
AV (DC - ft/min)		
SPR		
SPR PRESS		

DRILLS / BOP	17/05/99
LAST BOP DRILL	19-May-99
LAST FIRE DRILL	
LAST ABN.RIG DRILL	
LAST BOP TEST	14-May-99
NEXT BOP TEST	22-May-99
DAYS SINCE LAST LTA	105

BIT DATA		
BIT No.		
SIZE (ins)		
TYPE		
IADC CODE		
SERIAL No.		
NOZZLES		
OUT (m)		
IN (m)		
DRILLED (m)		
HOURS		
CONDITION		
AVG ROP (m/hr)		
WOB (x1000 lbs)		
RPM		
JET VEL (ft/sec)		
HHP @ BIT		

SURVEYS		
DEPTHS	Inc (deg)	Azimuth
MD/ (TVD)		

FORMATION DATA	
TRIP GAS (%)	
CONN.GAS (%)	
B.GAS (%)	
P.PRESS (ppg)	
ECD (ppg)	

TIME ANALYSIS	
1. MOVE RIG	
2. RIG UP	
3. DRILLING	
4. BIT TRIP	
5. WIPER TRIP	
6. SURVEY	
7. CIRC / COND	1
8. CHANGE BHA	
9. CASE & CEMENT	
10. WELLHEA w/ bushing	
11. BOP'S	3
12. L.O.T.	
13. CORING	
14. LOGGING	7
15. REAM / WASH	
16. FISH / STUCK	
17. LOSS CIRC	
18. KICK CONTROL	
19 COMPLETION	13
20. REP. SUBSURFACE	
21. REP. SURFACE	
22. WELL TEST	
23. W.O. WEATHER	
24. WAIT - cement	
25. ABANDON / SUSP	
26. RIG DOWN	
27. W.O. CEMENT	
28. DRILL CEMENT	
29. RIG SERVICE	
30. SLIP & CUT LINE	
TOTAL	24

BHA.:

BHA WEIGHT :	lbs	STRING WT.:	lbs
DP RATING :	lbs - 'G' Grade	MARGIN :	lbs @ 75%
DP RATING :	lbs - 'S' Grade	MARGIN :	lbs @ 75%
TORQUE ON BTM :	amps	DRAG UP :	lbs
TORQUE OFF BTM :	amps	DRAG DOWN :	lbs

CONTINUED ../2

908262 076

TU AUSTRALIA

DAILY DRILLING REPORT

RIG : OD & E 30

PERMIT : PPL-2 OTWAY BASIN

DATE:	22-May-99
REPORT No:	13
D.F.S:	10.55

WELL NAME: IONA OBS 2

STATUS @ 2400 HRS: Run in with scraper.

FROM	TO	OBS 2 OBS 2	24 HOUR SUMMARY
00:00	3:00	3	Nipple up BOP.
3:00	4:30	1.5	Prepare & measure 2 3/8" tubing.
4:30	12:00	7.5	Make up mill & scraper p/u tbg run in and tag FC at 1341m. work scraper over packer setting area.
12:00	13:00	1	Pump 20 bbls of detergent, Displace hole to brine.
13:00	16:30	3.5	Pulled out laying down 2 3/8" tubing.
16:30	19:30	3	Rigged up Schlumberger, run CBL
19:30	23:30	4	Perforate with schlumberger @ 1327.5 to 1332.5, @ 1302 to 1303.5. Rigged down schlum.
23:30	24:00	0.5	Make up mill & scraper, run in Picking up 2 3/8" tubing.

Incidents in last 24 Hours Y/N
(If yes see separate report)

- Weather : Rain

DOWNHOLE TOOLS		
Hours	Serial No.	Tool

FORMATION TOPS :

OPERATION TO 0600 HRS : Pulling scraper.

PROGRAM - NEXT 24 HRS : *Complete scraper run, run completion.*

TRANSPORTATION	
TRANSPORT-1	
TRANSPORT-2	
TRANSPORT-3	
FORKLIFT	
WATER HAULER	
CRANE	

PERSONNEL	
CONTRACTOR	20
OPERATOR	2
SERVICE CO	12
TOTAL :	**34**

PROGRAMME COSTS	
DAILY Aus$:	
CUMULATIVE Aus$:	
REPORTED TO :	Colin Stuart
REPORTED BY :	W.Westman / J. Lambert

END OF REPORT

908262 077

TU AUSTRALIA

DAILY DRILLING REPORT

RIG : OD & E 30

PERMIT : PPL-2 OTWAY BASIN

WUGS Western Underground Storage Project

DATE:	23-May-99
REPORT No:	14
D.F.S:	11.55
SHOE F.I.T:	

WELL NAME:	IONA OBS 2	STATUS @ 2400 HRS:	Rig released.
DEPTH - 2400 HRS:	1,355 m	FORMATION:	
DEPTH - PREVIOUS:	m	HOLE SIZE:	
24 HR PROGRESS:	m	ACCIDENTS:	NIL
SAFETY MEETINGS:			

KB - GL (m):	4.98
SHOE DEPTH:	1,355
LAST CASING:	4 1/2"

MUD PROPERTIES		ADDITIVES
DENSITY (ppg)		
VISCOSITY		
pH		
PV / YP		
GELS 0/10		
WL API / FC (cc)		
SOLIDS %		
SAND %		
CHLORIDES		
KCL (% WT)		
MBT (ppb)		
Pm Pm/Mf		
TEMP (degC)		
HOLE VOL (bbls)		
SURFACE VOL (bbls)		
HOLE LOSSES (bbls)		
MUD CO	Baroid	
MUD ENGINEER	T. Aung	

SOLIDS CONTROL		
UNIT	GPM / HRS	UF / OF
DESILTER		
DESANDER		
MUDCLEANER		
CENTRIFUGE		
SHAKER SCREENS:	140 x 110	140

INVENTORY	
BARITE	sx
GEL	sx
CEMENT	sx
SALT	sx
	sx
DRILLWATER	bbl
DIESEL FUEL	15,000 lts

PUMPS	1	2
TYPE	PZ-8	PZ-8
STROKE	8"	8"
LINER	6"	6"
SPM		
PRESSURE		
GPM		
AV (DP - ft/min)		
AV (DC - ft/min)		
SPR		
SPR PRESS		

DRILLS / BOP	17/05/99
LAST BOP DRILL	19-May-99
LAST FIRE DRILL	
LAST ABN.RIG DRILL	
LAST BOP TEST	14-May-99
NEXT BOP TEST	22-May-99
DAYS SINCE LAST LTA	106

BIT DATA		
BIT No.		
SIZE (ins)		
TYPE		
IADC CODE		
SERIAL No.		
NOZZLES		
OUT (m)		
IN (m)		
DRILLED (m)		
HOURS		
CONDITION		
AVG ROP (m/hr)		
WOB (x1000 lbs)		
RPM		
JET VEL (ft/sec)		
HHP @ BIT		

SURVEYS		
DEPTHS	Inc (deg)	Azimuth
MD/ (TVD)		

FORMATION DATA	
TRIP GAS (%)	
CONN.GAS (%)	
B.GAS (%)	
P.PRESS (ppg)	
ECD (ppg)	

TIME ANALYSIS	
1. MOVE RIG	
2. RIG UP	
3. DRILLING	
4. BIT TRIP	
5. WIPER TRIP	
6. SURVEY	
7. CIRC / COND	
8. CHANGE BHA	
9. CASE & CEMENT	
10. WELLHEA w/ bushing	
11. BOP'S	
12. L.O.T.	
13. CORING	
14. LOGGING	
15. REAM / WASH	
16. FISH / STUCK	
17. LOSS CIRC	
18. KICK CONTROL	
19 COMPLETION	
20. REP. SUBSURFACE	
21. REP. SURFACE	
22. WELL TEST	
23. W.O. WEATHER	
24. WAIT - cement	
25. ABANDON / SUSP	
26. RIG DOWN	
27. W.O. CEMENT	
28. DRILL CEMENT	
29. RIG SERVICE	
30. SLIP & CUT LINE	
TOTAL	

BHA.:

BHA WEIGHT :	lbs	STRING WT.:	lbs
DP RATING :	lbs - 'G' Grade	MARGIN :	lbs @ 75%
DP RATING :	lbs - 'S' Grade	MARGIN :	lbs @ 75%
TORQUE ON BTM :	amps	DRAG UP :	lbs
TORQUE OFF BTM :	amps	DRAG DOWN :	lbs

CONTINUED ../2

908262 078

DAILY DRILLING REPORT

RIG : OD & E 30

PERMIT : PPL-2 OTWAY BASIN

DATE:	23-May-99
REPORT No:	14
D.F.S:	11.55

WELL NAME: IONA OBS 2

STATUS @ 2400 HRS: Rig released

FROM	TO	OBS 2 OBS 2	24 HOUR SUMMARY
00:00	8:00	8	Scraper run, work scraper from 1340 upto 1292 m. pulled out laying down pipe.
8:00	11:00	3	Picked up & made up completion packer assembly, Rigged up and ran in with schlumberger.
			Set packer at 1304 m. Pulled out rigged down schlumberger.
11:00	3:30	2.5	Prepare 2 3/8" vam completion string.
3:30	20:00	6.5	Ran completion tubing, spaced out, latched in & landed with 12000 lbs compression.
			Installed B.P.V.
20:00	23:00	3	Nippled down BOP.
23:00	24:00	1	Nippled up X / mass tree, pressure tested seals to 3000 psi. RELEASED RIG 24:00 hrs.
			Incidents in last 24 Hours Y/N
			(If yes see separate report)
			- Weather : Rain

DOWNHOLE TOOLS		
Hours	Serial No.	Tool

FORMATION TOPS :

OPERATION TO 0600 HRS : Rigging down

PROGRAM - NEXT 24 HRS : *Rig released.*

TRANSPORTATION	
TRANSPORT-1	
TRANSPORT-2	
TRANSPORT-3	
FORKLIFT	
WATER HAULER	
CRANE	

PERSONNEL	
CONTRACTOR	20
OPERATOR	2
SERVICE CO	15
TOTAL :	37

PROGRAMME COSTS	
DAILY Aus$:	
CUMULATIVE Aus$:	
REPORTED TO :	Colin Stuart
REPORTED BY :	W.Westman / J. Lambert

END OF REPORT

APPENDIX 2

Definitive Survey by Sperry Sun/Gyrodata

Sperry-Sun Drilling Services

Survey Report for Iona Obs #2 : Definitive EMS Survey

Definitive Survey Report

Surveys down to 620.40m MD were recorded as inclination only surveys.
Surveys from 620.40m to 1351.50m MD were Electronic Multishot surveys.

Western Underground Gas Storage Pty. Ltd.
Iona

Iona Obs #2

Measured Depth (m)	Incl.	Azim.	Sub-Sea Depth (m)	Vertical Depth (m)	Local Coordinates Northings (m)	Local Coordinates Eastings (m)	Global Coordinates Northings (m)	Global Coordinates Eastings (m)	Dogleg Rate (°/30m)	Vertical Section (m)	Comment
0.00	0.000	0.000	-109.48	0.00	0.00 N	0.00 E	5728778.20 N	677216.00 E		0.00	
72.00	0.400	0.000	-37.48	72.00	0.25 N	0.00 E	5728778.45 N	677216.00 E	0.167	-0.11	
100.90	0.300	0.000	-8.58	100.90	0.43 N	0.00 E	5728778.63 N	677216.00 E	0.104	-0.18	
129.80	0.300	0.000	20.32	129.80	0.58 N	0.00 E	5728778.78 N	677216.00 E	0.000	-0.25	
158.60	0.200	0.000	49.12	158.60	0.70 N	0.00 E	5728778.90 N	677216.00 E	0.104	-0.30	
216.30	0.200	0.000	106.82	216.30	0.91 N	0.00 E	5728779.11 N	677216.00 E	0.000	-0.39	
245.20	0.200	0.000	135.72	245.20	1.01 N	0.00 E	5728779.21 N	677216.00 E	0.000	-0.43	
274.10	0.300	0.000	164.62	274.10	1.13 N	0.00 E	5728779.33 N	677216.00 E	0.104	-0.49	
302.90	0.300	0.000	193.42	302.90	1.28 N	0.00 E	5728779.48 N	677216.00 E	0.000	-0.55	
331.80	0.300	0.000	222.32	331.80	1.44 N	0.00 E	5728779.64 N	677216.00 E	0.000	-0.61	
360.60	0.400	0.000	251.12	360.60	1.61 N	0.00 E	5728779.81 N	677216.00 E	0.104	-0.69	
389.50	0.200	0.000	280.02	389.50	1.76 N	0.00 E	5728779.96 N	677216.00 E	0.208	-0.76	
418.40	0.200	0.000	308.92	418.40	1.86 N	0.00 E	5728780.06 N	677216.00 E	0.000	-0.80	
447.20	0.100	0.000	337.72	447.20	1.94 N	0.00 E	5728780.14 N	677216.00 E	0.104	-0.83	
476.10	0.300	0.000	366.62	476.10	2.04 N	0.00 E	5728780.24 N	677216.00 E	0.208	-0.87	
504.90	0.100	0.000	395.41	504.89	2.14 N	0.00 E	5728780.34 N	677216.00 E	0.208	-0.92	
562.70	0.200	0.000	453.21	562.69	2.29 N	0.00 E	5728780.49 N	677216.00 E	0.052	-0.98	
620.40	0.400	0.000	510.91	620.39	2.59 N	0.00 E	5728780.79 N	677216.00 E	0.104	-1.11	
649.20	0.200	234.603	539.71	649.19	2.67 N	0.04 W	5728780.87 N	677215.96 E	0.564	-1.10	
678.10	0.100	276.603	568.61	678.09	2.64 N	0.11 W	5728780.84 N	677215.89 E	0.148	-1.03	
707.00	0.200	234.003	597.51	706.99	2.61 N	0.17 W	5728780.81 N	677215.83 E	0.149	-0.96	
735.80	0.400	264.603	626.31	735.79	2.57 N	0.31 W	5728780.77 N	677215.69 E	0.260	-0.82	
762.70	0.500	224.803	653.21	762.69	2.48 N	0.49 W	5728780.68 N	677215.51 E	0.357	-0.62	
795.50	0.600	232.203	686.01	795.49	2.27 N	0.73 W	5728780.47 N	677215.27 E	0.112	-0.32	
822.40	0.600	243.603	712.91	822.39	2.13 N	0.96 W	5728780.33 N	677215.04 E	0.133	-0.04	

Continued...

Sperry-Sun Drilling Services

Survey Report for Iona Obs #2 : Definitive EMS Survey

Definitive Survey Report

Surveys down to 620.40m MD were recorded as inclination only surveys.
Surveys from 620.40m to 1351.50m MD were Electronic Multishot surveys.

Western Underground Gas Storage Pty. Ltd.
Iona

Iona Obs #2

Measured Depth (m)	Incl.	Azim.	Sub-Sea Depth (m)	Vertical Depth (m)	Local Coordinates Northings (m)	Local Coordinates Eastings (m)	Global Coordinates Northings (m)	Global Coordinates Eastings (m)	Dogleg Rate (°/30m)	Vertical Section (m)	Comment
851.30	0.700	231.803	741.81	851.29	1.95 N	1.24 W	5728780.15 N	677214.76 E	0.173	0.28	
880.10	0.400	211.503	770.61	880.09	1.75 N	1.43 W	5728779.95 N	677214.57 E	0.368	0.54	
937.90	0.600	227.203	828.40	937.88	1.38 N	1.76 W	5728779.58 N	677214.24 E	0.125	1.00	
966.70	0.600	237.803	857.20	966.68	1.19 N	1.99 W	5728779.39 N	677214.01 E	0.115	1.29	
1053.50	0.800	219.603	944.00	1053.48	0.48 N	2.77 W	5728778.68 N	677213.23 E	0.103	2.29	
1082.10	0.800	212.003	972.59	1082.07	0.16 N	3.00 W	5728778.36 N	677213.00 E	0.111	2.64	
1111.00	0.900	226.503	1001.49	1110.97	0.17 S	3.27 W	5728778.03 N	677212.73 E	0.245	3.03	
1139.90	1.000	211.303	1030.39	1139.87	0.54 S	3.57 W	5728777.66 N	677212.43 E	0.280	3.45	
1197.60	1.000	218.103	1088.08	1197.56	1.36 S	4.14 W	5728776.84 N	677211.86 E	0.062	4.32	
1226.40	1.000	206.403	1116.87	1226.35	1.79 S	4.41 W	5728776.41 N	677211.59 E	0.212	4.75	
1264.90	0.800	243.403	1155.37	1264.85	2.21 S	4.79 W	5728775.99 N	677211.21 E	0.469	5.28	
1291.25	0.526	241.064	1181.72	1291.20	2.35 S	5.07 W	5728775.85 N	677210.93 E	0.313	5.58	Top C1
1293.80	0.500	240.703	1184.27	1293.75	2.36 S	5.09 W	5728775.84 N	677210.91 E	0.313	5.61	
1304.35	0.500	240.666	1194.82	1304.30	2.41 S	5.17 W	5728775.79 N	677210.83 E	0.001	5.70	Top C2
1322.70	0.500	240.603	1213.17	1322.65	2.48 S	5.31 W	5728775.72 N	677210.69 E	0.001	5.86	
1327.15	0.515	240.225	1217.62	1327.10	2.50 S	5.34 W	5728775.70 N	677210.66 E	0.106	5.90	D
1351.50	0.600	238.503	1241.96	1351.44	2.62 S	5.54 W	5728775.58 N	677210.46 E	0.106	6.13	
1355.00	0.600	238.503	1245.46	1354.94	2.64 S	5.57 W	5728775.56 N	677210.43 E	0.000	6.17	Extrapolation to TD

Continued...

Sperry-Sun Drilling Services

Survey Report for Iona Obs #2 : Definitive EMS Survey

Definitive Survey Report

Surveys down to 620.40m MD were recorded as inclination only surveys.
Surveys from 620.40m to 1351.50m MD were Electronic Multishot surveys.

Iona Obs #2

Western Underground Gas Storage Pty. Ltd.
Iona

All data is in metres unless otherwise stated. Directions and coordinates are relative to Grid North.
Vertical depths are relative to RTE. Northings and Eastings are relative to Well.

Coordinate System is UTM Zone 54S on Australian Datum 1984, Meters.
Grid Convergence at Surface is -1.269°. Magnetic Convergence at Surface is -12.203° (25-May-99)

The Dogleg Severity is in Degrees per 30m.
Vertical Section is from Well and calculated along an Azimuth of 244.632° (Grid).

Based upon Minimum Curvature type calculations, at a Measured Depth of 1355.00m.,
The Bottom Hole Displacement is 6.17m., in the Direction of 244.632° (Grid).

Sperry-Sun Drilling Services

Survey Report for Iona Obs #2 : Definitive EMS Survey

Definitive Survey Report

Surveys down to 620.40m MD were recorded as inclination only surveys.
Surveys from 620.40m to 1351.50m MD were Electronic Multishot surveys.

