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AUSTRALIA
GIPPSLAND BASIN
# VIC/RL5

# BALEEN-2

## WELL COMPLETION REPORT
## BASIC GEOTECHNICAL DATA

**-VOLUME 1A-**
**Text, Figures, Appendices 1-13**

Prepared by: Alex Warris

**CONFIDENTIAL**

907960 002

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Prepared by: Alex Warris

Approved by:

Exploration Manager

July, 2000

**CONFIDENTIAL**

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# BASIC DATA REPORT
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# BALEEN-2

## 1 WELL SUMMARY

## 1.1 WELL SUMMARY CARD – BALEEN-2

| | | | |
|---|---|---|---|
| **WELL:** | **BALEEN-2** | **SPUD** | 02:15 hrs 11/10/99 |
| **WELL TYPE:** | APPRAISAL | **TD REACHED:** | 02:45 hrs 16/10/99 |
| **BLOCK/LICENCE:** | VIC/RL5 Gippsland Basin | **RIG RELEASE:** | 19/10/99 |
| **RIG:** | SEDCO 702 | **COMPLETION:** | n/a |
| **WATER DEPTH:** | 55m (BMSL) | **STATUS:** | Plugged and abandoned appraisal well with gas and trace oil shows |
| **RT (MSL):** | 26.0m | **TRAP TYPE** | Faulted anticline |
| **TD:** | 895 m (driller)<br>895 m (TVD corrected) | **ZONE(S):** | |
| **SURFACE LATITUDE:** | 38° 01' 55.76" S | **SURFACE Y coord:** | 5 789 663.9 mN |
| **SURFACE LONGITUDE:** | 148° 24' 37.55" E | **SURFACE X coord:** | 623 781.4 mE |
| **OBJECTIVE LATITUDE:** | 38° 01' 55.79" S | **OBJECTIVE Y coord:** | 5 789 663 N |
| **OBJECTIVE LONGITUDE:** | 148° 24' 37.57" E | **OBJECTIVE X coord:** | 623 782 E |
| | | **Spheroid/Datum:** | UTM Zone 55,<br>CM 147°E<br>ANS / AGD 66 |
| **SURFACE Seismic Station:** | GL88-62, coincident with intersecting line GL88-55 | **OBJECTIVE OFFSET:** | 1.08m at 326°T |

**REMARKS:** Vertical Well
Drilled without riser to 650m

| CASING SIZE | SHOE DEPTH (mRT): | TYPE |
|---|---|---|
| 30x20" | 126m | Drill quip / SWF60 |
| 9 5/8" | 646m | LTC/Buttress |

**PERFORATIONS**

| ZONE | INTERVAL m RT MD / TVD |
|---|---|
| Nil | - |

**CORES**

| ZONE | NO. | INTERVAL m RT | CUT m | REC m |
|---|---|---|---|---|
| | 1 | 746 - 762.2 m | 16.3 | 16.3 |
| | 2 | 763.7 - 779.5 m | 18 | 15.9 |

**MUD DATA**

| | |
|---|---|
| **SUITE** | SUITE 1 |
| **TYPE** | NaCl / PHPA / Polymer |
| **DENSITY** | 1.21 g/cm3 |
| **VISCOSITY** | 49 sec/qt |
| **FLUID LOSS** | 3.4 cc / 30 min |
| **pH** | 9 |
| **RM** | 0.134 ohm.m @21°C |
| **RMF** | 0.115 ohm.m @22°C |
| **RMC** | 0.213 ohm.m @22°C |
| **Chlorides** | 46 500 mg / L |
| **Barite** | 3.7% by volume |

**WIRELINE LOGS**

| LOG TYPE | SUITE / RUN | INTERVAL mRT | BHT/TIME °C | COMMENTS |
|---|---|---|---|---|
| PEX-HALS-DSI-NGS | 1 / 1 | 888.5-90 | 46.7°C/5:21hrs | Logged GR from 640-90. Full PEX-DSI high resolution data recorded at 1800ft/h. |
| FMI-GR | 1 / 2 | 887-647 | 48°C/8:35hrs | Logged open hole interval |
| MDT (pretests and samples) | 1 / 3,5 | 823-748 | 52°C/18:25hrs | 32 pretests, 16 normal, 8 supercharged, 5 lost seal, 2 pumpout failure, 1 dry test |
| CSAT-GR (VSP Survey) | 1 / 4 | 885-100 | 50°C/22hrs | 47 checkshot levels acquired, including 3 repeat levels at 300m, 663m and 795m |
| Junk Basket & Bridge Plug (GR and CCL record) | 6,7 | 200-100 | | Run prior to setting cement abandonment plug 3 |

**SUMMARY**

Baleen-2 was drilled as an appraisal well in the northern Gippsland Basin, in offshore Victoria. It is located on the Patricia-Baleen gasfield in VIC/RL5, 3.31 km southwest of the Baleen-1 gas discovery well, and is 350 km east of Melbourne. The well was spudded on the 11th October 1999 using the semi-submersible Sedco Forex 702 in 55 metres of water. It reached a total depth of 895mRT on the 16th October 1999.

A 36" x 26" hole section was drilled to 126mRT, where the 30x20" casing was set, and a 30" wellhead housing was run and cemented. The top hole was drilled from the conductor depth (126mRT) to 650 mRT without a marine riser, and the 9 5/8" casing was set with the shoe at 646mRT. The FIT was performed at 654mRT to 15.1 ppg EMW, then the 8 1/2" hole section was drilled to TD. Two cores were cut. Core 1 (16.2 m) was taken from 746mRT – 762.2mRT, and Core 2 (15.8 m) was taken from 762.3mRT – 780.3mRT (Drillers depth). One suite of wireline logs was acquired at T.D.

Baleen-2 was plugged and abandoned on the 18th October. The rig was released from the location on the 19th of October 1999.

## 1.2 SUMMARY

At 02:30 hrs on 7th October 1999, the semi-submersible MODU SEDCO 702 commenced the tow from the Barramundi-1 (Globelex) well location to the Cultus Baleen-2 location. The rig arrived on location and dropped and set anchor # 7 at 12:00 hrs on the 10th October 1999.

The final Racal DGPS rig position for Baleen-2 is as follows;

| | |
|---|---|
| Datum: | AGD66 |
| Latitude: | 038° 01' 55.758" S |
| Longitude: | 148° 24' 37.549" E |
| | |
| Projection: | AMG Zone 55, C.M. 147° East |
| Eastings: | 623,781.41 m |
| Northings: | 5,789,663.90 m |

This position was 1.08 metres on a bearing of 326.0° (T) from the intended location. The Final Rig Heading was 206.4°(T).

Baleen-2 was drilled as an appraisal well, with its final location 350 km east of Melbourne in the northern Gippsland Basin, which lies on the southwest extension of the Baleen portion of the Patricia-Baleen Gas Field (Figure 1). The well was drilled 3.31 km southwest and structurally downdip of the Baleen-1 discovery well (Figure 2), which had dry gas accumulations in the Gurnard Formation and Latrobe Group Coarse Clastics.

The well spudded at 02:15hrs on the 11th October 1999, and was drilled to a total depth of 895mRT at 02:45hrs on the 16th October.

The final rig elevations are as follows;

| | |
|---|---|
| RT - MSL | = 26.0 m |
| Water Depth | = 55.0 m |
| RT - Sea bed | = 81.0 m |

A 26"x36" hole was drilled from 81mRT to 126 mRT, where a 30" X 20" conductor was run to 126 mRT and cemented with good returns seen at the wellhead. The 20" shoe track was drilled out using a 17½" BHA. A 12-1/4" hole was drilled riserless from 126mRT to 650 mRT with seawater and gel sweeps and returns to the seabed. The hole was circulated clean and a Magnetic Single Shot survey dropped prior to pulling out of the hole to run 9-5/8" casing. A total of 47 joints of 9-5/8" casing was run to 646mRT and cemented. The FIT was performed at 654mRT to 15.1 ppg EMW. The marine riser and BOP were installed and the 8 ½" hole was drilled to TD at 895mRT.

The main objective for the Baleen-2 well was to intersect the gas-water contact (GWC) of the gas accumulation intersected in Baleen-1, and test the reservoir extent, continuity and quality. All these objectives were met. A further objective of recovering gas samples was not achieved.

Two cores were cut from 746mRT to 780.3mRT stradling the GWC with 93.7% recovery. Oil shows were noted in the lower part of core #1 over the interval 756mRT to 764mRT, where moderately bright yellow green patchy fluorescence with blooming cut fluorescence is present.

The well was plugged with 3 cement plugs; Plug 1: 790mRT – 890mRT, Plug 2: 600mRT – 760mRT, Plug 3: 125mRT – 175mRT, and abandoned at 02:45hrs on the 18th October 1999 (Figure 3), and the rig released on the 19th October 1999.

## 1.3 CASING

Two casing strings, 30"x20" and 9 5/8", were used in the Baleen-2 well. The 30"x20" casing was set at 125.7mRT on the 11th October 1999 after the 36" x 26" hole section was drilled. The top hole was drilled from the conductor depth (126mRT) to 650mRT, where the 9 5/8" casing was set on the 13th October 1999. The riser and BOP were installed at 650mRT, and the 8 1/2" hole section was drilled to TD. Both casing strings were tested to 2500 psi.

| CASING SUMMARY | | | | |
|---|---|---|---|---|
| **Casing Size** | **Hole Size** | **Weight (lb/ft)** | **Type** | **ShoeDepth (mRT)** |
| 30"x20" | 36" | 235 | Drill quip / SWF60 | 125.7 |
| 9 5/8" | 12 1/4" | 47 | LTC / Butress | 646.4 |

TABLE 1

## 1.4 STRATIGRAPHY

Baleen-2 penetrated a sedimentary sequence which included the following Gippsland Basin stratigraphy, described from cuttings:

- Marine Carbonates and Clays: 650 – 725 mRT
- Calcareous marine Clays and Calcilutite: 725 – 741 mRT
- Fine Sand and silty Claystone 741 – 759 mRT
- Interbedded quartz Sandstone and Claystone: 762 – 791 mRT
- Interbedded quartz Sandstone and Claystone with minor coal: 791 – 810 mRT
- Lithic Sandstone: 810 – 859 mRT
- Claystones with sandy Claystone interbeds 859 – 895 mRT

Interval Summaries are presented in the Daily Geological Reports in Appendix 1. More detailed descriptions of the Baleen-2 stratigraphy were made from conventional cores and drill cuttings, and are included as Appendix 2 and 3 respectively. Returns above 650mRT were to the sea floor.

Fifteen core and cuttings samples were sent for processing and evaluation for palynology. The species distribution chart is included as Appendix 10.

## 1.5 CONVENTIONAL CORES

Between the depths of 746mRT and 780.3mRT, 34.3 metres of conventional 8 ½" x 4 1/8" core were cut from the Baleen-2 well in two cores. Due to the unconsolidated nature of the core, only 93.7% was recovered, resulting in a final length of 32.2 metres.

| CORE SUMMARY | | | | |
|---|---|---|---|---|
| **Core No** | **Interval (mRT)** | **Metres cut** | **Recovery (%)** | **Recovery (m)** |
| 1 | 746 – 762.3 | 16.3 | 100% | 16.3m |
| 2 | 762.3 – 780 | 18 | 88.06% | 15.9m |

TABLE 2

The cores were cut into 1 metre intervals, and the annulus of each length was filled with an expanding isocyanate resin to prevent the core from being disturbed during transit. The core was then packed into custom designed chiller boxes for transport to ACS Laboratories Pty Ltd in Brisbane.

Core Chip Description Reports are included as Appendix 2, with a Coring Report by Security DBS included as Appendix 4

**CORE SAMPLING**

The core was then sampled for routine analyses by ACS Laboratories. A suite of 1½" diameter horizontal plug samples were cut at a rate of 3 per metre for Routine Core Analysis. Fluid Invasion samples were taken at 754.08mRT and 778.34mRT with a soft sediment core sampling apparatus, and divided into 5 equal sections. Three other sample points, at 757mRT, 758.5mRT, and 760.5mRT, were taken to obtain oil samples for finger print analysis over the zone of shows. One SCAL sample plug was taken every metre over the core, and were frozen and stored for further analysis.

Five whole core sections were removed and forwarded to CSIRO, Melbourne, for rock strength analysis. The depths for the removed sections are Sample 1 – 750.8mRT - 751.2mRT, Sample 2 – 756.49mRT -756.8mRT, Sample 3 – 760.19mRT -760.46mRT, Sample 4 – 770.88mRT -771.28mRT, Sample 5 – 776.69mRT -776.9mRT.

The results of the analyses by ACS Laboratories are included as Routine Core Analysis (RCA) Report, Fluid Analysis Report, Petrology and Reservoir Quality Report, and Detailed Core Lithological Description and Sedimentological Interpretation Report, in Appendices 12 to 15 respectively. Rock Strength Analysis results produced by CSIRO is included as the Single and Multiple Failure Triaxial Tests on Baleen-2 Sands Report in Appendix 16.

Core photography on 5 metre format in white and ultraviolet light was performed by ACS Laboratories, and is included as Appendix 5.

## 1.6 SIDEWALL CORES

No sidewall cores were acquired in the Baleen-2 well.

## 1.7 CUTTINGS

4 sets of cuttings were acquired over 3 intervals between 650mRT and 895mRT in the Baleen-2 well. The interval 746mRT – 780mRT were sampled at 1 metre as core chips, included as Core Chip Description Report in Appendix 2.

Cuttings sample sets were distributed as follows:

1 set to Cultus
1 set to BRS/AGSO
2 sets to VicDNRE

| CUTTINGS SUMMARY | | | | | |
|---|---|---|---|---|---|
| **Sample Type** | **No. of sets** | **Quantity per set** | **Sampling interval** | **From (m)** | **To (m)** |
| Washed and dried | 4 | 200 grams | 3 metres | 650 | 746 |
| Washed and dried | 4 | 200 grams | 5 metres | 780 | 810 |
| Washed and dried | 4 | 200 grams | 10 metres | 810 | 895 |

TABLE 3

Cuttings Description Report is included as Appendix 3.

## 1.8 MDT SUMMARY

MDT pretests for formation pressures were conducted across the reservoir sands, in two runs (run numbers 3 and 5).

A total of 32 pretests were attempted over the two runs. Run number three attempted 29 pretests over the interval 748.02mRT and 823mRT, of which 16 were successful, 7 were supercharged, 4 had lost seals, 1 was dry, and 1 one had pumpout failure. Two of these pretests were re-attempt samples at 753.5mRT and 749.3mRT. Run five was a rerun to attempt sampling again, and attempted 3 pretests at 749.01mRT, 757.22mRT, and 757.01mRT, with 1 supercharged, 1 pumpout failure, and 1 lost seal respectively.

14 attempts were made to recover gas and water samples over the two runs in the hole. 13 attempts were aborted due to lost seal while pumping filtrate or tool plugging. One sample was successful, resulting in a 1 gallon sample of water taken from 797 mRT, which was further subdivided into 6 samples. On transfer at the surface, the evolved gas had 32ppm $H_2S$ (by Draeger Tube). Two of the formation water samples were analysed by ACS Laboratories with the fluid analysis results included in Appendix 13.

MDT pressure data summary report is included as Appendix 7.

## 1.9 DST SUMMARY

No Drill Stem Tests were performed in the Baleen-2 well.

# BALEEN-2

## 2 GEOLOGY

## 2.1 GEOLOGICAL SUMMARY

A summary of the lithologies penetrated appears below. Detailed core chip descriptions (746mRT – 761.5mRT , 762.3mRT – 778.2mRT) can be found in Appendix 2, Cuttings sample descriptions (650mRT – 895mRT) can be found in Appendix 3

**Seafloor – 650mRT** No samples taken – returns to seabed.

**650 – 741mRT** ARGILLACEOUS CALCILUTITE grading to and interbedded with minor CALCAREOUS CLAYSTONE.

ARGILLACEOUS CALCILUTITE – (40-100%) light grey to medium grey, medium to dark olive grey, dominantly soft, dispersive, rare firm to moderately hard, amorphous to blocky, trace subfissile, trace carbonaceous specks, 30-35% siliceous clay content, trace quartz silt, trace very fine glauconite, trace forams, occasional to 5% Calcilutite, white to very light grey, light olive, grey, soft, amorphous, slightly dispersive; trace very fine glauconite.

CALCAREOUS CLAYSTONE – (0-60%) light to medium grey, light to medium olive grey, soft, amorphous, dispersive in part, 20-30% micrite content, trace-5% very fine glauconite, trace carbonaceous specks.

**741 – 792mRT** CLAYSTONE with ARGILLACEOUS CALCILUTITE, grading to ARGILLACEOUS SILTSTONE and SILTY SANDSTONE

CLAYSTONE – (0-90%) medium to dark yellowish brown, dark olive grey, soft, dispersive, 10-15% micrite content, 5-10% fine dark green glauconite, trace to 15% quartz silt, grades to silty Claystone, 5% micromica, trace fine quartz sand, trace very fine disseminated pyrite, trace hard dark brown siderite nodules, trace to minor carbonaceous flecks, trace lithics.

ARGILLACEOUS CALCILUTITE – (0-20%) as above.

ARGILLACEOUS SILTSTONE – (0-100%) medium to dark yellowish brown, soft, dispersive, 30-40% siliceous clay, trace to 5% micrite, trace to 5% very fine quartz sand, 5-10% fine dark green glauconite, trace hard dark yellowish brown siderite nodules, 5-10% micromica, trace carbonaceous specks, trace lithics.

SILTY SANDSTONE – (0-50%) clear to translucent, light grey, opaque, loose, silt size to very fine grading to fine to coarse quartz, angular to sub-rounded, poor to moderately sorted, 5% pyrite cement, 5-10% argillaceous matrix, trace nodular pyrite, trace glauconite, trace siderite nodules.

This interval (741mRT – 791mRT) also includes two unsampled intervals:

| | |
|---|---|
| **759 – 762mRT** | NO RETURNS - Cuttings from core not circulated. |
| **771 – 780.3mRT** | NO RETURNS - Cuttings from core not circulated. |

**792– 859mRT** <u>SANDSTONE with interbedded SILTSTONE and trace COAL.</u>

SANDSTONE – (40-100%) white to opaque, clear to translucent quartz grains, loose, medium to very coarse, dominantly medium to coarse, poorly sorted, sub-angular to sub-rounded, trace pyrite cement, 10-40% white kaolinitic matrix, grades to argillaceous Sandstone, 5% dark green pelloidal glauconite, trace reddish brown lithics (jasper).

COAL – (1-2%) black, firm to hard, occasionally brittle, dull to subvitreous. Observed between 800 – 810mRT.

SILTSTONE – (10-58%) pale brown to moderate yellowish brown, soft, dispersive, amorphous, 10-15% siliceous clay, grades to argillaceous Siltstone, 5% micromica, trace to 5% carbonaceous specks and microlaminae, trace to 2% glauconite, trace lithics.

**859 – 895mRT** <u>ARGILLACEOUS SANDSTONE grading to SANDY CLAYSTONE with minor CLAYSTONE interbeds.</u>

ARGILLACEOUS SANDSTONE – (30-95%)white to opaque, clear to translucent quartz grains, trace to 5% light bluish grey, loose, medium to very coarse, dominantly medium to coarse, poorly sorted, angular to sub-angular, moderately common siliceous cement, 40-50% white kaolinitic matrix, trace pyrite nodules.

SANDY CLAYSTONE – (0-65%) white to light grey, soft to very soft, 20-30% very fine to fine quartz sand, matrix supported, kaolinitic.

CLAYSTONE – (5%) dark grayish black, dark grayish brown, hard to very hard, subfissile to fissile, siliceous, minor micromica.

# BALEEN-2

## 3 HYDROCARBON SHOWS

## 3.1 OIL FLUORESCENCE SHOWS

Oil shows were observed in core #1 between the depths of 756 mRT and 764 mRT.

DEPTH: 756mRT – 762 mRT

FLUORESCENCE: 70 – 90%, dull to moderately bright yellowish green pinpoint to patchy direct fluorescence, slow to moderately fast yellowish white to bright bluish white blooming cut fluorescence, thick yellowish white residual ring fluorescence.

DEPTH: 762mRT – 764 mRT

FLUORESCENCE: 30%, dull to moderately bright yellowish green pinpoint to patchy direct fluorescence, slow yellowish white streaming to blooming cut fluorescence, thin to thick yellowish white residual ring fluorescence.

## 3.2 GAS SHOWS

Mudgas was recorded from the 9 5/8" casing shoe to TD. Some data through the reservoir was logged after tripping out the cores. The maximum gas occurred through the cored interval where 5.7% total gas was recorded. $C_2$ (ethane) was present only over the interval 749mRT to 763mRT. Below 763 mRT, total gas declines and remains between 0.3% and 1.0%.

Geoservices Overseas SA provided a number of gas detection units for gas analysis. These included a Total Hydrocarbon Gas Flame Ionisation detector (FID) with FID chromatograph measuring $C_1$ – $C_5$, Hotwire total gas detector, Continuous $CO_2$ (infra red) detector, $H_2S$ detector (continuous / catalytic), and Draeger gas detection unit with detection tubes for $CO_2$ and $H_2S$. No $CO_2$ or $H_2S$ was detected from the drilling mud for the drilled interval 650 m to 895 m.

| SUMMARY OF DRILLING GAS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Interval (mRT)** | **TG%** | **C1 (ppm)** | **C2 (ppm)** | **C3 (ppm)** | **iC4 (ppm)** | **nC4 (ppm)** | **iC5 (ppm)** | **nC5 (ppm)** |
| 650 – 700 | 0.12 | 1740 | 27 | - | - | - | - | - |
| 700 – 742 | 0.395 | 4933 | 41 | - | - | - | - | |
| 742 – 746 | 1.13 | 13207 | 100 | - | - | - | - | - |
| 746 – 762 | 4.0 | 25600 | 145 | - | - | - | - | |
| 762 – 771 | 1.2 | 12377 | 62 | - | - | - | - | - |
| 780 – 872 | 0.673 | 6263 | 28 | - | - | - | - | - |
| 872 – 895 | 0.326 | 4126 | 18 | - | - | - | - | - |

TABLE 4

| GAS PEAKS | | | | |
|---|---|---|---|---|
| Interval (mRT) | Type | TG% | C1 (ppm) | C2 (ppm) |
| 743 – 746 | Drill | 1.24 | 13207 | 100 |
| 746 – 762 | Drill | 5.7 | 29500 | 160 |
| 765 | Drill | 1.41 | 14800 | 65 |
| 860 | Drill | 1.31 | 14400 | - |
| 868 | Drill | 0.96 | 11000 | - |
| 887 | Drill | 0.41 | 4600 | - |
| 746 | Trip | 0.74 | 9100 | - |
| 762 | Trip | 2.44 | 14800 | 66 |
| 780 | Trip | 1.33 | 13800 | - |

TABLE 5

# BALEEN-2

## 4 WIRELINE AND MUD LOGS

## 4.1 WIRELINE LOGS

In the openhole section at total depth (TD), a total of 7 runs were made in 1 suite. The wireline logs did not reach the drilling TD due to soft fill. A list of the logs run, and mud data is shown below:

Junk basket and bridge plug runs (runs 6 and 7), were run prior to setting the abandonment plug 3 at 125mRT – 175mRT.

| BALEEN-2 WIRELINE LOGGING SUMMARY | | | | | |
|---|---|---|---|---|---|
| **LOG** | **DATE** | **SUITE / RUN** | **INTERVAL mRT** | **BHT-TIME** | **COMMENTS** |
| PEX-HALS-DSI-NGS | 16/10/99 | 1/1 | 888.5-90 | 46.7°C/5:21hrs | Logged GR from 640 to 90. Full PEX-DSI high resolution data recorded at 1800ft/h up to 640mRT. |
| FMI-GR | 16/10/99 | 1/2 | 887-647 | 48°C/8:35hrs | Logged open hole interval |
| MDT (pretests and samples) | 17/10/99 | 1/3,5 | 823-748 | 52°C/18:25hrs | 32 pretests, 16 normal, 8 supercharged, 5 lost seal, 2 pumpout failure, 1 dry test |
| CSAT-GR (VSP Survey) | 17/10/99 | 1/4 | 885-100 | 50°C/22hrs | 47 checkshot levels acquired, including 3 repeat levels at 300mRT, 663mRT and 795mRT |
| Junk Basket & Bridge Plug (GR and CCL record) | 17/10/99 | 6,7 | 200-100 | | Run prior to setting cement abandonment plug 3 |

TABLE 6

| MUD DATA | |
|---|---|
| **SUITE** | SUITE 1 |
| **TYPE** | NaCl / PHPA / Polymer |
| **DENSITY** | 1.21 g/cm3 |
| **VISCOSITY** | 49 s |
| **FLUID LOSS** | 3.4 g/cm3 |
| **pH** | 9 |
| **RM** | 0.134 ohm.m @21°C |
| **RMF** | 0.115 ohm.m @22°C |
| **RMC** | 0.213 ohm.m @22°C |
| **Barite** | 3.7% by volume |
| **NaCl** | 7.6% by volume |
| **Chlorides** | 46 500 mg / L |

TABLE 7

The Wireline logging report and operations summary are included in Appendix 6.

A merged plot of the main logs is presented as the Merged Composite Playback in Enclosure 1.

## 4.2 MUD LOGS

Geoservices Overseas SA provided conventional mudlogging services in conjunction with a computerized data logging and processing system.

The Geoservices unit was operated continuously throughout the well with the production of a Formation Evaluation Log, Pressure Log, and Drilling Log. All three logs are included as enclosures 2,3 and 4 respectively.

Mud Loggers Daily Reports are included in Appendix 8, and the Final Geoservices Report is included in Appendix 9.

## 4.3 VELOCITY SURVEY

Schlumberger Oilfield Australia Pty Ltd carried out one conventional VSP in Baleen-2. The survey was run on 17 October 1999 using the Combinable Seismic Acquisition Tool (CSAT).

The data were acquired using a 4x40 cubic inch airgun as the source, positioned 6 metres below the sea level, with a hydrophone attached 3 metres below the gun. A total of 47 levels were acquired with 3 checkshot levels at 300mRT, 663mRT and 795mRT. Recording was made on the Schlumberger Maxis 500 Unit using DLIS format.

Data processing consisted of VSP processing, sonic calibration and generating a Geogram. The vertical component of the VSP data was processed using the conventional zero offset vertical incidence processing chain. Geogram plots were generated using 40,50 and 60 Hertz - 90deg Zero Phase Ricker Wavelets.

The VSP processing report and Geogram are included in Appendix 11, with VSP plots included as Enclosures 5 to 10.

# BALEEN-2

## 5 SAMPLE ANALYSES

## 5.1 OIL ANALYSES

Oil was extracted from three samples of core, at 757.07mRT, 758.43mRT, and 760.55mRT. The samples were run through a liquid chromatograph to determine their composition, with the results included in the Fluids Analysis Final Report in Appendix 13.

## 5.2 GAS ANALYSIS

No gas samples were caught in Baleen-2. MDT sampling for gas was unsuccessful. However, 32ppm $H_2S$ was recorded by Draeger tube from gas which exsolved from a formation water sample acquired with the MDT from 797mRT.

## 5.3 MUD ANALYSES

Four mud samples were collected from Baleen-2, with three flowline mud samples acquired from various depths, and one MDT sample. Sample 1 was acquired during the cutting of core 1 at 746mRT, Sample 2 was acquired during the cutting of core 2 at 762mRT, and sample 3 was collected while circulating at 895mRT (TD) before running logs. Sample 4 was taken during logging with the MDT at 757mRT.

The mud sample from core 2 (762mRT) was sent to ACS Laboratories in Brisbane for analysis, with the results included in the Fluids Analysis Report in Appendix 13.

Mud samples are summarized in the Sample Collection Summary over the page.

## 5.4 WATER ANALYSES

During the MDT runs, 1 gallon of formation water was taken from 1 sample point at 797mRT. The sample was later subdivided into 6 sub-samples, labelled 1.01 – 1.06.

Two core plug samples were taken at 754.08mRT and 778.34mRT and cut into 5 equal lengths, marked a - e. Pore water was then extracted from all of the samples.

The two core plug water sample sets, and two formation water samples (1.01 and 1.06) were sent to ACS Laboratories in Brisbane for analysis, with the results included in the Fluids Analysis Report in Appendix 13.

Water samples are summarized in the Sample Collection Summary over the page.

## 5.5 FILTRATE ANALYSIS

A small amount of filtrate was pressed from the drilling mud during the core cutting operation, and was sent to ACS Laboratories in Brisbane for analysis. The results are included in the Fluids Analysis Report in Appendix 13.

Fluid samples are summarized in the Sample Collection Summary over the page.

| SAMPLE COLLECTION SUMMARY | | | | | |
|---|---|---|---|---|---|
| **Sample Type** | **Sample No.** | **Source** | **Depth mRT** | **Amount** | **Comments** |
| Mud | 1 | Flowline | 746m | 500ml | Core #1 |
| Mud | 2 | Flowline | 762m | 500ml | Core #2 |
| Mud | 3 | Flowline | 895m (TD) | 500ml | Wireline logging |
| Filtrate | - | Mud from flowline | - | 55ml | Pressed from mud during core cutting |
| Water | 1.01 – 1.06 | MDT | 797m | 500ml | |
| Mud | 1,07 | MDT | 757m | 200ml | |
| Water | 1 (a – e) | Core plug | 754.08m | - | To determine mud / filtrate invasion of core |
| Water | 2 (a – e) | Core plug | 778.34m | - | To determine mud / filtrate invasion of core |

TABLE 8

FIGURES

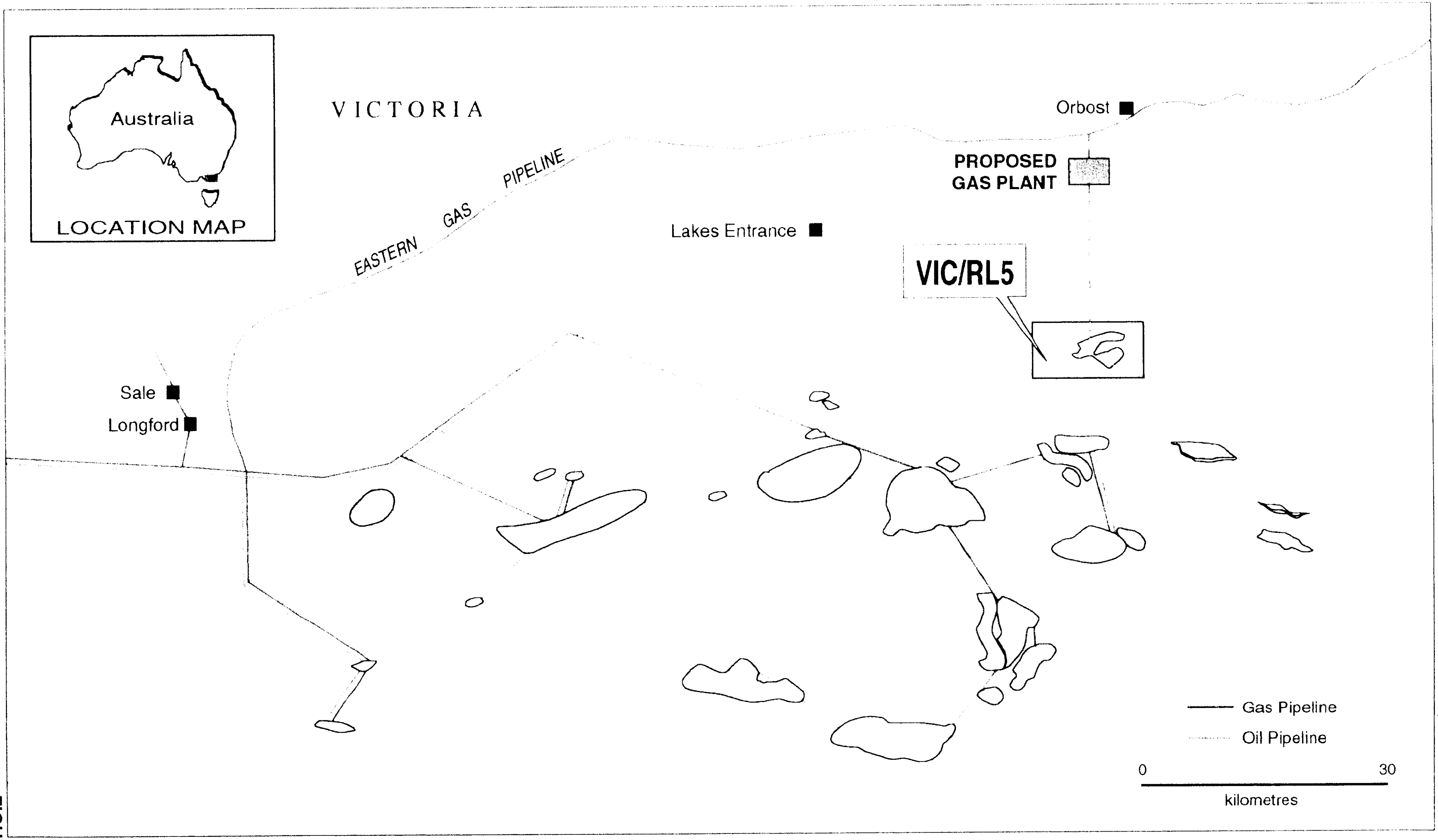
907960 027

# BALEEN-2

# FIGURES

907960 028 PE907964 - color 001

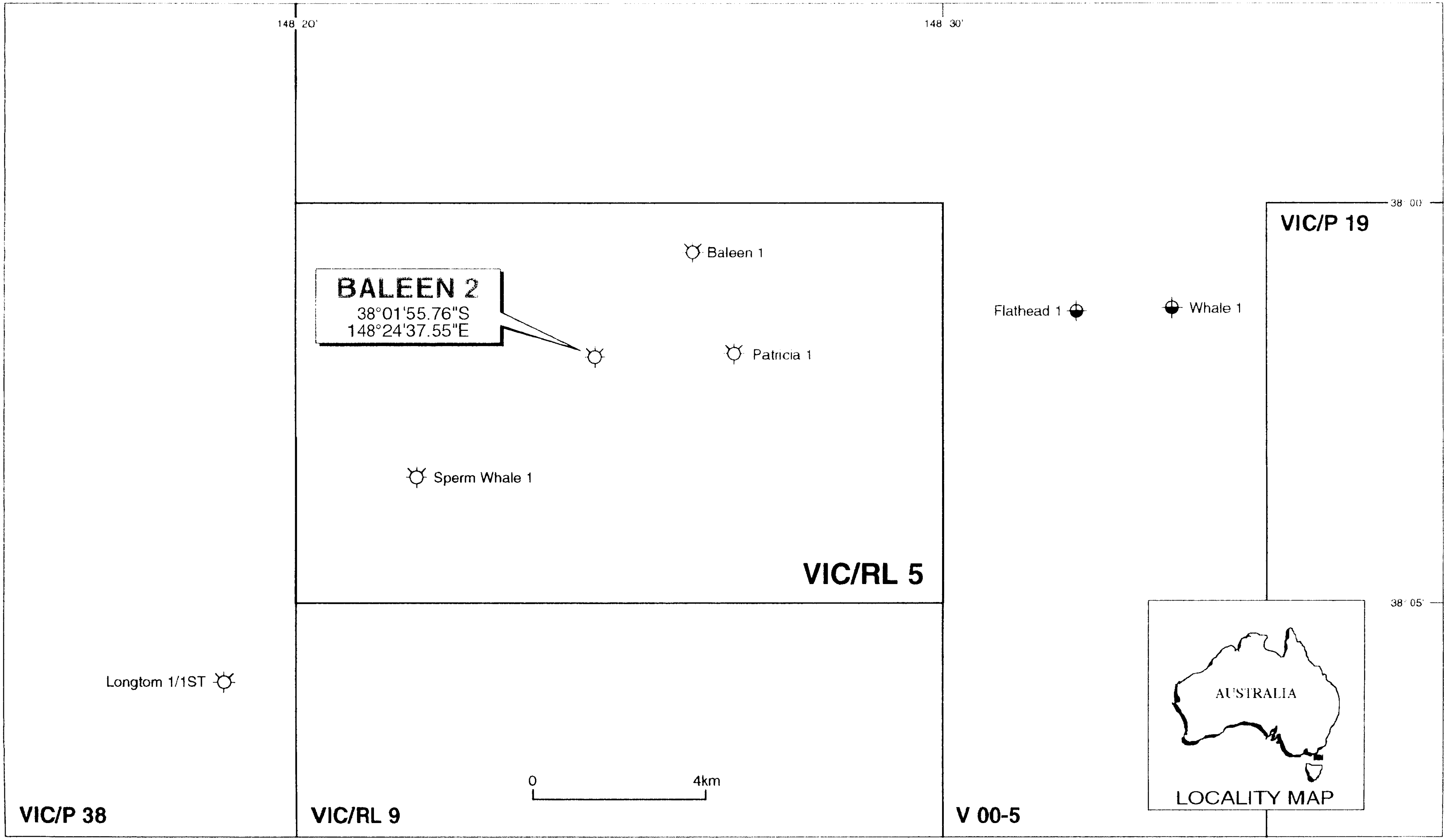
# PATRICIA - BALEEN GAS FIELD LOCATION MAP
## GIPPSLAND BASIN - OFFSHORE VICTORIA