Iona Obs #2

Western Underground Gas Storage Pty. Ltd.
Iona

Measured Depth (m)	Incl.	Azim.	Vertical Depth (m)	Local Coordinates Northings (m)	Local Coordinates Eastings (m)	Geographic Coordinates Latitude	Geographic Coordinates Longitude	Global Coordinates Northings (m)	Global Coordinates Eastings (m)
0.00	0.000	0.000	0.00	0.00 N	0.00 E	38.57166° S	143.03426° E	5728778.20 N	677216.00 E
72.00	0.400	0.000	72.00	0.25 N	0.00 E	38.57166° S	143.03426° E	5728778.45 N	677216.00 E
100.90	0.300	0.000	100.90	0.43 N	0.00 E	38.57166° S	143.03426° E	5728778.63 N	677216.00 E
129.80	0.300	0.000	129.80	0.58 N	0.00 E	38.57165° S	143.03426° E	5728778.78 N	677216.00 E
158.60	0.200	0.000	158.60	0.70 N	0.00 E	38.57165° S	143.03426° E	5728778.90 N	677216.00 E
216.30	0.200	0.000	216.30	0.91 N	0.00 E	38.57165° S	143.03426° E	5728779.11 N	677216.00 E
245.20	0.200	0.000	245.20	1.01 N	0.00 E	38.57165° S	143.03426° E	5728779.21 N	677216.00 E
274.10	0.300	0.000	274.10	1.13 N	0.00 E	38.57165° S	143.03426° E	5728779.33 N	677216.00 E
302.90	0.300	0.000	302.90	1.28 N	0.00 E	38.57165° S	143.03426° E	5728779.48 N	677216.00 E
331.80	0.300	0.000	331.80	1.44 N	0.00 E	38.57165° S	143.03426° E	5728779.64 N	677216.00 E
360.60	0.400	0.000	360.60	1.61 N	0.00 E	38.57165° S	143.03426° E	5728779.81 N	677216.00 E
389.50	0.200	0.000	389.50	1.76 N	0.00 E	38.57164° S	143.03426° E	5728779.96 N	677216.00 E
418.40	0.200	0.000	418.40	1.86 N	0.00 E	38.57164° S	143.03426° E	5728780.06 N	677216.00 E
447.20	0.100	0.000	447.20	1.94 N	0.00 E	38.57164° S	143.03426° E	5728780.14 N	677216.00 E
476.10	0.300	0.000	476.10	2.04 N	0.00 E	38.57164° S	143.03426° E	5728780.24 N	677216.00 E
504.90	0.100	0.000	504.89	2.14 N	0.00 E	38.57164° S	143.03426° E	5728780.34 N	677216.00 E
562.70	0.200	0.000	562.69	2.29 N	0.00 E	38.57164° S	143.03426° E	5728780.49 N	677216.00 E
620.40	0.400	0.000	620.39	2.59 N	0.00 E	38.57164° S	143.03426° E	5728780.79 N	677216.00 E
649.20	0.200	234.603	649.19	2.67 N	0.04 W	38.57164° S	143.03426° E	5728780.87 N	677215.96 E
678.10	0.100	276.603	678.09	2.64 N	0.11 W	38.57164° S	143.03425° E	5728780.84 N	677215.89 E
707.00	0.200	234.003	706.99	2.61 N	0.17 W	38.57164° S	143.03425° E	5728780.81 N	677215.83 E
735.80	0.400	264.603	735.79	2.57 N	0.31 W	38.57164° S	143.03425° E	5728780.77 N	677215.69 E
762.70	0.500	224.803	762.69	2.48 N	0.49 W	38.57164° S	143.03425° E	5728780.68 N	677215.51 E
795.50	0.600	232.203	795.49	2.27 N	0.73 W	38.57164° S	143.03425° E	5728780.47 N	677215.27 E
822.40	0.600	243.603	822.39	2.13 N	0.96 W	38.57164° S	143.03425° E	5728780.33 N	677215.04 E

Continued...

Sperry-Sun Drilling Services

Survey Report for Iona Obs #2 : Definitive EMS Survey

Definitive Survey Report

Surveys down to 620.40m MD were recorded as inclination only surveys.
Surveys from 620.40m to 1351.50m MD were Electronic Multishot surveys.

Western Underground Gas Storage Pty. Ltd.
Iona

Iona Obs #2

Measured Depth (m)	Incl.	Azim.	Vertical Depth (m)	Local Coordinates Northings (m)	Local Coordinates Eastings (m)	Geographic Coordinates Latitude	Geographic Coordinates Longitude	Global Coordinates Northings (m)	Global Coordinates Eastings (m)
851.30	0.700	231.803	851.29	1.95 N	1.24 W	38.57164° S	143.03424° E	5728780.15 N	677214.76 E
880.10	0.400	211.503	880.09	1.75 N	1.43 W	38.57164° S	143.03424° E	5728779.95 N	677214.57 E
937.90	0.600	227.203	937.88	1.38 N	1.76 W	38.57165° S	143.03424° E	5728779.58 N	677214.24 E
966.70	0.600	237.803	966.68	1.19 N	1.99 W	38.57165° S	143.03423° E	5728779.39 N	677214.01 E
1053.50	0.800	219.603	1053.48	0.48 N	2.77 W	38.57166° S	143.03422° E	5728778.68 N	677213.23 E
1082.10	0.800	212.003	1082.07	0.16 N	3.00 W	38.57166° S	143.03422° E	5728778.36 N	677213.00 E
1111.00	0.900	226.503	1110.97	0.17 S	3.27 W	38.57166° S	143.03422° E	5728778.03 N	677212.73 E
1139.90	1.000	211.303	1139.87	0.54 S	3.57 W	38.57167° S	143.03422° E	5728777.66 N	677212.43 E
1197.60	1.000	218.103	1197.56	1.36 S	4.14 W	38.57167° S	143.03421° E	5728776.84 N	677211.86 E
1226.40	1.000	206.403	1226.35	1.79 S	4.41 W	38.57168° S	143.03421° E	5728776.41 N	677211.59 E
1264.90	0.800	243.403	1264.85	2.21 S	4.79 W	38.57168° S	143.03420° E	5728775.99 N	677211.21 E
1293.80	0.500	240.703	1293.75	2.36 S	5.09 W	38.57168° S	143.03420° E	5728775.84 N	677210.91 E
1322.70	0.500	240.603	1322.65	2.48 S	5.31 W	38.57168° S	143.03420° E	5728775.72 N	677210.69 E
1351.50	0.600	238.503	1351.44	2.62 S	5.54 W	38.57168° S	143.03419° E	5728775.58 N	677210.46 E
1355.00	0.600	238.503	1354.94	2.64 S	5.57 W	38.57169° S	143.03419° E	5728775.56 N	677210.43 E

All data is in metres unless otherwise stated. Directions and coordinates are relative to Grid North.
Vertical depths are relative to RTE. Northings and Eastings are relative to Well.

Coordinate System is UTM Zone 54S on Australian Datum 1984, Meters.
Grid Convergence at Surface is -1.269°. Magnetic Convergence at Surface is -12.203° (25-May-99)

Based upon Minimum Curvature type calculations, at a Measured Depth of 1355.00m.,
The Bottom Hole Displacement is 6.17m., in the Direction of 244.632° (Grid).

Continued...

Sperry-Sun Drilling Services

Survey Report for Iona Obs #2 : Definitive EMS Survey

Definitive Survey Report

Surveys down to 620.40m MD were recorded as inclination only surveys.
Surveys from 620.40m to 1351.50m MD were Electronic Multishot surveys.

Western Underground Gas Storage Pty. Ltd.
Iona

Iona Obs #2

Comments

Measured Depth (m)	Station Coordinates TVD (m)	Northings (m)	Eastings (m)	Comment
1355.00	1354.94	2.64 S	5.57 W	Extrapolation to TD

Formation Tops

Measured Depth (m)	Vertical Depth (m)	Sub-Sea Depth (m)	Northings (m)	Eastings (m)	Formation Name
1291.25	1291.20	1181.72	2.35 S	5.07 W	Top C1
1304.35	1304.30	1194.82	2.41 S	5.17 W	Top C2
1327.15	1327.10	1217.62	2.50 S	5.34 W	D

APPENDIX 3

Cuttings Descriptions

Depth (mRT)	Lithol. (%)	Cuttings Description Sheet Western Underground Gas Storage Pty Ltd Well: Iona Obs-2 Permit: PPL-2 6" Hole Section (629 – 1355 mRT)
640	90	**ARENACEOUS CLAYSTONE:** medium to dark greenish grey to brownish grey in part, firm to moderately hard, abundant quartz silt to fine sand, nil to trace carbonaceous specks, minor to common glauconite pellets oxidised and ferruginised in part, trace to minor nodular pyrite, trace to rare mica flakes, trace skeletal fragments, slightly calcareous.
	10	**SANDSTONE:** light grey to light brownish grey, clear to translucent grains, unconsolidated, loose, predominantly medium to coarse grains, sub angular to sub rounded occasionally rounded and polished with ferruginous staining, low to moderate sphericity, moderate to well sorted quartz, trace to rare nodular pyrite, good to excellent inferred porosity. No shows.
		Note: 10 percent cement contamination
650	70	**ARENACEOUS CLAYSTONE:** as above
	30	**SANDSTONE:** as above
		Note: 10 percent cement contamination
654	80	**SANDSTONE:** light grey to light brownish grey, clear to translucent grains, unconsolidated to friable, predominantly medium occasionally coarse grains, sub angular to sub rounded occasionally rounded, moderate sphericity, poorly to moderately sorted quartz, rare to minor multicoloured, orange, blue, hard lithic volcanic? and siliceous grains, trace to rare nodular pyrite, nil to trace calcareous, moderate to good inferred porosity. No fluorescence.
	20	**ARENACEOUS CLAYSTONE:** as above
657	70	**SANDSTONE:** as above
	30	**CLAYSTONE:** medium to light grey to brownish grey, very soft, dispersive, minor to common silt, minor very fine sand, minor pyritized coal specks, trace to rare mica
663	80	**SANDSTONE:** as above, predominantly very coarse, minor to common (>15 percent) lithics
	20	**CLAYSTONE:** as above
670	90	**SANDSTONE:** as above
	10	**CLAYSTONE:** as above
	tr	**COAL:** black, soft
680	80	**SANDSTONE:** as above, 10 percent multicoloured volcanic lithics
	20	**CLAYSTONE:** as above

Depth (mRT)	Lithol. (%)	Cuttings Description Sheet Western Underground Gas Storage Pty Ltd Well: Iona Obs-2 Permit: PPL-2 6" Hole Section (629 – 1355 mRT)
690	90	**SANDSTONE:** as above, 10 to 15 percent multicoloured volcanic lithics
	10	**CLAYSTONE:** as above
700	90	**SANDSTONE:** light grey to light brownish grey, clear to translucent grains, unconsolidated to friable, predominantly coarse grains grading to granule, sub angular to sub rounded occasionally rounded, moderate sphericity, poorly to moderately sorted quartz, trace to rare multicoloured, orange, blue, hard lithic volcanic? and siliceous grains, trace to rare nodular and cement pyrite, trace to rare brown mica, nil to trace calcareous, moderate to good inferred porosity. No fluorescence.
	10	**CLAYSTONE:** medium to light grey to brownish grey, very soft, dispersive, minor to common silt, minor very fine sand, minor pyritized coal specks, trace to rare mica
	tr	**COAL:** black, soft, pyritized
710	80	**SANDSTONE:** as above, grading to granule, abundant multicoloured grains
	20	**CLAYSTONE:** as above
720	90	**SANDSTONE:** as above, grading to granule, minor multicoloured grains
	10	**CLAYSTONE:** as above
730	90	**SANDSTONE:** as above, grading to granule, 30 percent multicoloured grains
	10	**CLAYSTONE:** as above
740	70	**SANDSTONE:** as above, grading to granule, minor pyrite cement, 10 percent multicoloured grains
	30	**CLAYSTONE:** as above
750	100	**SANDSTONE:** as above, grading to granule, trace multicoloured grains
	tr	**CLAYSTONE:** as above
760	90	**SANDSTONE:** as above
	10	**CLAYSTONE:** as above
		COAL: black, soft
770	80	**SANDSTONE:** as above, 10 percent multicoloured lithics
	20	**CLAYSTONE:** as above
780	90	**SANDSTONE:** as above, nil to trace multicoloured lithics

Depth (mRT)	Lithol. (%)	Cuttings Description Sheet Western Underground Gas Storage Pty Ltd Well: Iona Obs-2 Permit: PPL-2 6" Hole Section (629 – 1355 mRT)
	10	**CLAYSTONE:** as above, grading to white in part with thin carbonaceous laminations
790	80	**SANDSTONE:** as above
	20	**CLAYSTONE:** as above
800	100	**SANDSTONE:** light grey to light brownish grey, clear to translucent grains, unconsolidated to friable, predominantly coarse grains grading to granule, sub angular to sub rounded occasionally rounded, moderate sphericity, poorly to moderately sorted quartz, trace to rare nodular and cement pyrite, trace to rare brown mica, moderate to good inferred porosity. No fluorescence.
	tr	**CLAYSTONE:** medium to light grey to brownish grey, very soft, dispersive, minor to common silt, minor very fine sand, minor pyritized coal specks, trace to rare mica
810	80	**SANDSTONE:** as above
	20	**CLAYSTONE:** as above
820	70	**SANDSTONE:** as above, trace to rare siliceous cement
	30	**CLAYSTONE:** as above
830	90	**SANDSTONE:** as above
	10	**CLAYSTONE:** as above
840	80	**SANDSTONE:** as above
	20	**CLAYSTONE:** as above
850	70	**SANDSTONE:** as above
	30	**CLAYSTONE:** as above
850	70	**SANDSTONE:** as above
	30	**CLAYSTONE:** as above
860	80	**SANDSTONE:** as above
	20	**CLAYSTONE:** as above
870	90	**SANDSTONE:** as above occasional granule to pebble
	10	**CLAYSTONE:** as above
880	80	**SANDSTONE:** as above, to occasional granule to pebble
	20	**CLAYSTONE:** as above

Depth (mRT)	Lithol. (%)	Cuttings Description Sheet Western Underground Gas Storage Pty Ltd Well: Iona Obs-2 Permit: PPL-2 6" Hole Section (629 – 1355 mRT)
	tr	**COAL:** black, firm, pyritized
890	70	**SANDSTONE:** as above, minor nodular pyrite
	30	**CLAYSTONE:** as above
900	60	**SANDSTONE:** light grey to light brownish grey, clear to translucent grains, unconsolidated to friable, predominantly coarse grains grading to granule, sub angular to sub rounded occasionally rounded, moderate sphericity, poorly to moderately sorted quartz, trace to rare nodular and cement pyrite, trace to rare brown mica, moderate to good inferred porosity. No fluorescence.
	40	**CLAYSTONE:** medium to light grey to brownish grey, very soft, dispersive, minor to common silt, minor very fine sand, minor pyritized coal specks, trace to rare mica
	tr	**COAL:** black, firm, pyritized
910	80	**SANDSTONE:** as above.
	20	**CLAYSTONE:** as above
920	70	**SANDSTONE:** as above
	30	**CLAYSTONE:** as above
	tr	**COAL:** black, firm, pyritized
930	70	**SANDSTONE:** light grey to light brownish grey, clear to translucent grains, unconsolidated to friable to firm in part, predominantly very fine to medium occasionally coarse grains, sub angular to sub rounded occasionally rounded, moderate sphericity, poorly to moderately sorted quartz, minor to common white argillaceous and siliceous matrix, trace to rare nodular and cement pyrite, trace to rare brown mica, moderate to good inferred porosity. No fluorescence.
	30	**CLAYSTONE:** as above
940	70	**SANDSTONE:** as above
	30	**CLAYSTONE:** as above
950	70	**SANDSTONE:** as above
	30	**CLAYSTONE:** as above
960	60	**SANDSTONE:** as above
	40	**CLAYSTONE:** as above
970	60	**SANDSTONE:** as above, grading to granule

Depth (mRT)	Lithol. (%)	Cuttings Description Sheet Western Underground Gas Storage Pty Ltd Well: Iona Obs-2 Permit: PPL-2 6" Hole Section (629 – 1355 mRT)
	40	**CLAYSTONE:** as above
	tr	**COAL:** as above
980	70	**SANDSTONE:** as above, predominantly medium
	30	**CLAYSTONE:** as above
986	40	**SANDSTONE:** as above
Spot	60	**CLAYSTONE:** as above
988	70	**SANDSTONE:** as above, grading to granule
spot	30	**CLAYSTONE:** as above
990	40	**SANDSTONE:** light grey to light brownish grey, clear to translucent grains, unconsolidated to friable to firm in part, predominantly very fine to medium occasionally coarse grains, sub angular to sub rounded occasionally rounded, moderate sphericity, poorly to moderately sorted quartz, minor to common white argillaceous and siliceous matrix, common nodular and cement pyrite, trace to rare brown mica, moderate to good inferred porosity. No fluorescence.
	60	**CLAYSTONE:** medium to light grey to brownish grey, very soft, dispersive, minor to common silt, minor very fine sand, minor pyritized coal specks, trace to rare mica
992	60	**SANDSTONE:** light grey to light brownish grey, clear to translucent grains, firm to hard, predominantly very fine to fine occasionally coarse grains, sub angular to sub rounded occasionally rounded, moderate sphericity, poorly to moderately sorted quartz, minor to common white argillaceous, common siliceous matrix, common nodular and cement pyrite, trace to rare brown mica, poor to moderate inferred porosity. No fluorescence.
spot	40	**CLAYSTONE:** as above
1000	50	**SANDSTONE:** as above
	50	**CLAYSTONE:** as above
1004	30	**SANDSTONE:** as above
spot	70	**CLAYSTONE:** as above
1006	80	**CLAYSTONE:** as above
spot	20	**SANDSTONE:** as above
1008	80	**CLAYSTONE:** as above

Depth (mRT)	Lithol. (%)	Cuttings Description Sheet Western Underground Gas Storage Pty Ltd Well: Iona Obs-2 Permit: PPL-2 6" Hole Section (629 – 1355 mRT)
spot	20	**SANDSTONE:** as above
1010	80	**CLAYSTONE:** as above
	20	**SANDSTONE:** as above, very fine with minor dolomitic cement, trace glauconite
1020	100	**CLAYSTONE:** medium to light grey to brownish grey, very soft, dispersive, minor to common silt, common to abundant very fine to fine sand grading to Sandy Claystone in part, minor pyritized coal specks, trace to rare mica flakes
	tr	**SANDSTONE:** as above
1030	100	**SANDSTONE:** as above
	tr	**CLAYSTONE:** as above
1040	100	**CLAYSTONE:** medium to light grey to brownish grey, very soft, dispersive, minor to common silt, common to abundant very fine to fine sand grading to Sandy Claystone in part, minor pyritized coal specks, trace to rare mica flakes, trace glauconite
	trace	**SANDSTONE:** light grey to light brownish grey, clear to translucent grains, firm to hard, predominantly very fine to fine occasionally coarse grains, sub angular to sub rounded occasionally rounded, moderate sphericity, poorly to moderately sorted quartz, minor to common white argillaceous, common siliceous matrix, common nodular and cement pyrite, trace to rare brown mica, trace poor to moderate inferred porosity. No fluorescence.
1050	100	**CLAYSTONE:** as above
	tr	**SANDSTONE:** as above
		Note: common pipe scale contamination
1060	80	**CLAYSTONE:** as above
	20	**SANDSTONE:** as above
1070	90	**CLAYSTONE:** as above, common (10 percent) pyrite
	10	**SANDSTONE:** as above
1080	70	**CLAYSTONE:** as above, common (10 percent) pyrite
	20	**SANDSTONE:** as above
	10	**DOLOMITE:** yellowish brown to medium grey, hard, blocky, trace pyrite, trace carbonaceous, trace glauconite