AUTHOR: OMV | DATE: MAY 2000 | FILENAME: GIPPSLAND \ A4S \ 21.DGN (V3)

FIGURE 1

# BALEEN-2 LOCATION MAP




AUTHOR: OMV | DATE: JULY 2000 | FILENAME: GIPPSLAND \ VICRL5 \ A4S \ 81.DGN (V2)

FIGURE 2

907960 029

PE907960_colo1 002

# BALEEN-2 ABANDONMENT SCHEMATIC

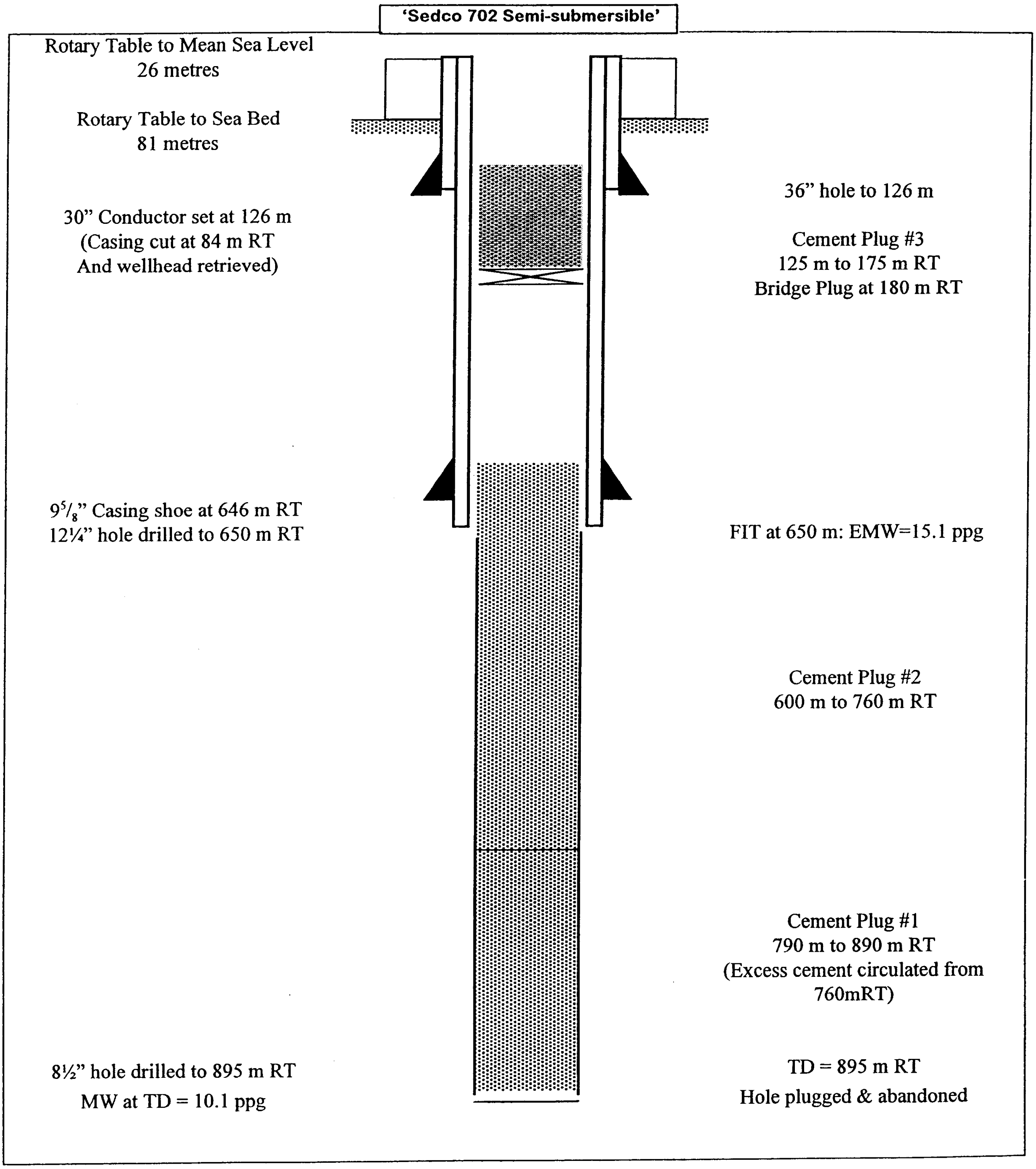



**FIGURE 3**

# APPENDICES

# BALEEN-2

# APPENDICES

## 1 - 13

# APPENDIX 1

BALEEN-2

## DAILY GEOLOGICAL REPORTS

-CULTUS-

## *CONFIDENTIAL*

| | | | |
|---|---|---|---|
| **Date:** | 10 October 1999 | **Rig:** | SEDCO 702 |
| **Report Number:** | 1 | **Bit Diameter:** | 0 " |
| **Report Period:** | 00:00 - 24:00 Hours | **Last Casing:** | N/A m MDRT |
| **Spud Date:** | 11/10/99 2:00:00 AM | **FIT:** | N/A |
| **Days From Spud:** | -0.1 | **Mud Weight:** | 0.00 SG |
| **Depth @ 2400 Hrs:** | .0 m MDRT<br>.0 m TVDRT | **ECD:** | 0.00 SG |
| | | **Mud Type:** | |
| **Lag Depth:** | .0 m MDRT | **Mud Chlorides:** | 0 mg/l |
| **Last Depth:** | .0 m MDRT | **Est. Pore Pressure:** | 0.00 SG |
| **Progress:** | 0 m | **DXC:** | |
| **Water Depth:** | 55.0 m MSL | **Last Survey:** | 0.0 m MDRT |
| **RT:** | 26.0 m | **Deviation:** | Inc. 0.00°<br>Az. 0.00° |

## OPERATIONS SUMMARY

**24 HOUR SUMMARY** Arrived on location at 12:00 hrs on the 10/10/1999. Ran and pretensioned anchors. Sonsub performed bottom scan. Prepared spud mud.

**NEXT 24 HOURS** Run and cement 30" casing. Clean out shoe track with 17.5" bit. Drill ahead 12-1/4" hole.

**CURRENT OPERATION @ 06:00 HRS (11/10/1999 )** : 00:00 to 06:00 hrs - Completed pre-tensioning all anchors. Moved into final position and spudded well at 02:00 hrs on the 11/10/1999. Tagged seabed at 80.71 mMDRT. Water Depth is 54.81m. Drilled 36" hole from 80.71m to 126 m MDRT. Wiper trip and clean hole prior to displacing hole with spud mud.

## GEOLOGICAL SUMMARY

**LITHOLOGY**

**INTERVAL:**
**ROP (Range):**
**Av. ROP:**

**HYDROCARBON FLUORESCENCE**
No Shows

**GAS SUMMARY**
**No Gas Data**

**CALCIMETRY**

| Interval (m MDRT) | Calcite Range (%) | Dolomite Range (%) |
|---|---|---|

**REMARKS**

Rig arrived on location at 12:00 Hrs on the 10/10/1999. Baleen-2 spudded at 02:00 hrs on the 11/10/1999.

Final Well Coordinates

| | |
|---|---|
| Latitude | 038° 01' 55.758" S |
| Longitude | 148° 24' 37.549" E |
| Easting | 623781.41m |
| Northing | 5789663.90 m |
| Rig Heading | 206.4° T |

| | |
|---|---|
| Water Depth | 55 m |
| RKB - MSL | 26 m |
| RKB - Seabed | 81 m |

(Note: These figures are rounded to the nearest meter.)

**WELLSITE GEOLOGISTS**

# *CONFIDENTIAL*

| | | | |
|---|---|---|---|
| **Date:** | 11 October 1999 | **Rig:** | SEDCO 702 |
| **Report Number:** | 2 | **Bit Diameter:** | 12.25 " |
| **Report Period:** | 00:00 - 24:00 Hours | **Last Casing:** | 30 X 20" @ 126.0 m MDRT |
| **Spud Date:** | 11/10/99 2:00:00 AM | **FIT:** | 0 SG EMW @ .0m MDRT |
| **Days From Spud:** | 0.9 | **Mud Weight:** | 1.03 SG |
| **Depth @ 2400 Hrs:** | 137.0 m MDRT<br>137.0 m TVDRT | **ECD:** | 0.00 SG |
| | | **Mud Type:** | Seawater with gel sweeps. |
| **Lag Depth:** | .0 m MDRT | **Mud Chlorides:** | 0 mg/l |
| **Last Depth:** | .0 m MDRT | **Est. Pore Pressure:** | 1.03 SG |
| **Progress:** | 137.0 m | **DXC:** | N/A |
| **Water Depth:** | 55.0 m MSL | **Last Survey:** | 310.0 m MDRT |
| **RT:** | 26.0 m | **Deviation:** | Inc. 0.50°<br>Az. 0.00° |

## OPERATIONS SUMMARY

**24 HOUR SUMMARY**

Completed pre-tensioning all anchors. Moved into final position and spudded well at 02:00 hrs on the 11/10/1999. Tagged seabed at 80.71 mMDRT. Water Depth is 54.81m. Drilled 36" hole from 80.71m to 126 m MDRT. Wiper trip and clean hole prior to displacing hole with viscous bentonite. Run 30" casing to 126 mMDRT and cement as per programme. Made up 17.5" drilling assembly. Conducted emergency winch off drill. Ran into hole with 17.5" drilling assembly and tagged top of cement at 120 mMDRT. Drilled out cement and shoe track to 126 mMDRT. Pulled out of hole and layed down 17.5" drilling assembly. Made up 12.25" drilling assembly and ran into hole to 126 m. Drilled ahead from 126m to 137 mMDRT.

**NEXT 24 HOURS**

Drill 12.25" hole to approximately 650 mMDRT. Clean hole. POOH and run 9-5/8" casing.

**CURRENT OPERATION @ 06:00 HRS (12/10/1999 )** : Drilling 12.25" hole at 368 mMDRT.

## GEOLOGICAL SUMMARY

**LITHOLOGY**

**INTERVAL:** 81 to 126 m MDRT
**ROP (Range):** to m/hr
**Av. ROP:** m/hr

Drilled 36" hole riserless with returns to seabed. No ROP's recorded.

**INTERVAL:** 126 to 137 m MDRT
**ROP (Range):** 7 to 45 m/hr
**Av. ROP:** 22 m/hr

Drilled 12.25" hole riserless with returns to seabed.

**HYDROCARBON FLUORESCENCE**
No Shows

**GAS SUMMARY**
**No Gas Data**

**CALCIMETRY**

| Interval (m MDRT) | Calcite Range (%) | Dolomite Range (%) |
|---|---|---|

**SAMPLE QUALITY**

Drilling riserless with returns to seabed.

**MUDLOGGING EQUIPMENT / PERSONNEL**
All equipment functioning normally. Full crew on board.

**MWD**
No MWD tool in drill string.

**REMARKS**
Samplex trays and aditional microscope being ordered for the Geoservices unit. No mudlog data available from spud to 126m. Unit not operational - only partial crew on board.

**WELLSITE GEOLOGISTS**
Peter Boothby

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| | | | |
|---|---|---|---|
| **Date:** | 12 October 1999 | **Rig:** | SEDCO 702 |
| **Report Number:** | 3 | **Bit Diameter:** | 12.25 " |
| **Report Period:** | 00:00 - 24:00 Hours | **Last Casing:** | 30 X 20" @ 126.0 m MDRT |
| **Spud Date:** | 11/10/99 2:00:00 AM | **FIT:** | 0 SG EMW @ .0m MDRT |
| **Days From Spud:** | 1.9 | **Mud Weight:** | 1.04 SG |
| **Depth @ 2400 Hrs:** | 650.0 m MDRT | **ECD:** | 0.00 SG |
| | 650.0 m TVDRT | **Mud Type:** | Seawater with gel sweeps. |
| **Lag Depth:** | .0 m MDRT | **Mud Chlorides:** | 0 mg/l |
| **Last Depth:** | 137.0 m MDRT | **Est. Pore Pressure:** | 1.03 SG |
| **Progress:** | 513.0 m | **DXC:** | normal |
| **Water Depth:** | 55.0 m MSL | **Last Survey:** | 650.0 m MDRT |
| **RT:** | 26.0 m | **Deviation:** | Inc. 0.25° |
| | | | Az. 0.00° |

## OPERATIONS SUMMARY

**24 HOUR SUMMARY** Drilled 12.25" hole from 137m to 650m MDRT with surveys every 100m. Conducted wiper trip to 110m - hole in good condition. Displaced hole with excess mud. Pulled out of hole. Commenced running 9-5/8" casing.

**NEXT 24 HOURS** Run and test BOP stack.

**CURRENT OPERATION @ 06:00 HRS (13/10/1999 )** : 00:00 - 06:00 - Run into hole with 9-5/8" casing to 646 mMDRT. Cement casing as per programme. Back out running tool.

## GEOLOGICAL SUMMARY

**LITHOLOGY**

**INTERVAL:** 137 to 650 m MDRT
**ROP (Range):** 7 to 129 m/hr
**Av. ROP:** 73 m/hr

Drilling riserless - returns to seabed.

**HYDROCARBON FLUORESCENCE**
No Shows

**GAS SUMMARY**
**No Gas Data**

**CALCIMETRY**

| Interval (m MDRT) | Calcite Range (%) | Dolomite Range (%) |
|---|---|---|

**SAMPLE QUALITY**

Drilling riserless with returns to seabed.

**MUDLOGGING EQUIPMENT / PERSONNEL**
All equipment functioning normally.

**MWD**
No MWD tool in drill string.

**REMARKS**
Expect to be drilling out 9-5/8" casing by 06:00 hrs on the 14/10/99.
9-5/8" Casing shoe set at 646 mMDRT

**WELLSITE GEOLOGISTS**
Peter Boothby

# *CONFIDENTIAL*

| | | | |
|---|---|---|---|
| **Date:** | 13 October 1999 | **Rig:** | SEDCO 702 |
| **Report Number:** | 4 | **Bit Diameter:** | 12.25 " |
| **Report Period:** | 00:00 - 24:00 Hours | **Last Casing:** | 9-5/8" @ 646.0 m MDRT |
| **Spud Date:** | 11/10/99 2:00:00 AM | **FIT:** | 1.8 SG EMW @ 650.0m MDRT |
| **Days From Spud:** | 2.9 | **Mud Weight:** | 1.21 SG |
| **Depth @ 2400 Hrs:** | 650.0 m MDRT<br>650.0 m TVDRT | **ECD:** | 0.00 SG |
| | | **Mud Type:** | NaCl/PHPA/Polymer |
| **Lag Depth:** | .0 m MDRT | **Mud Chlorides:** | 51000 mg/l |
| **Last Depth:** | 650.0 m MDRT | **Est. Pore Pressure:** | 1.03 SG |
| **Progress:** | 0 m | **DXC:** | normal |
| **Water Depth:** | 55.0 m MSL | **Last Survey:** | 650.0 m MDRT |
| **RT:** | 26.0 m | **Deviation:** | Inc. 0.25°<br>Az. 0.00° |

## OPERATIONS SUMMARY

**24 HOUR SUMMARY** Continued running 9-5/8" casing to 646 mMDRT. Cemented casing as per programme. Picked up and ran BOP's and riser. Pressure tested choke and kill lines. Stroked out slip joint and installed diverter. Function and pressure tested BOP's, choke and kill lines as required. Rigged down Dowell and pulled out of hole with test plug.

**NEXT 24 HOURS** Drill 8.5" hole to core point. Pull out of hole and pick up core barrel. Run into hole and cut core # 1.

**CURRENT OPERATION @ 06:00 HRS (14/10/1999 )** : 00:00 - 06:00 Function and test diverter system. Installed flex joint bore protector. Layed down 8" BHA. Picked up 8.5" BHA and run into hole. Tagged top of cement at 596 m. Commenced drilling cement.

## GEOLOGICAL SUMMARY

**LITHOLOGY**

**INTERVAL:**
**ROP (Range):**
**Av. ROP:**

**HYDROCARBON FLUORESCENCE**
No Shows

**GAS SUMMARY**
**No Gas Data**

**CALCIMETRY**

| Interval (m MDRT) | Calcite Range (%) | Dolomite Range (%) |
|---|---|---|

**MUDLOGGING EQUIPMENT / PERSONNEL**

All equipment functioning normally. H2S Sensor in Active pit area not functioning and has been removed. H2S sensors in gas line and at shakers tested OK. 500ml Pyrex jars (7) are on order and will arrive on Friday's helicopter.

**REMARKS**

A total of 4 Schlumberger Crew now on board. Two more operators to arrive on Friday. All coring equipment ready.

**WELLSITE GEOLOGISTS**

Peter Boothby

## CONFIDENTIAL

| | | | |
|---|---|---|---|
| **Date:** | 14 October 1999 | **Rig:** | SEDCO 702 |
| **Report Number:** | 5 | **Bit Diameter:** | 8.5 " |
| **Report Period:** | 00:00 - 24:00 Hours | **Last Casing:** | 9-5/8" @ 646.0 m MDRT |
| **Spud Date:** | 11/10/99 2:00:00 AM | **FIT:** | 1.8 SG EMW @ 650.0m MDRT |
| **Days From Spud:** | 3.9 | **Mud Weight:** | 1.21 SG |
| **Depth @ 2400 Hrs:** | 746.0 m MDRT<br>746.0 m TVDRT | **ECD:** | 1.29 SG |
| | | **Mud Type:** | NaCl/PHPA/Polymer |
| **Lag Depth:** | 746.0 m MDRT | **Mud Chlorides:** | 45500 mg/l |
| **Last Depth:** | 650.0 m MDRT | **Est. Pore Pressure:** | 1.03 SG |
| **Progress:** | 96.0 m | **DXC:** | normal |
| **Water Depth:** | 55.0 m MSL | **Last Survey:** | 650.0 m MDRT |
| **RT:** | 26.0 m | **Deviation:** | Inc. 0.25°<br>Az. 0.00° |

## OPERATIONS SUMMARY

**24 HOUR SUMMARY** Completed function and pressure testing BOP's. Layed down 12¼" BHA, picked up 8½" BHA. Ran into hole and tagged top of cement at 596 mMDRT. Drilled out cement and shoe track and clean out rat hole to 650mMDRT. Drilled new formation from 650 to 654 mMDRT. Cleaned and displaced hole to 10.1 ppg NACl/PHPA/Polymer mud system. Performed FIT to 15.1 ppg EMW. Drilled 8½" 654 to 698 m. Drilled ahead to core point at 746 mMDRT circulating samples at 698 m and 736. Circulated bottom up and pulled out of hole for Core # 1.

**NEXT 24 HOURS** Cut cores through Gurnard Reservoir.

**CURRENT OPERATION @ 06:00 HRS (15/10/1999 )** : 00:00 - 06:00 Pull out of hole - strapping out, picked up core barrel, run into hole to cut core # 1.

## GEOLOGICAL SUMMARY

**LITHOLOGY**

**INTERVAL:** 650 to 675 m MDRT
**ROP (Range):** 3 to 34 m/hr
**Av. ROP:** 23 m/hr

ARGILLACEOUS CALCILUTITE grading to and interbedded with minor CALCILUTITE.

ARGILLACEOUS CALCILUTITE: (95 - 100%) light grey to medium grey, medium to dark olive grey, soft, dispersive, firm in part, amorphous to blocky, trace subfissile, trace carbonaceous specks, 20-25% siliceous clay content, grades in part to Calcareous Claystone, trace quartz silt,

CALCILUTITE: (Trace-5%) white to very light grey, light olive, grey, soft, amorphous, slightly dispersive, trace very fine glauconite.

**INTERVAL:** 675 to 720 m MDRT
**ROP (Range):** 3 to 33 m/hr
**Av. ROP:** 13 m/hr

ARGILLACEOUS CALCILUTITE grading to CALCAREOUS CLAYSTONE

ARGILLACEOUS CALCILUTITE: (70 - 100%) light grey to medium grey, medium to dark olive grey, dominantly soft, dispersive, rare firm to moderately hard, amorphous to blocky, trace subfissile, trace carbonaceous specks, 30-35% siliceous clay content, grades in part to Calcareous Claystone, trace quartz silt, trace very fine Glauconite, trace forams.

CALCAREOUS CLAYSTONE: (Trace - 30%) light to medium grey, light olive grey, soft, amorphous, dispersive in part, 20-30% micrite content, trace very fine Glauconite.

**INTERVAL:** 720 to 740 m MDRT
**ROP (Range):** 5 to 21 m/hr
**Av. ROP:** 11 m/hr

CALCAREOUS CLAYSTONE with decreasing interbedded ARGILLACEOUS CALCILUTITE.

ARGILLACEOUS CALCILUTITE: (40 - 70%) as above.

CALCAREOUS CLAYSTONE: (30 - 60%) light to medium grey, pale yellowish brown in part, soft, dispersive, 20-25% micrite content, 5% fine dark green glauconite increasing, trace carbonaceous specks.

**INTERVAL:** 740 to 746 m MDRT
**ROP (Range):** 11 to 14 m/hr
**Av. ROP:** 13 m/hr

Predominantly CLAYSTONE with minor ARGILLACEOUS CALCILUTITE.

CLAYSTONE: (80 - 90%) medium to dark yellowish brown, dark olive grey, soft, dispersive, 10-15% micrite content, 5-10% fine dark green galuconite, trace to 5% quartz silt, trace fine quartz sand, trace very fine disseminated pyrite, trace hard dark brown siderite nodules, trace to minor carbonaceous flecks, trace lithics.

ARGILLACEOUS CALCILUTITE: (10 - 20%) as above.

**HYDROCARBON FLUORESCENCE**
No Shows

**GAS SUMMARY**

**Background Gas**

| INTERVAL | Total Gas (%) | C1 (ppm) | C2 (ppm) | C3 (ppm) | iC4 (ppm) | nC4 (ppm) | C5 (ppm) |
|---|---|---|---|---|---|---|---|
| 650 - 675 | 0.104 | 1245 | 0 | 0 | 0 | 0 | 0 |
| 675 - 720 | 0.254 | 3238 | 0 | 0 | 0 | 0 | 0 |
| 720 - 740 | 0.495 | 6234 | 0 | 0 | 0 | 0 | 0 |

**Gas Peak**

| INTERVAL | Total Gas (%) | C1 (ppm) | C2 (ppm) | C3 (ppm) | iC4 (ppm) | nC4 (ppm) | C5 (ppm) |
|---|---|---|---|---|---|---|---|
| 743 - 746 | 1.24 | 13207 | 100 | 0 | 0 | 0 | 0 |

**CALCIMETRY**

| Interval (m MDRT) | Calcite Range (%) | Dolomite Range (%) |
|---|---|---|
| 650 - 675 | 46 - 65 % | 0 - 7 % |
| 675 - 720 | 56 - 83 % | 4 - 11 % |
| 720 - 740 | 25 - 37 % | 2 - 5 % |
| 740 - 746 | 2 % | 1 % |

**MUDLOGGING EQUIPMENT / PERSONNEL**

All equipment functioning normally. H2S Sensor in Active pit area not functioning and has been removed. H2S sensors in gas line and at shakers tested OK. 500ml Pyrex jars (7) are on order and will arrive on Friday's helicopter.

**WELLSITE GEOLOGISTS**

Peter Boothby

# CONFIDENTIAL

| | | | |
|---|---|---|---|
| **Date:** | 15 October 1999 | **Rig:** | SEDCO 702 |
| **Report Number:** | 6 | **Bit Diameter:** | 8.5 " |
| **Report Period:** | 00:00 - 24:00 Hours | **Last Casing:** | 9-5/8" @ 646.0 m MDRT |
| **Spud Date:** | 11/10/99 2:00:00 AM | **FIT:** | 1.8 SG EMW @ 650.0m MDRT |
| **Days From Spud:** | 4.9 | **Mud Weight:** | 1.21 SG |
| **Depth @ 2400 Hrs:** | 780.3 m MDRT<br>780.3 m TVDRT | **ECD:** | 0.00 SG |
| | | **Mud Type:** | NaCl/PHPA/Polymer |
| **Lag Depth:** | 771.0 m MDRT | **Mud Chlorides:** | 44000 mg/l |
| **Last Depth:** | 746.0 m MDRT | **Est. Pore Pressure:** | 1.03 SG |
| **Progress:** | 34.0 m | **DXC:** | normal |
| **Water Depth:** | 55.0 m MSL | **Last Survey:** | 650.0 m MDRT |
| **RT:** | 26.0 m | **Deviation:** | Inc. 0.25°<br>Az. 0.00° |

# OPERATIONS SUMMARY

**24 HOUR SUMMARY** Continued pulling out of hole with drilling assembly. Picked up 18m core barrel and ran into hole. Cut core # 1 from 746 to 762.3 (16.3m) - core jammed off. Pulled out of hole at controlled rate. Tested core for H2S gas - nil. Layed out inner core barrel and recovered 16.3m of core (100%). Made up 18m core barrel and ran into hole. Cut core # 2 from 762.3 to 780.3 (18m). Pulled out of hole at controlled rate.

**NEXT 24 HOURS** Drill to TD of 925m MDRT and log with Schlumberger.

**CURRENT OPERATION @ 06:00 HRS (16/10/1999 )** : 00:00 - 06:00 Recoved core # 2 (88%) Layed down core barrel. Make up new bit and loacked drilling assembly and run into hole.

# GEOLOGICAL SUMMARY

**LITHOLOGY**

**INTERVAL:** 746 to 757 m MDRT
**ROP (Range):** 7 to 34 m/hr
**Av. ROP:** 19 m/hr

From Core Chip Descriptions

SANDY SILTSTONE grading to predominantly SILTY SANDSTONE

SANDY SILTSTONE: (20%) moderate to dark yellowish brown, firm to hard, blocky, 40-50% very fine to fine quartz sand, commonly grades to Silty Sandstone, 10% -15% siliceous clay, 20-25% siderite nodules, locally patchy siderite cement, trace to 5% glauconite, 5% micromica, trace to 5% carbonaceous specks, trace lithics.

SILTY SANDSONE: (80%) moderate to dark yellowish brown, clear to translucent quartz grains, friable to locally firm, very fine to fine grained, moderately well sorted, angular to sub-rounded, trace to 2% patchy siderite cement, 20-25% dark yellowish brown quartz silt matrix, grades to Sandy Siltstone, trace to 5% dark green Glauconite, trace to 5% micromica, trace feldspar, fair to locally good visible porosity. No shows.

**INTERVAL:** 757 to 762 m MDRT
**ROP (Range):** 23 to 42 m/hr
**Av. ROP:** 31 m/hr

From Core Chip Descriptions

SILTY SANDSTONE sequence

SILTY SANDSTONE: (100%) moderate to dark yellowish brown, clear to translucent quartz grains, friable to locally firm, very fine to fine grained, moderately well sorted, angular to sub-rounded, trace patchy siderite cement, 20-25% dark yellowish brown quartz silt matrix, grades to Sandy Siltstone, trace dark green Glauconite, trace to 5% micromica, trace feldspar, fair to locally good visible porosity. FLUORESCENCE: (70-90%) as described below.

**INTERVAL:** 762 to 771 m MDRT
**ROP (Range):** 11 to 23 m/hr
**Av. ROP:** 17 m/hr

From Cuttings Descriptions whilst Coring.

SILTSTONE grading to and interbedded with SILTY SANDSTONE

SILTSTONE: (80 - 90%) dark yellowish brown to moderate yellowish brown, very soft to soft, amorphous to subblocky, argillaceous, minor very fine quartz sand, 5% micromica, trace carbonaceous specks.

SILTY SANDSTONE: (10 - 20%) clear to translucent, opaque in part, loose, silt size to very fine grained quartz, trace medium quartz grains, angular to sub-angular, poor to moderately sorted, trace siderite cement, minor silty / argillaceous matrix, trace glauconite, poor to fair inferred porosity.

NOTE: suspect very fine sands not being seen in cuttings.

**INTERVAL:** 771 to 780.3 m MDRT
**ROP (Range):** 11 to 30 m/hr
**Av. ROP:** 18 m/hr

Samples not circulated. Core chips not yet described.

**HYDROCARBON FLUORESCENCE**
757 to 762 (70-90%) (From Core Chip Descriptions) dull to moderately bright yellowish green pinpoint to patchy direct fluorescence, slow to moderately fast yellowish white to bright bluish white blooming cut fluorescence, thick yellowish white residual ring fluorescence.

**GAS SUMMARY**

**Background Gas**

| INTERVAL | Total Gas (%) | C1 (ppm) | C2 (ppm) | C3 (ppm) | iC4 (ppm) | nC4 (ppm) | C5 (ppm) |
|---|---|---|---|---|---|---|---|
| 762 - 771 | 1.2 | 12377 | 62 | 0 | 0 | 0 | 0 |

**Gas Peak**

| INTERVAL | Total Gas (%) | C1 (ppm) | C2 (ppm) | C3 (ppm) | iC4 (ppm) | nC4 (ppm) | C5 (ppm) |
|---|---|---|---|---|---|---|---|
| 746 - 762 | 5.7 | 29500 | 160 | 0 | 0 | 0 | 0 |

**Trip Gas**

| INTERVAL | Total Gas (%) | C1 (ppm) | C2 (ppm) | C3 (ppm) | iC4 (ppm) | nC4 (ppm) | C5 (ppm) |
|---|---|---|---|---|---|---|---|
| 746 - 746 | 0.74 | 9100 | 0 | 0 | 0 | 0 | 0 |
| 762 - 762 | 2.44 | 14800 | 105 | 0 | 0 | 0 | 0 |

**CALCIMETRY**

| Interval (m MDRT) | Calcite Range (%) | Dolomite Range (%) |
|---|---|---|

**MUDLOGGING EQUIPMENT / PERSONNEL**
All equipment functioning normally. Crews working well.

**REMARKS**
ACS has completed resinating the core and may be able to leave today. Core # 1 is now in refrigerated container. Core # 2 is curing and will be moved into contained this morning.

Timing for the shipment of core to Port Welshpool is not clear. Boat may sail on Tuesday or Wednesday from the Amity Oil location.

**WELLSITE GEOLOGISTS**
Peter Boothby

## *CONFIDENTIAL*

| | | | |
|---|---|---|---|
| **Date:** | 16 October 1999 | **Rig:** | SEDCO 702 |
| **Report Number:** | 7 | **Bit Diameter:** | 8.5 " |
| **Report Period:** | 00:00 - 24:00 Hours | **Last Casing:** | 9-5/8" @ 646.0 m MDRT |
| **Spud Date:** | 11/10/99 2:00:00 AM | **FIT:** | 1.8 SG EMW @ 650.0m MDRT |
| **Days From Spud:** | 5.9 | **Mud Weight:** | 1.21 SG |
| **Depth @ 2400 Hrs:** | 895.0 m MDRT<br>895.0 m TVDRT | **ECD:** | 11.10 SG |
| | | **Mud Type:** | NaCl/PHPA/Polymer |
| **Lag Depth:** | 895.0 m MDRT | **Mud Chlorides:** | 47000 mg/l |
| **Last Depth:** | 780.3 m MDRT | **Est. Pore Pressure:** | 1.03 SG |
| **Progress:** | 115.0 m | **DXC:** | normal |
| **Water Depth:** | 55.0 m MSL | **Last Survey:** | 650.0 m MDRT |
| **RT:** | 26.0 m | **Deviation:** | Inc. 0.25°<br>Az. 0.00° |

## OPERATIONS SUMMARY

**24 HOUR SUMMARY** Continued pulling out of hole with core # 2. Layed down core and recovered 15.8m (88%). Layed down core barrel assembly. Picked up packed BHA and ran into hole. Drilled 8½" hole from 780.3 to 895m MDRT. Circulated hole clean. Pulled out of hole. Rigged up Schlumberger and logged Run 1 (Pex/DSI/NGS) , Run 2 (FMI/GR).

**NEXT 24 HOURS** Complete logging with Sclumberger. Plug and abandon well.

**CURRENT OPERATION @ 06:00 HRS (17/10/1999 )** : Logging pressure points with MDT

## GEOLOGICAL SUMMARY

**LITHOLOGY**

**INTERVAL:** 780.3 to 810 m MDRT
**ROP (Range):** 5.2 to 61 m/hr
**Av. ROP:** 23 m/hr

SANDSTONE with minor interbedded SILTSTONE and trace COAL.

SANDSTONE: (40 - 90%) white to opaque, clear to translucent quartz grains, loose, medium to very coarse, dominantly medium to coarse, poorly sorted, sub-angular to sub-rounded, trace pyrite cement, 10-20% white kaolinitic matrix, grades to Arg Sandstone, 5% dark green pelloidal Glauconite, trace reddish brown lithics (jasper), good inferred porosity. No shows.

COAL: (1 - 2%) black, firm to hard, occasional brittle, dull to subvitreous.

SILTSTONE: (10 - 58%) pale brown to moderate yellowish brown, soft, dispersive, amorphous, 10-15% siliceous clay, grades to argillaceous Siltstone, 5% micromica, trace to 5% carbonaceous specks and micro-laminae, trace to 2% Glauconite, trace lithics.