Depth (mRT)	Lithol. (%)	Cuttings Description Sheet Western Underground Gas Storage Pty Ltd Well: Iona Obs-2 Permit: PPL-2 6" Hole Section (629 – 1355 mRT)
1090	90	**CLAYSTONE:** as above, common (10 percent) pyrite, cavings as above
	10	**SANDSTONE:** as above, grading to medium to coarse, trace to rare glauconite
	tr	**DOLOMITE:** as above
1100	90	**CLAYSTONE:** as above, common (10 percent) pyrite
	10	**SANDSTONE:** as above
	tr	**DOLOMITE:** as above
1106 spot	40	**CLAYSTONE:** medium to light grey to brownish grey to greenish grey, very soft, dispersive, minor to common silt, common to abundant very fine to fine sand grading to Sandy Claystone in part, minor pyritized coal specks, trace to rare mica flakes, abundant light green dispersed glauconite
	60	**SANDSTONE:** light grey to light brownish grey, clear to translucent grains, firm to hard, predominantly very fine to fine occasionally coarse grains, sub angular to sub rounded occasionally rounded, moderate sphericity, poorly to moderately sorted quartz, minor to common white argillaceous, common siliceous and dolomitic matrix, minor nodular and cement pyrite, rare glauconite, trace to rare brown mica, poor to moderate inferred porosity. No fluorescence.
1108 spot	70	**CLAYSTONE:** medium to light grey to brownish grey to greenish grey, very soft, dispersive, minor to common silt, common to abundant very fine to fine sand grading to Sandy Claystone in part, minor pyritized coal specks, trace to rare mica flakes, abundant light green dispersed glauconite
	30	**SANDSTONE:** light grey to light brownish grey, clear to translucent grains, firm to hard, predominantly very fine to fine occasionally coarse grains, sub angular to sub rounded occasionally rounded, moderate sphericity, poorly to moderately sorted quartz, minor to common white argillaceous, common siliceous and dolomitic matrix, minor nodular and cement pyrite, rare glauconite, trace to rare brown mica, poor to moderate inferred porosity. No fluorescence.
1110	90	**SANDY CLAYSTONE:** as above, light grey to greenish grey to white
spot	10	**SANDSTONE:** as above
1112	90	**CLAYSTONE:** as above, up to 40 percent white sandy claystone
spot	10	**SANDSTONE:** as above
1114	90	**CLAYSTONE:** as above, up to 10 percent white sandy claystone
spot	10	**SANDSTONE:** as above
1116	90	**CLAYSTONE:** as above, up to 20 percent white sandy claystone

Depth (mRT)	Lithol. (%)	Cuttings Description Sheet Western Underground Gas Storage Pty Ltd Well: Iona Obs-2 Permit: PPL-2 6" Hole Section (629 – 1355 mRT)
spot	10	**SANDSTONE:** as above
1118	100	**CLAYSTONE:** as above
spot	tr	**SANDSTONE:** as above
1120	100	**CLAYSTONE:** as above
spot	tr	**SANDSTONE:** as above
1122	100	**CLAYSTONE:** as above
spot	tr	**SANDSTONE:** as above
1124	100	**CLAYSTONE:** as above, up to 20 percent white sandy claystone
	tr	**SANDSTONE:** as above
1126	90	**CLAYSTONE:** as above, up to 20 percent white sandy claystone
	10	**SANDSTONE:** as above
1128	90	**CLAYSTONE:** as above, up to 20 percent white sandy claystone
	10	**SANDSTONE:** as above
1130	90	**SANDSTONE:** light greenish grey to light brownish grey grading to white, clear to translucent grains, loose to friable to sub blocky in part, predominantly very fine to fine, sub angular to sub rounded, moderate sphericity, well sorted quartz, minor to common white argillaceous matrix, nil to trace calcareous cement, common to abundant disseminated glauconite, trace to rare nodular pyrite cement, poor to moderate inferred porosity. No fluorescence.
spot	10	**CLAYSTONE:** medium to light grey to brownish grey to greenish grey, very soft, dispersive, minor to common silt, common to abundant very fine to fine sand grading to Sandy Claystone in part, minor pyritized coal specks, trace to rare mica flakes, abundant light green dispersed glauconite
1133	90	**SANDSTONE:** as above
spot	10	**CLAYSTONE:** as above
1140	100	**SANDSTONE:** as above
1150	100	**SANDSTONE:** as above, grading to yellowish brown
1160	100	**SANDSTONE:** as above
1170	100	**SANDSTONE:** as above
1180	90	**SANDSTONE:** as above, occasional coarse to granule

Depth (mRT)	Lithol. (%)	Cuttings Description Sheet Western Underground Gas Storage Pty Ltd Well: Iona Obs-2 Permit: PPL-2 6" Hole Section (629 – 1355 mRT)
	10	**CLAYSTONE:** as above, common glauconite
1190	100	**SANDSTONE:** as above, nil to minor argillaceous matrix
1200	100	**SANDSTONE:** as above, grading to glauconitic sandstone
1210	100	**SANDSTONE:** as above
1220	60	**SANDSTONE:** as above
	40	**CLAYSTONE:** medium to light grey to brownish grey, very soft, dispersive, minor to common silt, common to abundant very fine to fine sand grading to Sandy Claystone in part, minor pyritized coal specks, trace to rare mica flakes, trace glauconite
1222	80	**CLAYSTONE:** as above
spot	20	**SANDSTONE:** as above
1224	80	**CLAYSTONE:** as above
spot	20	**SANDSTONE:** as above
1228	90	**CLAYSTONE:** as above, abundant glauconite nodules
spot	10	**SANDSTONE:** as above
1230	70	**CLAYSTONE:** dark grey to brownish grey, very soft, dispersive, minor to common silt, abundant (20 to 30 percent) glauconite
	30	**SANDSTONE:** light greenish grey to light brownish grey grading to white, clear to translucent grains, loose to friable to sub blocky in part, predominantly very fine to fine, sub angular to sub rounded, moderate sphericity, well sorted quartz, minor to common white argillaceous matrix, nil to trace calcareous cement, common to abundant disseminated glauconite, trace to rare nodular pyrite cement, poor to moderate inferred porosity. No fluorescence.
1240	60	**CLAYSTONE:** as above
	40	**SANDSTONE:** as above
1248	80	**CLAYSTONE:** as above, grading to light brownish grey
	20	**SANDSTONE:** as above
		Note: change to 3 metre samples
1251	100	**CLAYSTONE:** as above, abundant glauconite
	tr	**SANDSTONE:** as above

Depth (mRT)	Lithol. (%)	Cuttings Description Sheet Western Underground Gas Storage Pty Ltd Well: Iona Obs-2 Permit: PPL-2 6" Hole Section (629 – 1355 mRT)
1254	100	**CLAYSTONE:** as above, abundant glauconite
	tr	**SANDSTONE:** as above
1257	100	**CLAYSTONE:** as above, abundant glauconite
	tr	**SANDSTONE:** as above
1260	100	**CLAYSTONE:** as above, abundant glauconite
	tr	**SANDSTONE:** as above
1263	100	**CLAYSTONE:** as above, abundant glauconite
1266	90	**CLAYSTONE:** as above, abundant glauconite
	10	**SANDSTONE:** as above
1269	80	**CLAYSTONE:** as above, abundant glauconite
	20	**SANDSTONE:** as above
1272	60	**CLAYSTONE:** as above, abundant glauconite
	40	**SANDSTONE:** as above
1275	70	**CLAYSTONE:** as above, abundant glauconite
	30	**SANDSTONE:** as above, predominantly very fine to fine
1278	70	**CLAYSTONE:** dark grey to brownish grey, very soft, dispersive, minor to common silt, abundant (20 to 30 percent) glauconite
	30	**SANDSTONE:** light greenish grey to light brownish grey grading to white, clear to translucent grains, loose to friable to sub blocky in part, predominantly very fine to fine, occasionally rounded, polished, very coarse to granule, sub angular to sub rounded, moderate sphericity, well sorted quartz, minor to common white argillaceous matrix, nil to trace calcareous cement, common to abundant disseminated glauconite, trace to rare nodular pyrite cement, poor to moderate inferred porosity. No fluorescence.
1281	60	**CLAYSTONE:** as above, abundant glauconite
	30	**SANDSTONE:** as above
	10	**DOLOMITE:** greyish orange to dark yellowish orange, hard, cemented, conchoidal fracture
1284	70	**CLAYSTONE:** as above, abundant glauconite
	20	**SANDSTONE:** as above

Depth (mRT)	Lithol. (%)	Cuttings Description Sheet Western Underground Gas Storage Pty Ltd Well: Iona Obs-2 Permit: PPL-2 6" Hole Section (629 – 1355 mRT)
	10	**DOLOMITE:** as above
1287	90	**CLAYSTONE:** as above, abundant glauconite
	10	**SANDSTONE:** as above
	tr	**DOLOMITE:** as above
1290	80	**CLAYSTONE:** as above, abundant glauconite
	20	**SANDSTONE:** light brownish grey to very light grey, fine to coarse, dominantly medium clear quartz, moderately to well sorted, subangular to subrounded, firm to friable, predominantly loose and unconsolidated, trace pyrite, excellent porosity, No shows.
	tr	**COAL:** black, moderately hard, brittle, abundant pyrite
1291 spot	60	**SANDSTONE:** light brownish grey to very light grey, fine to coarse, dominantly medium clear quartz, moderately to well sorted, subangular to subrounded, firm to friable, predominantly loose and unconsolidated, trace pyrite, excellent porosity Fluorescence: 5 percent, light blue, no cut, associated with coal fragments
	20	**CLAYSTONE:** medium to dark grey, firm, minor to common silt, minor to common coal specks, rare mica flakes, rare to minor pyrite
	20	**COAL:** black, moderately hard, brittle, abundant pyrite
1293	60	**SANDSTONE:** light brownish grey to very light grey, fine to coarse, dominantly medium clear quartz, moderately to well sorted, subangular to subrounded, firm to friable, predominantly loose and unconsolidated, trace pyrite, excellent porosity, No shows.
	30	**CLAYSTONE:** medium to dark grey, firm, minor to common silt, minor to common coal specks, rare mica flakes, rare to minor pyrite
	10	**COAL:** black, moderately hard, brittle, abundant pyrite
1296	90	**SANDSTONE:** as above, grading to very coarse to granule
	10	**CLAYSTONE:** as above
	tr	**COAL:** as above
1297 spot	90	**SANDSTONE:** as above, grading to very coarse to granule
	10	**CLAYSTONE:** as above
	tr	**COAL:** as above
1299	90	**SANDSTONE:** as above, grading to very coarse to granule

Depth (mRT)	Lithol. (%)	Cuttings Description Sheet Western Underground Gas Storage Pty Ltd Well: Iona Obs-2 Permit: PPL-2 6" Hole Section (629 – 1355 mRT)
	10	**CLAYSTONE:** as above
1301	100	**SANDSTONE:** as above, grading to very coarse to granule
spot	tr	**CLAYSTONE:** as above
1302	90	**SANDSTONE:** as above, grading to very coarse to granule
B.U.	10	**CLAYSTONE:** as above
1305	90	**SANDSTONE:** as above, grading to very coarse to granule
	10	**CLAYSTONE:** as above
1308	30	**SANDSTONE:** as above, grading to very coarse to granule
	70	**CLAYSTONE:** as above, common carbonaceous laminations
1311	70	**SANDSTONE:** as above
	30	**CLAYSTONE:** medium light grey to dark greenish grey to white to firm, rare to minor quartz silt, minor to common very fine sand, laminated with Arenaceous Claystone, white with black carbonaceous laminations, trace to rare disseminated and nodular glauconite, common coal specks, rare mica, trace to minor nodular pyrite
1314	60	**SANDSTONE:** as above, abundant white argillaceous matrix
	40	**CLAYSTONE:** as above,
1317	60	**SANDSTONE:** light brownish grey to very light grey, fine to coarse, dominantly medium clear quartz, moderately to well sorted, subangular to subrounded, firm to friable, predominantly loose and unconsolidated, trace pyrite, poor to moderate porosity, No shows.
	40	**CLAYSTONE:** medium light grey to dark grey to white, firm, rare to minor quartz silt, minor to common very fine sand, laminated with Arenaceous Claystone, white with black carbonaceous laminations, trace to rare disseminated and nodular glauconite, common coal specks, rare mica, trace to minor nodular pyrite
1320	50	**SANDSTONE:** as above, with abundant white argillaceous matrix
	50	**CLAYSTONE:** as above grading to **SILTY CLAYSTONE**
1323	30	**SANDSTONE:** as above
	70	**SILTY CLAYSTONE:** as above
1326	20	**SANDSTONE:** as above

Depth (mRT)	Lithol. (%)	Cuttings Description Sheet Western Underground Gas Storage Pty Ltd Well: Iona Obs-2 Permit: PPL-2 6" Hole Section (629 – 1355 mRT)
	80	**SILTY CLAYSTONE:** as above
1329	80	**SANDSTONE:** as above, rare to minor argillaceous matrix, excellent inferred porosity
	20	**SILTY CLAYSTONE:** as above
1332	20	**SANDSTONE:** as above
	80	**SILTY CLAYSTONE:** as above
1335	20	**SANDSTONE:** as above
	80	**SILTY CLAYSTONE:** as above
1338	40	**SANDSTONE:** as above
	60	**SILTY CLAYSTONE:** as above
1341	10	**SANDSTONE:** as above
	90	**SILTY CLAYSTONE:** as above, abundant carbonaceous laminations
1344	20	**SANDSTONE:** as above
	80	**SILTY CLAYSTONE:** as above
1347	10	**SANDSTONE:** as above
	90	**SILTY CLAYSTONE:** as above, predominantly white with argillaceous matrix
1350	10	**SANDSTONE:** as above
	90	**SILTY CLAYSTONE:** as above, predominantly white with argillaceous matrix
1353	60	**SANDSTONE:** as above, predominantly fine to medium
	40	**SILTY CLAYSTONE:** as above, predominantly white with argillaceous matrix
1355	40	**SANDSTONE:** as above
B.U.	60	**SILTY CLAYSTONE:** as above, predominantly white with argillaceous matrix

Depth (mRT)	Lithol. (%)	Cuttings Description Sheet Western Underground Gas Storage Pty Ltd Well: Iona Obs-2 Permit: PPL-2 6" Hole Section (629 – 1355 mRT)

TD of 6" hole section 1355 mRT reached at 19:45 hrs 19 May 1999

APPENDIX 4

Well Seismic Edit and Geogram Report by Schlumberger Seaco

Schlumberger
GeoQuest

WESTERN UNDERGROUND GAS STORAGE

IONA OBS-2

REPORT

WELL SEISMIC EDIT

AND GEOGRAM

FIELD	:	IONA
COUNTRY	:	AUSTRALIA
COORDINATES	:	143 20 '3.3684 " E 38 34'25.1724" S
	:	
LOCATION	:	VICTORIA
DATE OF VSP SURVEY	:	20-MAY-1999
REFERENCE NO.	:	561291

August 1999

IONA OBS-1 Borehole Seismic

IONA OBS-2 Borehole Seismic

List of Figures

List of Enclosures

Summary of Geophysical Listings

IONA OBS-2 Borehole Seismic

Introduction

Checkshot data was acquired with the Seismic Acquisition Tiool (SAT-A) in the IONA OBS-2 vertical onshore well on the 20th of MAY 1999. The IONA OBS-2 well is operated by **WESTERN UNDERGROUND GAS STORAGE**. A SM4 was used as the downhole geophone and the air gun (200 cu. in) was used as the source.

Processing of the data consisted of loading the raw data, editing bad shots, picking transit times, stacking and then applying corrections to Seismic Reference Depth (SRD) which in this case is at Mean Sea Level (MSL).

CONVENTION.

In the plots, each processing step is displayed according to the *SEG normal* polarity convention (1976) whereby an upgoing compressional wave, reflected by an increase of acoustic impedance with depth, is displayed as a white trough.

Data Acquisition

Table 1. Survey Parameters

Elevation of KB	109.48m above MSL
Elevation of DF	109.18 m above MSL
Elevation of GL	104.5 m above MSL
Level Interval	109.5-1355.0 VD MSL
Energy Source	Air gun
Source Offset	21m
Source Depth	101.5 m above MSL
Reference Sensor	Reference hydrophone
Hydrophone Offset	21 m
Hydrophone Depth	102 m above MSL
Source & Hyd. Azimuth	263 Degrees
Tool Type	200 cu. in. air gun
Tool Combination	Stand Alone
Number of Axis	3
Geophone Type	SM-4
Sampling Rate	1.0 ms
Recording Time	3.0 s
Acquisition Unit	MAXIS 500
Recording Format	DLIS

WELL SEISMIC EDIT

Each shot of the raw geophone data was evaluated and edited as necessary.

The good shots at each level were stacked, using a median stacking technique, to increase the signal to noise ratio of the data. The transit time of each trace was re-computed after stacking. Stacked Z component is displayed in Plot 1.

Data Quality

The overall quality of the data is good.

Transit Time Measurement

The transit time measured, Delta t , corresponds to a difference between arrivals recorded by surface and downhole sensors. The reference time (zero time) is the physical recording of the source signal by accelerometers (fire pulse) on the gun or sensors positioned near the source (reference hydrophone and surface geophone). In this case, the reference hydrophone was used as the reference. First break picking algorithms were used on both the reference hydrophone and the downhole geophone.

Correction to Datum

Seismic Reference Datum (SRD) is at Mean Sea Level (MSL).

The source was positioned in the pit at 21 m, 263 degrees from the wellhead. elevation is 101.5 m above MSL. The surface velocity (1617 m/s) from the gun to MSL was calculated using an uphole survey, supplied by the client.

Geophysical Airgun Report

The Geophysical Airgun Report listing contains all downhole seismic measurements obtained by analyzing stacked shots.

The level number, corresponding KB and SRD depth, observed (non-vertical) transit times and corrected (vertical) transit times from the source and from SRD are listed. Also included are average velocities between SRD and geophone together with level separation and corresponding transit times and finally interval velocities between levels. Vertical transit times have been corrected for the effects of geometry. The interval velocities listed are those computed from corrected (i.e. vertical) transit times.

Sonic Calibration Processing

Sonic Calibration

The aim of the sonic calibration is to reconcile seismic (checkshot) times and integrated sonic times for any given depth in a well. In the presence of checkshot data with scatter, the calibration always adjusts the sonic integrated times to match smoothed checkshot times.

A *drift* curve is determined by comparing an integrated sonic log transit time and vertical check shot times. The term drift is defined as the seismic time (from check shots) minus the sonic time (from integration of edited sonic). Commonly the word drift is used to identify the difference between sonic and seismic measurements either between two or more levels or over different zones in a well.

For a negative drift, $\frac{\Delta Drift}{\Delta Depth} < 0$ the sonic time is greater than the seismic time over a certain section of the log.

For a positive drift, $\frac{\Delta Drift}{\Delta Depth} > 0$ the sonic time is less than the seismic time over a certain section of the log.

The drift curve, between two levels, is then an indication of the error on the integrated sonic or an indication of the amount of correction required on the sonic to have the TTI of the corrected sonic match the check shot times.

Two methods of correction to the sonic log are used.

1. Uniform or block shift. This method applies a uniform correction to all the sonic values over the interval. This uniform correction is applied in the case of positive drift and is the average correction represented by the drift curve gradient expressed in µsec/ft .

2. ΔT Minimum. In the case of negative drift a second method is used, called ΔT minimum. This applies a differential correction to the sonic log, where it is assumed that the greatest amount of transit time error is caused by the lower velocity sections of the log. Over a given interval the method will correct only Δt values which are higher than a threshold, the Δt_{min} . Values of Δt which are lower than the threshold are not corrected. The correction is a reduction of the excess of Δt over Δt_{min}, $\Delta t - \Delta t_{min}$.

$\Delta t - \Delta t_{min}$ is reduced through multiplication by a reduction coefficient which remains constant over the interval. This reduction coefficient, named G, can be defined as:

$$G = 1 + \frac{Drift}{\int (\Delta t - \Delta t_{min}) dz}$$

Where *Drift* is the drift over the interval to be corrected and the value $\int (\Delta t - \Delta t_{min})dz$ is the time difference between the integrals of the two curves Δt and Δt_{min} only over the intervals where $\Delta t > \Delta t_{min}$.

Hence the corrected sonic: $\Delta t = G(\Delta t - \Delta t_{min}) + \Delta t_{min}$.

Open Hole Logs

The following table summarizes the availability of the sonic and density logs.

Log	Type	Interval
Sonic	Sonic data	602-1358mKB
Density	Density data	602-1358 mKB

Both sonic and density have been depth matched.
Density log was edited for washout in the interval 1037-1041 mKB and extended to the SRD level using constant value of 2.27 g/cc.

The gamma ray, deep resistivity and caliper logs have been included as correlation curves where they were available.

Sonic Calibration Output

Zone Set Data

This listing shows the depth of selected knees from KB and SRD together with the measured drift. The amount of sonic adjustment and the type of correction (block shift or Delta T Minimum) plus the corresponding reduction factor G if applicable are all printed out.

Sonic Adjustment Data

The Drift & Sonic Adjustment Report contains the basic comparison of raw seismic and edited sonic integrated times at checkshot levels.
The level number, measured depth and vertical depth for all levels, vertical checkshot times adjusted to SRD and corresponding integrated sonic times are compiled in the listing. The drift between two adjacent checkshot levels is listed in milliseconds and

the corrections to be applied to the sonic log in μsec/ m are also listed for all intervals between two adjacent levels

Drift Corrected Sonic Plot

The effect of the shifts listed in the Drift & Sonic Adjustment Report on the edited sonic log and the results of sonic adjustment for drift are graphically displayed on the Drift Corrected Sonic (Plot 5).

Velocity Report

The Average, RMS and interval velocities between two adjacent checkshot levels computed from corrected (adjusted) sonic log are listed in the Velocity Report with the sampling rate 2 ms.

Velosity Crossplot

Three velocities - Average, Interval, and Root Mean Square together with Time vs. Depth curve are computed for all checkshot levels. The results are plotted as a function of depth on the Velosity Crossplot.

Interval velocities (v_{int}) are those computed between two adjacent checkshot levels from corrected sonic logs and listed in the Velocity Report. Interval velocity is defined as

$$v_{int} = z_n - z_{n-1} \text{ over } t_n - t_{n-1}$$

where z_n is the depth of nth layer and t_n its corresponding integrated sonic time.

Average velocities (v_{ave}) are computed by dividing SRD depth of checkshots and their corresponding integrated sonic times from corrected sonic log.

$$v_{ave} = \frac{\sum v_n t_n}{\sum t_n}$$

Root Mean Square Velocity (v_{rms}) is computed from calibrated sonic logs by

$$v_{rms} = \sqrt{\frac{\sum v_n^2 t_n}{\sum t_n}}$$

where v_n is an interval velocity over some specific time increment Delta t_n of calibrated sonic log.

The Time vs. Depth Curve is the result of integration of the calibrated sonic log and is plotted as two way time (TWT) against depth.

Time to Depth Report

This listing is obtained from the calibrated sonic log. The results are listed against two way time (TWT) together with corresponding seismic datum (SRD) depths.Sampling rate is 1 ms.

Sonic Calibration Results

Plot 4, Velosity Crosssplot is a display of the sonic calibration output in 34" format.

Top of the sonic log was chosen as the start of the drift comutation.

The calculated drift was small and well defined exhibiting very little scatter. The drift curve as expected increases steadily to a cumulative value of 7.4 msec at TD.

Knees are selected from the raw drift curve and lithological boundaries marked by the well logs. The depths of the knees define the zones for the adjustment.
The selected drift at the knees, defines the amount of time adjustment to the sonic log in each zone.

Geogram Processing

Composite Display plots 2, 3 (Normal and Reversed Polarities correspondinly at scale 1 s : 20 cm) and 6 and 7 (normal and Reversed Polarities at scale 1s : 50 cm) were generated using 25, 30 and 35 Hz zero phase Ricker wavelets (the sonic log used to generate the Geograms was calibrated using first break transit-times).

GEOGRAM processing produces synthetic seismic traces based on reflection coefficients generated form sonic and density measurements in the well-bore. The steps in the processing chain are described below.

Depth to Time Conversion

Open hole logs are recorded from the bottom to top with a depth index. These data are converted to a two-way time index in order to match the seismic section.

Primary Reflection Coefficients

Sonic and density data are averaged over chosen time intervals (normally 2 or 4 milliseconds). Reflection coefficients are then computed using:

$$R = \frac{\rho_2 v_2 - \rho_1 v_1}{\rho_2 v_2 + \rho_1 v_1}$$

where:

ρ_1 = density of the layer above the reflection interface
ρ_2 = density of the layer below the reflection interface
v_1 = compressional wave velocity of the layer above the reflection interface
v_2 = compressional wave velocity of the layer below the reflection interface

This computation is done for each time interval to generate a set of primary reflection coefficients without transmission losses.

Primaries with Transmission Loss

Transmission loss on two-way attenuation coefficients is computed using:

$$A_n = (1 - R_1^2).(1 - R_2^2).(1 - R_3^2)...(1 - R_n^2)$$

A set of primary reflection coefficients with transmission loss is generated using:

$$Primary_n = R_n.A_{n-1}$$

Primaries plus Multiples

Multiples are computed from these input reflection coefficients using the transform technique from the top of the well to obtain the impulse response of the earth. The transform outputs primaries plus multiples.

Multiples Only

By subtracting previously calculated primaries form the above result we obtain multiples only.

Wavelet

A theoretical wavelet is chosen to use for convolution with the reflection coefficients previously generated. Choices available include:

Klauder wavelet
Ricker zero phase wavelet
Ricker minimum phase wavelet
Butterworth wavelet
User defined wavelet

Time variant Butterworth filtering can be applied after convolution.

Polarity Convention

Throughout this report the following polarity convention is used. An increase in acoustic impedance gives a positive reflection coefficient, is written to tape as a negative number and is displayed as a white trough under normal polarity. This is displayed in figure 1.

Convolution

The standard procedure of convolving the wavelet with reflection coefficients is performed; the output is the synthetic seismogram.

Geograms were generated with zero phase Ricker wavelets with central frequencies of 25 Hz, 30 Hz and 35 Hz. They are displayed in Plots 2, 3 and 6,7.

A Summary of Geophysical Listings

Four geophysical data listings are appended to this report. Following is a brief description of the format of each listing.

Well Seismic Report

1. Level number: the level number starting from the top level (includes any imposed shots).

2. Vertical depth form SRD: *dsrd*, the depth in metres from seismic reference datum.

3. Measured depth from KB: *dkb*, the depth in metres from kelly bushing.

4. Observed travel time HYD to GEO: *tim*0, the transit time picked form the stacked data by subtracting the surface sensor first break time from the downhole sensor first break time.

5. Vertical travel time SRD to GEO: *shtm*, is *timv* corrected for the vertical distance between source and datum.

6. Delta depth between shots: Δ*depth*, the vertical distance between each level.

7. Delta time between shots: Δ*time*, the difference in vertical travel time (*shtm*),between each level.

8. Interval velocity between shots: the average seismic velocity between each level, Δ*depth*/Δ*time*

9. Average velocity SRD to GEO: the average seismic velocity from datum to the corresponding checkshot level, $\frac{dsrd}{shtm}$.

Drift & Sonic Adjustment

Zone Set Data

1. Knee number: the knee number starting from the highest knee. (The first knees listed will generally be at SRD and the top of sonic. The drift imposed at these knees will normally be zero.)

2. Measured depth from KB: the depth in metres from kelly bushing

3. Vertical depth from SRD: the depth in metres from seismic reference datum.

4. Selected Drift at knee: the value of drift imposed at each knee.

5. Shift: the change in drift divided by the change in depth between any two levels.

6. Delta-T: see section 4 of report for an explanation of Δt_{min}.

7. Reuction factor G: see section 4 of report.

8. Selected Drift Gradient: the gradient of the imposed drift curve.

Sonic Adjustment Data

1. Measured depth from KB: the depth in metres from kelly bushing

2. Vertical depth from SRD: the depth in metres from seismic reference datum.

3. Vertical shot time SRD to GEO: the calculated vertical travel time from datum to downhole geophone.

4. Adjusted Sonic Time.

5. Computed drift at level: the checkshot time minus the integrated raw sonic time.

6. Residual Shot Time - Adjusted Sonic Time.

7. Adjusted Interval Velocity.

8. Adjusted RMS Velocity.

9. Adjusted Average Velocity.

Velocity Report

The data in this listing has been resampled in time.

1. Two way travel time from SRD: this is the index for the data in this listing. The first value is at SRD (0 millisecs) and the sampling rate is 2 millisecs.

2. Measured depth from KB: the depth from KB at each corresponding value of two way time.

3. Vertical depth from SRD: the vertical depth from SRD at each corresponding value of two way time.

4. Average velocity SRD to GEO: the vertical depth from SRD divided by half the two way time.

5. RMS velocity: the root mean square velocity from datum to the corresponding value of two way time.

$$v_{rms} = \sqrt{S_1^n v_i^2 t_i / S^n_1 t_i}$$

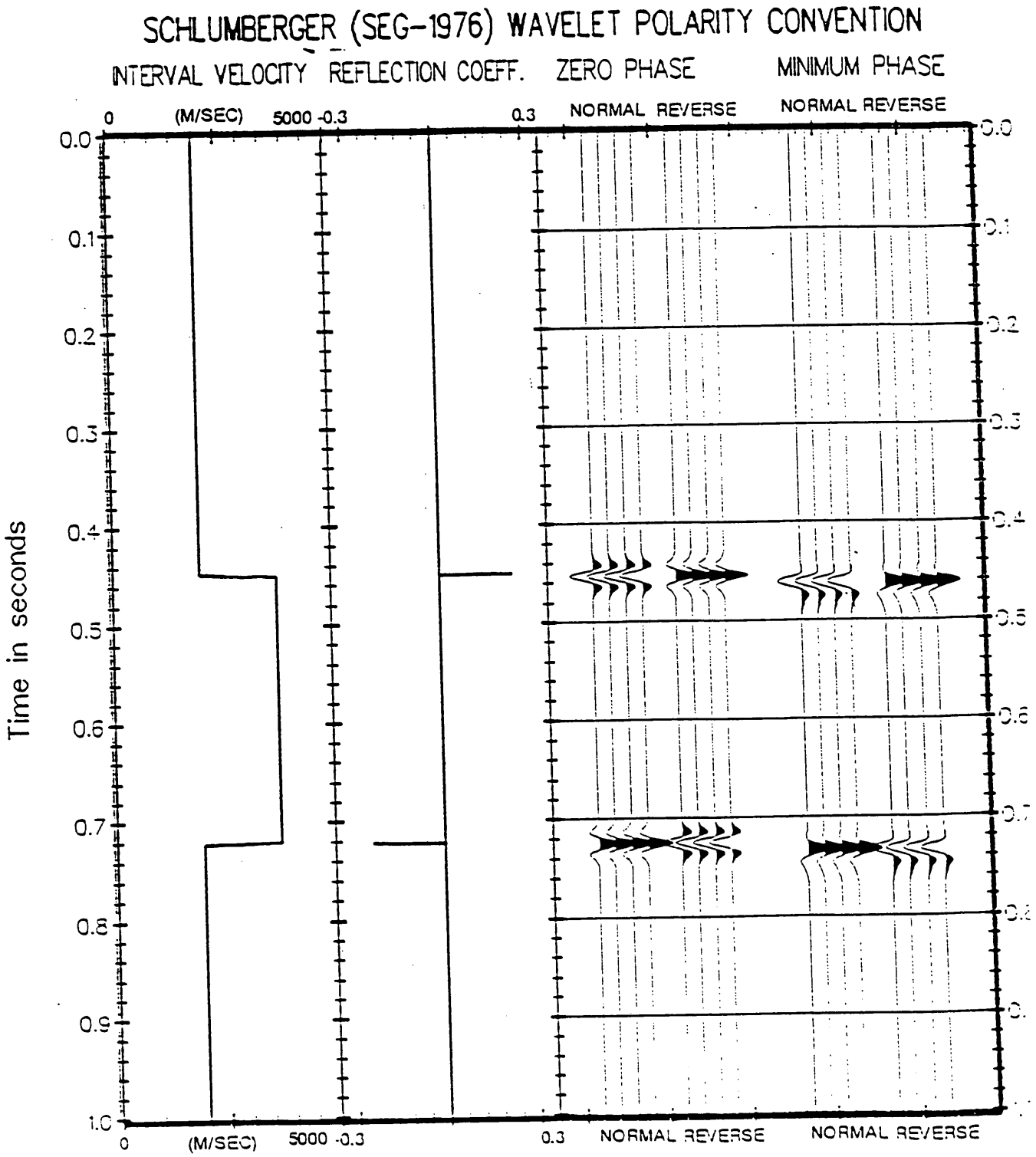
where v_i is the velocity between each 2 millisecs interval.

6. Interval velocity: the velocity between each sampled depth. Typically, the sampling rate is 2 millisecs two way time, (1 millisec one way time) therefore the interval velocity will be equal to the depth increment divided by 0.002. It is equivalent to column 9 from the Velocity Report.

Time to Depth

1. Two Way Sonic Time from SRD

2-11. Depth at Time 0-9 ms: moveout times every 1 ms


SCHLUMBERGER (SEG-1976) WAVELET POLARITY CONVENTION
INTERVAL VELOCITY
REFLECTION COEFF.
ZERO PHASE
MINIMUM PHASE
0
(M/SEC)
5000
-0.3
0.3
NORMAL
REVERSE
NORMAL
REVERSE
Time in seconds
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0

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GEOGRAM+
Well Seismic Report

DATE 8/3/99

Client and Well Information

Country	AUSTRALIA
State	VICTORIA
Logging Date	
Company	
Field	IONA
Well	IONA OBS #2

Check Shot Data

LEVEL NUMBER	VERTICAL DEPTH FROM SRD m	MEASURED DEPTH FROM KB m	OBSERVED TRAVEL TIME (owt) s	Vertical Transit Time-SRD (owt) s	DELTA DEPTH m	DELTA TIME s	ACOUSTIC INTERVAL VELOCITY m/s	ACOUSTIC AVERAGE VELOCITY m/s
1	0.0	109.5	0.0648	0.0010				1900
					158.5	0.0869	1824	
2	158.5	268.0	0.1509	0.0879				1803
					56.0	0.0265	2112	
3	214.5	324.0	0.1773	0.1145				1874
					186.0	0.0824	2258	
4	400.5	510.0	0.2595	0.1968				2035
					90.5	0.0377	2399	
5	491.0	600.5	0.2972	0.2346				2093
					52.5	0.0193	2726	
6	543.5	653.0	0.3164	0.2538				2141
					100.4	0.0375	2676	
7	643.9	753.4	0.3539	0.2913				2210
					66.1	0.0277	2386	
8	710.0	819.5	0.3816	0.3190				2226
					124.5	0.0443	2809	

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GEOGRAM+
Well Seismic Report

Check Shot Data (Continued)

LEVEL NUMBER	VERTICAL DEPTH FROM SRD m	MEASURED DEPTH FROM KB m	OBSERVED TRAVEL TIME (owt) s	Vertical Transit Time-SRD (owt) s	DELTA DEPTH m	DELTA TIME s	ACOUSTIC INTERVAL VELOCITY m/s	ACOUSTIC AVERAGE VELOCITY m/s
9	834.5	944.0	0.4259	0.3634				2297
					55.5	0.0215	2578	
10	890.0	999.5	0.4474	0.3849				2312
					45.9	0.0170	2704	
11	935.9	1045.4	0.4644	0.4019				2329
					11.6	0.0045	2583	
12	947.5	1057.0	0.4689	0.4063				2332
					73.0	0.0251	2907	
13	1020.5	1130.0	0.4940	0.4315				2365
					85.5	0.0306	2791	
14	1106.0	1215.5	0.5246	0.4621				2393
					29.5	0.0111	2649	
15	1135.5	1245.0	0.5357	0.4732				2399
					29.0	0.0108	2676	
16	1164.5	1274.0	0.5466	0.4841				2406
					17.2	0.0057	3014	
17	1181.7	1291.2	0.5523	0.4898				2413
					29.8	0.0099	3008	
18	1211.5	1321.0	0.5622	0.4997				2425
					34.0	0.0110	3080	
19	1245.5	1355.0	0.5732	0.5107				2439

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GEOGRAM+

Drift & Sonic Adjustment

DATE 8/3/99

Client and Well Information

Country	AUSTRALIA
State	VICTORIA
Logging Date	
Company	
Field	IONA
Well	IONA OBS #2

Knee and Zone Data

Raw Drift is computed at each shot level as

Shot Time - Sonic Time

From the raw drift curve, knees are selected. Knee depths define the zones for adjustment. Selected drift values define the amount of time adjustment to the sonic log in each zone.