**INTERVAL:** 810 to 870 m MDRT
**ROP (Range):** 18 to 184 m/hr
**Av. ROP:** 63 m/hr

SANDSTONE (Argillaceous) with minor interbedded CLAYSTONE and SILTSTONE.

SANDSTONE: (95 - 100%) white to opaque, clear to translucent quartz grains, trace light bluish grey, loose, fine to very coarse, dominantly medium to coarse, poorly sorted, angular to sub-angular, moderately common siliceous cement, 15-20% white kaolinitic matrix, grades to argillaceous Sandstone, trace Glauconite, fair to good inferred porosity. No shows.

CLAYSTONE: (5 - 5%) dark greyish black, dark greyish brown, hard to very hard, subfissile to fissile, siliceous, minor micromicaceous.

SILTSTONE: (5 - 5%) as above.

**INTERVAL:** 870 to 895 m MDRT
**ROP (Range):** 9 to 35 m/hr
**Av. ROP:** 16 m/hr

CLAYSTONE with SANDY CLAYSTONE interbeds.

SANDY CLAYSTONE: (40%) white to light grey, soft to very soft, 20-30% very fine to fine quartz sand, matrix supported, Kaolinitic.

CLAYSTONE: ( 60%) medium grey to medium light grey, very soft to soft, amorphous, occasionally blocky, homogenous, trace carbonacceous specks and micro-lamiae, trace pyrite nodules.

**HYDROCARBON FLUORESCENCE**
No Shows

**GAS SUMMARY**

**Background Gas**

| INTERVAL | Total Gas (%) | C1 (ppm) | C2 (ppm) | C3 (ppm) | iC4 (ppm) | nC4 (ppm) | C5 (ppm) |
|---|---|---|---|---|---|---|---|
| 780 - 810 | 0.459 | 5481 | 23 | 0 | 0 | 0 | 0 |
| 810 - 870 | 0.764 | 7626 | 30 | 0 | 0 | 0 | 0 |
| 870 - 895 | 0.326 | 4126 | 18 | 0 | 0 | 0 | 0 |

**CALCIMETRY**

| Interval (m MDRT) | Calcite Range (%) | Dolomite Range (%) |
|---|---|---|

**SAMPLE QUALITY**
Due to high ROP through Latrobe section sampling was conducted at 10m intervals.

**MUDLOGGING EQUIPMENT / PERSONNEL**
All equipment functioning normally. Crews working well.

**WELLSITE GEOLOGISTS**
Peter Boothby

# *CONFIDENTIAL*

| | | | |
|---|---|---|---|
| **Date:** | 17 October 1999 | **Rig:** | SEDCO 702 |
| **Report Number:** | 8 | **Bit Diameter:** | 8.5 " |
| **Report Period:** | 00:00 - 24:00 Hours | **Last Casing:** | 9-5/8" @ 646.0 m MDRT |
| **Spud Date:** | 11/10/99 2:00:00 AM | **FIT:** | 1.8 SG EMW @ 650.0m MDRT |
| **Days From Spud:** | 6.9 | **Mud Weight:** | 1.21 SG |
| **Depth @ 2400 Hrs:** | 895.0 m MDRT<br>895.0 m TVDRT | **ECD:** | 0.00 SG |
| | | **Mud Type:** | NaCl/PHPA/Polymer |
| **Lag Depth:** | .0 m MDRT | **Mud Chlorides:** | 46500 mg/l |
| **Last Depth:** | 895.0 m MDRT | **Est. Pore Pressure:** | 0.00 SG |
| **Progress:** | 0 m | **DXC:** | N/A |
| **Water Depth:** | 55.0 m MSL | **Last Survey:** | 0.0 m MDRT |
| **RT:** | 26.0 m | **Deviation:** | Inc. 0.00°<br>Az. 0.00° |

## OPERATIONS SUMMARY

**24 HOUR SUMMARY**

Picked up and ran in hole with run 3 MDT/GR. Conducted prressure survey as per program. Unable to obtain samples in Gurnard section. Rigged up and ran inhole with Run 4 VSP (CSAT/GR). Recorded 39 levels. Ran into hole with Run 5 (MDT/GR) with services pump out module and standard area probe. Ran into hole and attempted to sample at 749 and at 757.2 m without success - pump out module malfunctioned. Pulled out of hole and inspected tool. Pump out module full of very fine sand. Added 6 gallon dump chamber and reconfigured tool appropriately. Ran into hole. Attempted to sample at 757.0m. Pump out malfunctioned. Opened to 6 Gallon chamber - lost probe seal. Commenced pulling out of hole.

**NEXT 24 HOURS**

Plug and abandon well as per programme. Recover stack and pull secondary anchors.

**CURRENT OPERATION @ 06:00 HRS (18/10/1999 )** : 00:00 - 06:00 Pulled out of hole with MDT and inspected tool. Evaluated options. Rigged down Schlumberger. Picked up cement stinger and ran in hole to commence abandonment programme.

## GEOLOGICAL SUMMARY

**LITHOLOGY**

**INTERVAL:**
**ROP (Range):**
**Av. ROP:**

**HYDROCARBON FLUORESCENCE**
No Shows

**GAS SUMMARY**
**No Gas Data**

**CALCIMETRY**

| Interval (m MDRT) | Calcite Range (%) | Dolomite Range (%) |
|---|---|---|

**SAMPLE QUALITY**

Due to high ROP through Latrobe section sampling was conducted at 10m intervals.

**MUDLOGGING EQUIPMENT / PERSONNEL**

Crews completed sample splits. Mudloggers departed rig on the 17/10/1999.

**WELLSITE GEOLOGISTS**

Peter Boothby

# *CONFIDENTIAL*

| | | | |
|---|---|---|---|
| **Date:** | 18 October 1999 | **Rig:** | SEDCO 702 |
| **Report Number:** | 9 | **Bit Diameter:** | 0 " |
| **Report Period:** | 00:00 - 24:00 Hours | **Last Casing:** | 9-5/8" @ 646.0 m MDRT |
| **Spud Date:** | 11/10/99 2:00:00 AM | **FIT:** | 1.8 SG EMW @ 650.0m MDRT |
| **Days From Spud:** | 7.9 | **Mud Weight:** | 1.21 SG |
| **Depth @ 2400 Hrs:** | 895.0 m MDRT<br>895.0 m TVDRT | **ECD:** | 0.00 SG |
| | | **Mud Type:** | NaCl/PHPA/Polymer |
| **Lag Depth:** | .0 m MDRT | **Mud Chlorides:** | 0 mg/l |
| **Last Depth:** | 895.0 m MDRT | **Est. Pore Pressure:** | 0.00 SG |
| **Progress:** | 0 m | **DXC:** | N/A |
| **Water Depth:** | 55.0 m MSL | **Last Survey:** | 0.0 m MDRT |
| **RT:** | 26.0 m | **Deviation:** | Inc. 0.00°<br>Az. 0.00° |

## OPERATIONS SUMMARY

**24 HOUR SUMMARY** Logged with Run 5b MDT/GR - misrun unable to obtain sample. Rigged down MDT tool. Evaluated options. Rigged down Schlumberger. Commenceed plug and abandonment programme. Set cement plug # 1 from 890m to 790 m. Set balanced plug # 2 from 760 to 600m. Layed down tubing and drill collars. Ran into hole with drill pipe and tagged top of cement at 580m. Ran 8.5" EZSV bridge plug on Schlumberger wireline and set at 180m MDRT. Set cement plug # 3 from 175m to 125m. Circulated hole until clean. Commenced pulling flex joint bore protector and wear bushing.

**NEXT 24 HOURS** Pull stack and retrieve wellhead. Pull anchors.

**CURRENT OPERATION @ 06:00 HRS (19/10/1999 )** : 00:00 - 06:00 Pulled flex joint bore protector and wear bushing. Make up jetting stand. Pulling diverter and pin slip joint. Unlatch BOP's.

## GEOLOGICAL SUMMARY

**LITHOLOGY**

**INTERVAL:**
**ROP (Range):**
**Av. ROP:**

**HYDROCARBON FLUORESCENCE**
No Shows

**GAS SUMMARY**
No Gas Data

**CALCIMETRY**

| Interval (m MDRT) | Calcite Range (%) | Dolomite Range (%) |
|---|---|---|

**REMARKS**
All cuttings and fluid samples are packed in 4 boxes and are in container # 22532. The container is to be backloaded with the core on the Challenger and is due in Port Welshpool on Thursday the 21/10/1999.

**WELLSITE GEOLOGISTS**
Peter Boothby

# APPENDIX 2

BALEEN-2

## CORE CHIPS DESCRIPTION REPORT

-CULTUS-

# Cultus Petroleum N.L.

## CORE DESCRIPTION REPORT

| | | | |
|---|---|---|---|
| **Well Name :** | BALEEN-2 | **Date :** | 15 Oct 1999 |
| **Core Number :** | 1 | **Service Company :** | Security DBS |
| **Hole Size ("):** | 8.50 | **Core Diameter ("):** | 4.00 |
| **Barrel Length (m):** | 18.00 | **Bit Type :** | DBS CD76 |
| **Barrel Type :** | Aluminium | **Start Depth (m):** | 746.0 |
| **Mud Type :** | NaCL/PHPA/Polymer | **End Depth (m) :** | 762.3 |
| **Mud Weight (sg):** | 1.210 | **Meters Cut (m):** | 16.3 |
| **ROP Min (m/hr) :** | 6.7 | **Recovery Length (m):** | 16.3 ( 100.00% ) |
| **ROP Max (m/hr) :** | 42.0 | **Formation :** | Gurnard Formation |
| **ROP Avg (m/hr) :** | 22.9 | | |

**Geologists :** Peter Boothby
**Comments :** Core jammed off at 762.3

| Core Chip # | Core Chip Depth | Lithology / Shows |
|---|---|---|
| 1 | 746.0 | **SANDY SILTSTONE :** (100%) dark yellowish brown to moderate yellowish brown, firm to locally moderately hard, blocky, 30-40% very fine to fine grained quartz sand, commonly grades to Silty Sandstone, trace Glauconite, 5% siliceous clay, 5-10% micromica, common patchy siderite cement, trace to minor carbonaceous specks, trace lithics. No shows. |
| 2 | 747.0 | **SANDY SILTSTONE :** (100%) moderate to dark yellowish brown, firm to hard, blocky, 40-50% very fine to fine quartz sand, commonly grades to Silty Sandstone, 10% -15% siliceous clay, 20-25% siderite nodules, locally patchy siderite cement, trace to 5% glauconite, 5% micromica, trace to 5% carbonaceous specks, trace lithics. |
| 3 | 748.0 | **SILTY SANDSTONE :** (100%) moderate to dark yellowish brown, friable to locally firm, clear to translucent quartz grains, very fine to fine grained, moderately well sorted, angular to sub-rounded, trace to 5% patchy siderite cement, 20-30% dark yellowish brown quartz silt matrix, grades to Sandy Siltstone, 5% dark green Glauconite, trace to 5% micromica, trace feldspar, fair to locally good visible porosity. |
| 4 | 749.0 | **SILTY SANDSTONE :** (100%) moderate to dark yellowish brown, friable to locally firm, clear to translucent quartz grains, very fine to fine grained, moderately well sorted, angular to sub-rounded, trace to 2% patchy siderite cement, 20-25% dark yellowish brown quartz silt matrix, grades to Sandy Siltstone, trace to 2% dark green Glauconite, trace to 5% micromica, trace feldspar, fair to locally good visible porosity. No shows. |
| 5 | 750.0 | **SILTY SANDSTONE :** (100%) moderate to dark yellowish brown, clear to translucent quartz grains, friable to locally firm, very fine to fine grained, moderately well sorted, angular to sub-rounded, trace to 2% patchy siderite cement, 20-25% dark yellowish brown quartz silt matrix, grades to Sandy Siltstone, trace dark green Glauconite, trace to 5% micromica, trace feldspar, fair to locally good visible porosity. No shows. |
| 6 | 751.0 | **SILTY SANDSTONE :** (100%) dark greyish brown, dusky brown, dark yellowish brown, friable, very fine to fine quartz grains, moderately well sorted, angular to sub-rounded, trace patchy siderite cement, 20-30% dark yellowish brown silty matrix, 10-15% siliceous clay matrix, 5% micromica, trace Glauconite, trace lithics, poor to fair visible porosity. No shows. |
| 7 | 752.0 | **SILTY SANDSTONE :** (100%) moderate to dark yellowish brown, clear to translucent |

| Well Name :BALEEN-2 | Interval : 746.0m to 762.3 m |
|---|---|
| Core # : 1 | Cut : 16.30m Recovered : 16.30m ( 100.00% ) |

| Core Chip # | Core Chip Depth | Lithology / Shows |
|---|---|---|
| | | quartz grains, friable to locally firm, very fine to fine grained, moderately well sorted, angular to sub-rounded, trace patchy siderite cement, 20-25% dark yellowish brown quartz silt matrix,10-15% siliceous clay matrix, grades to Sandy Siltstone, trace dark green Glauconite, trace to 5% micromica, poor to fair visible porosity. No shows. |
| 8 | 752.6 | **SILTY SANDSTONE :** (100%) dominantly as above. No shows.<br>Note: dull to moderately bright yellowish green patchy fluorescence observed on surface of core only. Contamination |
| 9 | 753.0 | **SILTY SANDSTONE :** (100%) as above, Grades to Argillaceous Sandstone. No shows. |
| 10 | 754.0 | **SILTY SANDSTONE :** (100%) as above trace to 5% Glauconite. No shows. minor dull yellowish green fluorescence on surface of core. Contamination. |
| 11 | 755.0 | **SILTY SANDSTONE :** (100%) moderate to dark yellowish brown, clear to translucent quartz grains, friable to locally firm, very fine to fine grained, moderately well sorted, angular to sub-angular, trace to 10% patchy siderite cement, 20-25% dark yellowish brown quartz silt matrix, 10-15% siliceous clay matrix, grades to Sandy Siltstone, 5% dark green Glauconite, trace to 5% micromica, poor to fair visible porosity. No shows. |
| 12 | 756.0 | **SILTY SANDSTONE :** (100%) moderate to dark yellowish brown, clear to translucent quartz grains, friable, very fine to fine grained, moderately well sorted, angular to sub-angular, trace to 2% patchy siderite cement, 20-25% dark yellowish brown quartz silt matrix, 10-15% siliceous clay matrix, grades to Sandy Siltstone, 5-8% dark green Glauconite, trace to 5% micromica, fair visible porosity.<br>FLUORESCENCE: Nil direct fluorescence, slow to moderately fast yellowish green to yellowish white diffuse crush cut fluorescence, thin yellowish white residual ring fluorescence. |
| 13 | 757.0 | **SILTY SANDSTONE :** (100%) as above. Fair to Good Show<br>FLUORESCENCE : (80%) dull to moderately bright yellowish green pinpoint to patchy direct fluorescence, slow yellowish white blooming cut fluorescence, thick yellowish white residual ring fluorescence. |
| 14 | 758.0 | **ARGILLACEOUS SANDSTONE :** (100%) moderate to dark yellowish brown, clear to translucent quartz grains, friable to commonly firm, very fine to fine grained quartz, poor to moderately well sorted, angular to sub-angular, trace patchy siderite cement, 30-40% argillaceous matrix, 15-20 quartz silt matrix, trace Glauconite, trace to 5% micromica, trace lithics, poor to locally fair visible porosity. Fair to Good Show<br>FLUORESCENCE : (80%) Strong gassy / HC odour. Dull to moderately bright yellowish green pinpoint to patchy direct fluorescence, slow yellowish white to bluish white blooming cut fluorescence, thick yellowish white residual ring fluorescence. |
| 15 | 759.0 | **SILTY SANDSTONE :** (100%) moderate to dark yellowish brown, clear to translucent quartz grains, friable, very fine to fine grained, moderately well sorted, angular to sub-angular, trace patchy siderite cement, 20-25% dark yellowish brown quartz silt matrix, 10-15% siliceous clay matrix, grades to Sandy Siltstone, trace to 2% dark green Glauconite, trace to 5% micromica, fair visible porosity. Fair to Good Show.<br>FLUORESCENCE : (90%) Strong gassy / HC odour. Dull to moderately bright yellowish green pinpoint to patchy direct fluorescence, slow yellowish white to moderately bright bluish white blooming cut fluorescence, thick yellowish white residual ring fluorescence. |

| Well Name :BALEEN-2 | Interval : 746.0m to 762.3 m |
|---|---|
| Core # : 1 | Cut : 16.30m Recovered : 16.30m ( 100.00% ) |

| Core Chip # | Core Chip Depth | Lithology / Shows |
|---|---|---|
| 16 | 760.0 | **SILTY SANDSTONE :** (100%) as above, firm to locally moderately hard, trace to 10% patchy siderite cement, poor to fair visible porosity. Good show.<br>FLUORESCENCE : (90%) Strong gassy / HC odour. Dull to moderately bright yellowish green pinpoint to patchy direct fluorescence, slow to moderately fast yellowish white to moderately bright bluish white blooming cut fluorescence, thick yellowish white residual ring fluorescence. Bright bluish white fluorescence on surface of core. |
| 17 | 761.0 | **SILTY SANDSTONE :** (100%) as above, commonly grades to Sandy Siltstone, moderately common patchy siderite cement. poor to locally fair visible porosity. Good show.<br>FLUORESCENCE : (70%) Strong gassy / HC odour. Dull to moderately bright yellowish green pinpoint to patchy direct fluorescence, slow to moderately fast yellowish white to moderately bright bluish white blooming cut fluorescence, thick yellowish white residual ring fluorescence. |
| 18 | 761.5 | **SILTY SANDSTONE :** (100%) as above, 5% very fine Glauconite. 15-20% argillaceous matrix, grades to Argillaceous Sandstone.<br>FLUORESCENCE : (70%) Strong gassy / HC odour. Dull to moderately bright yellowish green pinpoint to patchy direct fluorescence, slow to moderately fast yellowish white to moderately bright bluish white blooming cut fluorescence, thick yellowish white residual ring fluorescence. |

907960 060

# Cultus Petroleum N.L.

## *CORE DESCRIPTION REPORT*

| | | | |
|---|---|---|---|
| **Well Name :** | BALEEN-2 | **Date :** | 15 Oct 1999 |
| **Core Number :** | 2 | **Service Company :** | Security DBS |
| **Hole Size ("):** | 8.50 | **Core Diameter ("):** | 4.00 |
| **Barrel Length (m):** | 18.00 | **Bit Type :** | CD73 |
| **Barrel Type :** | Aluminium | **Start Depth (m):** | 762.3 |
| **Mud Type :** | NaCl/PHPA/Polymer | **End Depth (m) :** | 780.3 |
| **Mud Weight (sg):** | 10.100 | **Meters Cut (m):** | 18.0 |
| **ROP Min (m/hr) :** | 11.3 | **Recovery Length (m):** | 15.9 ( 88.06% ) |
| **ROP Max (m/hr) :** | 30.2 | **Formation :** | Gurnard Formation |
| **ROP Avg (m/hr) :** | 17.8 | | |

**Geologists :** Peter Boothby
**Comments :**

| Core Chip # | Core Chip Depth | Lithology / Shows |
|---|---|---|
| 1 | 762.3 | **SIDERITIC SANDSTONE :** (100%) moderately to dark yellowish brown, olive grey, clear to translucent quartz grains, firm to hard, very fine to fine grained, moderately sorted, angular to sub-angular, 40-50% siderite cement, 5-10% argillaceous / silty matrix, 5-10% Glauconite, micromica, trace lithics, poor visible porosity. No shows. |
| 2 | 763.0 | **SIDERITIC SANDSTONE :** (100%) as above. No shows. |
| 3 | 764.0 | **SIDERITIC SANDSTONE :** (100%) moderately to dark yellowish brown, olive grey, clear to translucent quartz grains, firm to hard, very fine to fine grained, moderately sorted, angular to sub-angular, 20-30% patchy siderite cement, 5-10% argillaceous / silty matrix, 10-15% Glauconite, micromica, trace lithics, poor visible porosity. No shows.<br>FLUORESCENCE : (30%) dull to moderately bright yellowish green pinpoint to patchy direct fluorescence, slow yellowish white streaming to blooming cut fluorescence, thin to thick yellowish white residual ring fluorescence. Shows where not cemented. |
| 4 | 765.0 | **SILTY SANDSTONE :** (100%) moderate to dark yellowish brown, clear to translucent quartz grains, friable to locally firm, very fine to fine grained quartz, moderately well sorted, sub-angular to angular, trace to 5% siderite cement, 25-30% argillaceous / silty matrix, 15% dark green Glauconite, trace to 5% micromica, trace lithics, poor to fair visible porosity. No shows. |
| 5 | 766.0 | **SILTY SANDSTONE :** (100%) as above. Grades to an Argillaceous Sandstone. No shows. |
| 6 | 767.0 | **ARGILLACEOUS SANDSTONE :** (100%) moderate to dark yellowish brown, clear to translucent quartz grains, friable to firm, silt size quartz to fine grained quartz, dominantly very fine grained, grades to Sandy Siltstone, moderately well sorted, angular, trace siderite cement, 40-50% dark yellowish brown argillaceous matrix, 10-15% glauconite, 5% micromica, trace lithics, poor visible porosity. No shows. |
| 7 | 768.0 | **SANDY CLAYSTONE :** (100%) dark yellowish brown, soft, 25-30% very fine to fine grained quartz sand, 15-20% quartz silt, trace to 2% galuconite, 5% micromicaceous, trace lithics. No shows. |
| 8 | 768.4 | **SANDY CLAYSTONE :** (100%) as above. Grades to Argillaceous Siltstone No shows. |
| 9 | 769.0 | **SANDY CLAYSTONE :** (100%) as above. Grades to Argillaceous Siltstone No shows. |

| *Well Name* :BALEEN-2 | Interval : 762.3m to 780.3 m |
|---|---|
| *Core #* : 2 | *Cut :* 18.00m *Recovered* : 15.85m ( 88.06% ) |

| Core Chip # | Core Chip Depth | Lithology / Shows |
|---|---|---|
| 10 | 770.0 | **SANDY CLAYSTONE :** (100%) as above. Grades to Argillaceous Siltstone No shows. |
| 11 | 771.0 | **SILTY SANDSTONE :** (100%) moderate to dark yellowish brown, clear to translucent quartz grains, friable to locally firm, very fine to fine grained quartz, moderately well sorted, sub-angular to angular, trace to 5% siderite cement, 25-30% argillaceous / silty matrix, 5% dark green Glauconite, trace to 5% micromica, trace lithics, poor to fair visible porosity. No shows. |
| 12 | 772.0 | **SILTY SANDSTONE :** (100%) as above. Grades to Argillaceous Silstone. No shows. |
| 13 | 773.0 | **SILTY SANDSTONE :** (100%) moderate to dark yellowish brown, clear to translucent quartz grains, firm to moderately hard, friable in part, very fine to fine grained quartz, moderately well sorted, sub-angular to angular, trace to 15% patchy siderite cement, 25-30% argillaceous / silty matrix, 5-8% dark green Glauconite, trace to 5% micromica, trace lithics, poor to fair visible porosity. No shows. |
| 14 | 774.0 | **SILTY SANDSTONE :** (100%) as above. trace to 5% patchy siderite cement. No shows. |
| 15 | 775.0 | **SILTY SANDSTONE :** (100%) as above, grades to Argillaceous Sandstone. No shows. |
| 16 | 776.0 | **SILTY SANDSTONE :** (100%) as above. No Shows. |
| 17 | 777.0 | **SILTY SANDSTONE :** (100%) as above. Grades to Argillaceous Sandstone / Sandy Claystone. No shows. |
| 18 | 777.4 | **SILTY SANDSTONE :** (100%) moderate to dark yellowish brown, pale brown, clear to translucent quartz grains, friable, very fine to fine grained quartz, moderately well sorted, sub-angular to angular, trace patchy siderite cement, 20-30% argillaceous / silty matrix, Trace to 5% dark green Glauconite, trace to 5% micromica, trace lithics, fair visible porosity. No shows. |
| 19 | 778.2 | **SILTY SANDSTONE :** (100%) as above. No shows. |

3

# APPENDIX 3
BALEEN-2

## CUTTINGS DESCRIPTION REPORT
-CULTUS-

# Cultus Petroleum N.L.

### *Cuttings Descriptions Report*

| **Well Name :** BALEEN-2 | **Print Date** Wed 28/06/2000 |
|---|---|
| **Wellsite Geologist(s) :** Peter Boothby | |

| Interval (mRT) | % | Lithology / Show Descriptions | Ca (%) | Mg (%) |
|---|---|---|---|---|
| 650 to 654 | 70<br>30 | **ARGILLACEOUS CALCILUTITE:** medium to dark grey, olive grey, soft to firm, amorphous to blocky, 20-25% siliceous clay content, trace quartz silt, trace forams.<br>**CEMENT :** <none> | 46 | 0 |
| 654 to 657 | 80<br>20 | **ARGILLACEOUS CALCILUTITE:** as above.<br>Note: Poor quality samples.<br>**CEMENT :** as above | | |
| 657 to 660 | 95<br>5 | **ARGILLACEOUS CALCILUTITE:** medium to dark grey, olive grey, soft to firm, amorphous to blocky, 30-35% siliceous clay content, grades to Calcareous Claystone, trace quartz silt, trace forams.<br>**CEMENT :** as above | 62 | 1 |
| 660 to 663 | 100 | **ARGILLACEOUS CALCILUTITE:** light grey to medium grey, medium to dark olive grey, soft, dispersive, firm in part, amorphous to blocky, trace subfissile, trace carbonaceous specks, 20-25% siliceous clay content, grades in part to Calcareous Claystone, trace quartz silt, | | |
| 663 to 666 | 95<br>5 | **ARGILLACEOUS CALCILUTITE:** as above<br>**CALCILUTITE :** white to very light grey, light olive, grey, soft, amorphous, slightly dispersive, trace very fine glauconite. | 65 | 4 |
| 666 to 669 | 95<br>5 | **ARGILLACEOUS CALCILUTITE:** light grey to medium grey, medium to dark olive grey, soft, dispersive, firm in part, amorphous to blocky, trace subfissile, trace carbonaceous specks, 20-25% siliceous clay content, grades in part to Calcareous Claystone, trace quartz silt, trace very fine Glauconite.<br>**CALCILUTITE :** as above, trace firm to moderately hard calcite cemented. | | |
| 669 to 672 | 95<br>5 | **ARGILLACEOUS CALCILUTITE:** as above<br>**CALCILUTITE :** as above. | 63 | 7 |
| 672 to 675 | 95<br>5 | **ARGILLACEOUS CALCILUTITE:** as above<br>**CALCILUTITE :** as above | | |
| 675 to 678 | 100 | **ARGILLACEOUS CALCILUTITE:** light grey to medium grey, medium to dark olive grey, dominantly soft, dispersive, rare firm to moderately hard, amorphous to blocky, trace subfissile, trace carbonaceous specks, 30-35% siliceous clay content, grades in part to Calcareous Claystone, trace quartz silt, trace very fine Glauconite, trace forams. | 83 | 4 |
| 678 to 681 | 95 | **ARGILLACEOUS CALCILUTITE:** as above, trace to 5% forams, | | |

| Well Name : BALEEN-2 | Print Date Wed 28/06/2000 |
|---|---|
| Wellsite Geologist(s) : Peter Boothby | |

| Interval (mRT) | % | Lithology / Show Descriptions | Ca (%) | Mg (%) |
|---|---|---|---|---|
| | | trace Glauconite. | | |
| | 5 | **CALCAREOUS CLAYSTONE:** light to medium grey, light olive grey, soft, amorphous, dispersive in part, 20-30% micrite content, trace very fine Glauconite. | | |
| 681 to 684 | 95 | **ARGILLACEOUS CALCILUTITE:** as above, trace calcisiltite, trace Glauconite, trace to 5% forams. | 62 | 4 |
| | 5 | **CALCAREOUS CLAYSTONE:** as above. | | |
| 684 to 687 | 90 | **ARGILLACEOUS CALCILUTITE:** as above | | |
| | 10 | **CALCAREOUS CLAYSTONE:** as above. | | |
| 687 to 690 | 90 | **ARGILLACEOUS CALCILUTITE:** light grey to medium grey, medium olive grey, mottled, dominantly soft, dispersive, rare firm to moderately hard, amorphous to blocky, trace carbonaceous specks, 30-35% siliceous clay content, grades in part to Calcareous Claystone, trace quartz silt, trace very fine Glauconite, trace forams. | 61 | 5 |
| | 10 | **CALCAREOUS CLAYSTONE:** as above | | |
| 690 to 693 | 85 | **ARGILLACEOUS CALCILUTITE:** as above | | |
| | 15 | **CALCAREOUS CLAYSTONE:** light grey to medium grey, medium olive grey, soft to firm, amorphous to rare blocky, 20-30% micrite content, trace very fine Glauconite. | | |
| 693 to 696 | 85 | **ARGILLACEOUS CALCILUTITE:** as above, trace to 5% calcisiltite. | 65 | 8 |
| | 15 | **CALCAREOUS CLAYSTONE:** as above | | |
| 696 to 699 | 85 | **ARGILLACEOUS CALCILUTITE:** light to medium grey, medium olive grey, mottled, dominantly soft, dispersive, rare firm to moderately hard, amorphous to blocky, trace carbonaceous specks, 30-35% siliceous clay content, grades in part to Calcareous Claystone, trace quartz silt, trace to 5% calcisiltite, trace very fine Glauconite, trace forams. | | |
| | 15 | **CALCAREOUS CLAYSTONE:** as above. | | |
| 699 to 702 | 85 | **ARGILLACEOUS CALCILUTITE:** as above, trace Glauconite, trace calcisiltite. | 63 | 9 |
| | 10 | **CALCAREOUS CLAYSTONE:** as above | | |
| | 5 | **CALCILUTITE :** white to very light grey, light olive grey, soft to firm, blocky, trace carbonaceous specks, 5-10% siliceous clay content, grades to Argillaceous Calcilutite. | | |
| 702 to 705 | 85 | **ARGILLACEOUS CALCILUTITE:** as above, trace hard to very hard dark brown Siderite nodules. | | |
| | 10 | **CALCAREOUS CLAYSTONE:** as above | | |
| | 5 | **CALCILUTITE :** as above | | |
| 705 to 708 | 80 | **ARGILLACEOUS CALCILUTITE:** as above. | 56 | 11 |

| Well Name : BALEEN-2 | Print Date Wed 28/06/2000 |
|---|---|
| Wellsite Geologist(s) : Peter Boothby | |

| Interval (mRT) | % | Lithology / Show Descriptions | Ca (%) | Mg (%) |
|---|---|---|---|---|
| 705 to 708 | 20 | **CALCAREOUS CLAYSTONE:** light grey to medium grey, medium olive grey, soft to firm, amorphous to rare blocky, 20-30% micrite content, trace very fine to medium pelletal Glauconite, 5% carbonaceous specks. | 56 | 11 |
| 708 to 711 | 80<br>20 | **ARGILLACEOUS CALCILUTITE:** as above<br>**CALCAREOUS CLAYSTONE:** as above | | |
| 711 to 714 | 70<br>30 | **ARGILLACEOUS CALCILUTITE:** as above, commonly grades to Calcareous Claystone.<br>**CALCAREOUS CLAYSTONE:** as above | 59 | 8 |
| 714 to 717 | 70<br>30 | **ARGILLACEOUS CALCILUTITE:** as above<br>**CALCAREOUS CLAYSTONE:** as above | | |
| 717 to 720 | 70<br>30 | **ARGILLACEOUS CALCILUTITE:** as above<br>**CALCAREOUS CLAYSTONE:** as above | 40 | 4 |
| 720 to 723 | 70<br>30 | **ARGILLACEOUS CALCILUTITE:** as above, trace fossil fragments and forams.<br>**CALCAREOUS CLAYSTONE:** as above | | |
| 723 to 726 | 70<br>30 | **ARGILLACEOUS CALCILUTITE:** as above<br>**CALCAREOUS CLAYSTONE:** light grey to medium grey, light to medium olive grey, soft, amorphous, 20-30% micrite content, trace very fine to medium pelletal Glauconite, 5% carbonaceous specks. | 37 | 3 |
| 726 to 729 | 65<br>35 | **ARGILLACEOUS CALCILUTITE:** as above<br>**CALCAREOUS CLAYSTONE:** as above, trace to 2% dark green Glauconite. | | |
| 729 to 732 | 50<br>50 | **ARGILLACEOUS CALCILUTITE:** as above<br>**CALCAREOUS CLAYSTONE:** light to medium grey, pale yellowish brown in part, soft, dispersive, 20-25% micrite content, 5% fine dark green glauconite increasing, trace carbonaceous specks | 25 | 5 |
| 732 to 735 | 50<br>50 | **CALCAREOUS CLAYSTONE:** as above, 5-8% fine dark green Glauconite, trace disseminated pyrite.<br>**ARGILLACEOUS CALCILUTITE:** as above, commonly grades to Calcareous Claystone. | | |
| 735 to 738 | 60<br>40 | **CALCAREOUS CLAYSTONE:** as above<br>**ARGILLACEOUS CALCILUTITE:** as above | 28 | 2 |
| 738 to 741 | 60<br>40 | **CALCAREOUS CLAYSTONE:** as above, 8-10% Glauconite, trace disseminated pyrite. 15 - 20% micrite content, commonly grades to Claystone.<br>**ARGILLACEOUS CALCILUTITE:** as above | | |
| | | | | |

| Well Name : BALEEN-2 | Print Date Wed 28/06/2000 |
|---|---|
| Wellsite Geologist(s) : Peter Boothby | |

| Interval (mRT) | % | Lithology / Show Descriptions | Ca (%) | Mg (%) |
|---|---|---|---|---|
| 741 to 744 | 80 | **CLAYSTONE :** medium to dark yellowish brown, dark olive grey, soft, dispersive, 10-15% micrite content, 5-10% fine dark green galuconite, trace to 5% quartz silt, trace fine quartz sand, trace very fine disseminated pyrite, trace hard dark brown siderite nodules, trace to minor carbonaceous flecks, trace lithics. | 2 | 1 |
| | 20 | **ARGILLACEOUS CALCILUTITE:** as above | | |
| 744 to 746 | 90 | **CLAYSTONE :** as above | | |
| | 10 | **ARGILLACEOUS CALCILUTITE:** as above | | |
| 746 to 748 | 70 | **CLAYSTONE :** medium to dark yellowish brown, dark olive grey, soft, dispersive, 10-15% micrite content, 5-10% fine dark green galuconite, 10-15% quartz silt, grades to Silty Claystone , 5% micromica, trace fine quartz sand, trace very fine disseminated pyrite, trace hard dark brown siderite nodules, trace to minor carbonaceous flecks, trace lithics. | | |
| | 25 | **ARGILLACEOUS SILTSTONE:** medium to dark yellowish brown, soft, dispersive, 30-40% siliceous clay, trace to 5% micrite, trace very fine quartz sand, 5-10% fine dark green Glauconite, trace hard dark yellowish brown siderite nodules, trace to 5% micromica, trace carbonaceous specks, trace lithics. | | |
| | 5 | **ARGILLACEOUS CALCILUTITE:** as above | | |
| 748 to 750 | 50 | **ARGILLACEOUS SILTSTONE:** as above | | |
| | 50 | **SILTY CLAYSTONE:** as above increasing silt content. 20-30% quartz silt. | | |
| 750 to 753 | 80 | **ARGILLACEOUS SILTSTONE:** medium to dark yellowish brown, soft, dispersive, 30-40% siliceous clay, trace to 5% micrite, trace to 5% very fine quartz sand, 5-10% fine dark green Glauconite, trace hard dark yellowish brown siderite nodules, trace to 5% micromica, trace carbonaceous specks, trace lithics. | | |
| | 20 | **SILTY CLAYSTONE:** as above | | |
| 753 to 756 | 90 | **ARGILLACEOUS SILTSTONE:** medium to dark yellowish brown, pale brown, soft, dispersive, 30-40% siliceous clay, trace to 5% micrite, 5% very fine quartz sand, 5% fine dark green Glauconite, trace hard dark yellowish brown siderite nodules, 5% to 10% micromica, trace carbonaceous specks, trace lithics. | | |
| | 10 | **SILTY CLAYSTONE:** as above | | |
| 756 to 759 | 100 | **ARGILLACEOUS SILTSTONE:** as above. | | |
| 759 to 762 | 0 | **NO RETURNS :** Samples not circulated. | | |
| 762 to 765 | 90 | **SILTSTONE :** dark yellowish brown to moderate yellowish brown, very soft to soft, amorphous to subblocky, argillaceous, minor very fine quartz sand, 5% micromica, trace carbonaceous specks. | | |
| | 10 | **SILTY SANDSTONE:** clear to translucent, opaque in part, loose, silt | | |