When the gradient versus depth of the selected drift is POSITIVE, sonic velocities are deemed too fast. Sonic transit times are increased by a constant shift, the value of the selected drift gradient :

Adjusted DT = DT + Shift

When the gradient is NEGATIVE, sonic velocities are deemed too low. The excess sonic transit time over a threshold DT_Minimum is reduced by a constant reduction factor, G :

When DT < DT_Minimum Adjusted DT = DT

When DT > DT_Minimum Adjusted DT = G *(DT - DT_Minimum) + DT_Minimum

AFTER THE ADJUSTMENT OF THE SONIC LOG :

Residual is computed at each shot level as

Shot Time - Adjusted Sonic Time

It indicates how closely the adjustment has followed the shot times

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Drift & Sonic Adjustment

Zone Set Data

KNEE NUMBER	MEASURED DEPTH FROM KB m	VERTICAL DEPTH FROM SRD m	SELECTED DRIFT AT KNEE ms	SHIFT US/M	DELTA_T MINIMUM US/M	REDUCTION FACTOR G	SELECTED DRIFT GRADIENT US/M
1	652.3	542.9	-0.0004				
				8.4			8.4
2	658.6	549.1	-0.0003				
					350.7	0.66	-13.8
3	749.6	640.2	-0.0044				
				23.0			23.0
4	767.0	657.5	-0.0031				
				33.1			33.1
5	807.6	698.1	0.0014				
				20.5			20.5
6	823.7	714.2	0.0024				
					331.3	0.63	-16.0
7	862.7	753.2	0.0004				
					331.3	0.58	-16.0
8	879.0	769.6	-0.0005				
					331.3	0.63	-16.0
9	939.7	830.2	-0.0037				
				6.9			6.9
10	948.5	839.0	-0.0035				
				28.9			28.9
11	999.9	890.5	0.0014				
				4.7			4.7
12	1046.8	937.3	0.0021				

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Drift & Sonic Adjustment

Zone Set Data (Continued)

KNEE NUMBER	MEASURED DEPTH FROM KB m	VERTICAL DEPTH FROM SRD m	SELECTED DRIFT AT KNEE ms	SHIFT US/M	DELTA_T MINIMUM US/M	REDUCTION FACTOR G	SELECTED DRIFT GRADIENT US/M
				13.1			13.1
13	1056.0	946.5	0.0025				
					320.4	0.78	-7.0
14	1132.3	1022.8	0.0008				
				8.0			8.0
15	1213.2	1103.7	0.0029				
				16.2			16.2
16	1229.9	1120.4	0.0038				
				18.9			18.9
17	1291.8	1182.4	0.0076				
				63.1			63.1
18	1341.3	1231.8	0.0179				
				114.1			114.1
19	1358.2	1248.8	0.0242				

Sonic Adjustment Data

MEASURED DEPTH FROM KB m	VERTICAL DEPTH FROM SRD m	VERTICAL SHOT TIME ms	ADJUSTED SONIC TIME ms	RAW DRIFT SHOT - SONIC ms	RESIDUAL SHOT - ADJUSTED SONIC ms	ADJUSTED INTERVAL VELOCITY m/s	ADJUSTED RMS VELOCITY m/s	ADJUSTED AVERAGE VELOCITY m/s
109.5	0.0	0.0						
						2141		
109.5	0.0	1.0						
						2141		

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Drift & Sonic Adjustment

Sonic Adjustment Data (Continued)

MEASURED DEPTH FROM KB m	VERTICAL DEPTH FROM SRD m	VERTICAL SHOT TIME ms	ADJUSTED SONIC TIME ms	RAW DRIFT SHOT - SONIC ms	RESIDUAL SHOT - ADJUSTED SONIC ms	ADJUSTED INTERVAL VELOCITY m/s	ADJUSTED RMS VELOCITY m/s	ADJUSTED AVERAGE VELOCITY m/s
268.0	158.5	87.9					2210	2203
						2800		
324.0	214.5	114.5					2220	2213
						2411		
510.0	400.5	196.8					2274	2262
						2790		
600.5	491.0	234.6					2303	2289
						2787		
653.0	543.5	253.8	253.8	-0.0	-0.0		2317	2302
						3003		
753.4	643.9	291.3	291.6	-1.4	-0.3		2334	2318
						2559		
819.5	710.0	319.0	319.0	0.8	0.0		2347	2330
						2574		
944.0	834.5	363.4	363.6	-1.2	-0.2		2381	2362
						2822		
999.5	890.0	384.9	385.0	0.4	-0.1		2397	2376
						2860		
1045.4	935.9	401.9	402.0	0.6	-0.1		2404	2384
						2776		
1057.0	947.5	406.3	406.4	0.8	-0.1		2406	2385
						2490		
1130.0	1020.5	431.5	431.6	0.2	-0.1		2416	2396
						2559		
1215.5	1106.0	462.1	462.2	0.9	-0.1		2426	2405

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GEOGRAM+

Drift & Sonic Adjustment

Sonic Adjustment Data (Continued)

MEASURED DEPTH FROM KB m	VERTICAL DEPTH FROM SRD m	VERTICAL SHOT TIME ms	ADJUSTED SONIC TIME ms	RAW DRIFT SHOT - SONIC ms	RESIDUAL SHOT - ADJUSTED SONIC ms	ADJUSTED INTERVAL VELOCITY m/s	ADJUSTED RMS VELOCITY m/s	ADJUSTED AVERAGE VELOCITY m/s
						3058		
1245.0	1135.5	473.2	473.4	1.4	-0.1		2434	2412
						2558		
1274.0	1164.5	484.1	484.5	1.7	-0.4		2436	2415
						2616		
1291.2	1181.7	489.8	489.9	2.3	-0.1		2437	2416
						2529		
1321.0	1211.5	499.7	501.4	2.6	-1.7		2441	2420
						2729		
1355.0	1245.5	510.7	508.9	7.4	1.8			2450

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GEOGRAM+
Time To Depth Report

DATE 8/3/99

Client and Well Information

Country	AUSTRALIA
State	VICTORIA
Logging Date	
Company	
Field	IONA
Well	IONA OBS #2

Time To Depth Data

TWO WAY SONIC TIME FROM SRD ms	DEPTH AT TIME +0 ms m	DEPTH AT TIME +1 ms m	DEPTH AT TIME +2 ms m	DEPTH AT TIME +3 ms m	DEPTH AT TIME +4 ms m	DEPTH AT TIME +5 ms m	DEPTH AT TIME +6 ms m	DEPTH AT TIME +7 ms m	DEPTH AT TIME +8 ms m	DEPTH AT TIME +9 ms m
0	1.0	2.0	3.1	4.2	5.2	6.3	7.4	8.4	9.5	10.6
10	11.6	12.7	13.8	14.8	16.0	17.1	18.2	19.2	20.3	21.4
20	22.4	23.5	24.6	25.6	26.7	27.8	28.8	29.9	31.0	32.0
30	33.1	34.2	35.2	36.3	37.4	38.4	39.5	40.6	41.6	42.7
40	43.8	44.8	45.9	47.0	48.0	49.1	50.2	51.2	52.3	53.4
50	54.4	55.5	56.6	57.6	58.7	59.8	61.0	62.1	63.1	64.2
60	65.3	66.3	67.4	68.5	69.5	70.6	71.7	72.7	73.8	74.9
70	75.9	77.0	78.1	79.1	80.2	81.3	82.3	83.4	84.5	85.5
80	86.6	87.7	88.7	89.8	90.9	91.9	93.0	94.1	95.1	96.2
90	97.3	98.3	99.4	100.5	101.5	102.6	103.7	104.9	106.0	107.0
100	108.1	109.2	110.2	111.3	112.4	113.4	114.5	115.6	116.6	117.7
110	118.8	119.8	120.9	122.0	123.0	124.1	125.2	126.2	127.3	128.4
120	129.4	130.5	131.6	132.6	133.7	134.8	135.8	136.9	138.0	139.0
130	140.1	141.2	142.2	143.3	144.4	145.4	146.5	147.6	148.6	149.8
140	150.9	152.0	153.0	154.1	155.2	156.2	157.3	158.4	159.4	160.5

Schlumberger

GEOGRAM+

Time To Depth Report

Time To Depth Data (Continued)

TWO WAY SONIC TIME FROM SRD ms	DEPTH AT TIME +0 ms m	DEPTH AT TIME +1 ms m	DEPTH AT TIME +2 ms m	DEPTH AT TIME +3 ms m	DEPTH AT TIME +4 ms m	DEPTH AT TIME +5 ms m	DEPTH AT TIME +6 ms m	DEPTH AT TIME +7 ms m	DEPTH AT TIME +8 ms m	DEPTH AT TIME +9 ms m
150	161.6	162.6	163.7	164.8	165.8	166.9	168.0	169.0	170.1	171.2
160	172.2	173.3	174.4	175.4	176.5	177.6	178.6	179.7	180.8	181.8
170	182.9	184.0	185.1	186.1	187.2	188.3	189.3	190.4	191.5	192.5
180	193.6	194.8	195.9	196.9	198.0	199.1	200.1	201.2	202.3	203.3
190	204.4	205.5	206.5	207.6	208.7	209.7	210.8	211.9	212.9	214.0
200	215.1	216.1	217.2	218.3	219.3	220.4	221.5	222.5	223.6	224.7
210	225.7	226.8	227.9	228.9	230.0	231.1	232.1	233.2	234.3	235.3
220	236.4	237.5	238.7	239.8	240.8	241.9	243.0	244.0	245.1	246.2
230	247.2	248.3	249.4	250.4	251.5	252.6	253.6	254.7	255.8	256.8
240	257.9	259.0	260.0	261.1	262.2	263.2	264.3	265.4	266.4	267.5
250	268.6	269.6	270.7	271.8	272.8	273.9	275.0	276.0	277.1	278.2
260	279.2	280.3	281.4	282.4	283.6	284.7	285.8	286.8	287.9	289.0
270	290.1	291.1	292.2	293.3	294.3	295.4	296.5	297.5	298.6	299.7
280	300.7	301.8	302.9	303.9	305.0	306.1	307.1	308.2	309.3	310.3
290	311.4	312.5	313.5	314.6	315.7	316.7	317.8	318.9	319.9	321.0
300	322.1	323.1	324.2	325.3	326.3	327.5	328.6	329.7	330.7	331.8
310	332.9	333.9	335.0	336.1	337.1	338.2	339.3	340.3	341.4	342.5
320	343.5	344.6	345.7	346.7	347.8	348.9	349.9	351.0	352.1	353.1
330	354.2	355.3	356.3	357.4	358.5	359.5	360.6	361.7	362.7	363.8
340	364.9	365.9	367.0	368.1	369.1	370.2	371.3	372.5	373.6	374.6
350	375.7	376.8	377.8	378.9	380.0	381.0	382.1	383.2	384.2	385.3
360	386.4	387.4	388.5	389.6	390.6	391.7	392.8	393.8	394.9	396.0
370	397.0	398.1	399.2	400.2	401.3	402.4	403.4	404.5	405.6	406.6
380	407.7	408.8	409.8	410.9	412.0	413.0	414.1	415.2	416.2	417.5

Schlumberger

GEOGRAM+
Time To Depth Report

Time To Depth Data (Continued)

TWO WAY SONIC TIME FROM SRD ms	DEPTH AT TIME +0 ms m	DEPTH AT TIME +1 ms m	DEPTH AT TIME +2 ms m	DEPTH AT TIME +3 ms m	DEPTH AT TIME +4 ms m	DEPTH AT TIME +5 ms m	DEPTH AT TIME +6 ms m	DEPTH AT TIME +7 ms m	DEPTH AT TIME +8 ms m	DEPTH AT TIME +9 ms m
390	418.5	419.6	420.7	421.7	422.8	423.9	424.9	426.0	427.1	428.1
400	429.2	430.3	431.3	432.4	433.5	434.5	435.6	436.7	437.7	438.8
410	439.9	440.9	442.0	443.1	444.1	445.2	446.3	447.3	448.4	449.5
420	450.5	451.6	452.7	453.7	454.8	455.9	456.9	458.0	459.1	460.1
430	461.3	462.4	463.5	464.5	465.6	466.7	467.7	468.8	469.9	470.9
440	472.0	473.1	474.1	475.2	476.3	477.3	478.4	479.5	480.5	481.6
450	482.7	483.7	484.8	485.9	486.9	488.0	489.1	490.1	491.2	492.3
460	493.3	494.4	495.5	496.5	497.6	498.7	499.7	500.8	501.9	502.9
470	504.0	505.1	506.3	507.4	508.4	509.5	510.6	511.6	512.7	513.8
480	514.8	515.9	517.0	518.0	519.1	520.2	521.2	522.3	523.4	524.4
490	525.5	526.6	527.6	528.7	529.8	530.8	531.9	533.0	534.0	535.1
500	536.2	537.2	538.3	539.4	540.4	541.5	542.6	543.6	545.0	546.4
510	547.6	548.8	550.0	551.4	552.9	554.3	555.8	557.2	558.6	559.9
520	561.3	562.7	564.1	565.4	566.8	568.2	569.4	570.8	572.1	573.7
530	575.0	576.4	577.8	579.1	580.5	581.9	583.3	584.6	586.0	587.4
540	588.7	590.1	591.6	593.0	594.4	595.8	597.1	598.8	600.2	601.5
550	602.9	604.3	605.7	607.0	608.4	609.8	611.1	612.5	613.9	615.3
560	616.6	618.3	619.7	621.2	622.6	623.9	625.2	626.5	627.9	629.4
570	630.7	632.0	633.5	634.9	636.1	637.5	638.9	640.3	641.5	642.5
580	643.8	644.8	646.0	647.3	648.3	649.4	650.6	651.7	652.9	654.0
590	655.0	656.1	657.3	658.4	659.5	660.5	661.6	662.7	663.7	664.9
600	666.0	667.2	668.3	669.4	670.3	671.3	672.4	673.5	674.7	675.8
610	676.8	677.9	679.0	680.0	681.1	682.2	683.4	684.6	685.8	686.9
620	688.0	689.2	690.2	691.3	692.5	693.6	694.8	695.9	696.9	698.0

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GEOGRAM+
Time To Depth Report

Time To Depth Data (Continued)

TWO WAY SONIC TIME FROM SRD ms	DEPTH AT TIME +0 ms m	DEPTH AT TIME +1 ms m	DEPTH AT TIME +2 ms m	DEPTH AT TIME +3 ms m	DEPTH AT TIME +4 ms m	DEPTH AT TIME +5 ms m	DEPTH AT TIME +6 ms m	DEPTH AT TIME +7 ms m	DEPTH AT TIME +8 ms m	DEPTH AT TIME +9 ms m
630	699.2	700.4	701.5	702.7	704.0	705.2	706.4	707.6	709.0	710.4
640	711.6	712.9	714.3	715.7	717.2	718.6	720.3	721.6	723.2	724.5
650	726.1	727.6	728.9	730.5	731.8	733.4	734.7	736.3	737.6	739.2
660	740.7	742.1	743.6	744.9	746.5	747.8	749.4	750.7	752.3	753.8
670	755.2	756.7	758.2	759.7	761.3	762.8	764.2	765.7	767.2	768.6
680	770.1	771.6	773.0	774.5	775.9	777.4	778.9	780.5	781.8	783.4
690	784.7	786.2	787.6	789.1	790.5	792.0	793.4	794.9	796.5	797.8
700	799.4	800.7	802.2	803.8	805.1	806.7	808.2	809.6	811.1	812.5
710	814.0	815.5	816.9	818.4	819.8	821.3	822.7	824.2	825.7	827.1
720	828.6	830.0	831.4	832.6	833.8	835.6	837.0	838.2	839.4	840.5
730	841.9	843.2	844.5	845.7	846.9	848.1	849.2	850.6	851.8	853.0
740	854.2	855.3	856.5	857.7	858.9	860.2	861.4	862.6	864.0	865.0
750	866.3	867.5	868.5	869.6	870.8	872.0	873.1	874.3	875.4	876.6
760	877.8	878.9	880.1	881.3	882.4	883.9	885.2	886.2	887.4	888.5
770	889.7	890.9	892.3	893.5	894.9	896.3	897.5	899.0	900.2	901.6
780	902.8	904.2	905.4	906.6	908.0	909.2	910.6	912.0	913.3	914.7
790	915.9	917.3	918.5	919.9	921.3	922.6	924.0	925.2	926.8	928.1
800	929.3	930.7	932.1	933.5	934.8	936.2	937.6	938.8	940.0	941.2
810	942.6	943.8	945.0	946.3	947.6	949.2	950.5	951.9	953.4	954.8
820	956.3	957.7	959.2	960.6	962.1	963.6	965.2	966.7	968.1	969.6
830	970.9	972.5	974.0	975.5	977.0	978.6	980.1	981.6	983.1	984.7
840	986.2	987.6	989.1	990.6	992.1	993.5	995.0	996.6	998.1	999.6
850	1001.1	1002.5	1004.0	1005.5	1007.1	1008.6	1010.0	1011.5	1012.9	1014.4
860	1015.8	1017.3	1018.8	1020.3	1021.7	1023.4	1024.7	1026.3	1027.6	1029.0

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GEOGRAM+

Time To Depth Report

Time To Depth Data (Continued)

TWO WAY SONIC TIME FROM SRD ms	DEPTH AT TIME +0 ms m	DEPTH AT TIME +1 ms m	DEPTH AT TIME +2 ms m	DEPTH AT TIME +3 ms m	DEPTH AT TIME +4 ms m	DEPTH AT TIME +5 ms m	DEPTH AT TIME +6 ms m	DEPTH AT TIME +7 ms m	DEPTH AT TIME +8 ms m	DEPTH AT TIME +9 ms m
870	1030.2	1031.6	1033.0	1034.3	1036.0	1037.4	1038.9	1040.4	1042.1	1043.6
880	1045.0	1046.4	1047.6	1048.8	1050.2	1051.4	1052.8	1054.0	1055.4	1056.7
890	1058.1	1059.3	1060.7	1062.2	1063.6	1064.8	1066.2	1067.6	1068.9	1070.3
900	1071.7	1073.1	1074.4	1075.8	1077.2	1078.4	1079.6	1080.8	1082.0	1083.4
910	1084.6	1085.9	1087.1	1088.3	1089.8	1091.0	1092.4	1093.8	1095.2	1096.5
920	1097.9	1099.4	1100.8	1102.2	1103.5	1104.9	1106.3	1107.5	1108.9	1110.1
930	1111.5	1112.7	1114.0	1115.3	1116.6	1117.9	1119.1	1120.3	1121.5	1122.7
940	1124.1	1125.3	1126.4	1127.6	1128.8	1130.4	1131.6	1132.8	1134.0	1135.4
950	1136.6	1137.8	1139.0	1140.3	1141.3	1142.5	1143.8	1145.0	1146.2	1147.4
960	1148.6	1149.9	1151.1	1152.3	1153.5	1154.7	1156.0	1157.2	1158.4	1159.8
970	1161.3	1162.5	1164.0	1165.4	1166.8	1168.3	1169.8	1171.2	1172.7	1174.2
980	1175.8	1177.3	1178.8	1180.3	1181.9	1182.9	1184.0	1185.1	1186.1	1187.2
990	1188.3	1189.3	1190.4	1191.6	1192.7	1193.8	1194.8	1196.0	1197.1	1198.3
1000	1199.4	1200.6	1201.7	1202.9	1204.0	1205.0	1206.2	1207.5	1208.5	1209.8
1010	1210.8	1211.9	1213.1	1214.2	1215.4	1216.6	1217.7	1218.9	1220.0	1221.0
1020	1222.1	1223.3	1224.5	1225.6	1227.0	1228.2	1229.3	1230.5	1231.5	

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GEOGRAM+
Velocity Report

DATE 8/3/99

Client and Well Information

Country	AUSTRALIA
State	VICTORIA
Logging Date	
Company	
Field	IONA
Well	IONA OBS #2

Velocity Data

TWO WAY TRAVEL TIME FROM SRD ms	MEASURED DEPTH FROM KB m	VERTICAL DEPTH FROM SRD m	AVERAGE VELOCITY SRD/GEO m/s	RMS VELOCITY m/s	INTERVAL VELOCITY m/s
					1617
0	110.4	1.0	1622	1621	
					1617
2	112.6	3.1	1630	1630	
					2141
4	114.7	5.2	1638	1639	
					2141
6	116.8	7.4	1645	1647	
					2141
8	119.0	9.5	1652	1656	
					2141
10	121.1	11.6	1659	1663	
					2141
12	123.2	13.8	1666	1671	
					2141

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GEOGRAM+
Velocity Report

Velocity Data (Continued)

TWO WAY TRAVEL TIME FROM SRD ms	MEASURED DEPTH FROM KB m	VERTICAL DEPTH FROM SRD m	AVERAGE VELOCITY SRD/GEO m/s	RMS VELOCITY m/s	INTERVAL VELOCITY m/s
14	125.5	16.0	1673	1679	
					2141
16	127.7	18.2	1679	1686	
					2141
18	129.8	20.3	1686	1693	
					2141
20	131.9	22.4	1692	1700	
					2141
22	134.1	24.6	1698	1706	
					2141
24	136.2	26.7	1703	1713	
					2141
26	138.3	28.8	1709	1719	
					2141
28	140.5	31.0	1714	1725	
					2141
30	142.6	33.1	1720	1731	
					2141
32	144.7	35.2	1725	1736	
					2141
34	146.9	37.4	1730	1742	
					2141
36	149.0	39.5	1735	1747	
					2141

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GEOGRAM+
Velocity Report

Velocity Data (Continued)

TWO WAY TRAVEL TIME FROM SRD ms	MEASURED DEPTH FROM KB m	VERTICAL DEPTH FROM SRD m	AVERAGE VELOCITY SRD/GEO m/s	RMS VELOCITY m/s	INTERVAL VELOCITY m/s
38	151.1	41.6	1740	1752	
					2141
40	153.3	43.8	1744	1757	
					2141
42	155.4	45.9	1749	1762	
					2141
44	157.5	48.0	1753	1767	
					2141
46	159.7	50.2	1758	1772	
					2141
48	161.8	52.3	1762	1776	
					2141
50	163.9	54.4	1766	1781	
					2141
52	166.1	56.6	1770	1785	
					2141
54	168.2	58.7	1774	1789	
					2141
56	170.5	61.0	1779	1794	
					2141
58	172.6	63.1	1782	1798	
					2141
60	174.7	65.3	1786	1802	
					2141

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GEOGRAM+
Velocity Report

Velocity Data (Continued)

TWO WAY TRAVEL TIME FROM SRD ms	MEASURED DEPTH FROM KB m	VERTICAL DEPTH FROM SRD m	AVERAGE VELOCITY SRD/GEO m/s	RMS VELOCITY m/s	INTERVAL VELOCITY m/s
62	176.9	67.4	1790	1806	
					2141
64	179.0	69.5	1794	1809	
					2141
66	181.1	71.7	1797	1813	
					2141
68	183.3	73.8	1801	1817	
					2141
70	185.4	75.9	1804	1820	
					2141
72	187.5	78.1	1807	1824	
					2141
74	189.7	80.2	1811	1827	
					2141
76	191.8	82.3	1814	1830	
					2141
78	193.9	84.5	1817	1833	
					2141
80	196.1	86.6	1820	1837	
					2141
82	198.2	88.7	1823	1840	
					2141
84	200.4	90.9	1826	1843	
					2141

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GEOGRAM+

Velocity Report

Velocity Data (Continued)

TWO WAY TRAVEL TIME FROM SRD ms	MEASURED DEPTH FROM KB m	VERTICAL DEPTH FROM SRD m	AVERAGE VELOCITY SRD/GEO m/s	RMS VELOCITY m/s	INTERVAL VELOCITY m/s
86	202.5	93.0	1829	1846	
					2141
88	204.6	95.1	1832	1849	
					2141
90	206.8	97.3	1834	1852	
					2141
92	208.9	99.4	1837	1854	
					2141
94	211.0	101.5	1840	1857	
					2141
96	213.2	103.7	1843	1860	
					2141
98	215.4	106.0	1845	1863	
					2141
100	217.6	108.1	1848	1865	
					2141
102	219.7	110.2	1850	1868	
					2141
104	221.8	112.4	1853	1870	
					2141
106	224.0	114.5	1855	1873	
					2141
108	226.1	116.6	1858	1875	
					2141

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GEOGRAM+

Velocity Report

Velocity Data (Continued)

TWO WAY TRAVEL TIME FROM SRD ms	MEASURED DEPTH FROM KB m	VERTICAL DEPTH FROM SRD m	AVERAGE VELOCITY SRD/GEO m/s	RMS VELOCITY m/s	INTERVAL VELOCITY m/s
110	228.2	118.8	1860	1877	
					2141
112	230.4	120.9	1862	1880	
					2141
114	232.5	123.0	1865	1882	
					2141
116	234.6	125.2	1867	1884	
					2141
118	236.8	127.3	1869	1886	
					2141
120	238.9	129.4	1871	1889	
					2141
122	241.0	131.6	1873	1891	
					2141
124	243.2	133.7	1876	1893	
					2141
126	245.3	135.8	1878	1895	
					2141
128	247.4	138.0	1880	1897	
					2141
130	249.6	140.1	1882	1899	
					2141
132	251.7	142.2	1884	1901	
					2141

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Velocity Report

Velocity Data (Continued)

TWO WAY TRAVEL TIME FROM SRD ms	MEASURED DEPTH FROM KB m	VERTICAL DEPTH FROM SRD m	AVERAGE VELOCITY SRD/GEO m/s	RMS VELOCITY m/s	INTERVAL VELOCITY m/s
134	253.8	144.4	1886	1903	
					2141
136	256.0	146.5	1887	1905	
					2141
138	258.1	148.6	1889	1907	
					2141
140	260.4	150.9	1891	1909	
					2141
142	262.5	153.0	1893	1910	
					2141
144	264.7	155.2	1895	1912	
					2141
146	266.8	157.3	1897	1914	
					2141
148	268.9	159.4	1899	1916	
					2141
150	271.1	161.6	1900	1917	
					2141
152	273.2	163.7	1902	1919	
					2141
154	275.3	165.8	1904	1921	
					2141
156	277.5	168.0	1905	1922	
					2141

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GEOGRAM+
Velocity Report

Velocity Data (Continued)

TWO WAY TRAVEL TIME FROM SRD ms	MEASURED DEPTH FROM KB m	VERTICAL DEPTH FROM SRD m	AVERAGE VELOCITY SRD/GEO m/s	RMS VELOCITY m/s	INTERVAL VELOCITY m/s
158	279.6	170.1	1907	1924	
					2141
160	281.7	172.2	1909	1925	
					2141
162	283.9	174.4	1910	1927	
					2141
164	286.0	176.5	1912	1929	
					2140
166	288.1	178.6	1913	1930	
					2141
168	290.3	180.8	1915	1932	
					2141
170	292.4	182.9	1916	1933	
					2141
172	294.5	185.1	1918	1934	
					2141
174	296.7	187.2	1919	1936	
					2141
176	298.8	189.3	1921	1937	
					2141
178	300.9	191.5	1922	1939	
					2141
180	303.1	193.6	1923	1940	
					2141

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GEOGRAM+
Velocity Report

Velocity Data (Continued)

TWO WAY TRAVEL TIME FROM SRD ms	MEASURED DEPTH FROM KB m	VERTICAL DEPTH FROM SRD m	AVERAGE VELOCITY SRD/GEO m/s	RMS VELOCITY m/s	INTERVAL VELOCITY m/s
182	305.4	195.9	1925	1941	
					2141
184	307.5	198.0	1926	1943	
					2141
186	309.6	200.1	1928	1944	
					2141
188	311.8	202.3	1929	1945	
					2141
190	313.9	204.4	1930	1947	
					2141
192	316.0	206.5	1932	1948	
					2141
194	318.2	208.7	1933	1949	
					2141
196	320.3	210.8	1934	1950	
					2141
198	322.4	212.9	1935	1952	
					2141
200	324.6	215.1	1937	1953	
					2141
202	326.7	217.2	1938	1954	
					2141
204	328.8	219.3	1939	1955	
					2141

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GEOGRAM+
Velocity Report

Velocity Data (Continued)

TWO WAY TRAVEL TIME FROM SRD ms	MEASURED DEPTH FROM KB m	VERTICAL DEPTH FROM SRD m	AVERAGE VELOCITY SRD/GEO m/s	RMS VELOCITY m/s	INTERVAL VELOCITY m/s
206	331.0	221.5	1940	1956	
					2141
208	333.1	223.6	1942	1957	
					2141
210	335.2	225.7	1943	1959	
					2141
212	337.4	227.9	1944	1960	
					2141
214	339.5	230.0	1945	1961	
					2141
216	341.6	232.1	1946	1962	
					2141
218	343.8	234.3	1947	1963	
					2140
220	345.9	236.4	1948	1964	
					2140
222	348.2	238.7	1949	1965	
					2140
224	350.3	240.8	1951	1966	
					2141
226	352.4	243.0	1952	1967	
					2141
228	354.6	245.1	1953	1968	
					2140

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GEOGRAM+
Velocity Report

Velocity Data (Continued)

TWO WAY TRAVEL TIME FROM SRD ms	MEASURED DEPTH FROM KB m	VERTICAL DEPTH FROM SRD m	AVERAGE VELOCITY SRD/GEO m/s	RMS VELOCITY m/s	INTERVAL VELOCITY m/s
230	356.7	247.2	1954	1969	
					2140
232	358.8	249.4	1955	1970	
					2140
234	361.0	251.5	1956	1971	
					2140
236	363.1	253.6	1957	1972	
					2141
238	365.2	255.8	1958	1973	
					2141
240	367.4	257.9	1959	1974	
					2141
242	369.5	260.0	1960	1975	
					2141
244	371.6	262.2	1961	1976	
					2141
246	373.8	264.3	1962	1977	
					2141
248	375.9	266.4	1963	1978	
					2141
250	378.0	268.6	1964	1979	
					2141
252	380.2	270.7	1964	1979	
					2141

Velocity Data (Continued)

TWO WAY TRAVEL TIME FROM SRD ms	MEASURED DEPTH FROM KB m	VERTICAL DEPTH FROM SRD m	AVERAGE VELOCITY SRD/GEO m/s	RMS VELOCITY m/s	INTERVAL VELOCITY m/s
254	382.3	272.8	1965	1980	
					2141
256	384.4	275.0	1966	1981	
					2141
258	386.6	277.1	1967	1982	
					2141
260	388.7	279.2	1968	1983	
					2141
262	390.8	281.4	1969	1984	
					2141
264	393.1	283.6	1970	1985	
					2141
266	395.3	285.8	1971	1985	
					2141
268	397.4	287.9	1972	1986	
					2141
270	399.5	290.1	1972	1987	
					2141
272	401.7	292.2	1973	1988	
					2141
274	403.8	294.3	1974	1989	
					2141
276	405.9	296.5	1975	1989	
					2141

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GEOGRAM+
Velocity Report

Velocity Data (Continued)

TWO WAY TRAVEL TIME FROM SRD ms	MEASURED DEPTH FROM KB m	VERTICAL DEPTH FROM SRD m	AVERAGE VELOCITY SRD/GEO m/s	RMS VELOCITY m/s	INTERVAL VELOCITY m/s
278	408.1	298.6	1976	1990	
					2141
280	410.2	300.7	1977	1991	
					2141
282	412.3	302.9	1977	1992	
					2141
284	414.5	305.0	1978	1992	
					2141
286	416.6	307.1	1979	1993	
					2141
288	418.7	309.3	1980	1994	
					2141
290	420.9	311.4	1980	1995	
					2141
292	423.0	313.5	1981	1995	
					2141
294	425.1	315.7	1982	1996	
					2141
296	427.3	317.8	1983	1997	
					2141
298	429.4	319.9	1983	1997	
					2141
300	431.5	322.1	1984	1998	
					2141

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GEOGRAM+
Velocity Report

Velocity Data (Continued)

TWO WAY TRAVEL TIME FROM SRD ms	MEASURED DEPTH FROM KB m	VERTICAL DEPTH FROM SRD m	AVERAGE VELOCITY SRD/GEO m/s	RMS VELOCITY m/s	INTERVAL VELOCITY m/s
302	433.7	324.2	1985	1999	
					2141
304	435.8	326.3	1986	1999	
					2140
306	438.1	328.6	1986	2000	
					2140
308	440.2	330.7	1987	2001	
					2141
310	442.4	332.9	1988	2002	
					2140
312	444.5	335.0	1988	2002	
					2141
314	446.6	337.1	1989	2003	
					2140
316	448.8	339.3	1990	2003	
					2140
318	450.9	341.4	1990	2004	
					2141
320	453.0	343.5	1991	2005	
					2141
322	455.2	345.7	1992	2005	
					2141
324	457.3	347.8	1992	2006	
					2141

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GEOGRAM+
Velocity Report

Velocity Data (Continued)

TWO WAY TRAVEL TIME FROM SRD ms	MEASURED DEPTH FROM KB m	VERTICAL DEPTH FROM SRD m	AVERAGE VELOCITY SRD/GEO m/s	RMS VELOCITY m/s	INTERVAL VELOCITY m/s
326	459.4	349.9	1993	2007	
					2141
328	461.6	352.1	1994	2007	
					2141
330	463.7	354.2	1994	2008	
					2141
332	465.8	356.3	1995	2008	
					2141
334	468.0	358.5	1996	2009	
					2141
336	470.1	360.6	1996	2010	
					2141
338	472.2	362.7	1997	2010	
					2141
340	474.4	364.9	1998	2011	
					2141
342	476.5	367.0	1998	2011	
					2141
344	478.6	369.1	1999	2012	
					2141
346	480.8	371.3	1999	2012	
					2141
348	483.0	373.6	2000	2013	
					2141

Schlumberger

GEOGRAM+
Velocity Report

Velocity Data (Continued)

TWO WAY TRAVEL TIME FROM SRD ms	MEASURED DEPTH FROM KB m	VERTICAL DEPTH FROM SRD m	AVERAGE VELOCITY SRD/GEO m/s	RMS VELOCITY m/s	INTERVAL VELOCITY m/s
350	485.2	375.7	2001	2013	
					2141
352	487.3	377.8	2001	2014	
					2141
354	489.4	380.0	2002	2015	
					2141
356	491.6	382.1	2002	2015	
					2141
358	493.7	384.2	2003	2016	
					2141
360	495.8	386.4	2003	2016	
					2141
362	498.0	388.5	2004	2017	
					2141
364	500.1	390.6	2004	2017	
					2141
366	502.2	392.8	2005	2018	
					2141
368	504.4	394.9	2006	2018	
					2141
370	506.5	397.0	2006	2019	
					2141
372	508.6	399.2	2007	2019	
					2141

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GEOGRAM+

Velocity Report

Velocity Data (Continued)

TWO WAY TRAVEL TIME FROM SRD ms	MEASURED DEPTH FROM KB m	VERTICAL DEPTH FROM SRD m	AVERAGE VELOCITY SRD/GEO m/s	RMS VELOCITY m/s	INTERVAL VELOCITY m/s
374	510.8	401.3	2007	2020	
					2141
376	512.9	403.4	2008	2020	
					2141
378	515.0	405.6	2008	2021	
					2141
380	517.2	407.7	2009	2021	
					2141
382	519.3	409.8	2009	2022	
					2140
384	521.4	412.0	2010	2022	
					2140
386	523.6	414.1	2010	2023	
					2141
388	525.7	416.2	2011	2023	
					2140
390	528.0	418.5	2011	2024	
					2140
392	530.1	420.7	2012	2024	
					2140
394	532.3	422.8	2012	2024	
					2140
396	534.4	424.9	2013	2025	
					2141

Schlumberger

GEOGRAM+

Velocity Report

Velocity Data (Continued)

TWO WAY TRAVEL TIME FROM SRD ms	MEASURED DEPTH FROM KB m	VERTICAL DEPTH FROM SRD m	AVERAGE VELOCITY SRD/GEO m/s	RMS VELOCITY m/s	INTERVAL VELOCITY m/s
398	536.5	427.1	2013	2025	
					2141
400	538.7	429.2	2014	2026	
					2141
402	540.8	431.3	2014	2026	
					2141
404	542.9	433.5	2015	2027	
					2141
406	545.1	435.6	2015	2027	
					2141
408	547.2	437.7	2016	2028	
					2141
410	549.3	439.9	2016	2028	
					2141
412	551.5	442.0	2017	2028	
					2141
414	553.6	444.1	2017	2029	
					2141
416	555.7	446.3	2017	2029	
					2141
418	557.9	448.4	2018	2030	
					2141
420	560.0	450.5	2018	2030	
					2141

Schlumberger

GEOGRAM+

Velocity Report

Velocity Data (Continued)

TWO WAY TRAVEL TIME FROM SRD ms	MEASURED DEPTH FROM KB m	VERTICAL DEPTH FROM SRD m	AVERAGE VELOCITY SRD/GEO m/s	RMS VELOCITY m/s	INTERVAL VELOCITY m/s
422	562.1	452.7	2019	2031	
					2141
424	564.3	454.8	2019	2031	
					2141
426	566.4	456.9	2020	2031	
					2141
428	568.5	459.1	2020	2032	
					2141
430	570.8	461.3	2021	2032	
					2141
432	573.0	463.5	2021	2033	
					2141
434	575.1	465.6	2021	2033	
					2141
436	577.2	467.7	2022	2033	
					2141
438	579.4	469.9	2022	2034	
					2141
440	581.5	472.0	2023	2034	
					2141
442	583.6	474.1	2023	2035	
					2141
444	585.8	476.3	2024	2035	
					2141

Schlumberger

GEOGRAM+
Velocity Report

Velocity Data (Continued)

TWO WAY TRAVEL TIME FROM SRD ms	MEASURED DEPTH FROM KB m	VERTICAL DEPTH FROM SRD m	AVERAGE VELOCITY SRD/GEO m/s	RMS VELOCITY m/s	INTERVAL VELOCITY m/s
446	587.9	478.4	2024	2035	
					2141
448	590.0	480.5	2024	2036	
					2141
450	592.2	482.7	2025	2036	
					2141
452	594.3	484.8	2025	2036	
					2141
454	596.4	486.9	2026	2037	
					2141
456	598.6	489.1	2026	2037	
					2141
458	600.7	491.2	2026	2037	
					2141
460	602.8	493.3	2027	2038	
					2141
462	605.0	495.5	2027	2038	
					2141
464	607.1	497.6	2027	2039	
					2141
466	609.2	499.7	2028	2039	
					2141
468	611.4	501.9	2028	2039	
					2140

Schlumberger

GEOGRAM+

Velocity Report

Velocity Data (Continued)

TWO WAY TRAVEL TIME FROM SRD ms	MEASURED DEPTH FROM KB m	VERTICAL DEPTH FROM SRD m	AVERAGE VELOCITY SRD/GEO m/s	RMS VELOCITY m/s	INTERVAL VELOCITY m/s
470	613.5	504.0	2029	2040	
					2140
472	615.8	506.3	2029	2040	
					2141
474	617.9	508.4	2029	2040	
					2140
476	620.0	510.6	2030	2041	
					2141
478	622.2	512.7	2030	2041	
					2140
480	624.3	514.8	2030	2041	
					2140
482	626.4	517.0	2031	2042	
					2141
484	628.6	519.1	2031	2042	
					2141
486	630.7	521.2	2032	2042	
					2141
488	632.8	523.4	2032	2043	
					2141
490	635.0	525.5	2032	2043	
					2141
492	637.1	527.6	2033	2043	
					2141

Schlumberger

GEOGRAM+

Velocity Report

Velocity Data (Continued)

TWO WAY TRAVEL TIME FROM SRD ms	MEASURED DEPTH FROM KB m	VERTICAL DEPTH FROM SRD m	AVERAGE VELOCITY SRD/GEO m/s	RMS VELOCITY m/s	INTERVAL VELOCITY m/s
494	639.2	529.8	2033	2044	
					2141
496	641.4	531.9	2033	2044	
					2141
498	643.5	534.0	2034	2044	
					2141
500	645.6	536.2	2034	2045	
					2141
502	647.8	538.3	2034	2045	
					2141
504	649.9	540.4	2035	2045	
					2141
506	652.0	542.6	2035	2045	
					2139
508	654.5	545.0	2036	2047	
					2139
510	657.1	547.6	2038	2049	
					2648
512	659.5	550.0	2039	2050	
					2482
514	662.4	552.9	2042	2053	
					2720
516	665.3	555.8	2044	2056	
					2870

Schlumberger

GEOGRAM+
Velocity Report

Velocity Data (Continued)