| Well Name : BALEEN-2 | Print Date Wed 28/06/2000 |
|---|---|
| Wellsite Geologist(s) : Peter Boothby | |

| Interval (mRT) | % | Lithology / Show Descriptions | Ca (%) | Mg (%) |
|---|---|---|---|---|
| | | size to very fine grained quartz, trace medium quartz grains, angular to sub-angular, poor to moderately sorted, trace siderite cement, minor silty / argillaceous matrix, trace glauconite, poor to fair inferred porosity. | | |
| 765 to 768 | 90 | **SILTSTONE :** as above | | |
| | 10 | **SILTY SANDSTONE:** as above | | |
| 768 to 771 | 80 | **SILTSTONE :** as above | | |
| | 20 | **SILTY SANDSTONE:** as above | | |
| 771 to 780 | 0 | **NO RETURNS :** Cuttings from core not circulated. | | |
| 780 to 790 | 60 | **SANDSTONE :** clear to translucent quartz, light grey, opaque, fine to coarse, dominantly fine to medium, poorly sorted, angular to sub-rounded, 5% pyrite cement, 5-10% argillaceous matrix where aggregated, trace nodular pyrite, trace Glauconite, trace siderite nodules, fair to good inferred porosity. No shows. | | |
| | 40 | **SILTSTONE :** moderate yellowish brown, medium olive grey, soft, dispersive, 15-20% siliceous clay content, grades to argillaceous Claystone, 10-15% very fine to fine grained quartz sand, trace to 2% Glauconite, trace nodular pyrite, trace micromica, trace lithics. | | |
| 790 to 795 | 90 | **SANDSTONE :** white to opaque, clear to translucent quartz grains, medium to v coarse, dominantly medium to coarse, poorly sorted, sub-angular to sub-rounded, trace pyrite cement, 5% white kaolinitic matrix, trace Glauconite, trace lithics, good inferred porosity. No shows. | | |
| | 10 | **SILTSTONE :** as above | | |
| 795 to 800 | 70 | **SANDSTONE :** white to opaque, clear to translucent quartz grains, loose, medium to very coarse, dominantly medium to coarse, poorly sorted, sub-angular to sub-rounded, trace pyrite cement, 10-20% white kaolinitic matrix, grades to Arg Sandstone, 5% dark green pelloidal Glauconite, trace reddish brown lithics (jasper), good inferred porosity. No shows. | | |
| | 30 | **SILTSTONE :** as above | | |
| 800 to 805 | 58 | **SILTSTONE :** pale brown to moderate yellowish brown, soft, dispersive, amorphous, 10-15% siliceous clay, grades to argillaceous Siltstone, 5% micromica, trace to 5% carbonaceous specks and micro-laminae, trace to 2% Glauconite, trace lithics. | | |
| | 40 | **SANDSTONE :** dominantly as above. No shows. | | |
| | 2 | **COAL :** black, firm to hard, occasional brittle, dull to subvitreous. | | |
| 805 to 810 | 70 | **ARGILLACEOUS SANDSTONE:** white to opaque, clear to translucent quartz grains, loose, fine to coarse, dominantly medium to coarse, poorly sorted, sub-angular to sub-rounded, trace weak silica cement, 35 to 40% white kaolinitic / feldspathic matrix, | | |

| Well Name : BALEEN-2 | Print Date Wed 28/06/2000 |
|---|---|
| Wellsite Geologist(s) : Peter Boothby | |

| Interval (mRT) | % | Lithology / Show Descriptions | Ca (%) | Mg (%) |
|---|---|---|---|---|
| | | (possibly matrix supported?), trace Glauconite, | | |
| | 29 | **SILTSTONE :** as above | | |
| | 1 | **COAL :** as above | | |
| 810 to 820 | 95 | **SANDSTONE :** white to opaque, clear to translucent quartz grains, trace light bluish grey, loose, fine to very coarse, dominantly medium to coarse, poorly sorted, angular to sub-angular, moderately common siliceous cement, 15-20% white kaolinitic matrix, grades to argillaceous Sandstone, trace Glauconite, poor to fair inferred porosity. No shows. | | |
| | 5 | **SILTSTONE :** as above. | | |
| 820 to 830 | 100 | **SANDSTONE :** as above. No shows. | | |
| 830 to 840 | 100 | **SANDSTONE :** as above, medium grained, moderately well sorted, 15-20% white kaolinitic matrix, poor inferred porosity. No shows. | | |
| 840 to 850 | 100 | **SANDSTONE :** as above, dominantly medium to coarse, occasional very coarse. siliceous, poor inferred porosity. No shows. | | |
| 850 to 860 | 95 | **SANDSTONE :** white to opaque, clear to translucent quartz grains, trace to 5% light bluish grey, loose, medium to very coarse, dominantly medium to coarse, poorly sorted, angular to sub-angular, moderately common siliceous cement, 15-20% white kaolinitic matrix, grades to argillaceous Sandstone, poor to fair inferred porosity. No shows. | | |
| | 5 | **CLAYSTONE :** dark greyish black, dark greyish brown, hard to very hard, subfissile to fissile, siliceous, minor micromicaceous. | | |
| 860 to 870 | 95 | **ARGILLACEOUS SANDSTONE:** as above with 40-50% white kaolinitic matrix. trace pyrite nodules, poor inferred porosity. No shows. | | |
| | 5 | **CLAYSTONE :** as above. | | |
| 870 to 880 | 55 | **ARGILLACEOUS SANDSTONE:** as above | | |
| | 40 | **SANDY CLAYSTONE:** white to light grey, soft to very soft, 20-30% very fine to fine quartz sand, matrix supported, Kaolinitic. | | |
| | 5 | **CLAYSTONE :** as above | | |
| 880 to 890 | 65 | **CLAYSTONE :** as above. | | |
| | 30 | **ARGILLACEOUS SANDSTONE:** as above with 40-50% white kaolinitic matrix. trace pyrite nodules, poor inferred porosity. No shows. | | |
| | 5 | **CLAYSTONE :** as above. | | |
| 890 to 895 | 65 | **CLAYSTONE :** as above. | | |
| | 30 | **ARGILLACEOUS SANDSTONE:** as above | | |
| | 5 | **CLAYSTONE :** as above | | |

4

# APPENDIX 4

BALEEN-2

## CORING REPORT

-SECURITY DBS-

907960 072

Security DBS

# CORING REPORT

## BALEEN-2

# CULTUS

## BASIN OIL NL

Edited to Remove all Interpretive Data

**Prepared**
**For**

**Chris Way & Mark Adamson**

**19.10.99**

## TARGET SUMMARY

CORING OBJECTIVE

Potentially three 18m non-oriented core were programmed for the Reservoir Sands, Coring point was picked based on confirmation of bottoms up sample, with the aim of coring from approximately 2-3m above "Top Reservoir" in order to obtain core over most of the reservoir. The programmed core point of 736mrt was reached and no indications of the reservoir had been seen, so another 10m was drilled, bottoms up samples confirmed core point at 746m,The amount of core required was reviewed once the Top Reservoir depth was established, it would have been no more than 30m if the stratigraphy was as prognosed. On further discussion at rig site, it was decided to run two 18m cores.

The Core was to be cut into 1m lengths for the transportation to ACS at their Brisbane base.

FORMATION DESCRIPTION

SANDY SILTSTONE: moderate to dark yellowish brown, firm to hard, 40%-50% very fine to fine quartz sand, commonly grades to silty sandstone, 10%- 25% siliceous nodules, locally patchy siderite cement, trace to 5% glauconite, 5% micromica, trace to 5% carbonaceous specks, trace lithics.

SILTY SANDSTONE: (80%) moderate to dark yellowish brown, clear to translucent quartz grains, friable to locally firm, very fine to fine grained, moderately well sorted, angular to sub-rounded, trace to 2% patchy siderite cement, 20%-25% dark yellowish brown quartz silt matrix, grades to sandy siltstone, trace to 5% dark green glauconite, trace to 5% micromica, trace feldspar, fair to good visible porosity. _____

## CORING SUMMARY REPORT

| | |
|---|---|
| Core Point | : 746m |
| Depth finish | : 780.3m |
| Hole Angle | : 0° |
| Hole Temp | : 40°C |
| Shoe Depth | :646m (9-5/8 casing) |
| Mud Type | :10.1ppg polymer, viscosity 52cp, PV 22, YP 25 |

## CORING SUMMARY

| | |
|---|---|
| Length Cut | : 34.3 m |
| Core Recovery | : 32.15m |
| % Recovered | : 93.70 % |
| Hours total | : 0.62 hr |
| Average ROP | : 16.6 m/hr |
| Dull conditions | : Corehead is in very good condition, No wear encountered during core run , Corehead suitable for re-run |

## CORING PARAMETERS

| | |
|---|---|
| W.O.B: | 2 – 20 lbs |
| R.P.M: | 70 – 90 rpm |
| G.P.M: | 200 gpm |
| TORQUE: | 2 – 5 ft/lbs |
| PRESSURE: | 380 – 580 psi |

The first half meter of core cut, is cut using controlled parameters, this is to allow the core to establish itself inside the core catcher, once this is done the coring parameters can be increased to the optimum parameters, there was no problem on either of the run's once the optimum parameters were reached, the remainder of core was cut with constant parameters, the only noted change was to the pressure, which fluctuated during both runs, this was probably due to the unconsolidated nature of the core, this proved not to be a problem as torque & ROP remained constant.

## RUN SUMMARY

**CORING ASSEMBLY** 6-3/4"x 4" x 18m Heavy Duty Thread Core Barrel dressed with 3 x 8-15/32" Cobra stabilisers at 9m interval from near bit. 2 x 4" Aluminium fluted inner sleeve dressed with internal lip shoe.

**CORE BIT** 8-1/2" x 4" CD 73. The CD 73 is a low Invasion style, matrix body, seven bladed light-medium set corebit, set with 13mm cutters, spiralled blades and gauge. This design is suitable for applications in soft unconsolidated but potentially abrasive sandstone formations, interbedded with claystone and siltstone stringers.

**B.H.A.** Coring Assembly, 1 x Circ-sub, 9 x 6 ½ DC 1x X-over, 1 x Drilling Jar 3 x 6 ½ DC

**CORE - 1** Made up coring assembly for 18m conventional core run. Used CD 73 corehead, R.I.H.. broke circulation at shoe, washed and reamed though shoe track, continued to R.I.H. again broke circulation one stand off bottom, Reamed last stand and tagged bottom, spaced out to allow core to be cut with no connections, took SCRs, Dropped ball, noted 300psi pressure increase when ball seated, established off bottom parameters commenced coring. Started coring with low parameters to establish first half meter in core catcher, increased rpm and weight on bottom, after first meter cut. First 16m cut with no problems, pressure increased and decreased over the period of core cut, indicating the unconsolidated nature of core, on the next 0.3m Noted lost torque and ROP indicating barrel had jammed off. Stopped coring and P.O.O.H.

On surface found catcher packed off with loose sandstone, laid out core and redressed assembly for next run. Core head was found to have four ports blocked with claystone. Cleaned corehead and prepared for next run, No wear found on corehead, 1,2,CT,S,X,I,PN,PR

**CORE – 2** R.I.H for core two, no problems going though shoe on this run, broke circulation one stand off bottom, Reamed last stand and tagged bottom, spaced out to allow core to be cut with no connections, took SCRs, Dropped ball, noted 300psi pressure increase when ball seated, established off bottom parameters commenced coring. Started coring with low parameters to establish first half meter in core catcher, increased rpm and weight on bottom. After first meter cut, continued coring with no problems, as in the first run pressure varied over length of core increasing and decreasing alternately, ROP, WOB & TORQUE remained consistent though rest of core cut.

Stopped coring once 18m had been cut, P.O.O.H. On surface found core head with three ports blocked with claystone and soft sandstone, laid out core and coring assembly as program was complete, lost two meters of core on recovery. This was initially thought to have been lost due to loose friable sands falling from barrel during tripping, however it is believed from GR results on captured core, that the first two meters of the run may have been washed/milled away.

## FURTHER REMARKS AND CONCLUSIONS

On surface core head throat was found to be blocked and three ports plugged off with soft friable sandstone. Core shoe assembly was also packed, (i.e. no annulus in core). CD 73 corehead was found to be in good condition with no new wear on bit, 1,2,CT,S,X,I,PN,PR, core head would be suitable for re-run in future coring programmes. Held J.H.A. prior to laying out inner barrel sleeves, this job was completed successfully, following surface handling procedures as listed in the coring program, with the use of a **hydraulic shear plate boot**. The core was sheared with a single stroke as opposed to being hammered though. The core was then checked measured and cut into 1m lengths, and prepared for resination and transportation to ACS Brisbane.

Flow ports on corehead were most likely blocked due to breaking circulation at shoe, and reaming through shoe track, it is also possible ports blocked up reaming last stand to bottom. Security DBS can provide port plugs, which will work if circulation is not broken while running in hole. The plugs are designed to allow fluid out and not in. However if the pumps are run the plugs will release, and then the only way to try to prevent the ports from blocking up is to maintain a reasonably high flow rate. However flow rate has to be restricted until the diverter ball has been dropped, at this point the flow rate can be increased and should help to clear blocked ports prior to commencing core run

## MUD TYPE

| | |
|---|---|
| TYPE: | Water Base/polymer |
| VISC: | 52 |
| WT: | 10.1ppg |
| % SOLIDS: | 0.5 |
| PV: | 22 |
| YP: | 25 |

The mud system used for the 8½ section was a NaCl/EZ-MUD/POLYMER/GEM-CP system. The cores were cut using a bland drilling fluid with no surfactants, thinners or defoamers added to the system, no problems encountered with filter cake or build-up of mud in the inner barrels or the annulus of the outer barrels, no invasion of shoe assembly or swivel assembly found.

A mud system of this formula would be suitable for fourth coming coring programs of similar depth and formation.

## RECOMMENDATIONS FOR THE FUTURE

Security DBS recommend the use of the Posiclose System for maximum recovery in unconsolidated formations. Other considerations are: core head type and length of barrel to be run. We would recommend the option of running shorter barrels, 9 meter to start with and then increasing barrel length depending on core cut and recovered There is also the option of running with slick stabilisation in conjunction with the Poiseclose system to improve the length cut and recovery.

We perceive that the CD 73 Corehead performed well in this application. The CD 73 is a low invasion style, matrix body, seven bladed light/medium set core bit, set with 22 face and 6 gauge medium diamond volume content 13mm Claw cutters, spiraled blades and gauge to combat bit whirl, the gauge is set with natural diamond and carbide for added protection. The 4" gauge helps to give good stability at the bitface. This corebit is ideal for fast penetration coring whilst being able to cope with moderately hard stringers. The CD 73 is designed for soft to medium formations. The angled face discharge ports are directed outwards at the bit face, directing mud flow away from the core, minimising core washing.

The CD 73 can be run in conjunction with an internal lip Posi-close catcher system. The CD73 has a labyrinth which the posi-close inner lip lower half shoe locates into, diverting the drilling fluid away to the face discharge ports. The lowermost innersleeve is dressed with the posi-close bottom section, full closure catcher system sub. This section includes several components that conceal the core catchers during coring, expose the catchers at the end of the run, and shut the full closure core catchers. An inner sleeve conceals the core catchers and provides a smooth, unrestricted bore for core entry into the inner tube. The sub also houses a backup standard tungsten spring catcher, to catch a more consolidated formation. If the clam shells are unable to cut through the core, the conventional spring catcher below them will catch the core in the usual manner.

In order to activate the full closure catcher system on bottom after a core run, a second 2" steel ball is dropped from a slotted ball valve, this ball valve is installed at surface, between the top drive and the drill string. The box and pin of the sub are 4 ½" IF.

### ALTERNATIVE COREBIT SELECTION

### FC 264 L/I ( T.F.A. 0.90)

An optional corehead choice would be the 8 ½" x 4" FC 264 L/I set with 13mm and 9mm cutters. The FC 264 L/I is a low invasion style, matrix body, six bladed, light set core bit, set with 13mm and 9mm cutters, spiraled blades and gauge to combat bit whirl.

This design is for the posi-close application in formations of a soft unconsolidated sandstone with interbedding of claystones and siltstones.

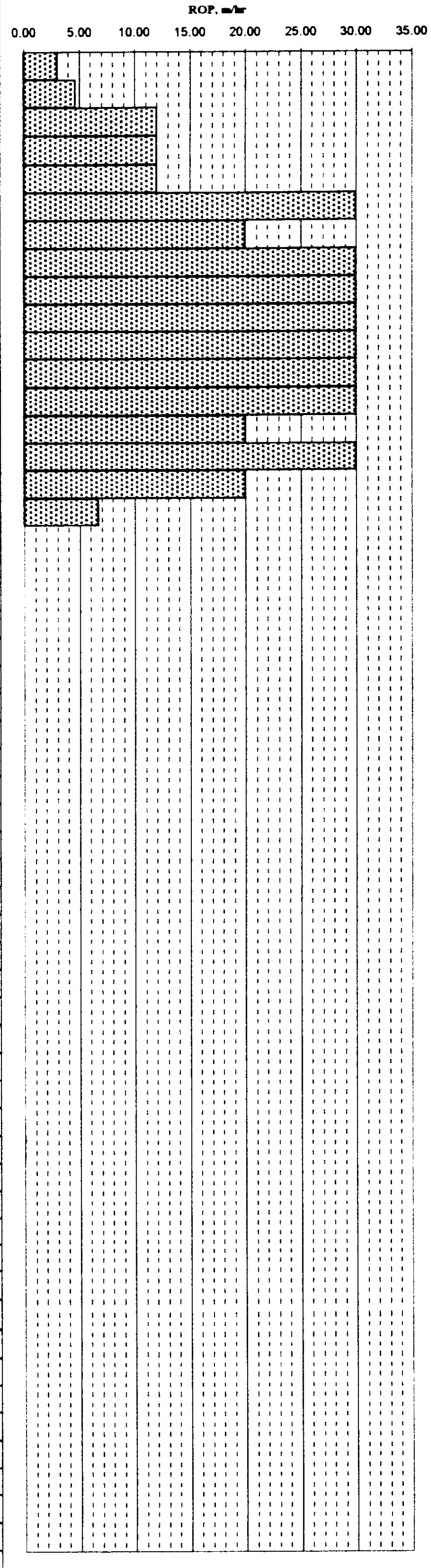
The angled face discharge ports are directed outwards at the bitface, directing the flow away from the core, minimising core washing. The FC 264 L/I has a labyrinth where the inner lip lower half shoe fits into, diverting the flow to the face discharge ports. The design is aggressive, to cut unconsolidated formations at maximum penetration rates and get the core into the inner assembly as quickly as possible, with little time for possible washing or giving undergauge coresize.

Security DBS

## PENETRATION AND PARAMETERS LOG

**COMPANY:** CULTUS
**WELL:** BALEEN-2

**CORE No.:** 1 **SHEET No.:** 1




| 746 | | OPREATION CONDITIONS | | | | | | |
|---|---|---|---|---|---|---|---|---|
| INTERVAL | M | MIN/M | WOB | RPM | GPM | PSI | TRQ | FORMATION |
| 747 | 1 | 20.0 | 12 | 90 | 200 | 550 | 1-2 | **GURNARD** |
| 748 | 2 | 13.0 | 12 | 100 | 200 | 575 | 2 | |
| 749 | 3 | 5.0 | 14 | 100 | 200 | 550 | 2-3 | SILTY SANDSTONE |
| 750 | 4 | 5.0 | 16 | 100 | 200 | 580 | 2-3 | |
| 751 | 5 | 5.0 | 16 | 100 | 200 | 630 | 2-3 | SILTY SANDSTONE |
| 752 | 6 | 2.0 | 14 | 100 | 200 | 620 | 2-3 | SILTY SANDSTONE |
| 753 | 7 | 3.0 | 12 | 100 | 200 | 660 | 2-3 | |
| 754 | 8 | 2.0 | 12 | 100 | 200 | 660 | 2-3 | SILTY SANDSTONE |
| 755 | 9 | 2.0 | 12 | 100 | 200 | 640 | 2-3 | SILTY SANDSTONE |
| 756 | 10 | 2.0 | 12 | 100 | 200 | 580 | 2-3 | |
| 757 | 11 | 2.0 | 12 | 100 | 200 | 580 | 2-3 | SILTY SANDSTONE |
| 758 | 12 | 2.0 | 12 | 100 | 200 | 580 | 2-3 | SILTY SANDSTONE |
| 759 | 13 | 2.0 | 12 | 100 | 200 | 480 | 2-3 | |
| 760 | 14 | 3.0 | 12 | 100 | 200 | 540 | 2-3 | SILTY SANDSTONE |
| 761 | 15 | 2.0 | 12 | 100 | 200 | 525 | 2-4 | SILTY SANDSTONE |
| 762 | 16 | 3.0 | 12 | 100 | 200 | 530 | 1-5 | |
| 762.3 | 17 | 9.0 | 12 | 100 | 200 | 460 | 2 | SILTY SANDSTONE |
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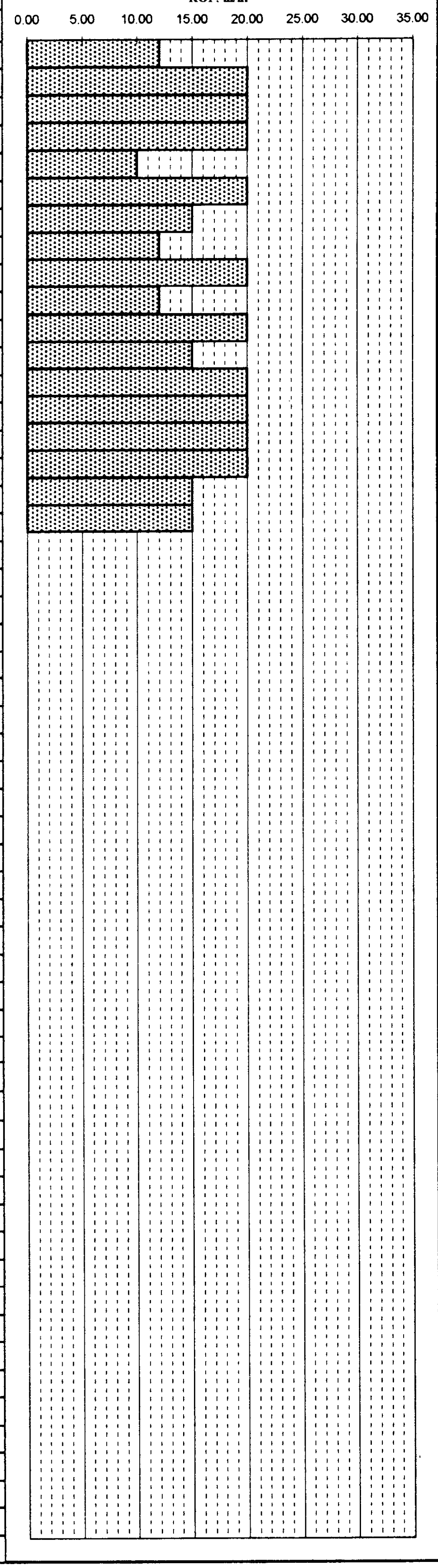
Security DBS

# PENETRATION AND PARAMETERS LOG

**COMPANY:** CULTUS
**WELL:** BALEEN-2

**CORE No.:** 2 **SHEET No.:** 1

ROP. m/hr




| 762.3 | | OPREATION CONDITIONS | | | | | | |
|---|---|---|---|---|---|---|---|---|
| INTERVAL | M | MIN/M | WOB | RPM | GPM | PSI | TRQ | FORMATION |
| 763.3 | 1 | 5 | 6 | 90 | 200 | 380 | 2 -3 | GURNARD |
| 764.3 | 2 | 3.0 | 6 | 90 | 200 | 380 | 2 - 4 | |
| 765.3 | 3 | 3.0 | 6 | 90 | 200 | 420 | 2 - 4 | SILTY SANDSTONE |
| 766.3 | 4 | 3.0 | 8 | 90 | 200 | 460 | 2 - 4 | |
| 767.3 | 5 | 6.0 | 8 | 90 | 200 | 480 | 2 - 4 | |
| 768.3 | 6 | 3.0 | 10 | 90 | 200 | 460 | 2 - 4 | |
| 769.3 | 7 | 4.0 | 10 | 90 | 200 | 460 | 2 - 4 | |
| 770.3 | 8 | 5.0 | 10 | 90 | 200 | 460 | 2 - 4 | |
| 771.3 | 9 | 3.0 | 10 | 90 | 200 | 460 | 2 - 4 | |
| 772.3 | 10 | 5.0 | 12 | 90 | 200 | 500 | 2 - 4 | |
| 773.3 | 11 | 3.0 | 12 | 90 | 200 | 520 | 2 - 4 | SILTY SANDSTONE |
| 774.3 | 12 | 4.0 | 12 | 90 | 200 | 520 | 2 - 4 | |
| 775.3 | 13 | 3.0 | 12 | 90 | 200 | 480 | 2 - 3 | |
| 776.3 | 14 | 3.0 | 12 | 90 | 200 | 500 | 2 - 3 | |
| 777.3 | 15 | 3.0 | 12 | 90 | 200 | 475 | 2 - 3 | |
| 778.3 | 16 | 3.0 | 12 | 90 | 200 | 510 | 2 - 3 | |
| 779.3 | 17 | 4.0 | 12 | 90 | 200 | 460 | 2 -4 | |
| 780.3 | 18 | 4.0 | 12 | 90 | 200 | 460 | 2 - 4 | SILTY SANDSTONE |
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Security DBS

## Equipment Data

| | |
|---|---|
| Customer | CULTUS |
| Country | AUSTRALIA |
| Rig | SEDCO-702 |
| Well | BALEEN-2 |
| Core # | 1&2 |

| | |
|---|---|
| **Core Barrel** | *6 3/4 X 4"* |
| N° | |
| Size | 18m |
| Top Connection | 4 1/2 IF |
| Stabs O.D. | 8 15/32 |
| Connect. (Std. - H.D.) | HD |
| X-Over Stab (Yes/Not) | YES |

Date: 15.10.99

SDBS Eng. G.DURWARD

Signature:

**REMARKS:** fiberglas expansion = mm

**TECHNICAL INFORMATION**

**Spacing mm. for Inner Tubes**

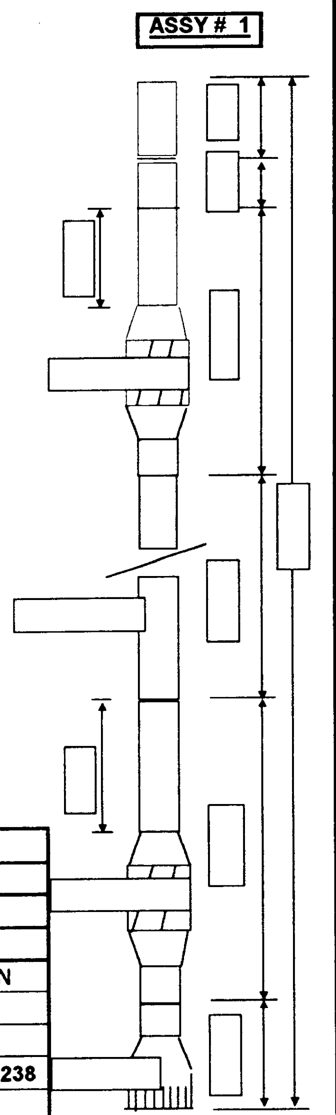
| **Core Heads Connections** | | | **Core Heads** | |
|---|---|---|---|---|
| Core Barrel | Normal | Heavy Duty | TYPE | S/N |
| 4.3/4 x 2.5/8 | 72 | 101 | | |
| 5.3/4 x3.1/2 | 72 | N.A. | | |
| **6.3/4 x 4** | **89** | **127** | **CD 73** | **7970238** |
| 8 x 5.1/4 | 80 | N.A. | | |

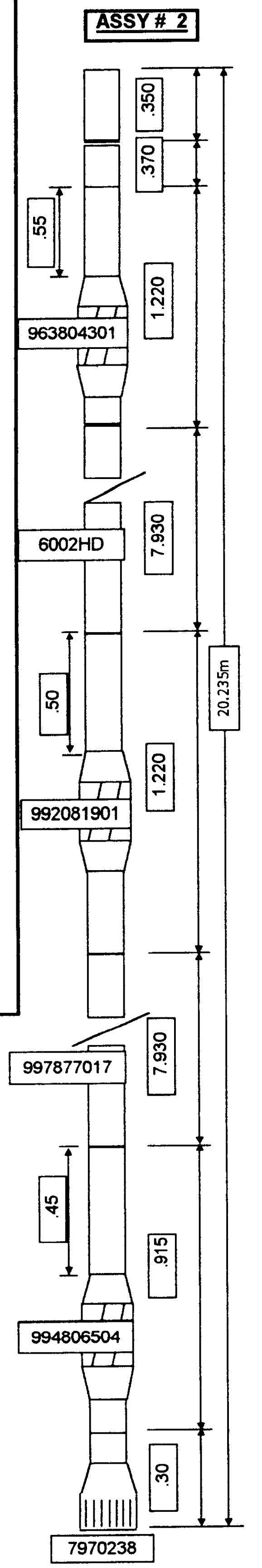
| **Tubes Sizes** | Outer Tubes | | Inner Tubes | |
|---|---|---|---|---|
| Core Barrel | O.D. | I.D | O.D. | I.D. |
| 4.3/4 x 2.5/8 | 4.3/4 | 3.3/4 | 3.3/8 | 2.7/8 |
| 5.3/4 x 3.1/2 | 5.3/4 | 4.5/8 | 4.1/4 | 3.3/4 |
| **6.3/4 x 4** | **6.3/4** | **5.3/8** | **4.3/4** | **4.1/4** |
| 8 x 5.1/4 | 8 | 6.5/8 | 6.1/4 | 5.1/2 |

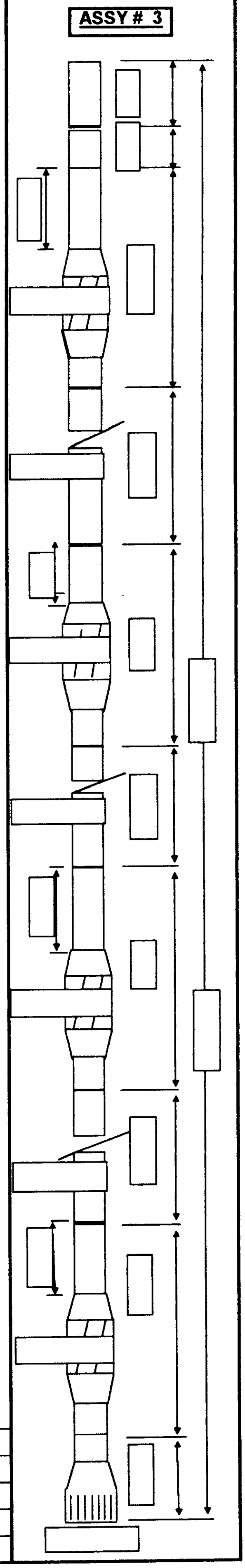
| **Recommanded Parameters** | |
|---|---|
| LIT/MIN | |
| W.O.B. | |
| R.P.M. | |

| **Normal Connections** | Make-up Torque | | | Maximum Pull | | |
|---|---|---|---|---|---|---|
| Core Barrel | M.Kg. | M.dan | Ft.lb | Kg. | daN | Lbs |
| 4.3/4 x 2.5/8 | 770 | 755 | 5,570 | 62,000 | 60,820 | 137,000 |
| 5.3/4 x 3.1/2 | 1,000 | 981 | 7,230 | 88,000 | 86,330 | 194,000 |
| **6.3/4 x 4** | **1,300** | **1,275** | 9,400 | 125,000 | 122,625 | 276,000 |
| 8 x 5.1/4 | 2,900 | 2,845 | 21,000 | 146,000 | 143,230 | 322,000 |

| **HDT Connections** | Make-up Torque | | | Maximum Pull | | |
|---|---|---|---|---|---|---|
| Core Barrel | M.Kg. | M.dan | Ft.lb | Kg. | daN | Lbs |
| **4. 3/4 x 2.5/8** | **1,360** | **1,335** | **9,800** | **125,000** | **122,625** | **275,000** |
| 6.3/4 x 4 | 3,500 | 3,435 | 25,300 | 320,000 | 313,920 | 705,000 |
| 8 x 5.1/4 | 6720 | N.A. | 48000 | | | |
| # = | The connection: core head - XO stab is normal | | | | | |




**REMARKS:** CONVENTIONAL CORING

**MAX PULL=506000 LBS**

**MAX TORQUE=39000FT.LBS**

COREHEAD TYPE : CD 73

907960 081

Security DBS

# CORING LOG

| | |
|---|---|
| CORE N. | 1 |
| SHEET # | 1 |
| DATE: | 15.10.99 |

## WELL INFORMATION

| | | | |
|---|---|---|---|
| OPERATOR: | CULTUS | HOLE SIZE: | 8 1/2 |
| WELL N.: | BALEEN-2 | | |
| CONTRACTOR: | SEDCO RIG: 702 | ROCK TYPE: | GURNARD |
| COUNTRY: | AUST | FORM. DESCR: | SANDSTONE |
| HOLE ANGLE: | 0 | | |

## EQUIP. DESCRIPTION

| | | | |
|---|---|---|---|
| CORE BARREL SIZE: | 6 3/4 X 4" X 18m | SAFETY J. TYPE: | 6" |
| INN. STRING TYPE: | ALUMINIUM | LOWER SHOE/CATCHER TYPE: | SPRING |

| | | | | | |
|---|---|---|---|---|---|
| CORE HEAD TYPE: | CD 73 | SIZE: | 8 1/2 X 4" | SER. N. | 7970238 |
| PREV. FOOTAGE: | N/A | THIS CORE: | 16.30 | TOT CORED: | 16.30 |
| CORE HEAD N.: | 1 | CORE HEAD COND. AT RUN START: | | | 1,2,CT,S,X,I, |
| | | (iadc code) AT RUN END: | | | 1,2,CT,S,X,I, |