TWO WAY TRAVEL TIME FROM SRD ms	MEASURED DEPTH FROM KB m	VERTICAL DEPTH FROM SRD m	AVERAGE VELOCITY SRD/GEO m/s	RMS VELOCITY m/s	INTERVAL VELOCITY m/s
518	668.0	558.6	2046	2059	
					2733
520	670.8	561.3	2048	2061	
					2850
522	673.5	564.1	2051	2064	
					2729
524	676.3	566.8	2053	2066	
					2740
526	678.9	569.4	2055	2068	
					2703
528	681.6	572.1	2057	2071	
					2716
530	684.5	575.0	2059	2073	
					2770
532	687.3	577.8	2061	2076	
					2716
534	690.0	580.5	2063	2078	
					2946
536	692.7	583.3	2065	2080	
					2733
538	695.5	586.0	2067	2083	
					2769
540	698.2	588.7	2069	2085	
					2686

Schlumberger

GEOGRAM+
Velocity Report

Velocity Data (Continued)

TWO WAY TRAVEL TIME FROM SRD ms	MEASURED DEPTH FROM KB m	VERTICAL DEPTH FROM SRD m	AVERAGE VELOCITY SRD/GEO m/s	RMS VELOCITY m/s	INTERVAL VELOCITY m/s
542	701.1	591.6	2072	2088	
					2743
544	703.9	594.4	2074	2090	
					2775
546	706.6	597.1	2076	2092	
					2761
548	709.7	600.2	2079	2096	
					3141
550	712.4	602.9	2081	2098	
					2743
552	715.1	605.7	2083	2100	
					2743
554	717.9	608.4	2085	2103	
					2733
556	720.6	611.1	2087	2105	
					2884
558	723.4	613.9	2088	2107	
					2701
560	726.1	616.6	2090	2109	
					2769
562	729.2	619.7	2093	2112	
					2932
564	732.1	622.6	2095	2115	
					2736

Schlumberger

GEOGRAM+
Velocity Report

Velocity Data (Continued)

TWO WAY TRAVEL TIME FROM SRD ms	MEASURED DEPTH FROM KB m	VERTICAL DEPTH FROM SRD m	AVERAGE VELOCITY SRD/GEO m/s	RMS VELOCITY m/s	INTERVAL VELOCITY m/s
566	734.6	625.2	2097	2117	
					2700
568	737.4	627.9	2099	2119	
					2677
570	740.1	630.7	2101	2121	
					2742
572	743.0	633.5	2103	2123	
					2675
574	745.6	636.1	2104	2125	
					2714
576	748.4	638.9	2106	2127	
					2727
578	751.0	641.5	2107	2128	
					2797
580	753.2	643.8	2108	2128	
					2265
582	755.5	646.0	2108	2129	
					2346
584	757.8	648.3	2109	2129	
					2338
586	760.1	650.6	2109	2130	
					2213
588	762.4	652.9	2110	2130	
					2258

Schlumberger

GEOGRAM+

Velocity Report

Velocity Data (Continued)

TWO WAY TRAVEL TIME FROM SRD ms	MEASURED DEPTH FROM KB m	VERTICAL DEPTH FROM SRD m	AVERAGE VELOCITY SRD/GEO m/s	RMS VELOCITY m/s	INTERVAL VELOCITY m/s
590	764.5	655.0	2110	2130	
					2230
592	766.8	657.3	2110	2131	
					2155
594	768.9	659.5	2110	2131	
					2213
596	771.1	661.6	2110	2131	
					2153
598	773.2	663.7	2111	2131	
					2178
600	775.5	666.0	2111	2131	
					2205
602	777.8	668.3	2111	2132	
					2250
604	779.8	670.3	2111	2131	
					2097
606	781.9	672.4	2111	2131	
					2080
608	784.2	674.7	2111	2132	
					2111
610	786.3	676.8	2112	2132	
					2139
612	788.4	679.0	2112	2132	
					2135

Schlumberger

GEOGRAM+
Velocity Report

Velocity Data (Continued)

TWO WAY TRAVEL TIME FROM SRD ms	MEASURED DEPTH FROM KB m	VERTICAL DEPTH FROM SRD m	AVERAGE VELOCITY SRD/GEO m/s	RMS VELOCITY m/s	INTERVAL VELOCITY m/s
614	790.6	681.1	2112	2132	
					2178
616	792.9	683.4	2112	2132	
					2200
618	795.3	685.8	2113	2133	
					2513
620	797.4	688.0	2113	2133	
					2332
622	799.7	690.2	2114	2133	
					2178
624	802.0	692.5	2114	2134	
					2165
626	804.3	694.8	2114	2134	
					2286
628	806.4	696.9	2115	2134	
					2214
630	808.7	699.2	2115	2135	
					2274
632	811.0	701.5	2116	2135	
					2367
634	813.4	704.0	2116	2136	
					2334
636	815.9	706.4	2117	2137	
					2509

Schlumberger

GEOGRAM+

Velocity Report

Velocity Data (Continued)

TWO WAY TRAVEL TIME FROM SRD ms	MEASURED DEPTH FROM KB m	VERTICAL DEPTH FROM SRD m	AVERAGE VELOCITY SRD/GEO m/s	RMS VELOCITY m/s	INTERVAL VELOCITY m/s
638	818.5	709.0	2118	2138	
					2420
640	821.1	711.6	2120	2139	
					2589
642	823.8	714.3	2121	2141	
					2532
644	826.7	717.2	2123	2143	
					3008
646	829.7	720.3	2126	2146	
					2947
648	832.6	723.2	2128	2148	
					2892
650	835.5	726.1	2130	2151	
					2934
652	838.4	728.9	2132	2153	
					2946
654	841.3	731.8	2134	2155	
					2868
656	844.2	734.7	2136	2158	
					2917
658	847.1	737.6	2138	2160	
					2917
660	850.2	740.7	2140	2162	
					2932

Schlumberger

GEOGRAM+
Velocity Report

Velocity Data (Continued)

TWO WAY TRAVEL TIME FROM SRD ms	MEASURED DEPTH FROM KB m	VERTICAL DEPTH FROM SRD m	AVERAGE VELOCITY SRD/GEO m/s	RMS VELOCITY m/s	INTERVAL VELOCITY m/s
662	853.1	743.6	2142	2164	
					2902
664	856.0	746.5	2143	2167	
					2883
666	858.8	749.4	2145	2169	
					2936
668	861.7	752.3	2147	2171	
					2878
670	864.6	755.2	2149	2173	
					2914
672	867.7	758.2	2151	2176	
					2956
674	870.7	761.3	2154	2178	
					3051
676	873.6	764.2	2156	2181	
					2909
678	876.7	767.2	2158	2183	
					2944
680	879.6	770.1	2160	2185	
					2944
682	882.5	773.0	2161	2187	
					2920
684	885.4	775.9	2163	2189	
					2904

Schlumberger

GEOGRAM+

Velocity Report

Velocity Data (Continued)

TWO WAY TRAVEL TIME FROM SRD ms	MEASURED DEPTH FROM KB m	VERTICAL DEPTH FROM SRD m	AVERAGE VELOCITY SRD/GEO m/s	RMS VELOCITY m/s	INTERVAL VELOCITY m/s
686	888.4	778.9	2165	2192	
					2924
688	891.3	781.8	2167	2194	
					2961
690	894.2	784.7	2169	2196	
					2936
692	897.1	787.6	2171	2198	
					2878
694	900.0	790.5	2172	2200	
					2862
696	902.9	793.4	2174	2202	
					2927
698	905.9	796.5	2176	2204	
					2920
700	908.8	799.4	2178	2206	
					2927
702	911.7	802.2	2180	2208	
					2907
704	914.6	805.1	2181	2210	
					2937
706	917.7	808.2	2183	2212	
					2939
708	920.6	811.1	2185	2214	
					2937

Schlumberger

GEOGRAM+
Velocity Report

Velocity Data (Continued)

TWO WAY TRAVEL TIME FROM SRD ms	MEASURED DEPTH FROM KB m	VERTICAL DEPTH FROM SRD m	AVERAGE VELOCITY SRD/GEO m/s	RMS VELOCITY m/s	INTERVAL VELOCITY m/s
710	923.5	814.0	2187	2216	
					2916
712	926.4	816.9	2189	2218	
					2930
714	929.3	819.8	2190	2220	
					2919
716	932.1	822.7	2192	2221	
					2921
718	935.2	825.7	2194	2223	
					2891
720	938.1	828.6	2195	2225	
					2932
722	940.8	831.4	2197	2227	
					2930
724	943.3	833.8	2198	2227	
					2553
726	946.5	837.0	2200	2230	
					2528
728	948.9	839.4	2200	2231	
					2557
730	951.4	841.9	2201	2231	
					2266
732	953.9	844.5	2202	2232	
					3539

Schlumberger

GEOGRAM+
Velocity Report

Velocity Data (Continued)

TWO WAY TRAVEL TIME FROM SRD ms	MEASURED DEPTH FROM KB m	VERTICAL DEPTH FROM SRD m	AVERAGE VELOCITY SRD/GEO m/s	RMS VELOCITY m/s	INTERVAL VELOCITY m/s
734	956.4	846.9	2202	2233	
					2417
736	958.7	849.2	2203	2233	
					2366
738	961.3	851.8	2204	2234	
					2311
740	963.7	854.2	2204	2234	
					2332
742	966.0	856.5	2204	2235	
					2293
744	968.4	858.9	2205	2235	
					2397
746	970.9	861.4	2205	2235	
					2436
748	973.4	864.0	2206	2236	
					2378
750	975.7	866.3	2206	2237	
					2514
752	978.0	868.5	2206	2237	
					2473
754	980.3	870.8	2207	2237	
					2258
756	982.6	873.1	2207	2237	
					2332

Schlumberger

GEOGRAM+
Velocity Report

Velocity Data (Continued)

TWO WAY TRAVEL TIME FROM SRD ms	MEASURED DEPTH FROM KB m	VERTICAL DEPTH FROM SRD m	AVERAGE VELOCITY SRD/GEO m/s	RMS VELOCITY m/s	INTERVAL VELOCITY m/s
758	984.9	875.4	2207	2237	
					2323
760	987.3	877.8	2207	2237	
					2323
762	989.6	880.1	2208	2238	
					2298
764	991.9	882.4	2208	2238	
					2328
766	994.6	885.2	2209	2239	
					2311
768	996.9	887.4	2209	2239	
					2266
770	999.2	889.7	2209	2239	
					2320
772	1001.8	892.3	2210	2240	
					2225
774	1004.4	894.9	2211	2241	
					2581
776	1007.0	897.5	2212	2242	
					2730
778	1009.7	900.2	2213	2243	
					2673
780	1012.3	902.8	2214	2244	
					2680

Schlumberger

GEOGRAM+
Velocity Report

Velocity Data (Continued)

TWO WAY TRAVEL TIME FROM SRD ms	MEASURED DEPTH FROM KB m	VERTICAL DEPTH FROM SRD m	AVERAGE VELOCITY SRD/GEO m/s	RMS VELOCITY m/s	INTERVAL VELOCITY m/s
782	1014.9	905.4	2215	2245	
					2501
784	1017.5	908.0	2215	2245	
					2594
786	1020.1	910.6	2216	2246	
					2530
788	1022.8	913.3	2218	2248	
					2772
790	1025.4	915.9	2218	2248	
					2656
792	1028.0	918.5	2219	2249	
					2513
794	1030.7	921.3	2220	2250	
					2580
796	1033.5	924.0	2221	2251	
					2699
798	1036.2	926.8	2222	2253	
					2748
800	1038.8	929.3	2223	2254	
					2767
802	1041.6	932.1	2225	2255	
					2761
804	1044.3	934.8	2226	2256	
					2713

Schlumberger

GEOGRAM+
Velocity Report

Velocity Data (Continued)

TWO WAY TRAVEL TIME FROM SRD ms	MEASURED DEPTH FROM KB m	VERTICAL DEPTH FROM SRD m	AVERAGE VELOCITY SRD/GEO m/s	RMS VELOCITY m/s	INTERVAL VELOCITY m/s
806	1047.1	937.6	2227	2257	
					2724
808	1049.5	940.0	2227	2257	
					2466
810	1052.1	942.6	2228	2258	
					2473
812	1054.5	945.0	2228	2258	
					2509
814	1057.1	947.6	2229	2259	
					2473
816	1060.0	950.5	2231	2261	
					2879
818	1062.9	953.4	2232	2262	
					2824
820	1065.8	956.3	2233	2264	
					2881
822	1068.7	959.2	2235	2265	
					2939
824	1071.6	962.1	2236	2267	
					2912
826	1074.6	965.2	2238	2269	
					3006
828	1077.5	968.1	2239	2270	
					2978

Schlumberger

GEOGRAM+
Velocity Report

Velocity Data (Continued)

TWO WAY TRAVEL TIME FROM SRD ms	MEASURED DEPTH FROM KB m	VERTICAL DEPTH FROM SRD m	AVERAGE VELOCITY SRD/GEO m/s	RMS VELOCITY m/s	INTERVAL VELOCITY m/s
830	1080.4	970.9	2241	2272	
					2930
832	1083.5	974.0	2242	2274	
					2966
834	1086.5	977.0	2244	2276	
					3044
836	1089.6	980.1	2246	2277	
					3028
838	1092.6	983.1	2247	2279	
					3141
840	1095.7	986.2	2249	2281	
					3008
842	1098.6	989.1	2250	2283	
					3017
844	1101.6	992.1	2252	2284	
					3051
846	1104.5	995.0	2253	2286	
					2946
848	1107.6	998.1	2255	2288	
					3005
850	1110.6	1001.1	2256	2289	
					2997
852	1113.5	1004.0	2258	2291	
					2999

Schlumberger

GEOGRAM+
Velocity Report

Velocity Data (Continued)

TWO WAY TRAVEL TIME FROM SRD ms	MEASURED DEPTH FROM KB m	VERTICAL DEPTH FROM SRD m	AVERAGE VELOCITY SRD/GEO m/s	RMS VELOCITY m/s	INTERVAL VELOCITY m/s
854	1116.5	1007.1	2259	2293	
					2999
856	1119.4	1010.0	2261	2294	
					2978
858	1122.3	1012.9	2262	2295	
					2922
860	1125.2	1015.8	2263	2297	
					2892
862	1128.3	1018.8	2265	2298	
					2973
864	1131.2	1021.7	2266	2300	
					2941
866	1134.2	1024.7	2268	2302	
					3155
868	1137.1	1027.6	2269	2303	
					2952
870	1139.7	1030.2	2270	2304	
					2588
872	1142.5	1033.0	2270	2304	
					2639
874	1145.5	1036.0	2272	2306	
					2748
876	1148.4	1038.9	2273	2308	
					2968

Schlumberger

GEOGRAM+
Velocity Report

Velocity Data (Continued)

TWO WAY TRAVEL TIME FROM SRD ms	MEASURED DEPTH FROM KB m	VERTICAL DEPTH FROM SRD m	AVERAGE VELOCITY SRD/GEO m/s	RMS VELOCITY m/s	INTERVAL VELOCITY m/s
878	1151.6	1042.1	2275	2310	
					3073
880	1154.5	1045.0	2276	2311	
					3035
882	1157.1	1047.6	2277	2312	
					2469
884	1159.5	1050.0	2277	2312	
					2470
886	1162.3	1052.8	2278	2313	
					2462
888	1164.9	1055.4	2279	2313	
					2596
890	1167.6	1058.1	2280	2314	
					2501
892	1170.2	1060.7	2280	2315	
					2645
894	1173.1	1063.6	2281	2316	
					2975
896	1175.7	1066.2	2282	2317	
					2682
898	1178.4	1068.9	2283	2318	
					2828
900	1181.2	1071.7	2284	2319	
					2637

Schlumberger

GEOGRAM+
Velocity Report

Velocity Data (Continued)

TWO WAY TRAVEL TIME FROM SRD ms	MEASURED DEPTH FROM KB m	VERTICAL DEPTH FROM SRD m	AVERAGE VELOCITY SRD/GEO m/s	RMS VELOCITY m/s	INTERVAL VELOCITY m/s
902	1183.9	1074.4	2285	2320	
					2658
904	1186.6	1077.2	2286	2320	
					2749
906	1189.1	1079.6	2286	2321	
					2613
908	1191.5	1082.0	2286	2321	
					2454
910	1194.1	1084.6	2287	2321	
					2550
912	1196.6	1087.1	2287	2322	
					2479
914	1199.3	1089.8	2288	2322	
					2473
916	1201.9	1092.4	2289	2323	
					2612
918	1204.6	1095.2	2289	2324	
					2733
920	1207.4	1097.9	2290	2325	
					2879
922	1210.3	1100.8	2291	2326	
					2796
924	1213.0	1103.5	2292	2327	
					2764

Schlumberger

GEOGRAM+

Velocity Report

Velocity Data (Continued)

TWO WAY TRAVEL TIME FROM SRD ms	MEASURED DEPTH FROM KB m	VERTICAL DEPTH FROM SRD m	AVERAGE VELOCITY SRD/GEO m/s	RMS VELOCITY m/s	INTERVAL VELOCITY m/s
926	1215.8	1106.3	2293	2328	
					2682
928	1218.3	1108.9	2294	2328	
					2328
930	1220.9	1111.5	2294	2329	
					2517
932	1223.5	1114.0	2295	2329	
					2633
934	1226.1	1116.6	2295	2330	
					2600
936	1228.6	1119.1	2296	2330	
					2543
938	1231.0	1121.5	2296	2330	
					2447
940	1233.6	1124.1	2296	2331	
					2525
942	1235.9	1126.4	2297	2331	
					2493
944	1238.3	1128.8	2297	2331	
					2414
946	1241.1	1131.6	2297	2332	
					2512
948	1243.5	1134.0	2298	2332	
					2427

Schlumberger

GEOGRAM+
Velocity Report

Velocity Data (Continued)

TWO WAY TRAVEL TIME FROM SRD ms	MEASURED DEPTH FROM KB m	VERTICAL DEPTH FROM SRD m	AVERAGE VELOCITY SRD/GEO m/s	RMS VELOCITY m/s	INTERVAL VELOCITY m/s
950	1246.1	1136.6	2298	2332	
					2492
952	1248.5	1139.0	2299	2333	
					2427
954	1250.8	1141.3	2299	2333	
					2413
956	1253.2	1143.8	2299	2333	
					2341
958	1255.7	1146.2	2299	2333	
					2419
960	1258.1	1148.6	2299	2333	
					2418
962	1260.6	1151.1	2300	2333	
					2391
964	1263.0	1153.5	2300	2333	
					2457
966	1265.4	1156.0	2300	2334	
					2459
968	1267.9	1158.4	2300	2334	
					2493
970	1270.8	1161.3	2301	2335	
					2527
972	1273.5	1164.0	2302	2336	
					2711

Schlumberger

GEOGRAM+
Velocity Report

Velocity Data (Continued)

TWO WAY TRAVEL TIME FROM SRD ms	MEASURED DEPTH FROM KB m	VERTICAL DEPTH FROM SRD m	AVERAGE VELOCITY SRD/GEO m/s	RMS VELOCITY m/s	INTERVAL VELOCITY m/s
974	1276.3	1166.8	2303	2337	
					2833
976	1279.3	1169.8	2304	2338	
					3159
978	1282.2	1172.7	2305	2339	
					2985
980	1285.1	1175.6	2307	2341	
					2971
982	1288.3	1178.8	2308	2342	
					2958
984	1291.3	1181.9	2309	2344	
					3139
986	1293.5	1184.0	2309	2343	
					2822
988	1295.6	1186.1	2309	2343	
					2115
990	1297.7	1188.3	2309	2343	
					2102
992	1299.9	1190.4	2308	2342	
					2176
994	1302.2	1192.7	2308	2342	
					2220
996	1304.3	1194.8	2308	2342	
					2141

Schlumberger

GEOGRAM+

Velocity Report

Velocity Data (Continued)

TWO WAY TRAVEL TIME FROM SRD ms	MEASURED DEPTH FROM KB m	VERTICAL DEPTH FROM SRD m	AVERAGE VELOCITY SRD/GEO m/s	RMS VELOCITY m/s	INTERVAL VELOCITY m/s
998	1306.6	1197.1	2308	2342	
					2351
1000	1308.9	1199.4	2308	2342	
					2411
1002	1311.2	1201.7	2308	2342	
					2285
1004	1313.4	1204.0	2308	2341	
					2208
1006	1315.7	1206.2	2308	2341	
					2245
1008	1318.0	1208.5	2308	2341	
					2293
1010	1320.3	1210.8	2308	2341	
					2233
1012	1322.6	1213.1	2307	2341	
					2214
1014	1324.9	1215.4	2307	2341	
					2331
1016	1327.2	1217.7	2308	2341	
					2299
1018	1329.4	1220.0	2307	2341	
					2318
1020	1331.6	1222.1	2307	2341	
					2225

Schlumberger

GEOGRAM+

Velocity Report

Velocity Data (Continued)

TWO WAY TRAVEL TIME FROM SRD ms	MEASURED DEPTH FROM KB m	VERTICAL DEPTH FROM SRD m	AVERAGE VELOCITY SRD/GEO m/s	RMS VELOCITY m/s	INTERVAL VELOCITY m/s
1022	1334.0	1224.5	2307	2340	
					2233
1024	1336.5	1227.0	2308	2341	
					2357
1026	1338.7	1229.3	2308	2341	
					2433
1028	1341.0	1231.5	2307	2341	

Schlumberger

GEOGRAM+
Velocity Report

PE605514

This is an enclosure indicator page.
The enclosure PE605514 is enclosed within the container PE908262 at this location in this document.

The enclosure PE605514 has the following characteristics:

ITEM_BARCODE	PE605514
CONTAINER_BARCODE	PE908262
NAME	Iona Obs-2 : Vertical Seismic Profile
BASIN	OTWAY
ONSHORE?	Y
DATA_TYPE	WELL
DATA_SUB_TYPE	SYNTH_SEISMOGRAM
DESCRIPTION	Iona Obs-2 Vertical Seismic Profile, Z-Axis Processing Steps, (Enclosure from: Appendix 4, Plot 1, Iona Obs-2 WCR vol.1). Western Underground Gas Storage Pty. Ltd/Schlumberger.
REMARKS	
DATE_WRITTEN	31-OCT-1999
DATE_PROCESSED	
DATE_RECEIVED	
RECEIVED_FROM	Western Underground Gas Storage Pty Ltd
WELL_NAME	Iona Obs-2
CONTRACTOR	Western Underground Gas Storage Pty Ltd
AUTHOR	
ORIGINATOR	Western Underground Gas Storage Pty Ltd
TOP_DEPTH	0
BOTTOM_DEPTH	0
ROW_CREATED_BY	PC00_SW

(Inserted by DNRE - Vic Govt Mines Dept)

PE605515

This is an enclosure indicator page.
The enclosure PE605515 is enclosed within the container PE908262 at this location in this document.

The enclosure PE605515 has the following characteristics:

ITEM_BARCODE	PE605515
CONTAINER_BARCODE	PE908262
NAME	Iona Obs-2 : Vertical Seismic Profile
BASIN	OTWAY
ONSHORE?	Y
DATA_TYPE	WELL
DATA_SUB_TYPE	SYNTH_SEISMOGRAM
DESCRIPTION	Iona Obs-2 : Vertical Seismic Profile, Composite Display Normal Polarity, (Enclosure from: Iona Obs-2 WCR vol.1, Appendix 4, Plot 2). Western Underground Gas Storage Pty. Ltd/Schlumberger.
REMARKS	
DATE_WRITTEN	31-OCT-1990
DATE_PROCESSED	
DATE_RECEIVED	
RECEIVED_FROM	Western Underground Gas Storage Pty Ltd
WELL_NAME	Iona Obs-2
CONTRACTOR	Western Underground Gas Storage Pty Ltd
AUTHOR	
ORIGINATOR	Western Underground Gas Storage Pty Ltd
TOP_DEPTH	0
BOTTOM_DEPTH	0
ROW_CREATED_BY	PC00_SW

(Inserted by DNRE - Vic Govt Mines Dept)

PE605516

This is an enclosure indicator page.
The enclosure PE605516 is enclosed within the container PE908262 at this location in this document.

The enclosure PE605516 has the following characteristics:

ITEM_BARCODE	PE605516
CONTAINER_BARCODE	PE908262
NAME	Iona Obs-2 : Vertical Seismic Profile
BASIN	OTWAY
ONSHORE?	Y
DATA_TYPE	WELL
DATA_SUB_TYPE	SYNTH_SEISMOGRAM
DESCRIPTION	Iona Obs-2 : Vertical Seismic Profile, Composite Display Reversed Polarity, (Enclosure from: Iona Obs-2 WCR vol.1, Appendix 4, Plot 3). Western Underground Gas Storage Pty. Ltd/Schlumberger.
REMARKS	
DATE_WRITTEN	31-OCT-1990
DATE_PROCESSED	
DATE_RECEIVED	
RECEIVED_FROM	Western Underground Gas Storage Pty Ltd
WELL_NAME	Iona Obs-2
CONTRACTOR	
AUTHOR	
ORIGINATOR	Western Underground Gas Storage Pty Ltd
TOP_DEPTH	
BOTTOM_DEPTH	
ROW_CREATED_BY	PC00_SW

(Inserted by DNRE - Vic Govt Mines Dept)

PE908914

This is an enclosure indicator page.
The enclosure PE908914 is enclosed within the container PE908262 at this location in this document.

The enclosure PE908914 has the following characteristics:

ITEM_BARCODE	= PE908914
CONTAINER_BARCODE	= PE908262
NAME	= Iona Obs-2 Check Shot Survey Plot
BASIN	= OTWAY
ONSHORE?	= Y
DATA_TYPE	= WELL
DATA_SUB_TYPE	= VELOCITY_CHART
DESCRIPTION	= Iona Obs-2 Check Shot Survey Velocity Cross-plot Appendix 4 Plot 4
REMARKS	=
DATE_WRITTEN	=
DATE_PROCESSED	=
DATE_RECEIVED	=
RECEIVED_FROM	= Western Underground Gas Storage Pty Ltd
WELL_NAME	= Iona Obs-2
CONTRACTOR	= Western Underground Gas Storage Pty Ltd
AUTHOR	=
ORIGINATOR	= Western Underground Gas Storage Pty Ltd
TOP_DEPTH	=
BOTTOM_DEPTH	=
ROW_CREATED_BY	= DN07_SW

(Inserted by DNRE - Vic Govt Mines Dept)

PE605561

This is an enclosure indicator page.
The enclosure PE605561 is enclosed within the container PE908262 at this location in this document.

The enclosure PE605561 has the following characteristics:

ITEM_BARCODE	PE605561
CONTAINER_BARCODE	PE908262
NAME	Iona Obs-2 Drift Corrected Sonic Plot
BASIN	OTWAY
ONSHORE?	Y
DATA_TYPE	WELL
DATA_SUB_TYPE	WELL_LOG
DESCRIPTION	Iona Obs-2 Drift Corrected Sonic, Geoframe Processed Interpretation Appendix 4 Plot 5
REMARKS	
DATE_WRITTEN	
DATE_PROCESSED	31-MAY-1999
DATE_RECEIVED	
RECEIVED_FROM	Western Underground Gas Storage Pty Ltd
WELL_NAME	Iona Obs-2
CONTRACTOR	Western Underground Gas Storage Pty Ltd
AUTHOR	
ORIGINATOR	Western Underground Gas Storage Pty Ltd
TOP_DEPTH	0
BOTTOM_DEPTH	1250
ROW_CREATED_BY	DN07_SW

(Inserted by DNRE - Vic Govt Mines Dept)

PE908915

This is an enclosure indicator page.
The enclosure PE908915 is enclosed within the container PE908262 at this location in this document.

The enclosure PE908915 has the following characteristics:

ITEM_BARCODE	PE908915
CONTAINER_BARCODE	PE908262
NAME	Iona Obs-2 Vertical Seismic Profile
BASIN	OTWAY
ONSHORE?	Y
DATA_TYPE	WELL
DATA_SUB_TYPE	SYNTH_SEISMOGRAM
DESCRIPTION	Iona Obs-2 Vertical Seismic Profile, Composite Display Normal Polarity 1s:50cm Appendix 4 Plot 6
REMARKS	
DATE_WRITTEN	
DATE_PROCESSED	
DATE_RECEIVED	
RECEIVED_FROM	Western Underground Gas Storage Pty Ltd
WELL_NAME	Iona Obs-2
CONTRACTOR	Western Underground Gas Storage Pty Ltd
AUTHOR	
ORIGINATOR	Western Underground Gas Storage Pty Ltd
TOP_DEPTH	
BOTTOM_DEPTH	
ROW_CREATED_BY	DN07_SW

(Inserted by DNRE - Vic Govt Mines Dept)

PE908916

This is an enclosure indicator page.
The enclosure PE908916 is enclosed within the container PE908262 at this location in this document.

The enclosure PE908916 has the following characteristics:

ITEM_BARCODE	PE908916
CONTAINER_BARCODE	PE908262
NAME	Iona Obs-2 Vertical Seismic Profile
BASIN	OTWAY
ONSHORE?	Y
DATA_TYPE	WELL
DATA_SUB_TYPE	SYNTH_SEISMOGRAM
DESCRIPTION	Iona Obs-2 Vertical Seismic Profile, Composite Display Reversed Polarity 1s:50cm Appendix 4 Plot 7
REMARKS	
DATE_WRITTEN	
DATE_PROCESSED	
DATE_RECEIVED	
RECEIVED_FROM	Western Underground Gas Storage Pty Ltd
WELL_NAME	Iona Obs-2
CONTRACTOR	Western Underground Gas Storage Pty Ltd
AUTHOR	
ORIGINATOR	Western Underground Gas Storage Pty Ltd
TOP_DEPTH	
BOTTOM_DEPTH	
ROW_CREATED_BY	DN07_SW

(Inserted by DNRE - Vic Govt Mines Dept)

APPENDIX 5

SHDT Processing and Interpretation Report by Schlumberger

Western Underground Gas Storage

Iona OBS-2

SHDT Processing & Interpretation Report

Thomas J. Neville

Schlumberger GeoQuest

Acquisition

Dipmeter data was acquired in the Iona OBS-2 well on May 20, 1999 using an SHDT tool. The main pass was recorded with an emex gain of 2 and offset of 0. The repeat section was recorded with an emex gain of 3 and offset of 1. Table 1 summarises borehole conditions at the time of logging.

Table 1 - Borehole Conditions

Rm @ temperature	0.178 Ωm @ 11° C
Rmf @ temperature	0.160 Ωm @ 11° C
Rmc @ temperature	0.081 Ωm @ 12° C
Maximum recorded temperature	52° C
Mud type	KCl/PHPA/polymer
Mud density	1.08 g/cm^3
Bit size	6 in

Processing

Original format copies of field acquisition data were loaded into GeoFrame, Schlumberger's geotechnical computing environment, for processing. Following loading, the data was processed through the following steps:

Borehole Geology Formatter

Data loaded in compressed field acquisition format was converted to a format appropriate for further processing.

GPIT Survey

Using knowledge of well location (latitude and longitude) and logging data, IGM geomagnetic components (magnetic field strength, inclination, declination, and acceleration due to gravity) were computed. These were then used in conjunction with raw accelerometer and magnetometer measurements to recompute tool inclinometry values. GPIT data was also quality checked at this time. A GPIT LQC Display is included in the accompanying prints.

BorEID

BorEID represents the central processing step in dip and image processing. For SHDT data, BorEID processing includes GPIT based speed correction, emex voltage correction to recorded button conductivities, and equalisation of button conductivities. GPIT based speed correction was conducted using explicit sticking detection. The results of GPIT based speed correction are presented in the Tool Dynamics Display included in the accompanying prints.

BorDip

Automated dip computation was conducted within the BorDip module. Three different dip computation methods were used.

Firstly, a two-pass MSD processing technique was used. In the first pass, the data was processed using a 4'x2'x60° correlation, with a correlation cutoff of 0.5. The search window was focussed normal to the tool axis ("California" option). Then, the results of this first pass were used in variable plane focussing for a second pass of MSD computation, with a 4'x2'x20° correlation. This two-pass technique has proved very useful in maximising the number of high quality dips obtained from the MSD technique. The primary aim of the MSD processing was evaluation of structural and large-scale sedimentary features.

Secondly, the results of the second MSD pass were used to guide focussing of CSB processing. This processing was conducted using a 6"x2"x30° correlation, with the aim of imaging small-scale sedimentary features.

Finally, the SHDT data were processed using the Local Dip technique with a derivative length of 21 samples and derivative threshold of 0.1. Again, the outputs of the second MSD pass were used to focus the search region for this processing. Local Dip processing is an event based correlation technique, as opposed to the interval based correlation techniques used in MSD and CSB computation, and is designed to detect and correlate very fine scale features.

The results of each of these processings are presented in the Automated Dip Computation display included in the accompanying prints.

Interpretation

Fluvial environments are characterised by five main groups of sedimentary features that may be recognised on dipmeters: current bedding, lateral accretion, downstream accretion, erosional surfaces, and compaction features. From dipmeter data, these features are primarily identified using dip patterns. It is important when evaluating dip patterns to remember that all automated dip computation methods rely on the assumption that the events to be correlated are planar. On the scale of the borehole, this assumption holds true for many but not all sedimentary features.

Lateral and downstream accretion features are the most easily recognisable features on dip plots, as the sedimentary bedforms are essentially planar. Current bedding is more difficult to recognise, particularly in high-energy environments where trough cross bedding dominates. In this environment, it is impossible for automatic dip computation algorithms to identify bedding features as they are not planar, even on the scale of the borehole. This is the primary reason for the generally poor performance of automatic dip computations in fluvial environments. Erosional surfaces can also be difficult to recognise, as they are typically only represented by a single dip, which is impossible to interpret in the absence of other supporting information. Compaction features are only useful in low energy environments where inter-channel shale deposits are preserved. In high energy, sand prone environments, compaction features are not commonly preserved due to erosion of inter-channel shales.

An expanded scale display of the automated dip computation results over the reservoir interval, annotated with interpretation comments, is presented as the Interpretation Display in the accompanying prints.

From a review of the computed dips available, the most apparent feature is a blue pattern from 1310 to 1310.5 metres with average dip azimuth of 110 degrees overlain by a red pattern from 1309.6 to 1310 metres with average dip azimuth of 110 degrees. This signature of a red pattern overlying a blue pattern with the same dip azimuth is characteristic of lateral accretion units deposited in longitudinal bars. In this situation, the dip azimuth of the dip signature indicated the position of the channel thalweg with respect to the borehole, in this case 110 degrees. The channel orientation is perpendicular to this orientation, in this case the channel axis is oriented 20 degrees – 200 degrees. From a lateral accretion signature alone, it is impossible to identify the direction of current flow. A similar lateral accretion signature can be identified at 1320.5 metres (average dip azimuth 120 degrees). Truncated lateral accretion signatures (blue pattern only) have also been identified at 1296.5 metres (average dip azimuth 130 degrees), 1297.2 metres (average dip azimuth 140 degrees), 1305.8 metres (average dip azimuth 130 degrees), and 1309.5 metres (average dip azimuth 140 degrees).

Definitive current bedding signatures (characterised by a well developed blue pattern) are rare in this data set. Only two have been identified in the reservoir interval, from 1321 to 1322 metres (average dip azimuth 30 degrees) and from 1329.5 to 1330 metres (average dip azimuth 40 degrees).

Although limited by the quality of the available dip data, the most likely interpretation based on the dip patterns described above, is that the sands of the reservoir interval in the Iona OBS-2 well were deposited by a high energy (braided?) stream system with a general northeast-southwest trend, flowing towards the northeast (approximately 35-40 degrees).

PE605562

This is an enclosure indicator page.
The enclosure PE605562 is enclosed within the container PE908262 at this location in this document.

The enclosure PE605562 has the following characteristics:

ITEM_BARCODE	PE605562
CONTAINER_BARCODE	PE908262
NAME	Iona Obs-2 Mudlog
BASIN	OTWAY
ONSHORE?	Y
DATA_TYPE	WELL
DATA_SUB_TYPE	MUD_LOG
DESCRIPTION	Iona Obs-2 Formation Evaluation Mudlog Scale 1:200 Enclosure 1
REMARKS	
DATE_WRITTEN	
DATE_PROCESSED	
DATE_RECEIVED	
RECEIVED_FROM	Western Underground Gas Storage Pty Ltd
WELL_NAME	Iona Obs-2
CONTRACTOR	Western Underground Gas Storage Pty Ltd
AUTHOR	
ORIGINATOR	Western Underground Gas Storage Pty Ltd
TOP_DEPTH	280
BOTTOM_DEPTH	1355
ROW_CREATED_BY	DN07_SW

(Inserted by DNRE - Vic Govt Mines Dept)

PE605563

This is an enclosure indicator page.
The enclosure PE605563 is enclosed within the container PE908262 at this location in this document.

The enclosure PE605563 has the following characteristics:

ITEM_BARCODE	PE605563
CONTAINER_BARCODE	PE908262
NAME	Iona Obs-2 Composite Well Log
BASIN	OTWAY
ONSHORE?	Y
DATA_TYPE	WELL
DATA_SUB_TYPE	COMPOSITE_LOG
DESCRIPTION	Iona Obs-2 Composite Well Log Enclosure 2
REMARKS	
DATE_WRITTEN	
DATE_PROCESSED	
DATE_RECEIVED	
RECEIVED_FROM	Western Underground Gas Storage Pty Ltd
WELL_NAME	Iona Obs-2
CONTRACTOR	Western Underground Gas Storage Pty Ltd
AUTHOR	
ORIGINATOR	Western Underground Gas Storage Pty Ltd
TOP_DEPTH	
BOTTOM_DEPTH	
ROW_CREATED_BY	DN07_SW

(Inserted by DNRE - Vic Govt Mines Dept)

PE605564

This is an enclosure indicator page.
The enclosure PE605564 is enclosed within the container PE908262 at this location in this document.

The enclosure PE605564 has the following characteristics:

ITEM_BARCODE	PE605564
CONTAINER_BARCODE	PE908262
NAME	Iona Obs-2 Composite Well Log
BASIN	OTWAY
ONSHORE?	Y
DATA_TYPE	WELL
DATA_SUB_TYPE	COMPOSITE_LOG
DESCRIPTION	Iona Obs-2 Composite Well Log, Reservoir Section, Scale 1:200 Enclosure 3
REMARKS	
DATE_WRITTEN	31-AUG-1999
DATE_PROCESSED	
DATE_RECEIVED	
RECEIVED_FROM	Western Underground Gas Storage Pty Ltd
WELL_NAME	Iona Obs-2
CONTRACTOR	Western Underground Gas Storage Pty Ltd
AUTHOR	
ORIGINATOR	Western Underground Gas Storage Pty Ltd
TOP_DEPTH	
BOTTOM_DEPTH	
ROW_CREATED_BY	DN07_SW

(Inserted by DNRE - Vic Govt Mines Dept)