CORING B.H.A. CD 73,CBBL,SIRC-SUB,9 X 6 1/2 DC, X-OVER,JARS,3 X 6 1/2 DC

## BACKGROUND READINGS

| | STRING WTS | | TRQ. OFF B. | DROP BALL PRESS INCR. | | ON/OFF PRESS INCR. | |
|---|---|---|---|---|---|---|---|
| ↑ | 190 | 40 rpm | | Flow R. | 175 | Flow R. | 200gpm |
| → | 180 | 60 rpm | 1-2000 ft.lbs | Press incr. | 300 psi | On Bottom | 540 |
| ↓ | 190 | 80 rpm | 2000 ft.lbs | Mins. to drop | 5 | Off Bottom | 460 |

## MUD PROPERTIES

| TYPE | VISC | WT | W./Loss | % SAND | % SOLIDS | H2O/OIL | PV | YP |
|---|---|---|---|---|---|---|---|---|
| POLYMER | 52 | 10.1PPG | | 0.5 | 7.1 | 0 | 22 | 25 |

## TIMINGS

| | ST. IN HOLE | ST. CORING | ST. OUT OF H. | BBL AT SURF. | BBL READY TO R. |
|---|---|---|---|---|---|
| Day/Time | | | | | |

## OVERPULL (Last connection is at P.O.O.H.)

| Conn. (Lbs) | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | |

## PERFORMANCE

| DEPTH IN | DEPTH OUT | CORED | HOURS | R.O.P. | REC. | % REC |
|---|---|---|---|---|---|---|
| 746m | 762.30 | 16.30 | 62mins | 15.7m/ph | 16.30 | 1.00 |

Efficiency 90% Reason for stopping coring: BARREL JAMMED

SPARES USED/ DAMAGE SUSPECTED: 1 X SHOE ASSEMBLY, 2 X ALUMINIUM, 1 UPPER & LOWER "O" RING SEALS 1 UPPER & LOWER QUAD RING 1 UPPER & LOWER SLYDRING

REMARKS: Held JHA prior to picking up 18m coring assembly, dressed with CD 73 PDC, and two aluminium tubes, R.I.H. Broke circulation at shoe, washed and reamed though shoe track, ran to bottom with no problems, tagged and spaced out, dropped ball, observed pressure increase, took S.C.R'S and off bottom perameters commenced coring, ROP picked up after first meter cut and remaind steady for first 16m, noted pressure change and torque drop, indicating barrel had jammed, lost ROP, stopped coring, no over-pull observed. P.O.O.H

COMPANY REP. RAY KOHUT SDBS REP. G.DURWARD D.WHITBY

907960 082

Security DBS

# CORING LOG

| | |
|---|---|
| CORE N. | 2 |
| SHEET # | 2 |
| DATE: | 15.10.99 |

## WELL INFORMATION

| | | | |
|---|---|---|---|
| OPERATOR: | CULTUS | HOLE SIZE: | 8 1/2 |
| WELL N.: | BALEEN-2 | | |
| CONTRACTOR: | SEDCO RIG: 702 | ROCK TYPE: | GURNARD |
| COUNTRY: | AUST | FORM. DESCR: | SANDSTONE |
| HOLE ANGLE: | 0 | | |

## EQUIP. DESCRIPTION

| | | | |
|---|---|---|---|
| CORE BARREL SIZE: | 6 3/4 X 4" X 18m | SAFETY J. TYPE: | 6" |
| INN. STRING TYPE: | ALUMINIUM | LOWER SHOE/CATCHER TYPE: | SPRING |

| | | | | | |
|---|---|---|---|---|---|
| CORE HEAD TYPE: | CD 73 | SIZE: | 8 1/2 X 4" | SER. N. | 7970238 |
| PREV. FOOTAGE: | 16.30 | THIS CORE: | 18m | TOT CORED: | 34.3m |
| CORE HEAD N.: | 1 | CORE HEAD COND. AT RUN START: | | | 1,2,CT,S,X,I, |
| | | (iadc code) AT RUN END: | | | 1,2,CT,S,X,I, |

CORING B.H.A. CD 73,CBBL,SIRC-SUB,9 X 6 1/2 DC, X-OVER,JARS,3 X 6 1/2 DC

## BACKGROUND READINGS

| | STRING WTS | | TRQ. OFF B. | DROP BALL PRESS INCR. | | ON/OFF PRESS INCR. | |
|---|---|---|---|---|---|---|---|
| ↑ | 185 | 40 rpm | | Flow R. | 175 | Flow R. | 200 |
| → | 190 | 60 rpm | 1000ft.lbs | Press incr. | 180 | On Bottom | 350 |
| ↓ | 190 | 80 rpm | 1-2000ft.lbs | Mins. to drop | 5 | Off Bottom | 340 |

## MUD PROPERTIES

| TYPE | VISC | WT | W./Loss | % SAND | % SOLIDS | H2O/OIL | PV | YP |
|---|---|---|---|---|---|---|---|---|
| POLYMER | 52 | 10.1PPG | | 0.5 | 7.1 | 0 | 22 | 25 |

## TIMINGS

| | ST. IN HOLE | ST. CORING | ST. OUT OF H. | BBL AT SURF. | BBL READY TO R. |
|---|---|---|---|---|---|
| Day/Time | | | | | |
| | | | | | |

## OVERPULL (Last connection is at P.O.O.H.)

| Conn. (Lbs) | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | |

## PERFORMANCE

| DEPTH IN | DEPTH OUT | CORED | HOURS | R.O.P. | REC. | % REC |
|---|---|---|---|---|---|---|
| 762.30 | 780.30 | 18M | 62mins | 17.4m/hr | 15.85 | 88% |

Efficiency 100% Reason for stopping coring: 18m CUT

SPARES USED/ DAMAGE SUSPECTED: 1 X SHOE ASSEMBLY, 2 X ALUMINIUM TUBES

REMARKS: Serviced and redressed barrel for next run, R.I.H., tagged and spaced out,took SCR'S and off bottom peramaters commenced coring, no problems during core run, cut and filled 18m core, P.O.O.H. on surface layed out core and outer barrels as program was complete, 2m of core lost on recovery, most probable cause of loss due to friable sands falling from barrel during trip out.

COMPANY REP. RAY KOHUT SDBS REP. G.DURWARD D.WHITBY

907960 083

Security DBS

# CORING SUMMARY

| | |
|---|---|
| COMPANY : | CULTUS |
| WELL NO. : | Baleen-2 |
| RIG : | SEDCO 702 |
| HOLE SIZE : | 8 1/2 |
| HOLE ANGLE : | 0 |
| FORMATION : | GURNARD |

| SERVICE ENGINEERS NAME | |
|---|---|
| G.DURWARD | |
| D.WHITBY | |
| DATE ON: | 13.10.99 |
| DATE OFF: | 16.10.99 |
| UNITS: | 8 DAYS |

| | |
|---|---|
| CSG SIZE : | 9 5/8 |
| SHOE DEPTH : | 645m |
| PUMP/LINERS : | 6" |
| MUD TYPE-WT : | POLYMER |

RATHOLE ☐ ORIENTED ☐ CORIENTED ☐ LONG' ☐ SOFT' ☐ MOTOR ☐

| CORE | COREHEAD | | COREBARREL | | | MOTOR | EFFICIEN. | CORE | CORE | REC | HRS | R.O.P. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NO. | SER.NO. | TYPE | S'JT | SIZE | I.TUBE | | % | CUT | REC | % | | |
| 1 | 7970238 | CD 73 | 6" | 6 3/4X4"X 18m | ALUM | | 90% | 16.3 | 16.3 | 100% | 62mins | 15.7m/hr |
| 2 | 7970238 | CD 73 | 6" | 6 3/4X4"X 18m | ALUM | | 100% | 18 | 15.85 | 88% | 62mins | 17.4m/hr |
| OVERALL PERFORMANCE | | | | | | | | 34.3m | 32.15m | 93.70% | 124min | 16.6m/hr |

## CORE HEAD PERFORMANCE AND EVALUATION

| NO | SERIAL NO. | | SIZE | TYPE | SPC | NO OF CORES | FT/MT CUT | HRS | ROP | REC % | COREHEAD CONDITION | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 7970238 | | 8 1/2 | CD 73 | | 2 | 34.3 | 124mins | 16.6 | 93.70% | 20% | |

# APPENDIX 5

BALEEN-2

## 5 METRE CORE PHOTOGRAPHS

-ACS LABORATORIES-

907960 086

ACS

LABORATORIES

PTY. LTD.

**5m WHITE LIGHT & UV PHOTOGRAPHY**

**of**

***BALEEN-2***

**for**

***OMV AUSTRALIA PTY LTD***

**by**

**ACS LABORATORIES PTY LTD**

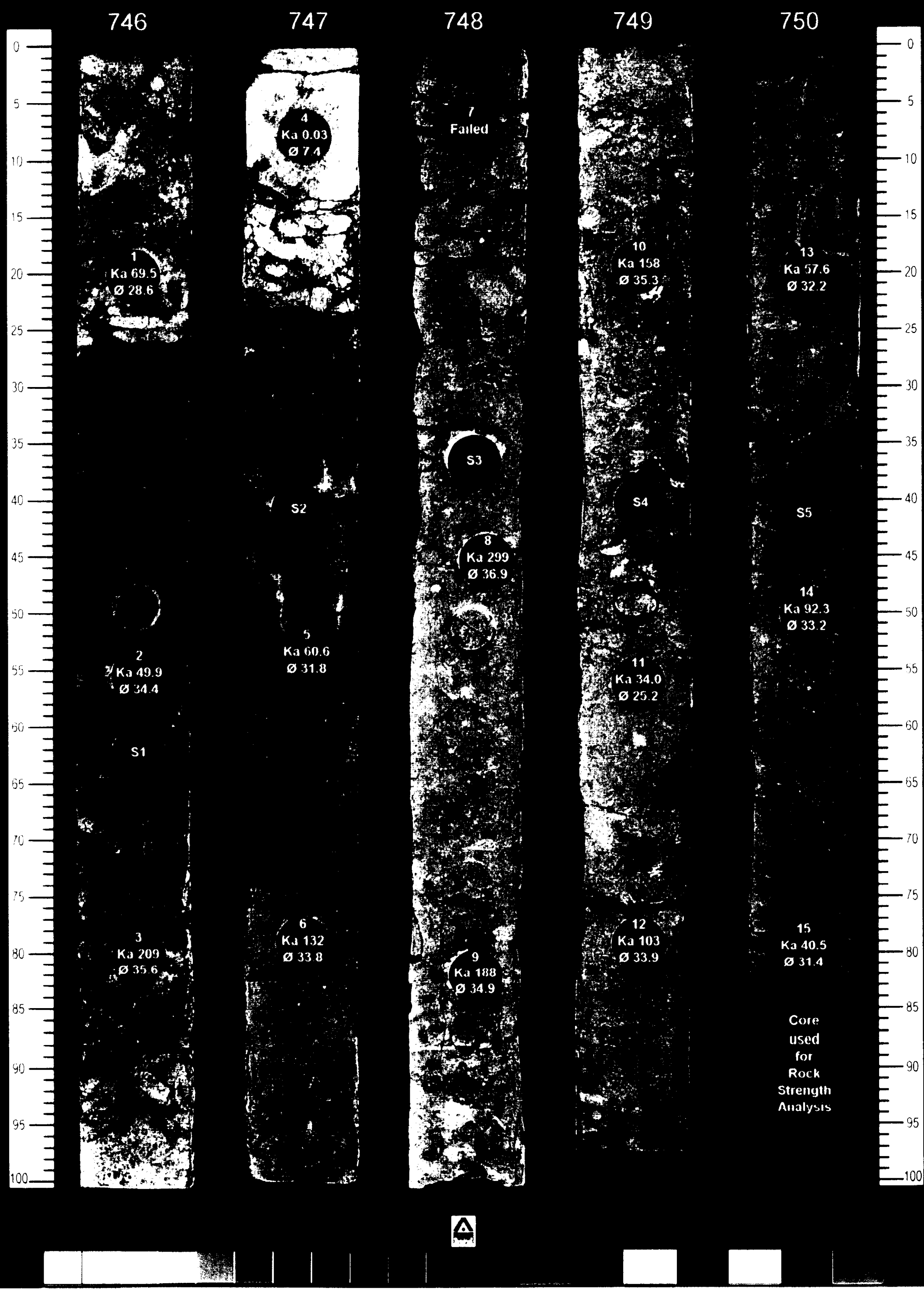
PE907964 - color ##3

907960 087

OMV Australia Pty Ltd.

# BALEEN 2

CORE No.1



PE907960 - color 004

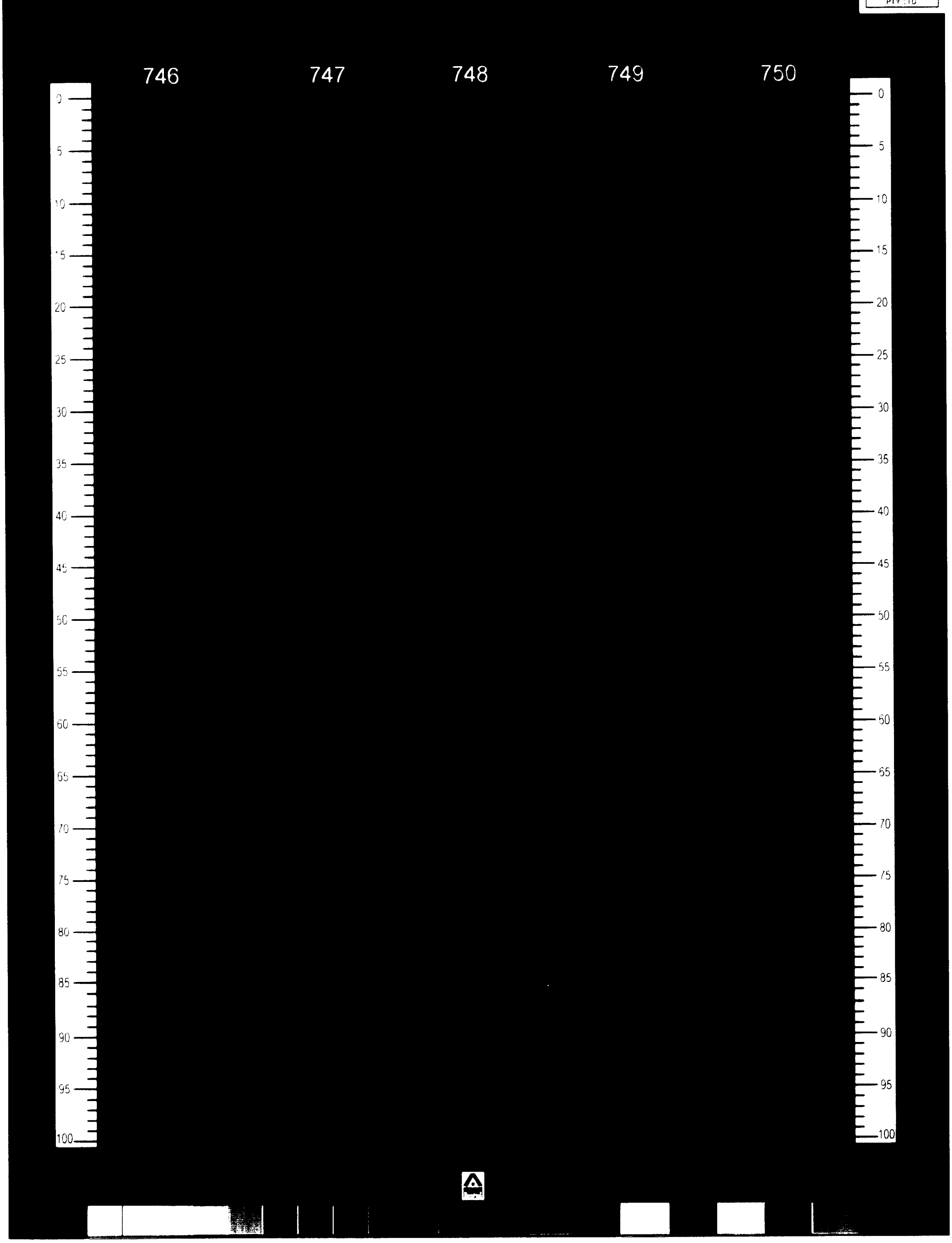
907960 088

OMV Australia Pty Ltd.

# BALEEN 2

CORE No. 1

ACS LABORATORIES PTY LTD



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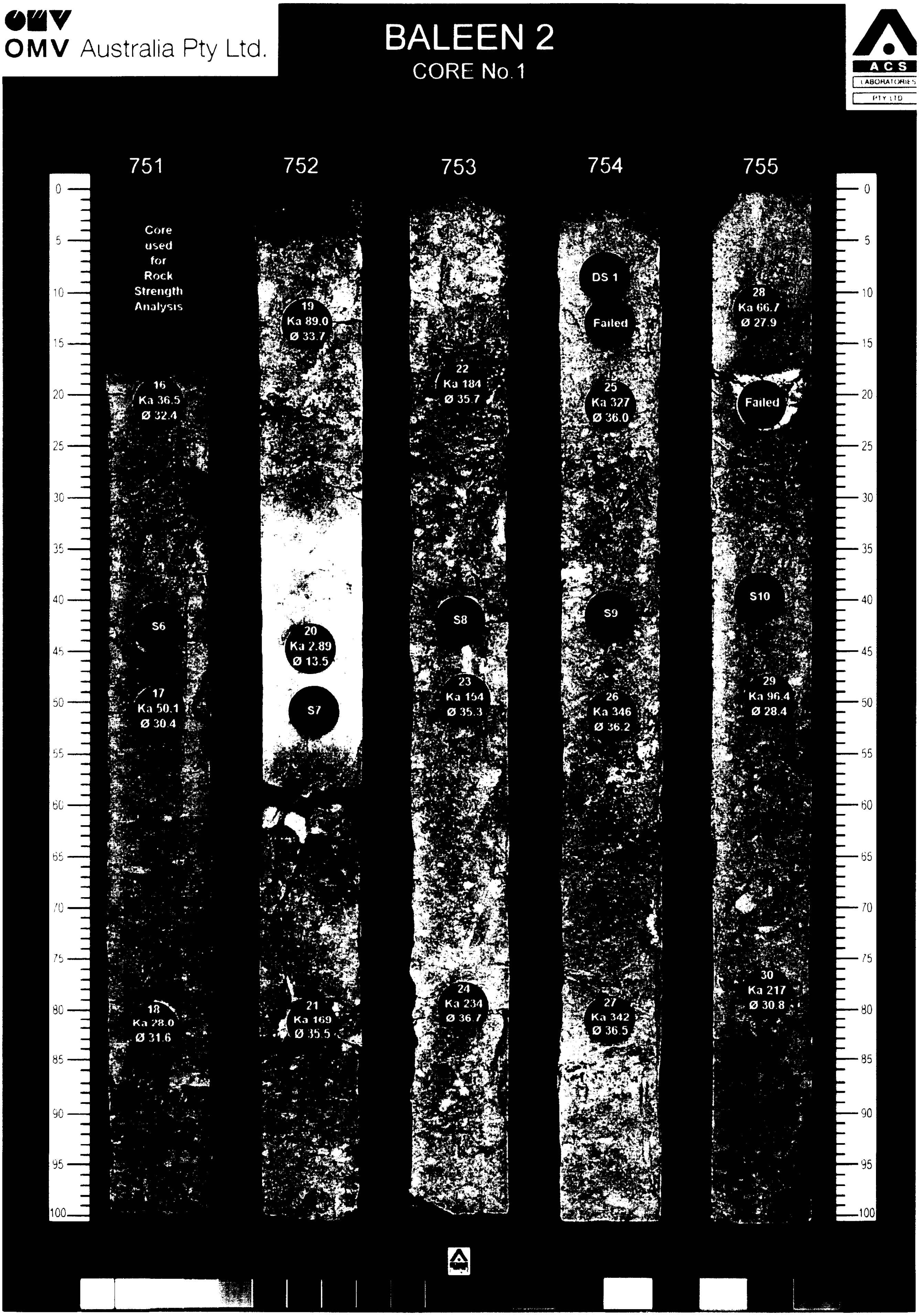
907960 089



PE907960 . cclccq46

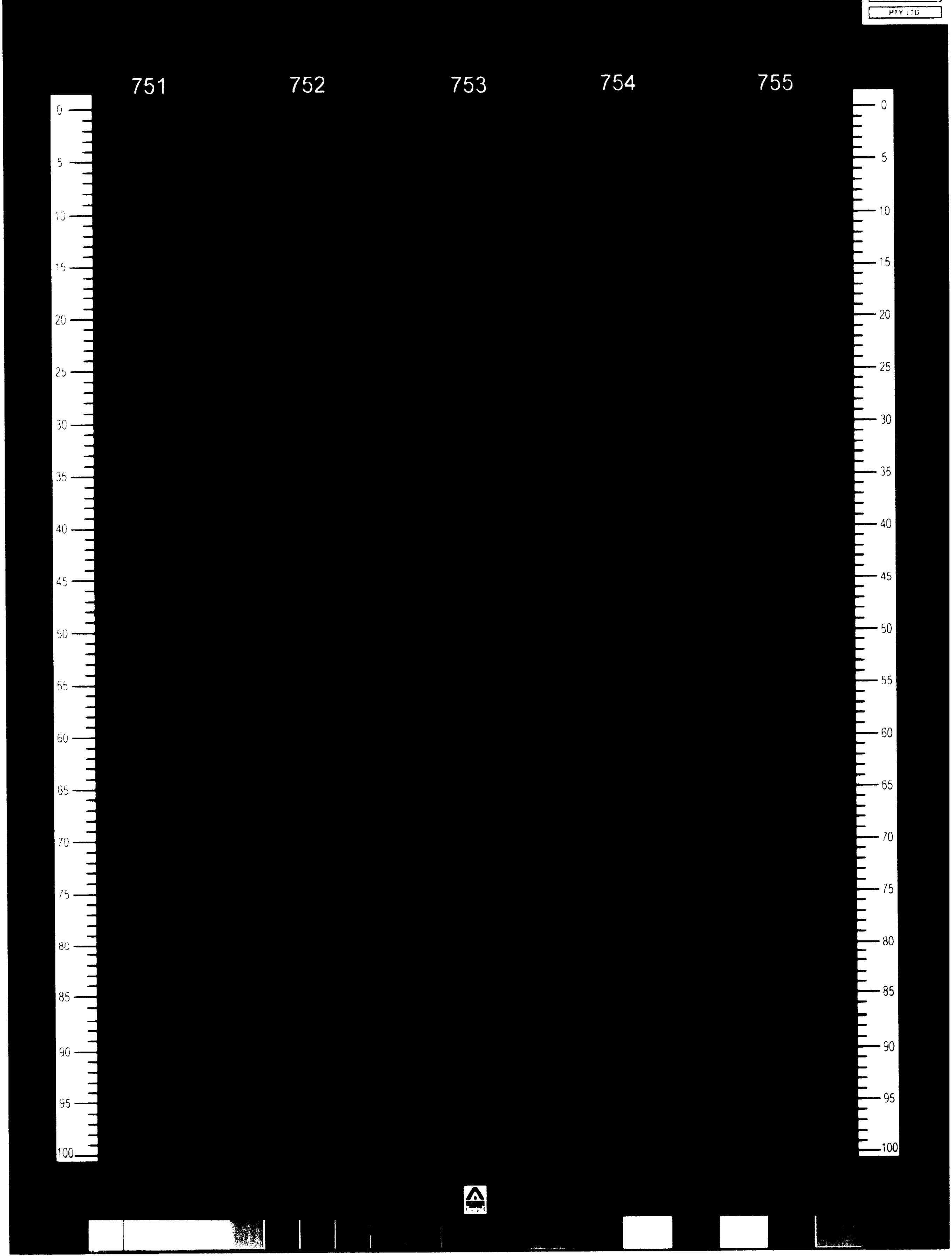
907960 090

OMV Australia Pty Ltd.

# BALEEN 2

CORE No. 1

ACS LABORATORIES PTY LTD



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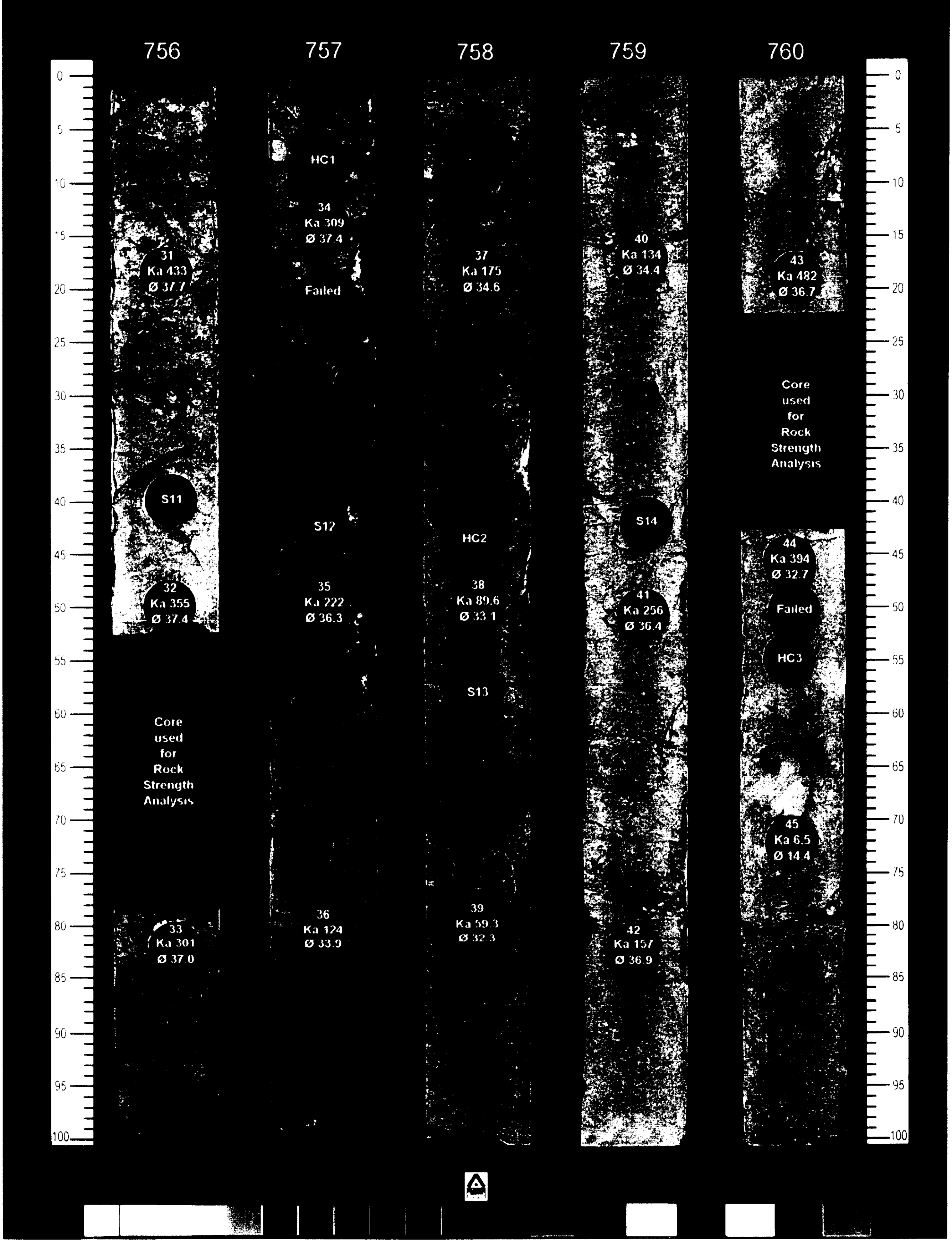
907960 091

OMV Australia Pty Ltd.

# BALEEN 2

CORE No.1



PE907960-color008

907960 092

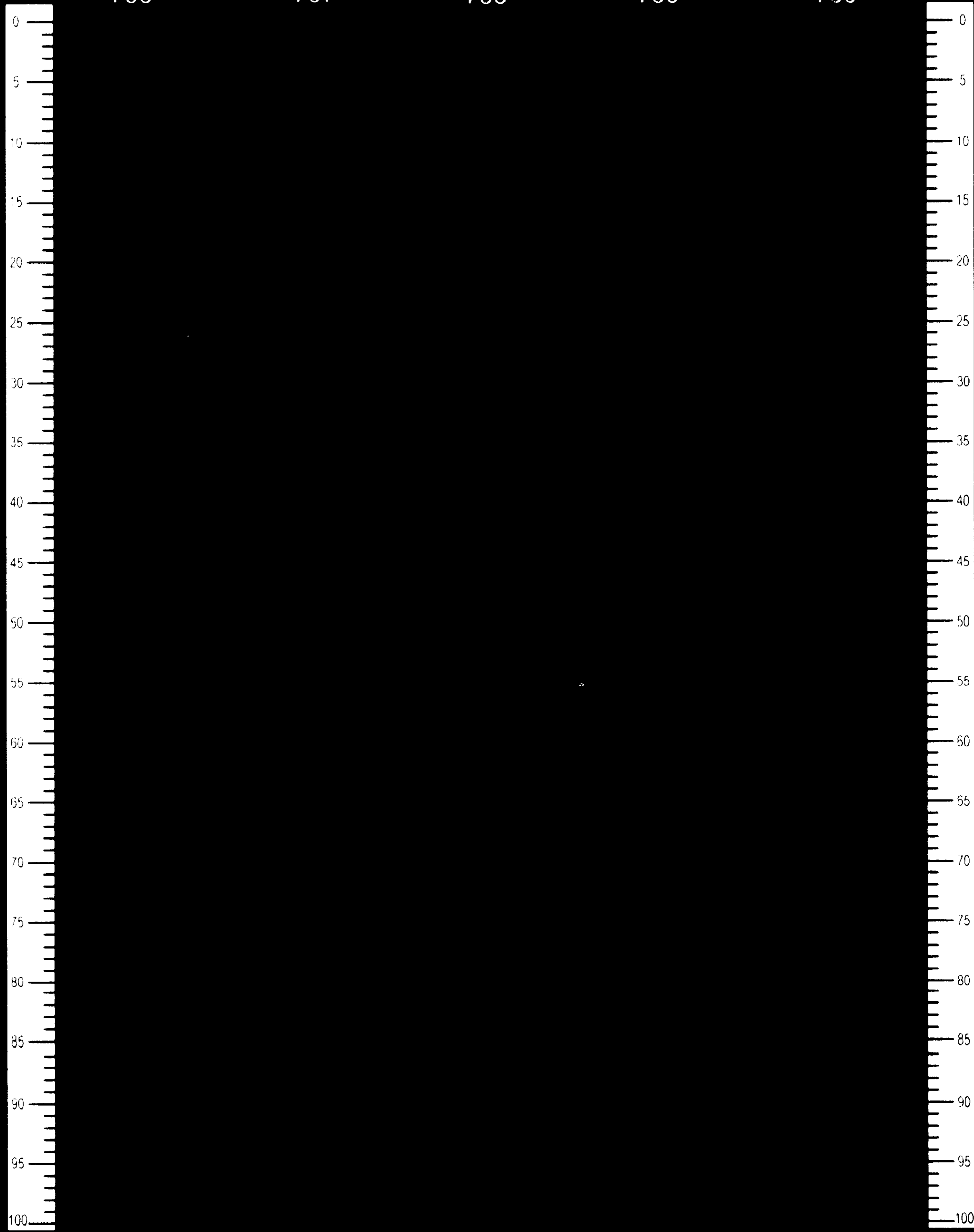
OMV Australia Pty Ltd.

# BALEEN 2

CORE No.1

ACS LABORATORIES PTY LTD

756 757 758 759 760



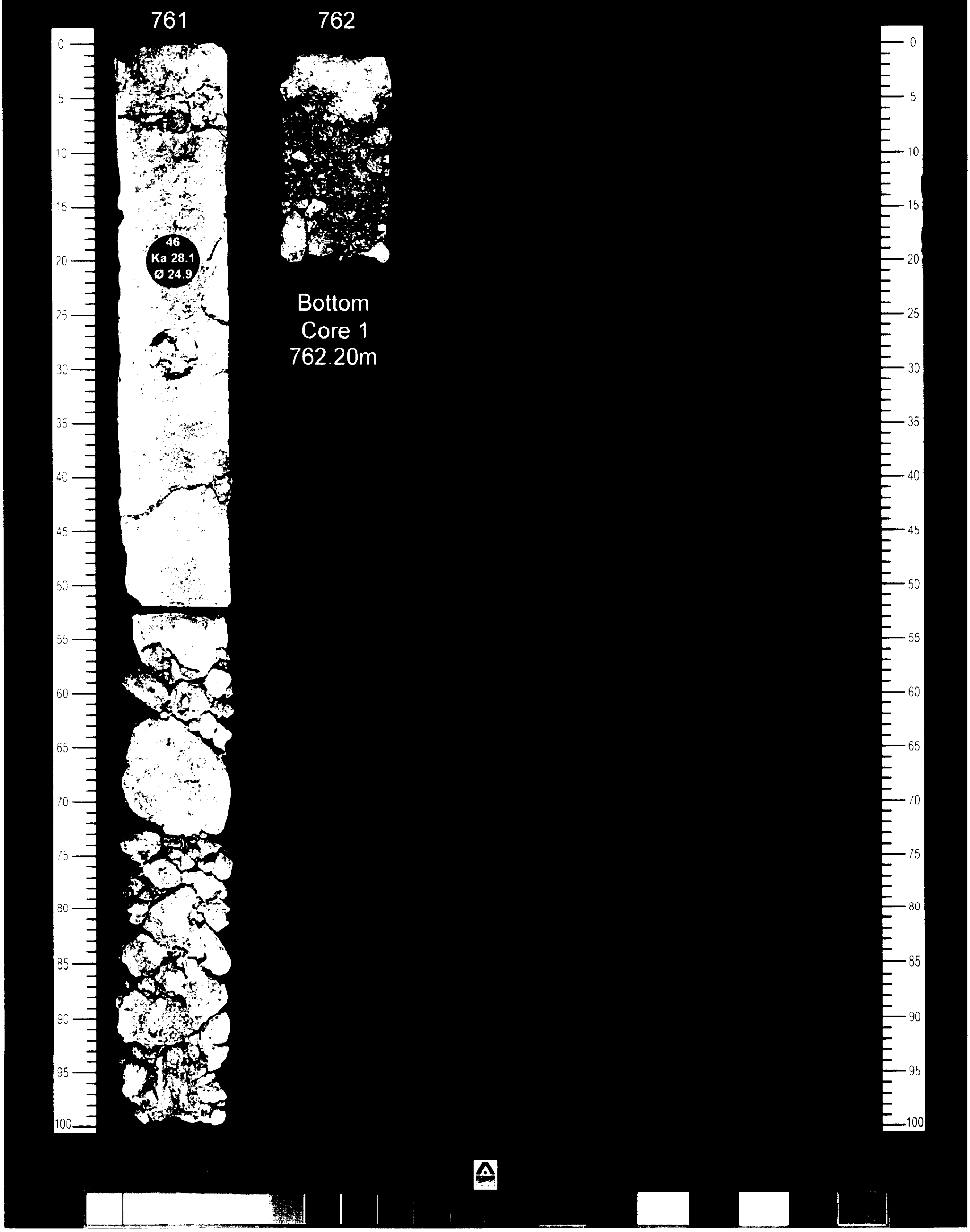
PE907960-cdc1009

907960 093

OMV Australia Pty Ltd.

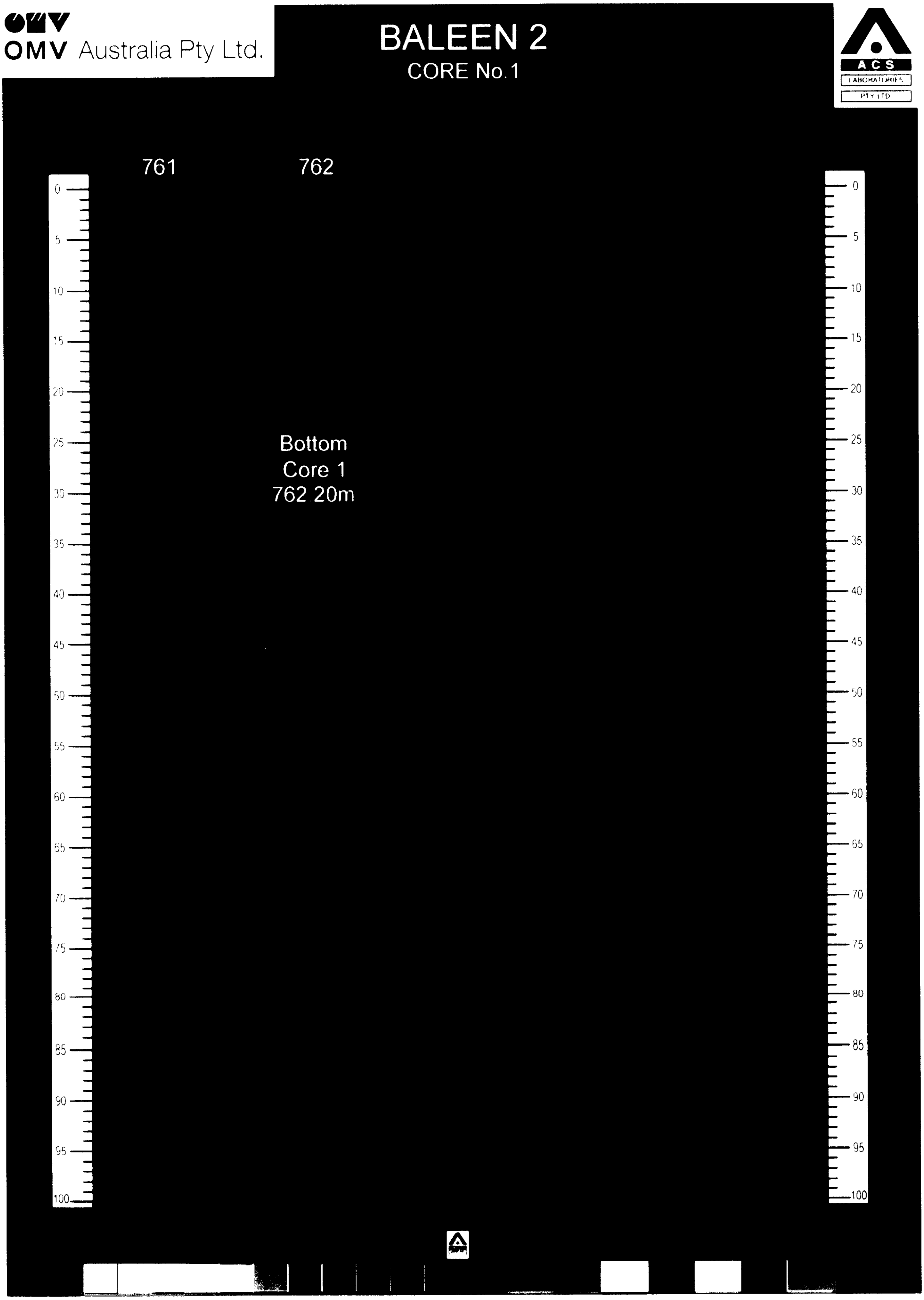
# BALEEN 2
CORE No. 1

ACS LABORATORIES PTY LTD



PE907960_cclc1 010

907960 094



PE907960-color 011

907960 095

OMV Australia Pty Ltd.

# BALEEN 2

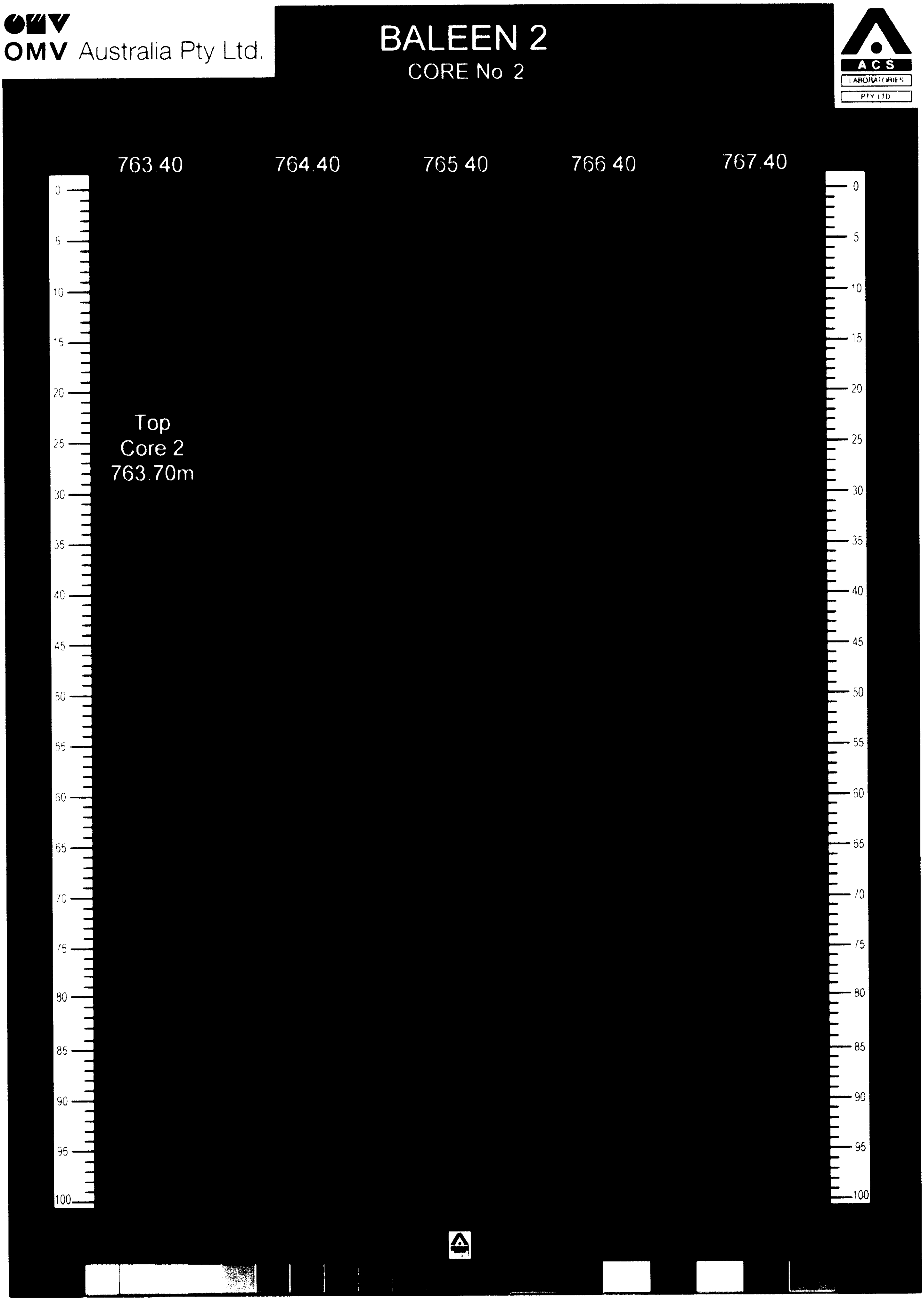
CORE No 2

ACS LABORATORIES PTY LTD

PE907960 _colr Φ12

907960 096

OMV Australia Pty Ltd.



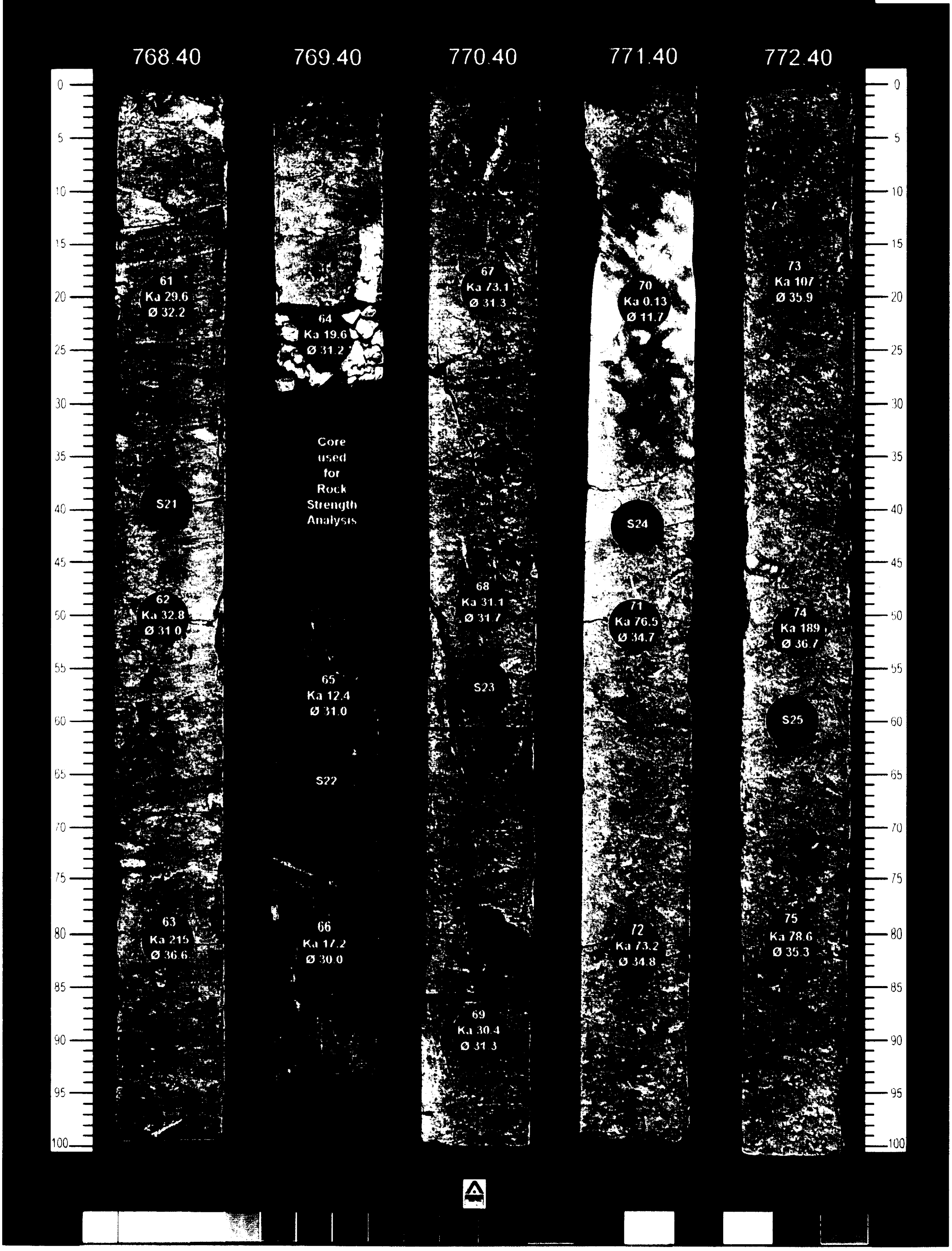
PE907960_color013

907960 097

OMV Australia Pty Ltd.

# BALEEN 2

CORE No. 2




ACS LABORATORIES PTY LTD

PE907960-color014

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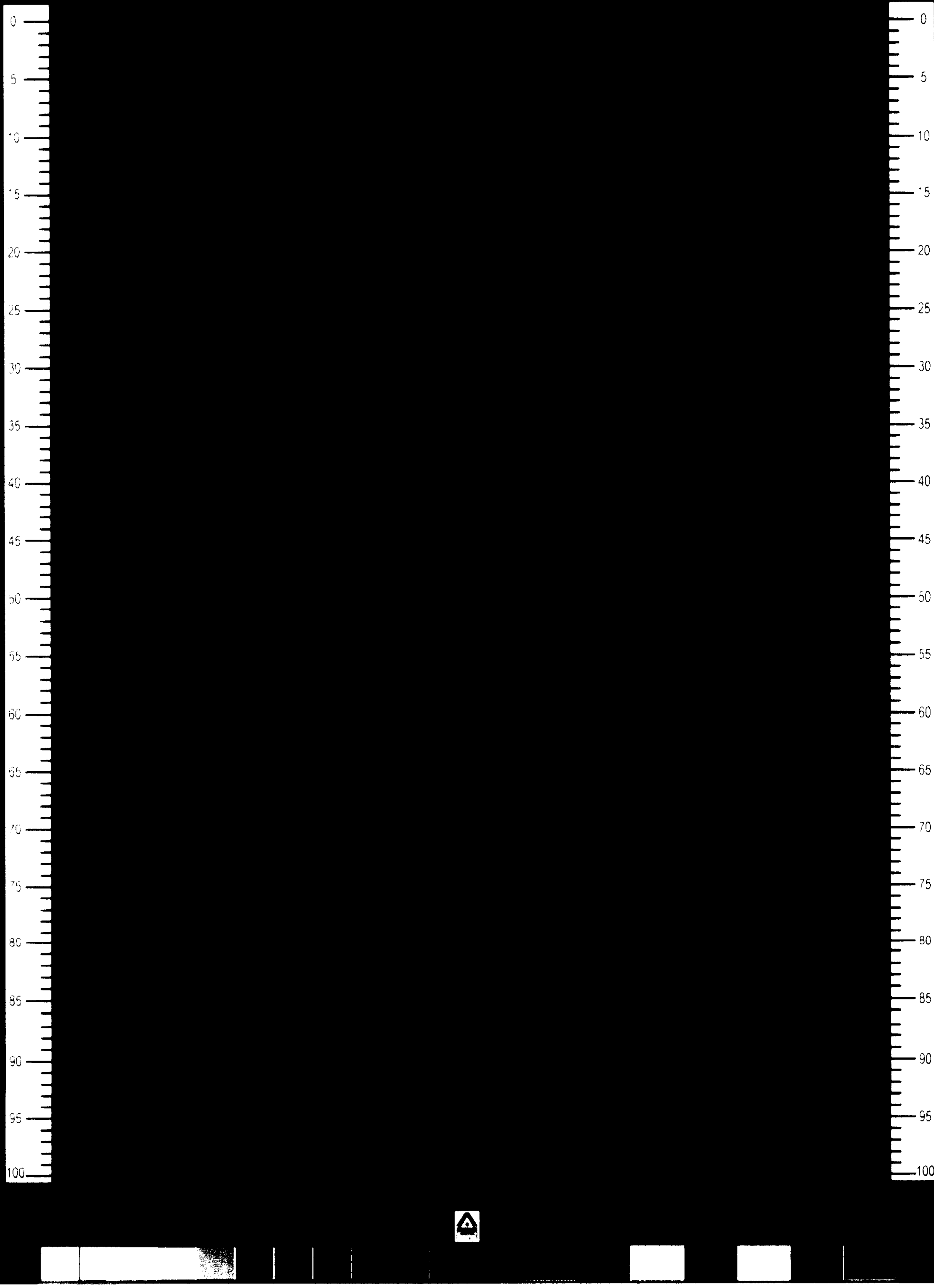
**OMV** Australia Pty Ltd.

# BALEEN 2

CORE No. 2

ACS LABORATORIES PTY LTD

768.40 769.40 770.40 771.40 772.40



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OMV Australia Pty Ltd.

# BALEEN 2

CORE No. 2

ACS LABORATORIES PTY LTD

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OMV Australia Pty Ltd.

# BALEEN 2

CORE No. 2

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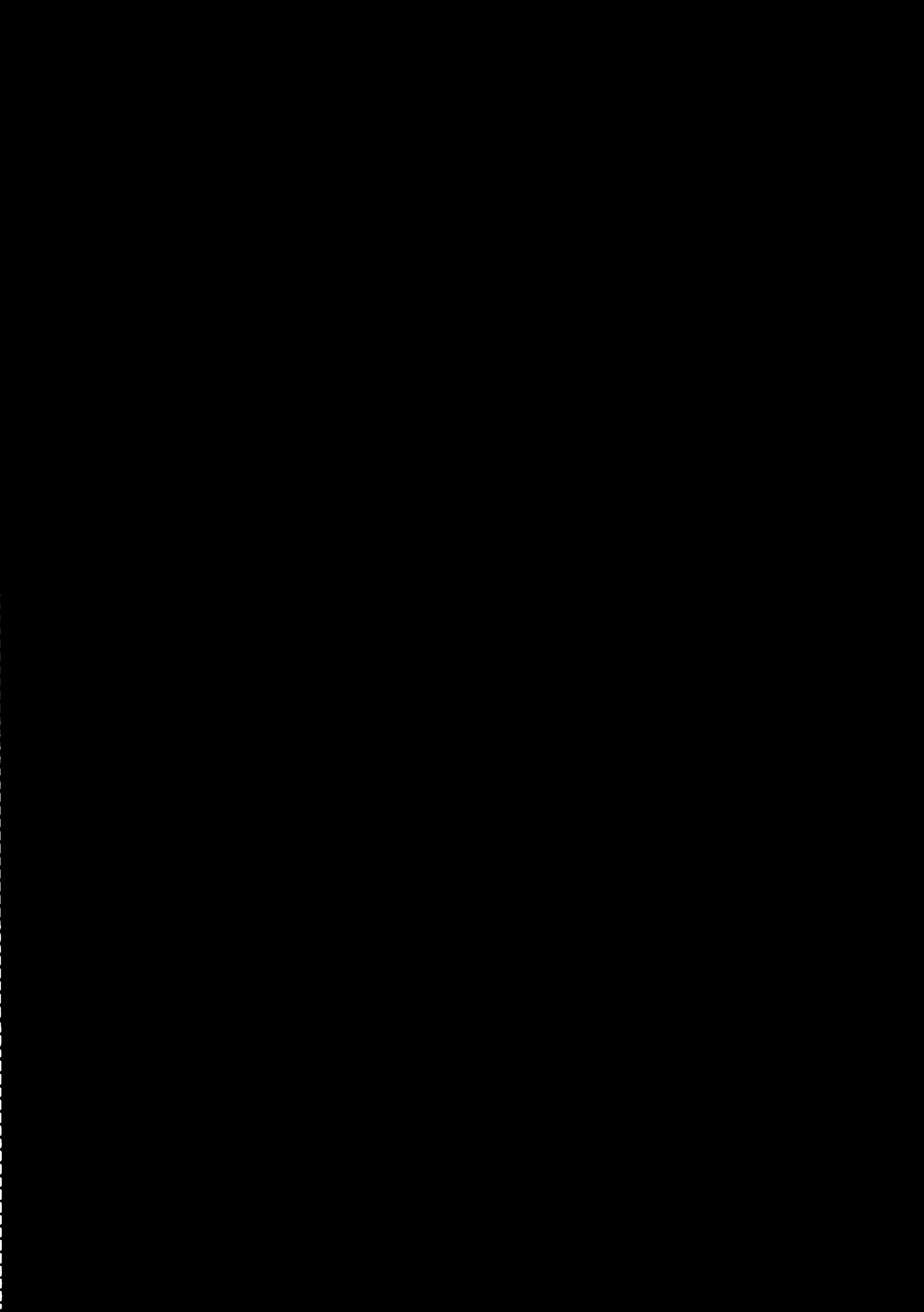

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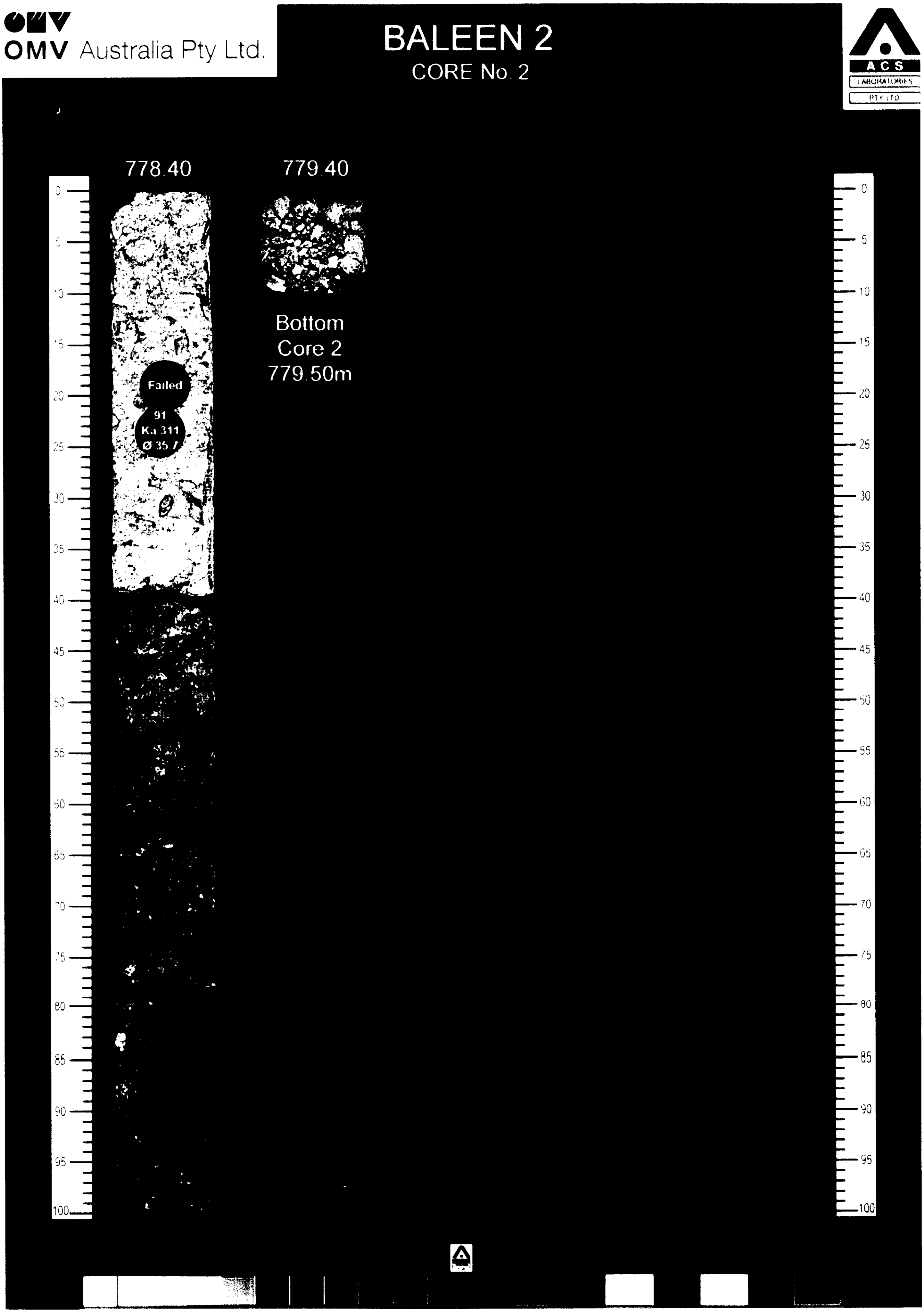

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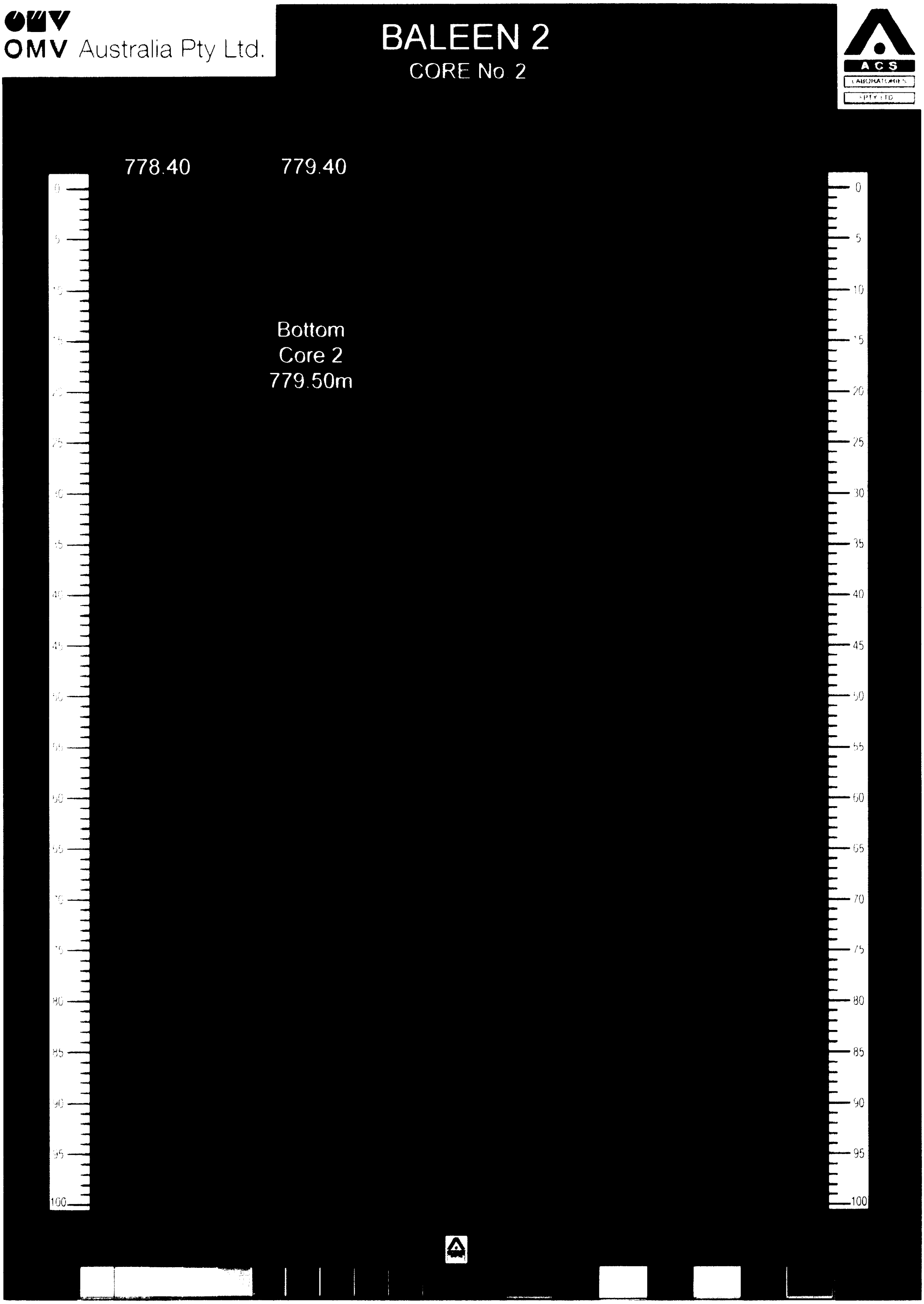

6

# APPENDIX 6

BALEEN-2

## WIRELINE LOGGING REPORT / OPERATION SUMMARY

-CULTUS-

907960 105

# Cultus Petroleum N.L.

## *WIRELINE LOGGING REPORT*

### GENERAL WELL DATA

| | | |
|---|---|---|
| **Well Name :** BALEEN-2<br>**Permit :** VIC / RL5<br>**Depth Ref. :** RT<br>**Location Lat :** 038° 01' 55.758 " South<br>**Long :** 148° 24' 37.549" East<br>**Easting X:** 623781.41<br>**Northing Y:** 5789663.90 | **Suite :** 1<br>**Date 1st Log :** 16 Oct 1999<br>**Depth Ref. Elev** 26.00 m<br>**Service Comp** Schlumberger<br>**Engineer(s) :** D.Wong / D.Pastor | **Rig :** SEDCO 702<br>**Date Last Log** 18 Oct 1999<br>**GL Elev. :** -55.0 m<br>**Seismic Ref :** Line G92A-3017, SP :<br>**Witnesses :** P.Boothby / Phillip Reichardt |

### HOLE DATA

| | | |
|---|---|---|
| **Hole Size :** 8.50"<br>**Driller's Depth ;** 895.0m<br>**Sea Bed Temp :** 25.00° C | **Survey Type :**<br>**Logger's Depth :** 890.5 m<br>**Max BHT :** 50.00 ° C | **Max Hole Dev :** 0.50 °<br>**Max Dev Depth :** 0.0 Meters |

**Hole Problems :** Hole in good condition

### CASING DATA

| Casing String | Shoe Depth (mRT) | Shoe Depth (mTVDRT) | Casing OD (") | Casing ID (") | Weight (lbs/ft) | Hole Size (") |
|---|---|---|---|---|---|---|
| 30 X 20" | 126.0 | 126.0 | 0.000 | N/A | N/A | 36.00 |
| 9-5/8" | 646.0 | 646.0 | 9.630 | N/A | 47.00 | 12.25 |

### WATER BASED MUD DATA

| Date Mud Check | Sample Taken From | Date Time Circ Stopped (date/time) | Circ Time (hrs) | Mud Type | MW (sg) | pH | KCl (%) | Cl mg/l | FL | Barite (%) | Rmf Deg C | Rm Deg C | Rmc Deg C |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 16 Oct 99 | Flowline | 16 Oct 99 13:55 | 0.58 | NaCL/PHPA/Polymer | 1.21 | 9.0 | 0.0 | 46500 | 3.0 | 3.7 | 0.1150 @ 21.60° C | 0.1340 @ 21.40° C | 0.2130 @ 21.70° C |

### OIL BASED MUD DATA

| Date Mud Check | Sample Taken From | Date Time Circ Stopped | Circ Time (Mins) | Mud Type | MW (sg) | MW Hot (sg) | Water Phase CaCl2 | Water Phase Salinity | Total Solids (%) | Funnel Viscosity | Fluid Loss (ml) | Electrical Stability (mV) | Ester Water Ratio |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | |

### WIRELINE RUN SUMMARY DATA

**Date of Mud Check:** 10/16/99 **Date / Time Circ. Stopped:** 16 Oct 1999 13:55 **Circ. Time (Hrs):** 0.58

| Run Number | Run Date | Tool String | Max BHT °C | Max BHT Depth | Date Time Logger on Bottom | Time Since Circ. Stopped (hrs) |
|---|---|---|---|---|---|---|
| 1 | 16 Oct 1999 | PEX/HALS/DSI/NGS | 46.67 | 860.5 | 16 Oct 99 19:16 | 5.35 |
| 2 | 16 Oct 1999 | FMI/GR | 48.00 | 878.5 | 16 Oct 99 22:27 | 8.53 |
| 3 | 17 Oct 1999 | MDT/GR | 52.00 | 797.0 | 17 Oct 99 08:20 | 18.42 |
| 4 | 17 Oct 1999 | VSP (CSAT) | 50.00 | 877.0 | 17 Oct 99 11:56 | 22.02 |
| 5 | 17 Oct 1999 | MDT/GR | 50.00 | 727.0 | 17 Oct 99 17:44 | 27.82 |

### RUN SUMMARY DATA

| Run # | Tool String | Log From Depth | Log To Depth | Repeat From Depth | Repeat To Depth | Comments |
|---|---|---|---|---|---|---|
| | | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 1 | PEX/HALS/DSI/NGS | 889 | 90 | 820 | 809 | Logged GR from 640 to 90. Full PEX-DSI high resolution data recorded at 1800ft/hr up to 640m. High resolution PEX data and NGT recorded upto 640m. |
| 2 | FMI/GR | 887 | 647 | 810 | 716 | Logged open hole interval. |
| 3 | MDT/GR | 748 | 823 | | | Took a total of 29 pretests, 25 normal, 3 lost seals, 1 dry test. 12 sample points were attempted - 11 attempts were aborted due to lost seals whilst using pump out module. 1 one gallon sample of water from the Latrobe Sandstones was taken. Water sample tested at surface whilst decantingfrom chamber contained 32 ppm $H_2S$ when tested with Draeger tube. |
| 4 | VSP (CSAT) | 885 | 100 | | | Shot 3 checkshot levels running in at 300m, 663m and 795 as repeat levels. Shot 42 levels from 885 to 100m. Airgun depth was 6m relative to MSL. Two Hydrophones positioned 3m below the guns. 32 VSP levels shot in open hole, 10 VSP levels shot in cased hole. |
| 5 | MDT/GR | 749 | 757 | | | Tool configured with POS and standard area probe. Attempted Pretest at 749m - supercharged. Moved to 757.2m and attempted sample. Pump unable to draw down formation -suspected pump failure or probe plugging. Pulled out of hole to trouble shoot tools. Pump displacement unit blocked with sand. Redressed pump and changed out probe to Martineau probe and picked up 6 gallon dump chamber and ran into hole. Attempted Sample at 757.0 with pump - no draw down on formation. Open 6 gallon dump and immediately lost seal. Pulled out of hole and rigged down. Probe and flow line were later found to completly plugged with fine sand mud cake and mud. |

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# Cultus Petroleum N.L.

## WIRELINE LOGGING
## Operations Diary / Time Summary

| | | | |
|---|---|---|---|
| **WELL NAME** : | BALEEN-2 | **SUITE** : | 1 |
| **FIELD** : | PATRICIA BALEEN GAS FIELD | **SERVICE COMPANY** : | Schlumberger |
| **PERMIT** : | VIC / RL5 | **ENGINEERS** : | D.Wong / D.Pastor |
| **LOCATION** | | **WITNESSES** : | P.Boothby / Phillip Reichardt |
| **Latitude:** | 038° 01' 55.758 " South | **DATE FIRST LOG** : | 16 Oct 1999 |
| **Longitude:** | 148° 24' 37.549" East | **DATE LAST LOG** : | 18 Oct 1999 |
| **Easting (m):** | 623781.41 | | |
| **lorthing (m):** | 5789663.90 | | |

| Date | Time From | Time To | Elapsed Time | Cumm. Time | Logging Code | Event Description |
|---|---|---|---|---|---|---|
| **Run Number : 1 PEX/HALS/DSI/NGS** | | | | | | |
| 16 Oct 1999 | 17:10 | 17:17 | 0.12 | 0.12 | Logging | Hold JSA on Rig floor. |
| | 17:17 | 18:10 | 0.88 | 1.00 | Logging | Rig up sheaves and run 1 PEX-DSI tool |
| | 18:10 | 18:15 | 0.08 | 1.08 | Logging | Install radioactive sources |
| | 18:15 | 18:23 | 0.13 | 1.21 | Logging | Commence running into hole. |
| | 18:23 | 18:27 | 0.07 | 1.28 | Logging | Commence logging down from 640 m at 1000 ft/hr |
| | 18:27 | 18:42 | 0.25 | 1.53 | Logging | Initialisation to logging hung up - restarted logging down from 667 m. Initialised OK increased speed to 2000 ft/hr. down to 796 m |
| | 18:42 | 18:50 | 0.13 | 1.66 | Logging | Log up repeat section over reservoir interval from 796 to 745 m at 1000 ft/hr. |
| | 18:50 | 18:54 | 0.07 | 1.73 | Logging | Run back in hole to 820 - did not allow for tool length of 30m for logging repeat section over the reservoir interval. |
| | 18:54 | 19:04 | 0.17 | 1.90 | Logging | Log up repeat section from 820 m at 1800 ft/hr to 721m. 0.2m differnece from the down log. Hence Add 0.2m (Subract 1.0 m for tide). |
| | 19:04 | 19:16 | 0.20 | 2.10 | Logging | Run into hole from 714 to TD at 895m |
| | 19:16 | 19:44 | 0.47 | 2.57 | Logging | Commence logging main pass from 890.5m TD to 628m. Shoe at 647m |
| | 19:44 | 19:49 | 0.08 | 2.65 | Logging | Stop and log GR only to seabed. |
| | 19:49 | 19:53 | 0.07 | 2.72 | Logging | Commence logging up GR only through casing from 641m to 604 at 4000 ft/hr. |
| | 19:53 | 19:57 | 0.07 | 2.79 | Logging | Stop logging and run back into 675 to ensure overlap of GR curves. |
| | 19:57 | 20:27 | 0.50 | 3.29 | Logging | Log up GR from 675 to 90m at 4500 ft/hr |
| | 20:27 | 20:30 | 0.05 | 3.34 | Logging | Decompensate at 90m. |
| | 20:30 | 20:35 | 0.08 | 3.42 | Logging | Pull out of hole to surface. |
| | 20:35 | 21:10 | 0.58 | 4.00 | Logging | Rig down tools |
| | | | | | | **Cumulative Run Time (Hrs):** 4.00 |
| **Run Number : 2 FMI/GR** | | | | | | |
| 16 Oct 1999 | 21:10 | 21:40 | 0.50 | 0.50 | Logging | Pick up FMI/GR tool |
| | 21:40 | 21:48 | 0.13 | 0.63 | Logging | Surface checks. |

| Date | Time From | Time To | Elapsed Time | Cumm. Time | Logging Code | Event Description |
|---|---|---|---|---|---|---|
| 16 Oct 1999 | 21:48 | 22:07 | 0.32 | 0.95 | Logging | Commence running into hole. |
| | 22:07 | 22:21 | 0.23 | 1.18 | Logging | Log repeat section from 715.7 and run back to TD. |
| | 22:21 | 22:27 | 0.10 | 1.28 | Logging | Run in hole to TD |
| | 22:27 | 23:00 | 0.55 | 1.83 | Logging | Log up main pass from 890.5 to 647 m. |
| | 23:00 | 23:20 | 0.33 | 2.16 | Logging | Pull out of hole to surface. - decompensate at 90m. |
| | 23:20 | 23:55 | 0.58 | 2.74 | Logging | Rigged down FMI/GR |
| | | | | | | **Cumulative Run Time (Hrs):** 6.74 |

**Run Number : 3 MDT/GR**

| Date | Time From | Time To | Elapsed Time | Cumm. Time | Logging Code | Event Description |
|---|---|---|---|---|---|---|
| 16 Oct 1999 | 23:55 | 00:50 | 0.92 | 0.92 | Logging | Rig up MDT. Configured with Martineau Probe, 3 X 1 gallon Chambers, 3 X MRSC 450 cc bottles, 3 X SPMC 250cc bottles, OFA and pump out module. |
| 17 Oct 1999 | 00:50 | 00:55 | 0.08 | 1.00 | Logging | Run into hole to 90m. compensate. |
| | 00:55 | 01:00 | 0.08 | 1.08 | Logging | Set compensators |
| | 01:00 | 01:20 | 0.33 | 1.41 | Logging | Run into hole to 825m. |
| | 01:20 | 01:35 | 0.25 | 1.66 | Logging | Commence correlation pass from 825m to 767 - subtract 0.7m. |
| | 01:35 | 08:20 | 6.75 | 8.41 | Logging | Commence taking pretests at 748 to 823 mMDRT. Took a total of 29 pretests, 25 normal, 3 lost seals, 1 dry test. 12 sample points were attempted - 11 attempts were aborted due to lost seals whilst using pump out module. A 1 Gal Sample taken at 797m. |
| | 08:20 | 08:34 | 0.23 | 8.64 | Logging | Perform correlation pass from |
| | 08:34 | 08:36 | 0.04 | 8.68 | Logging | Move back to 753.5 to re-attempt sample. |
| | 08:36 | 09:02 | 0.43 | 9.11 | Logging | Take pretest attempt sample at 753.5 and at 749.3. Pumpout failed at 749.3 m unable to drawdown on formation. POOH. |
| | 09:02 | 10:05 | 1.05 | 10.16 | Logging | Pull out of hole. |
| | 09:55 | 10:20 | 0.42 | 10.58 | Logging | Rig down MDT tools. |
| | | | | | | **Cumulative Run Time (Hrs):** 17.32 |

**Run Number : 4 VSP (CSAT)**

| Date | Time From | Time To | Elapsed Time | Cumm. Time | Logging Code | Event Description |
|---|---|---|---|---|---|---|
| 17 Oct 1999 | 10:20 | 10:42 | 0.37 | 0.37 | Logging | Make up tools |
| | 10:42 | 10:59 | 0.29 | 0.66 | Logging | Run in hole to 300m for first checkshot. |
| | 10:59 | 11:08 | 0.15 | 0.81 | Logging | Check shot at 300m. |
| | 11:08 | 11:17 | 0.15 | 0.96 | Logging | Run in hole to 755 for correlation pass. |
| | 11:17 | 11:26 | 0.15 | 1.11 | Logging | Run correlation pass from 775 to 728 - adjust -1.1m. and rerun correllation from 755m. Correct -0.1m |
| | 11:26 | 11:28 | 0.03 | 1.14 | Logging | Run into hole to 663 from |
| | 11:28 | 11:35 | 0.12 | 1.26 | Logging | Check shot at 663m running in. |
| | 11:35 | 11:41 | 0.10 | 1.36 | Logging | Run in hole to 795m. |
| | 11:41 | 11:48 | 0.12 | 1.48 | Logging | Check shot at 795m running into hole. |
| | 11:48 | 11:55 | 0.12 | 1.60 | Logging | Run inhole to TD. |

| Date | Time From | Time To | Elapsed Time | Cumm. Time | Logging Code | Event Description |
|---|---|---|---|---|---|---|
| 17 Oct 1999 | 11:55 | 17:02 | 5.12 | 6.72 | Logging | Commence VSP Survey at 885m to 100m. |
| | 17:02 | 17:04 | 0.03 | 6.75 | Logging | Decompensate at 100m. |
| | 17:04 | 17:08 | 0.07 | 6.82 | Logging | Pull out of hole to surface. |
| | 17:08 | 17:35 | 0.45 | 7.27 | Logging | Rig Down CSAT. |
| | | | | | | **Cumulative Run Time (Hrs):** 24.59 |

## Run Number : 5 MDT/GR

| Date | Time From | Time To | Elapsed Time | Cumm. Time | Logging Code | Event Description |
|---|---|---|---|---|---|---|
| 17 Oct 1999 | 17:35 | 18:24 | 0.82 | 0.82 | Logging | Rig up MDT tool with standard area probe, 2 iGal chambers, 3 X MRSC 450cc, 3 SPMC 250 bottles, OFA and pump out. |
| | 18:24 | 18:28 | 0.07 | 0.89 | Logging | Run into hole to 100m and compensate. |
| | 18:28 | 18:32 | 0.07 | 0.96 | Logging | Set Compensators at 100m. |
| | 18:32 | 18:49 | 0.28 | 1.24 | Logging | Run into hole |
| | 18:49 | 18:49 | 0.01 | 1.25 | Logging | Correlation pass from 800 to 729m |
| | 18:49 | 19:07 | 0.29 | 1.54 | Logging | Get on depth at 749.0m for First Sample. |
| | 19:07 | 19:44 | 0.62 | 2.16 | Logging | Commence pretest at 749.0m. Supercharged. Move to 757.2 and attempt sample. Pump out module not functioning. Unable to draw down formation. Pump malfunction or probe/flow line plugged? |
| | 19:44 | 20:05 | 0.35 | 2.51 | Logging | Pull out of hole to inspect tool. |
| | 20:05 | 21:10 | 1.08 | 3.59 | Logging | Trouble shoot POS whilst tool in derrick. POS failed surface checks. Inspection found displacement unit to be blocked with sand. Redressed POS. Unable to adequetly test flowine from probe to POS for blockages due to low rig air pressure. |
| | 21:10 | 23:00 | 1.83 | 5.42 | Logging | Decision taken to pick up 6 gallon chamber and re-attempt sampling of Gurnard sands. Pump out module to be layed out and chambers reconfigured. |
| | 23:00 | 23:20 | 0.33 | 5.75 | Logging | Run in hole with MDT - Martinaeu Probe, 6 Gal Chamber, 2 X 1 gallon chamber, 3 x SPMC, 3 X MPSR. POS and OFA. |
| | 23:20 | 23:35 | 0.25 | 6.00 | Logging | Commence correlation pass from 800m to 731m make -7m correction. Run bacin hole to 780 and relog correlation pass. On depth. Move to sample point at 757m. |
| | 23:35 | 23:46 | 0.20 | 6.20 | Logging | Attempt to sample at 757m Pump out module failed - unable to draw down formation. Opened 6 gal chamber. lost seal - formation collapsing around the seal. |
| | 23:46 | 00:10 | 0.38 | 6.58 | Logging | Pull out of hole and rig down. |
| 18 Oct 1999 | 00:10 | 01:00 | 0.83 | 7.41 | Logging | Rigged Down MDT. Probe found to be totally plugged and the screen had collapsed. Flow line was alos totally plugged. |
| | 01:00 | 02:50 | 1.83 | 9.24 | Lost Time | Wait on confirmation to rig down Schlumberger. |
| | 02:50 | 03:15 | 0.42 | 9.66 | Logging | Complete rigging down remainder of MDT components. |

| Date | Time From | Time To | Elapsed Time | Cumm. Time | Logging Code | Event Description |
|---|---|---|---|---|---|---|
| 18 Oct 1999 | 03:15 | 03:30 | 0.25 | 9.91 | Logging | Rig down Sheaves. End Of Job. |

**Cumulative Run Time (Hrs):** 34.50

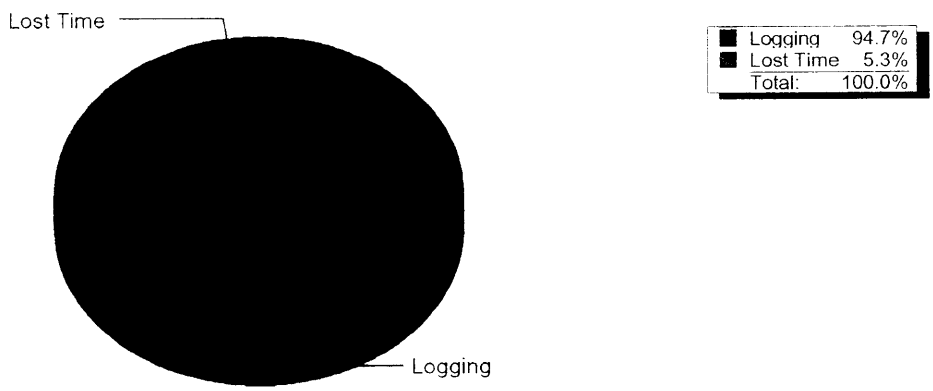
PE907960-Color 019



# Wireline Logging Time Summary

| | Logging | Lost Time | Total |
|---|---|---|---|
| *FMI/GR* | 2.74 | 0.00 | 2.74 |
| *MDT/GR* | 18.66 | 1.83 | 20.49 |
| *PEX/HALS/DSI/NGS* | 4.00 | 0.00 | 4.00 |
| *VSP (CSAT)* | 7.27 | 0.00 | 7.27 |
| **Total** | 32.67 | 1.83 | 34.50 |

Units in decimal hours



# Wireline Logging Detailed Time Breakdown

| | 1 | 2 | 3 | 4 | 5 | Total |
|---|---|---|---|---|---|---|
| Correlation Pass | 0.00 | 0.00 | 0.48 | 0.15 | 0.26 | **0.89** |
| Decompensate | 0.05 | 0.00 | 0.00 | 0.03 | 0.00 | **0.08** |
| Hold JSA | 0.12 | 0.00 | 0.00 | 0.00 | 0.00 | **0.12** |
| Log Down | 0.32 | 0.00 | 0.00 | 0.00 | 0.00 | **0.32** |
| Log Main Pass | 1.04 | 0.55 | 7.22 | 5.12 | 0.82 | **14.75** |
| Log Repeat Section | 0.30 | 0.23 | 0.00 | 0.00 | 0.00 | **0.53** |
| Lost Time due to Other | 0.00 | 0.00 | 0.00 | 0.00 | 1.83 | **1.83** |
| Make Up Tools | 0.00 | 0.50 | 0.92 | 0.37 | 0.82 | **2.61** |
| POOH | 0.08 | 0.33 | 1.05 | 0.07 | 0.73 | **2.26** |
| Pre Log Tool Checks | 0.08 | 0.13 | 0.00 | 0.00 | 0.00 | **0.21** |
| Rig Down Sheaves | 0.00 | 0.00 | 0.00 | 0.00 | 0.25 | **0.25** |
| Rig Down Tools | 0.58 | 0.58 | 0.42 | 0.45 | 1.25 | **3.28** |
| Rig up Sheave | 0.88 | 0.00 | 0.00 | 0.00 | 0.00 | **0.88** |
| RIH | 0.47 | 0.42 | 0.41 | 0.69 | 0.97 | **2.96** |
| Set Compensator | 0.00 | 0.00 | 0.08 | 0.00 | 0.07 | **0.15** |
| Verify Tools | 0.08 | 0.00 | 0.00 | 0.39 | 2.91 | **3.38** |
| **Total** | **4.00** | **2.74** | **10.58** | **7.27** | **9.91** | **34.50** |

Units in decimal hours

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# APPENDIX 7
BALEEN-2

## MDT SUMMARY REPORT
-CULTUS-

# Cultus Petroleum N.L.

## *Wireline Pressure Data Report*

| **GENERAL WELL DATA** | | **LOGGING DATA** | |
|---|---|---|---|
| **WELL NAME :** | BALEEN-2 | **WIRELINE SERVICE CO. :** | Schlumberger |
| **FIELD :** | PATRICIA BALEEN GAS FIE | **SUITE NUMBER :** | 1 |
| **BASIN :** | OFFSHORE GIPPSLAND BASIN | **RUN NUMBER :** | 3 |
| **PERMIT :** | VIC / RL5 | **RUN DATE :** | 17 Oct 1999 |
| **LATITUDE :** | 038° 01' 55.758 " South | **ENGINEERS :** | D.Wong / D.Pastor |
| **LONGITUDE :** | 148° 24' 37.549" East | **WITNESSES :** | P.Boothby / Phillip Reichardt |
| **EASTING :** | 623781.41 | **HOLE SIZE (") :** | 8.50 |
| **NORTHING :** | 5789663.90 | **SECTION TD (Lgr meters) :** | 890.5 |
| **PRIMARY OBJECTIVE :** | Gurnard Formation | **TOOL TYPE :** | MDT-GR |
| **RIG RTE (m) :** | 26.0 | **PROBE TYPE :** | Martineau Probe |
| **WATER DEPTH (m) :** | 55.0 | **PROBE DIAMETER (mm) :** | 0.0 |
| **SPUD DATE :** | 11 Oct 1999 | **QUARTZ GUAGE TYPE :** | CQG-G |
| **DATE COMPLETED :** | | **TOOL CONFIGURATION :** | 3 X 1 Gal, 3 X 450cc MRSC's, 3 X 250cc SPMC's, OFA / POS |

| Pretest Number | Mini Pretest Number | Pretest Depth MD | Pretest Depth TVDSS | Hydro. before psia | Draw Down Vol cc | Initial Pressure psia | Final Pressure psia | Gauge Temp. °C | Hydro. After psia | Mobility | Sample Taken | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | a | 748.0 | 722.0 | 1,333.5 | 20 | 564.0 | 1,075.1 | 46.20 | 1,333.0 | 3.1 | No | Slow build up ?? |
| 2 | a | 749.3 | 723.3 | 1,335.5 | 20 | | 1,071.0 | 46.74 | 1,335.2 | 4.2 | No | Seems Low? |
| 3 | a | 750.5 | 724.5 | 1,337.5 | 7.6 | | 1,081.0 | 46.93 | 1,337.4 | 1.6 | No | Abort Tight. |
| 4 | a | 750.7 | 724.7 | 1,337.9 | 8.8 | | | | | | No | Abort Tight test |
| 5 | a | 751.5 | 725.5 | 1,339.4 | 6.8 | | 1,085.5 | 47.18 | 1,338.9 | 0.8 | No | Abort - Tight test. |
| 6 | a | 753.5 | 727.5 | 1,342.7 | 19.9 | | 1,071.3 | 47.46 | 1,342.8 | 3.8 | No | Good Test. |
| 7 | a | 754.7 | 728.7 | 1,344.9 | 19.9 | | 1,070.9 | 47.75 | 1,344.8 | 5.6 | No | Good Test. |
| 8 | a | 754.7 | 728.7 | 1,344.8 | 19.9 | | | | | | No | Lost seal whilst pumping. |
| 9 | a | 757.0 | 731.0 | 1,348.8 | 20 | | 1,071.9 | 48.18 | 1,348.8 | 10.7 | No | Good Pretest. Lost seal after starting pump out. |
| 10 | a | 757.0 | 731.0 | 1,348.8 | 20 | | | | | | No | Seal failed whilst pumping. Formation collapsing? |
| 11 | a | 757.0 | 731.0 | 1,348.7 | 20 | | | 48.25 | 1,348.7 | | No | Seal Failed during pretest. |
| 12 | a | 757.5 | 731.5 | 1,349.7 | 20 | | 1,075.2 | 48.47 | 1,349.5 | | No | Aborted Test - supercharging. |
| 13 | a | 757.3 | 731.3 | 1,349.7 | 20 | | 1,073.5 | 48.50 | 1,349.2 | | No | Aborted test - supercharging. |

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| Pretest Number | Mini Pretest Number | Pretest Depth MD | Pretest Depth TVDSS | Hydro. before psia | Draw Down Vol cc | Initial Pressure psia | Final Pressure psia | Gauge Temp. ° C | Hydro. After psia | Mobility | Sample Taken | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 14 | a | 758.5 | 732.5 | 1,351.4 | 20 | | 1,076.7 | 48.54 | 1,351.2 | | No | Aborted test - supercharging. |
| 15 | a | 768.0 | 742.0 | 1,368.1 | 20 | | 842.0 | 48.63 | 1,367.8 | | No | Aborted test - tight. |
| 16 | a | 771.5 | 745.5 | 1,374.3 | 20 | | 1,086.1 | 48.95 | 1,374.2 | 3.3 | No | Good Test |
| 17 | a | 774.5 | 748.5 | 1,379.4 | 20 | | 1,086.6 | 49.14 | 1,379.5 | 10.6 | No | Good test |
| 18 | a | 778.5 | 752.5 | 1,386.5 | 20 | | 1,091.6 | 49.34 | 1,386.4 | 44.9 | No | High perm. Attempt sample - lost seal. |
| 19 | a | 779.5 | 753.5 | 1,388.2 | 20 | | 1,093.3 | 49.58 | 1,388.1 | 14.3 | No | High Perm. Attempt sample - lost seal. |
| 20 | a | 783.5 | 757.5 | 1,395.3 | 20 | | 1,099.4 | 49.75 | 1,395.2 | 13.1 | No | High Perm. Attempt sample - Lost seal. |
| 21 | a | 785.0 | 759.0 | 1,398.0 | 20 | | 1,102.4 | 49.94 | 1,397.4 | 4.9 | No | Low to moderate perm. Attempt Sample - Lost seal. |
| 22 | a | 795.0 | 769.0 | 1,415.4 | 20 | | 1,110.3 | 49.98 | 1,415.4 | 3,399.6 | No | V. High perm. |
| 23 | a | 797.0 | 771.0 | 1,419.0 | 20 | | 1,113.2 | 50.14 | 1,418.4 | 79.1 | Yes | High Perm. Sample # 1 to chamber 19 (1 gallon) |
| 24 | a | 802.5 | 776.5 | 1,427.4 | 20 | | 1,120.9 | 51.50 | | 2,668.4 | No | Good Test |
| 25 | a | 805.0 | 779.0 | 1,432.1 | 20 | | 1,124.6 | 51.50 | 1,432.2 | 740.0 | No | Good Test |
| 26 | a | 817.0 | 791.0 | 1,453.1 | 20 | | 1,141.5 | 51.50 | 1,453.2 | 91.4 | No | Good Test |
| 27 | a | 823.0 | 797.0 | 1,463.7 | 20 | | 1,150.0 | 51.60 | 1,463.8 | 2,596.0 | No | Good test. |
| 28 | a | 753.5 | 727.5 | 1,341.3 | 20 | | 1,070.4 | 50.50 | 1,341.2 | | No | Pretest not stable - attempt to sample. Lost seal. |
| 29 | a | 749.3 | 723.3 | 1,333.8 | 18.9 | | | | | | No | Attempt to sample - pumpout failed. POOH |

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# Cultus Petroleum N.L.

*Wireline Pressure Data Report*

### GENERAL WELL DATA

| | |
|---|---|
| **WELL NAME :** | BALEEN-2 |
| **FIELD :** | PATRICIA BALEEN GAS FIEI |
| **BASIN :** | OFFSHORE GIPPSLAND BASIN |
| **PERMIT :** | VIC / RL5 |
| **LATITUDE :** | 038° 01' 55.758 " South |
| **LONGITUDE :** | 148° 24' 37.549" East |
| **EASTING :** | 623781.41 |
| **NORTHING :** | 5789663.90 |
| **PRIMARY OBJECTIVE :** | Gurnard Formation |
| **RIG RTE (m) :** | 26.0 |
| **WATER DEPTH (m) :** | 55.0 |
| **SPUD DATE :** | 11 Oct 1999 |
| **DATE COMPLETED :** | |

### LOGGING DATA

| | |
|---|---|
| **WIRELINE SERVICE CO. :** | Schlumberger |
| **SUITE NUMBER :** | 1 |
| **RUN NUMBER :** | 5 |
| **RUN DATE :** | 17 Oct 1999 |
| **ENGINEERS :** | D.Wong / D.Pastor |
| **WITNESSES :** | P.Boothby / Phillip Reichardt |
| **HOLE SIZE (") :** | 8.50 |
| **SECTION TD (Lgr meters) :** | 890.5 |
| **TOOL TYPE :** | MDT/GR |
| **PROBE TYPE :** | Std Area |
| **PROBE DIAMETER (mm) :** | 0.0 |
| **QUARTZ GUAGE TYPE :** | CQG-G |
| **TOOL CONFIGURATION :** | 2 X 1 Gal / 3 X 450cc MRSC's / 3 X 250cc SPMC's/ OFA / POS |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 30 | a | 749.0 | 723.0 | 1,332.1 | 20 | | 1,080.4 | 47.10 | | | No | Aborted test. Supercharged. |
| 31 | a | 757.2 | 731.2 | 1,346.3 | 20 | | 1,064.7 | 47.70 | | | No | Abort test - Attempted sample. Pumpout not functioning. |
| 32 | a | 757.0 | 731.0 | 1,345.7 | 18.6 | | | | | | No | Attempt to Sample using Pump out - No go. Opened 6 gal Chamber. Lost seal. |

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8

# APPENDIX 8

BALEEN-2

## MUD LOGGER DAILY REPORTS

-GEOSERVICES-

307960 120

GeoServices **Cultus Petroleum N.L.** Morning Report

| | | |
|---|---|---|
| Well: **Baleen 2** | Date: **11-10-1999** | Drilling Day: **1** |
| $24^{h}00$ Depth 137 m TVD | Metres Last 24 hrs: 56 m | Prepared by M. SMITH |
| Present Operation: Drilling 12 1/4" hole to casing point. | | |

## BIT DATA

| | | | |
|---|---|---|---|
| **Bit #** 3 | Size: 12.25 | Type: HYCALOG DS40H | |
| Depth In: 126.0m | Jets: 5 x 18 | TFA: in² | Condition |
| Depth Out: | Bit Run 11 m | Bit hrs: 0.1 | Lag Time: 4 min |
| Pump Press 1475 psi | Flow: 1055 gpm | Rpm/Krev 62/1 | Torq: 500-700 ftlbs |

| ROP | M/HR | DEPTH |
|---|---|---|
| MINIMUM | 6.67 | 134 |
| MAXIMUM | 45.45 | 133 |
| AVERAGE | 22 | |

| INTERVAL | LITHOLOGY |
|---|---|
| | |

GAS DATA [Total Gas in units, Chromatograph in ppm, 50 units = 10,000 ppm.]

DRILLED BACKGROUND GAS

| Depth | Depth to | TG units | C1 ppm | C2 | C3 | iC4 | nC4 | iC5 | nC5 |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | |
| | | | | | | | | | |

DRILLED GAS PEAKS

| Depth | Type | TG units | C1 ppm | C2 | C3 | iC4 | nC4 | iC5 | nC5 |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | |
| | | | | | | | | | |

| | | |
|---|---|---|
| $06^{h}00$ Depth 356 m TVD | | |
| Present Operation: Drilling 12 1/4" hole to casing point. | | |

**Comments:** Realigned RPM sensor. Calibrated Total Gas. Began calibration of Low Scale Chromatograph. Degasser and gas line fine.

GeoServices **Cultus Petroleum N.L.** Morning Report

| | | |
|---|---|---|
| Well: **Baleen 2** | Date: **12-10-1999** | Drilling Day: **2** |
| 24h00 Depth 650.0m 650m TVD | Metres Last 24 hrs: 513 m | Prepared by M. Smith |
| Present Operation: Run 9⅝" Casing. | | |

## BIT DATA

| | | | |
|---|---|---|---|
| Bit #: 3 | Size: 12¼ | Type: HYCALOG DS40H | |
| Depth In: 126.0 m | Jets: 5 x 18 | TFA: in² | Condition |
| Depth Out: 650 m | Bit Run 524 m | Bit hrs: 7.5 | Lag Time: 11.2 min |
| Pump Press 2150 psi | Flow: 1050 gpm | Rpm/Krev 128/61 | Torq: 6-10 kft/lbs |

| ROP | M/HR | DEPTH |
|---|---|---|
| MINIMUM | 6.60 | 138 |
| MAXIMUM | 128.69 | 640 |
| AVERAGE | 73.3 | |

| INTERVAL | LITHOLOGY |
|---|---|
| 126 - 650m | RETURNS TO SEABED |

GAS DATA [Total Gas in units, Chromatograph in ppm, 50 units = 10,000 ppm.]

DRILLED BACKGROUND GAS

| Depth | Depth to | TG units | C1 ppm | C2 | C3 | iC4 | nC4 | iC5 | nC5 |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | |
| | | | | | | | | | |

DRILLED GAS PEAKS

| Depth | Type | TG units | C1 ppm | C2 | C3 | iC4 | nC4 | iC5 | nC5 |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | |
| | | | | | | | | | |

| | |
|---|---|
| 13-10-99 0600 650 650m TVD | |
| Present Operation: W.O.C. | |

**Comments:** Calibrated Chromatograph. Calibrated CO2. Loaded ADOBE print driver.

GeoServices

# Cultus Petroleum N.L. Morning Report

| | | |
|---|---|---|
| Well: **Baleen 2** | Date: **13-10-1999** | Drilling Day: **3** |
| 24h00 Depth 746.0m 746m TVD | Metres Last 24 hrs: 96 m | Prepared by M. Smith |
| Present Operation: Pulling out of the hole for core. | | |

## BIT DATA

| | | | |
|---|---|---|---|
| Bit #: 4 | Size: 8 1/2" | Type: REED MH13G | |
| Depth In: 650 m | Jets: 3x18 | TFA: 0.75 in² | Condition |
| Depth Out: m | Bit Run 96 m | Bit hrs: 9.6 | Lag Time: 11.4 min |
| Pump Press 1500 psi | Flow: 650 gpm | Rpm/Krev 80/61 | Torq: 900 ft/lbs |

| ROP | M/HR | DEPTH |
|---|---|---|
| MINIMUM | 2.90 | 660 |
| MAXIMUM | 25.21 | 698 |
| AVERAGE | 10 | |

| INTERVAL | LITHOLOGY |
|---|---|
| 650-675 | Argillaceous Calcilutite |
| 675-746 | Calcareous Claystone & Argillaceous Calcilutite |

GAS DATA [Total Gas in units, Chromatograph in ppm, 50 units = 10,000 ppm.]

DRILLED BACKGROUND GAS

| Depth | Depth to | TG % | C1 ppm | C2 | C3 | iC4 | nC4 | iC5 | nC5 |
|---|---|---|---|---|---|---|---|---|---|
| 650 | 675 | 0.104 | 1245 | | | | | | |
| 675 | 720 | 0.254 | 3238 | | | | | | |
| 720 | 742 | 0.495 | 6234 | | | | | | |
| 742 | 746 | 1.13 | 13207 | 100 | | | | | |

DRILLED GAS PEAKS

| Depth | Type | TG % | C1 ppm | C2 | C3 | iC4 | nC4 | iC5 | nC5 |
|---|---|---|---|---|---|---|---|---|---|
| 746 | Drill | 1.24 | 13667 | 100 | | | | | |
| | | | | | | | | | |

| |
|---|
| 14-10-99 0600 746m 746mTVD |
| Present Operation: Running in to core. |

**Comments:**

GeoServices **Cultus Petroleum N.L.** Morning Report

| | | |
|---|---|---|
| Well: **Baleen 2** | Date: **14-10-1999** | Drilling Day: **4** |
| $24^h00$ Depth 780.0m 780m TVD | Metres Last 24 hrs: 34 m | Prepared by M. Smith |
| Present Operation: Pulling out of the hole after core 2. | | |

## BIT DATA

| | | | |
|---|---|---|---|
| **Bit #:** 5 CR#1 | Size: 8 1/2" | Type: DBS CD73 | |
| Depth In: 746 m | Jets: OPEN | TFA: | Condition |
| Depth Out: 762 m | Bit Run 16 m | Bit hrs: 1.2 | Lag Time: 39 min |
| Pump Press 500 psi | Flow: 195 gpm | Rpm/Krev 102/4 | Torq: 1500-2200 ft/lbs |
| **Bit #:** 5RR CR#2 | Size: 8 1/2" | Type: DBS CD73 | |
| Depth In: 762 m | Jets: OPEN | TFA: | Condition |
| Depth Out: 780 m | Bit Run 18 m | Bit hrs: 1.2 | Lag Time: 40 min |
| Pump Press 350 psi | Flow : 205 gpm | Rpm/Krev 88-98/5 | Torq: 1200-2300 ft/lbs |

| ROP | M/HR | DEPTH |
|---|---|---|
| MINIMUM | 10.40 | 750 |
| MAXIMUM | 42.34 | 772 |
| AVERAGE | 14.2 | |

| INTERVAL | LITHOLOGY |
|---|---|
| 746-747 | ARENACEOUS SILTSTONE |
| 747-762 | SILTY SANDSTONE |
| | |

GAS DATA [Total Gas in units, Chromatograph in ppm, 50 units = 10,000 ppm.]

DRILLED BACKGROUND GAS

| Depth | Depth to | TG % | C1 ppm | C2 | C3 | iC4 | nC4 | iC5 | nC5 |
|---|---|---|---|---|---|---|---|---|---|
| 746 | 762 | 4.0 | 25600 | 145 | | | | | |
| 762 | 771 | 1.0 | 12200 | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |

DRILLED GAS PEAKS

| Depth | Type | TG % | C1 ppm | C2 | C3 | iC4 | nC4 | iC5 | nC5 |
|---|---|---|---|---|---|---|---|---|---|
| 746 | Trip | 0.74 | 9100 | | | | | | |
| 762 | Trip | 2.44 | 14800 | 66 | | | | | |
| 753 | Drill | 5.15 | 30500 | 157 | | | | | |
| 765 | Drill | 1.41 | 14800 | 65 | | | | | |

| | |
|---|---|
| 14-10-99 0600 780 m 780 m TVD | |
| Present Operation: Run in hole to drill to TD. | |



**Comments:**

GeoServices **Cultus Petroleum N.L.** Morning Report

| | | |
|---|---|---|
| Well: **Baleen 2** | Date: **16-10-1999** | Drilling Day: **5** |
| 24:00 Depth 895.0m 895m TVD | Metres Last 24 hrs: 115 m | Prepared by M. Smith |
| Present Operation: Make up tools for logging run #3. | | |

## BIT DATA

| | | | |
|---|---|---|---|
| Bit #: 5 | Size: 8 1/2" | Type: REED EHP43 | |
| Depth In: 780 m | Jets: OPEN | TFA: 0.45 | Condition |
| Depth Out: 895 m | Bit Run 115 m | Bit hrs: 5.1 | Lag Time: 39 min |
| Pump Press 2300 psi | Flow: 605 gpm | Rpm/Krev 90/27 | Torq: 1000-1500 ft/lbs |

| ROP | M/HR | DEPTH |
|---|---|---|
| MINIMUM | 6.46 | 793 |
| MAXIMUM | 184.99 | 845 |
| AVERAGE | 22.55 | |

| INTERVAL | LITHOLOGY |
|---|---|
| 780-870 | SANDSTONE W/ MINOR SILTSTONE |
| 870-895 | CLAYSTONE |
| | |

GAS DATA [Total Gas in units, Chromatograph in ppm, 50 units = 10,000 ppm.]

DRILLED BACKGROUND GAS

| Depth | Depth to | TG % | C1 ppm | C2 | C3 | iC4 | nC4 | iC5 | nC5 |
|---|---|---|---|---|---|---|---|---|---|
| 780 | 870 | 0.6 | 6500 | | | | | | |
| 870 | 895 | 0.35 | 3200 | | | | | | |

DRILLED GAS PEAKS

| Depth | Type | TG % | C1 ppm | C2 | C3 | iC4 | nC4 | iC5 | nC5 |
|---|---|---|---|---|---|---|---|---|---|
| 780 | Trip | 1.33 | 13800 | | | | | | |
| 860 | Drill | 1.31 | 14400 | | | | | | |
| 868 | Drill | 0.96 | 11000 | | | | | | |
| 887 | Drill | 0.41 | 4600 | | | | | | |

| |
|---|
| 17-10-99 0600 895 m 895 m TVD |
| Present Operation: Logging run #3. |

**Comments:**

# Cultus Petroleum N.L. Morning Report

| | | |
|---|---|---|
| Well: **Baleen 2** | Date: **17-10-1999** | Drilling Day: **6** |
| 24:00 Depth 895.0m 895m TVD | Metres Last 24 hrs: | Prepared by M. Smith |
| Present Operation: Continue wireline logging. | | |

## BIT DATA

| | | | |
|---|---|---|---|
| Bit #: 5 | Size: 8 1/2" | Type: REED EHP43 | |
| Depth In: 780 m | Jets: OPEN | TFA: 0.45 | Condition 1-1-NO-A-E-I-NO-TD |
| Depth Out: 895 m | Bit Run 115 m | Bit hrs: 5.1 | Lag Time: min |
| Pump Press | Flow: | Rpm/Krev | Torq: |

| ROP | M/HR | DEPTH |
|---|---|---|
| MINIMUM | | |
| MAXIMUM | | |
| AVERAGE | | |

| INTERVAL | LITHOLOGY |
|---|---|
| | |
| | |
| | |

GAS DATA [Total Gas in units, Chromatograph in ppm, 50 units = 10,000 ppm.]

DRILLED BACKGROUND GAS

| Depth | Depth to | TG % | C1 ppm | C2 | C3 | iC4 | nC4 | iC5 | nC5 |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | |

DRILLED GAS PEAKS

| Depth | Type | TG % | C1 ppm | C2 | C3 | iC4 | nC4 | iC5 | nC5 |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | |
| | | | | | | | | | |

| |
|---|
| 18-10-99 0600 895 m 895 m TVD |
| Present Operation: Running in to set cement plugs. |

**Comments:**

GeoServices **Cultus Petroleum N.L.** Morning Report

| | | |
|---|---|---|
| Well: **Baleen 2** | Date: **18-10-1999** | Drilling Day: **7** |
| 24h00 Depth 895.0m 895m TVD | Metres Last 24 hrs: | Prepared by M. Smith |
| Present Operation: Completed Cement plug #3 (175m to 125m). At 120m. | | |

## BIT DATA

| | | | |
|---|---|---|---|
| Bit #: | Size: | Type: | |
| Depth In: | Jets: | TFA: | Condition |
| Depth Out: | Bit Run | Bit hrs: | Lag Time: |
| Pump Press | Flow: | Rpm/Krev | Torq: |

| ROP | M/HR | DEPTH |
|---|---|---|
| MINIMUM | | |
| MAXIMUM | | |
| AVERAGE | | |

| INTERVAL | LITHOLOGY |
|---|---|
| | |
| | |
| | |

GAS DATA [Total Gas in units, Chromatograph in ppm, 50 units = 10,000 ppm.]

DRILLED BACKGROUND GAS

| Depth | Depth to | TG % | C1 ppm | C2 | C3 | iC4 | nC4 | iC5 | nC5 |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | |

DRILLED GAS PEAKS

| Depth | Type | TG % | C1 ppm | C2 | C3 | iC4 | nC4 | iC5 | nC5 |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | |
| | | | | | | | | | |

| |
|---|
| 19-10-99 0600 895 m 895 m TVD |
| Present Operation: Pulling BOP stack. |

**Comments:**

# APPENDIX 9

BALEEN-2

# FINAL MUD LOGGER REPORT

-GEOSERVICES-

907960 129

# Cultus Petroleum N.L.

# BALEEN 2

## FINAL WELL REPORT
**-BASIC DATA-**

**Prepared By**

Geoservices

Geoservices Overseas S.A.

Edited to Remove all Interpretive Data


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# CONTENTS

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| Revision | Date | Issued by | Approved by | Remarks |
|---|---|---|---|---|
| 1 | 10/07/99 | Geoservices Unit 093 | Base Mudlogging Coordinator | |
| | | | | |

# Section 1

## General Well Summary

# WELL DATA

907960 132

| | |
| --- | --- |
| Operator | : Cultus Petroleum N.L. |
| Platform | : SEDCO 702 (semi-submersible) |
| Well name | : Baleen - 2 |
| Country | : Australia |
| Location | : Bass Basin |
| Well Type | : Appraisal |
| Field | : Baleen |

| | | | | |
| --- | --- | --- | --- | --- |
| Location | Longitude | = 148° 24' 37.549" E | Latitude | = 38° 01' 55.758" S |
| AMG co-ordinates | X | = 623,781.41 m E | Y | = 5,789,663.9 m N |

| | |
| --- | --- |
| Profile | : Vertical |
| Reference depth | : Rotary Table (RT) |
| Elevation RT A.M.S.L. | : 26 m |
| Seawater depth | : 55 m |
| Proposed total depth (MDRT) | : 925 m MDRT |
| Actual total depth | : 895 m MDRT |
| True vertical depth | : 895 m MDRT |
| Hole Spudded on | : 11 October 1999 |
| TD reached on | : 16 October 1999 |

## Drilling Contractor

| | |
| --- | --- |
| Drilling Contractor | : Schlumberger - Sedco Forex |
| Rig name | : SEDCO 702 |
| Rig type | : Semi-Submersible |

## Drilling Phases

| Diameter (inch) | From (m) | To (m) | Mud Type |
| --- | --- | --- | --- |
| 36" | 81 m | 126.0 m | Seawater with Hivis sweeps |
| 12¼" | 126 m | 650.0 m | Seawater with Hivis sweeps |
| 8½" | 650.0 m | 895.0 m | NaCl/EZ-MUD/Polymer mud |

## Cased Hole

| Casing Diameter (inch) | Casing Type | Shoe Depth (m) | Top (m) |
| --- | --- | --- | --- |
| 30" | Drill quip/SF60 | 126 m | 77 m |
| $9^5/_8$" | LTC/Buttress | 646 m | 77 m |

## MUD LOGGING

907960 133

Logging Unit Number : 93

Engineers : Phil Rady
Mark Smith

Mudloggers Cherie Clark-Moore
Adam Walsh

### Cuttings Collection

| Sample Type | Number of sets | Quantity per set | Sampling interval | From (m) | To (m) |
|---|---|---|---|---|---|
| Washed and Dried | 4 | 200 grams | 3 metres | 650 | 746 |
| Washed and Dried | 4 | 200 grams | 5 metres | 780 | 810 |
| Washed and Dried | 4 | 200 grams | 10 metres | 810 | 895 |

### Cuttings Distribution

| Company | Washed and dried paper envelope |
|---|---|
| Cultus (100 grams) | 1 sets |
| BRS | 1 set |
| Vic DNRE | 2 set |

## WELL SUMMARY

907960 134

Baleen 2 was planned as a vertical appraisal well, designed to locate the GWC within the Gurnard Formation of the La Trobe Group. A further aim was to test the reservoir distribution, quality and continuity within the gas field. The well is located within permit VIC/RL5, encompassing the Patricia Baleen Gasfield. Baleen 2 lies on the northern flank of the Gippsland Basin, at the extreme south-westerly end of the Baleen portion of the gasfield. The primary objective was planned to be met at 710m SS RT and to TD the well in 8½" hole at 925 m. The well was to be drilled in 8 days plus time for plug and abandon procedures. Cores were to be cut over the zone of interest.

Baleen 2 was spudded on the 11th of October 1999 by the semi-submersible rig Sedco Forex 702 in 55 metres of water. Top hole was drilled from the conductor depth of 126 m to 650 m and 9 $^5/_8$" casing was set at 646 m in 12$^1/_4$" hole. The 12¼" hole section was drilled with seawater and gel sweeps and returns were to the seabed. The 8 $^1/_2$" hole section was drilled to a TD of 895 m in 5 drilling days, with a water based NaCl/EZ-MUD/Polymer mud system and four bit runs; including 2 cores.

Background gas levels in this well were very low. There were no quantifiable indications of abnormal formation pressures and a mud weight of 10.1 ppg was utilized in the 8 $^1/_2$" hole section. No major losses to the formations were experienced, with minor seepage losses. Static losses while logging at TD were around 0.5 bbl/hr. Hole condition was good, with no significant overpull on connections or during trips.

In this well, the practice of backreaming each stand at connections and circulating until the hole was clean before tripping was successful in maintaining good hole conditions. By monitoring overpull / drag and torque at connections and studying trends, hole condition could be determined. In this well no wiper trips were necessary, just routine trips at phase TD. Drilling fluid losses were not a problem in this well.

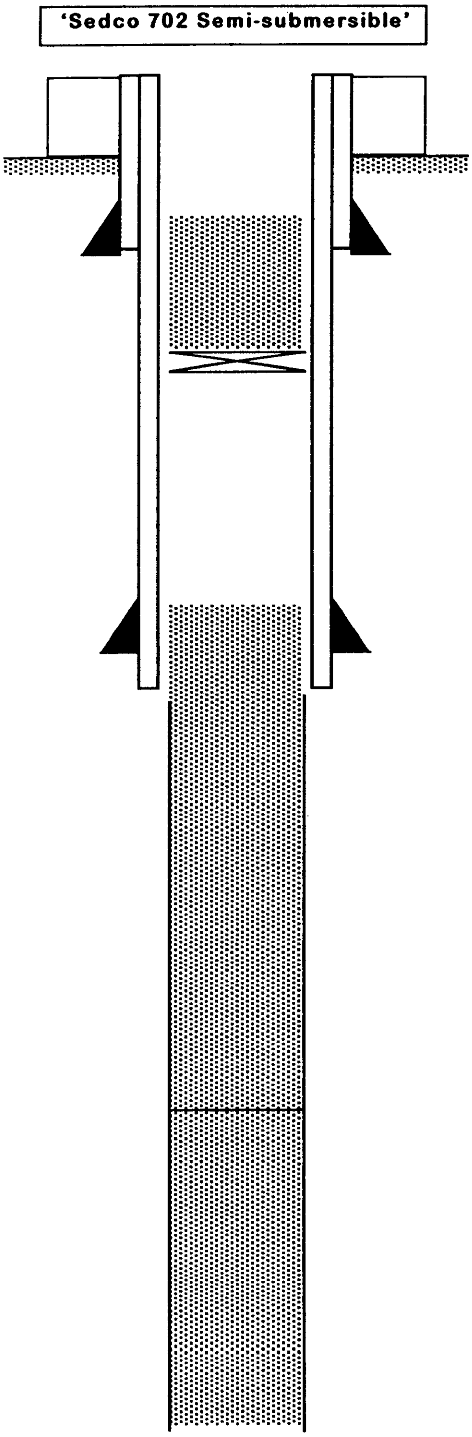
The final status for this well was plugged and abandoned. The rig was released from the location on 19th of October 1999.

## WELL PROFILE

907960 135

Rotary Table to Mean Sea Level
26 metres

Rotary Table to Sea Bed
81 metres




36" hole to 126 m

30" Conductor set at 126 m
(Casing cut at 84 m RT
And wellhead retrieved)

Cement Plug #3
125 m to 175 m RT
Bridge Plug at 180 m RT

$9^5/_8$" Casing shoe at 646 m RT
12¼" hole drilled to 650 m RT

FIT at 650 m: EMW=15.1 ppg

Cement Plug #2
580 m to 760 m RT

Cement Plug #1
760 m to 890 m RT

8½" hole drilled to 895 m RT
MW at TD = 10.1 ppg

TD = 895 m RT
Hole plugged & abandoned

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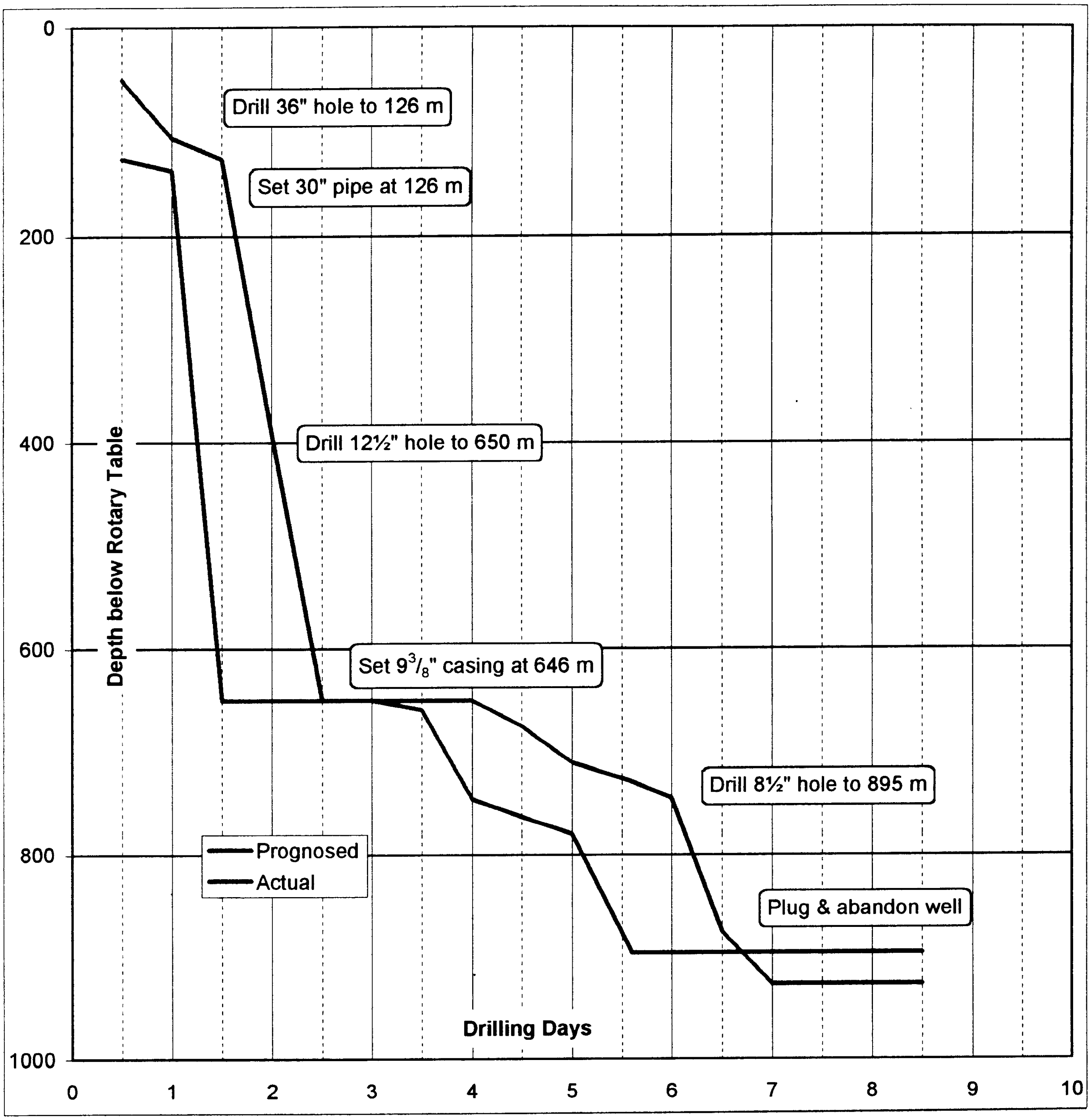
## DAYS vs DEPTH



## CEMENTING DETAILS

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Baleen 2 was cased with the 30" shoe at 126 m and the 9 5/8" shoe at 646 m. The well was plugged and abandoned with 3 cement plugs as described below.

| SLURRY DETAILS | CEMENT TYPE | DRY CMT VOLUME | CMT ADDITIVES (as per program) | MIX WATER | SLURRY VOL. | SLURRY DENSITY | CEMENT to/from |
|---|---|---|---|---|---|---|---|
| 30" csg | Class G | 850 sx | 1.0% CaCl2<br>1 gal NF5 | 107 bbl seawater | 191bbl | 15.8 ppg | 126 m to seabed |
| 9 5/8" csg Lead | Class G | 488 sx | 14.6 gal/10 bbl econolite +<br>1 gal NF5 | 150 bbl fresh | 194.5 bbl | 12.5 ppg | to seabed |
| 9 5/8" csg Tail | Class G | 227 sx | Neat | 28 bbl seawater | 53 bbl | 15.8 ppg | frm 646 m to 496 m |
| Cement Plug #1 | Class G | 128 sx | 1 gal NF-5 | 15.5 bbl | 25 bbl | 15.8 ppg | 890 m to 790 m |
| Cement Plug #2 | Class G | 217 sx | 1 gal NF-5 | 26.5 bbl | 48 bbl | 15.8 ppg | 760 m to 600 m |
| Cement Plug #3 | Class G | 50 sx | 1 gal NF-5 | 7 bbl | 10 bbl | 15.8 ppg | 175 m to 125 m |

# WELL DIARY

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**11 October 1999** Partention anchors, position rig over location and confirm with Surveyor. Run in with 36" BHA and tag Seabed, 81 m, confirm depth and drill 26" hole to 126 m and 36" hole to 123 m pumping Hivis sweeps every single and back ream and wipe each stand before connection. Displace hole with 50 Bbls Hivis gel and drop Survey marker. Pull out of hole and recover Totco - $^3/_4$ deg - rack back BHA and pick up 30" running tool, run in hole and engage to 30" casing. Run in hole with ROV assistance, make up cement stand and land out well head, hold JHA, make up cement hose, pressure test same to 2500 psi and cement 30" casing. Pull out of hole with 1 stand, make up TDS, flush DP, and continue to pull out of hole laying out 30" running tool. Lay out 36" drilling assembly, Slm 30" landing string and make up 17½" assembly and run in to 20 m. Install guide ropes, wait on cement, hold emergency winch off drill, continue to run in hole from 20 m to 105 m with ROV assistance through wellhead and wait on cement. Wash down from 105 m to 120 m, tag top of cement and drill out cement and shoe from 120 m to 126 m. Sweep hole clean with Gel mud pull out of hole, lay out 17½" bit assembly and service TDS and block whilst repairing Geoservices RPM sensor. Make up 12¼" bit and run in hole to 125.71 m with ROV assistance through wellhead. Drill 12¼" hole from 126 m to 137 m.

**12 October 1999** Continue to drill 12¼" hole from 137 m to 650 m pumping Hivis pills every ½ stand, Spot Hivis pill on bottom on connection, pump Hivis round and drop MSS. POOH from 650 m to 110 m - wiper trip - retrieve MSS survey - ¼ deg. RIH to 650 m, tag ½ m fill, sweep hole, spot 375 bbls Hivis mud and POOH. Jet Wellhead, break out bit, rig up to run $9^5/_8$" Casing, hold JHA, pick up shoe joint and test same. RIH attach guide ropes on way in with ROV assistance through Wellhead to 557 m and rig down casing gear and make up x/o.

**13 October 1999** Pick up & make up 20" Hanger, install plugs, fill cavity above plugs with water. Run $9^5/_8$" Casing on landing string, land out 20" housing in 30" and confirm with 50k overpull. Make up cement hose, pressure test same 2500 psi, hold JHA and cement $9^5/_8$" Casing - Lead slurry 488 sx 12.5 ppg/ Tail slurry 220 sx 15.8 ppg. Remove cement hose, back out running tool, POOH and lay out cement stand. Jet Wellhead, lay out running tool and Plug launcher, rig up to run BOP's, hold JHA, pick up and make up double of riser and rack back same. Move BOP's, LMRP on to Spider beams, function test BOP's, pick up double Riser and make up to LMRP.

**14 October 1999** Continue to pull BOP test tool out of hole. Function test diverter system port and starboard. Continue to POOH, lay out test tool, rack 4 stands HWDP below test tool. Make up and run flex joint wear bushing. POOH and lay out running tool. Lay out 12¼" BHA. Pick up 8½" BHA from Catwalk. RIH and tag TOC at 596 m. Drill cement from 596 m to 647 m. Drill out rat hole from 647 m to 650 m. Continue to drill new hole from 650 m to 654 m. Sweep hole 50 bbls Hivis, 50 bbls seawater and displace hole, Choke and Kill lines to 10.1 ppg mud. Pull back to 650 m and perform FIT 560 psi - 15.1 ppg. Continue to drill 8½" hole from 654 m to 698 m at control drill rate of parameters. Flow check well and circulate sample up for Geologist. Continue to drill 8½" hole from 698 m to 716 m. Flow check well and continue to drill from 716 m to 736 m. Circulate sample up for Geologist. Continue to drill 8½" hole from 736 m to 746 m. Circulate up sample for Geologist. Flow check and POOH from 746 m to the shoe at 646 m. SCR at 669 m, MW 10.0+ ppg.

**15 October 1999** Continue to POOH from 646 m to surface, rack BHA, break bit. Hold JHA, pick up Outer core barrels, make up Core head, load Inner barrel, make up safety joint. Pick up BHA from derrick, RIH with Core assembly to 744 m. Circulate bottoms up, drop ball, set same and take SCR, 10.1 ppg. Commence cutting core from 746 m to 763 m. Flow check and POOH. POOH at a controlled rate as per program from 400 m. Core barrel at rotary table - test for $H_2S$. Hold JHA, pull inner Core barrel and lay out same - 100% recovery. Pull outer Core barrel to Rotary table and break out bit ( 2xNozzles blocked ). Make up bit and RIH, load 2 inner Core barrel assembly to 757 m. Circulate hole clean, drop ball observe psi increase, take SCR's and wash down and tag @ 763 m, cut Core from 763 m to 780 m, flow check and POOH @ a controlled rate as per program to 134 m.

**16 October 1999** Continue to POOH, rack BHA in Derrick from 134 m. Hold JHA for laying out Core barrel, Hold JHA andpick up BHA from catwalk. Make up bit, pick up BHA from Derrick and RIH to 646 m. Drill stringstabilizes hanging up @ float collar of Shoe. Wash and ream to 780 m and drill $8^1/_2$" hole from 780 m to 895 m. Circulate hole clean, flow check and POOH to 688 m. Pump slug and POOH to shoe. Flow check and continue to POOH, rackback BHA and break bit. Hold JHA and rig up wireline. Make up and run tool string #1. Lay out run #1 and make up and run tool string #2. Lay out run #2.

**17 October 1999** Make up MDT, function test at surface and run tool string #3. Run #3 at surface and lay out. Make up and run tool string #4. Run #4 at surface and lay out. Make up MDT and run tool string #5. Pull to surface and troubleshoot problem with probe. Rerun MDT tool string.

**18 October 1999** Continue to run MDT. Pull to surface and lay out tool string. Hold JHA and rig down wireline. Hold JHA and rig up and pick up cement stinger on 2 $^7/_8$" tubing and run to 197.33 m. Run in with cement stinger on DP to 890 m and circulate bottoms up. Pressure test cement lines and pump cement plug #1 from 890 m to 790 m. Pull back to 760 m, circulate bottoms up and pump cement plug #2, from 760 m to 600 m. Pull out to 550 m, circulate bottoms up and function test BOP and annulus. Pull out of hole, hold JHA and lay out 2 $^7/_8$" tubing and cement stinger. Lay out 6 $^1/_2$" DC's. Make up mule shoe and run in on DP to 580 m and tag cement. Circulate hole to inhibited mud. Pull out of hole and lay out mule shoe. Rig up wireline and make up tool string - junk basket and guage ring. Run wireline, pull out, lay out and make up tool string #2 - EZSV. Run and set EZSV at 180 m, pull out and rig down wireline. Run in with DP and tag EZSV and pull up to 175 m. Circulate hole to seawater and flush choke and kill lines to same. Pressure test cement lines and pump cement plug #3 from 175 m to 125 m. Rig down cement line and pull back to 120 m.

**19 October 1999** Reverse circulate contents of drill string. Function test BOPs. POOH to surface. Make up running tool. RIH and retrieve flex joint wear bushing. RIH and retrieve wellhead wear bushing. Hold JHA. Rig up equipment to pull marine riser and BOPs. Pull diverter. Pick up landing joint. Make up and close inner barrel. Unlatch connector. Pull up BOPs. Remove choke & kill lines. Remove rucker lines. Pull riser and BOPs. Continue pulling up riser and BOPs. Land BOPs in moonpool. End Geoservices well diary.

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# Section 2

# Geological Summary

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## GEOLOGICAL SUMMARY

| | |
|---|---|
| Seafloor to 650 m MD | RETURNS TO SEAFLOOR. |
| 650-717 m MD | ARGILLACEOUS CALCILUTITE WITH MINOR INTERBEDDED CALCILUTITE AND CALCAREOUS CLAYSTONE. |
| ARG. CALCILUTITE | Light grey to medium grey, medium to dark olive grey, soft, dispersive, firm in part, amorphous to blocky, trace subfissile, trace carbonaceous speaks, 20% to 30% siliceous clay content, grades in part to Calcareous Claystone, trace Calcisiltite in part, trace to 5% forams, trace quartz silt, trace very fine glauconite. |
| CALCILUTITE | White to very light grey, light olive, grey, soft to firm, amorphous, blocky in part, slightly dispersive, trace very fine glauconite. |
| CALC. CLAYSTONE | Light to medium grey, light to medium olive grey, soft to firm, amorphous to rarely sub-blocky, dispersive in part, 20% to 30% micrite, trace very fine to medium pelletal glauconite, 5% carbonaceous specks in part. |
| 717-746 m MD | ARGILLACEOUS CALCILUTITE , INTERBEDDED CALCAREOUS CLAYSTONE AND MINOR CLAYSTONE. |
| ARG. CALCILUTITE | Light grey to medium grey, medium olive grey, mottled, soft, dispersive, rarely firm to moderately hard, amorphous to blocky, trace carbonaceous speaks, 30% to 35% siliceous clay content, grades in part to Calcareous Claystone, trace to 5% Calcisiltite, trace fossil fragments and forams, trace quartz silt, trace very fine glauconite. |
| CALC. CLAYSTONE | Light to medium grey, light to medium olive grey, soft, amorphous, 20% to 30% micrite, trace to 10% very fine to medium pelletal glauconite, 5% carbonaceous specks. |
| CLAYSTONE: | Medium to dark yellowish brown, dark olive grey, soft, dispersive, 10%-15% micrite, 5%-10% fine dark green glauconite, trace to 15% quartz silt, grades to Silty Claystone, 5% micromica, trace fine quartz sand, trace very fine disseminated pyrite, trace hard dark siderite nodules, trace to minor carbonaceous flecks, trace lithics. |
| 746-762 m MD | SANDSTONE WITH MINOR SILTSTONE. |
| SILTY SANDSTONE | Moderate to dark yellowish brown, clear to translucent quartz grains, very fine to fine grained, moderately well sorted, angular to sub-rounded, trace-2% patchy siderite cement, 20-25% dark yellowish brown quartz silt matrix, grading to SILTY SILTSTONE, trace dark green glauconite, trace-5% micromica, trace feldspar, friable to locally firm, fair to locally good visible porosity. |

SANDY SILTSTONE — Dark yellowish brown to moderate yellowish brown, arenaceous, 30-40% very fine to fine quartz sand, commonly grading to silty SANDSTONE, trace glauconite, 5% siliceous clay, 5-10% micomica, common patchy siderite cement, trace to minor carbonaceous specks, trace lithics, firm to locally moderately hard, blocky, no fluorescence.

762-780 m MD — SANDSTONE WITH INTERBEDDED CLAYSTONE.

SANDSTONE — Moderate to dark yellowish brown, olive grey, clear to translucent quartz grains, firm to hard, very fine to fine grained, moderately sorted, angular to sub-angular, 20%-50% siderite cement, 5%-10% argillaceous/silty matrix, 5%-15% glauconite, micromica, trace lithics, poor visible porosity.

SILTY SANDSTONE — Moderate to dark yellowish brown, olive grey, clear to translucent quartz grains, friable to firm, very fine to fine grained quartz grades to Sandy Siltstone, moderately sorted, sub-angular to angular, trace to 15% siderite cement, 25%-50% dark yellowish brown argillaceous matrix, 5%-15% dark green glauconite, trace to 5% micromica, trace lithics, poor to fair in part visible porosity, no shows.

SANDY CLAYSTONE — Dark yellowish brown, soft, 25%-30% very fine to fine grained quartz sand, 15%-20% quartz silt, grades to Argillaceous Siltstone, trace to 2% glauconite, 5% micromica, trace lithics, no shows.

780-791m MD — SANDSTONE WITH INTERBEDDED SILTSTONE.

SANDSTONE — Clear to translucent quartz, light grey, opaque, fine to coarse, dominantly fine to medium, poorly sorted, sub-angular to angular, 5% pyrite cement, 5%-10% argillaceous matrix where aggregated, trace nodular pyrite, trace glauconite, trace siderite nodules, fair to good porosity, no shows.

SILTSTONE — Moderate yellowish brown, medium olive grey, soft, dispersive, 15%-20% siliceous clay, grades to Claystone, 10%-15% very fine to fine quartz sand, trace to 2% glauconite, trace nodular pyrite, trace micromica, trace lithics.

791-872m MD — SANDSTONE WITH MINOR SILTSTONE AND TRACE COAL.

SANDSTONE — Clear to translucent, opaque, light blue grey in part, predominantly medium to coarse grained, occasionally fine, common very coarse angular milky quartz, poor sort, angular to sub-rounded, trace pyrite cement, minor white kaolinitic matrix, trace to rare pyrite nodules, locally trace glauconite, commonly loose grains, friable aggregates in part, fair to good porosity, no fluorescence.

SILTSTONE — Moderate yellowish brown to pale brown, argillaceous, minor siliceous clay, trace micromica and disseminated pyrite, occasionally local carbonaceous specks, trace to rare glauconite, soft to firm, amorphous, occasionally sub-blocky.

COAL — Black, firm to hard, occasionally brittle, dull to sub-vitreous.

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| | |
|---|---|
| 872-895m MD | CLAYSTONE WITH MINOR INTERBEDDED SANDSTONE. |
| CLAYSTONE | Medium to light medium grey, trace carbonaceous specks and microlaminations, trace pyrite nodules, homogenous, very soft to soft, amorphous, occasionally sub-blocky. |
| ARG. SANDSTONE | White to opaque, clear to translucent quartz grains, trace light bluish grey, loose, medium to very coarse, dominantly medium to coarse, poorly sorted, angular to sub-angular, moderately common siliceous cement, 40%-50% white kaolinitic matrix, trace pyrite nodules, poor inferred porosity, no shows. |

## FLUORESCENCE REPORT

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DEPTH 756 m to 762 m MD

SILTY SANDSTONE Moderate to dark yellowish brown, clear to translucent quartz grains, very fine to fine grained, moderately well sorted, angular to sub-rounded, trace-2% patchy siderite cement, 20-25% dark yellowish brown quartz silt matrix, grading to arenaceous SILTSTONE, trace dark green glauconite, trace-5% micromica, trace feldspar, friable to locally firm, fair to locally good visible porosity.

FLUORESCENCE 80 %, dull to moderately bright yellowish green pinpoint to patchy direct fluorescence, slow yellowish white blooming cut fluorescence, thick yellowish white residual ring fluorescence.

ASSOCIATED GAS

| Depth | Tot Gas | C1 ppm | C2 ppm | C3 | iC4 | nC4 | iC5 | nC5 |
|---|---|---|---|---|---|---|---|---|
| 752 | 4.21 | 21000 | 65 | - | - | - | - | - |
| 753 | 5.15 | 29500 | 147 | - | - | - | - | - |
| 756 | 5.07 | 30500 | 157 | - | - | - | - | - |
| 758 | 4.95 | 30200 | 149 | - | - | - | - | - |
| 756 | 4.53 | 29100 | 135 | - | - | - | - | - |

DEPTH 763 m to 764 m MD

SANDSTONE Moderately to dark yellowish brown, olive grey, clear to translucent quartz grains, firm to hard, very fine to fine grained, moderately sorted, angular to sub-angular, 20%-50% siderite cement, 5%-10% argillaceous/silty matrix, 5%-15% glauconite, micromica, trace lithics, poor visible porosity.

FLUORESCENCE 30%, dull to moderately bright yellowish green pinpoint to patchy direct fluorescence, slow yellowish white streaming to blooming cut fluorescence, thin to thick yellowish white residual ring fluorescence.

ASSOCIATED GAS

| Depth | Tot Gas | C1 ppm | C2 ppm | C3 | iC4 | nC4 | iC5 | nC5 |
|---|---|---|---|---|---|---|---|---|
| 763 | 1.21 | 12800 | 60 | - | - | - | - | - |
| 764 | 1.21 | 12900 | 61 | - | - | - | - | - |

# GAS REPORT

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Background gas levels while drilling Baleen 2 were initially low during the 8½" phase, but increased dramatically on drilling into the Primary Objective (746mRT – 762mRT) and remained high till the GWC, where they decreased from 5% to 1%. Until TD at 895 m the background gas level was 0.4% to 0.6%, with peaks of greater than 1%.

The only heavy gas component detected was C2 in very low amounts in the Primary Objective. Gas peaks were generated from sands and the highest peaks were associated with sample fluorescence.

Gas was recorded on drilling out of the $9^5/_8$" Casing shoe and slowly increased to a background of around 0.4% (methane equivalent ) at 705 m. Gas upon drilling into the Primary Objective increased dramatically and whilst drilling Core #1 reached 5.15%. After the GWC the gas level decreased to just over 1%. Between 780mRT and 872mRT, gas ran at between 0.2% to 0.6%, with peaks above 1%. In the interval 872mRT – 895mRT, the gas averaged 0.35%.

Gas ratio analysis shows a gas well regime. Gas ratios were very dry for the whole well, especially over the cored section.

No CO2 was detected for the drilled interval 650 m to 895 m. There was no H2S recorded in this well.

A summary of highest gas peaks and trip gas peaks appears on the following page. For gas peaks in surface sample oil shows, see the Fluorescence section on the previous page.

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DRILLED GAS PEAKS

| Depth | MW ppg | TG % | C1 ppm | C2 ppm | C3 | iC4 | nC4 | iC5 | nC5 |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 686 | 10.1 | 0.26 | 3400 | | | | | | |
| 707 | 10.1 | 0.40 | 5000 | | | | | | |
| 724 | 10.1 | 0.60 | 7200 | | | | | | |
| 729 | 10.1 | 0.57 | 7700 | | | | | | |
| 743 | 10.1 | 1.21 | 13700 | 54 | | | | | |
| 753 | 10.1 | 5.15 | 30500 | 157 | | | | | |
| 756 | 10.1 | 5.07 | 29500 | 151 | | | | | |
| 765 | 10.1 | 1.41 | 14800 | 65 | | | | | |
| 785 | 10.1 | 0.77 | 8800 | | | | | | |
| 807 | 10.1 | 0.76 | 9100 | | | | | | |
| 834 | 10.1 | 0.77 | 9100 | | | | | | |
| 852 | 10.1 | 1.68 | 14700 | 78 | | | | | |
| 860 | 10.1 | 1.31 | 14400 | | | | | | |
| 868 | 10.1 | 0.96 | 11000 | | | | | | |
| 887 | 10.1 | 0.41 | 4600 | | | | | | |

TRIP GAS PEAKS

| Depth (m MD) | Type | MW (ppg) | Tot. Gas (%) |
| --- | --- | --- | --- |
| 746 | Trip Gas | 10.1 | 0.74 |
| 762 | Trip Gas | 10.1 | 2.44 |
| 780 | Trip Gas | 10.1 | 1.33 |
| 895 | Trip Gas-Post Logs | 10.1 | 0.79 |

## OVERPRESSURE SUMMARY

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The following techniques were utilized as indicators of abnormal formation pressures during the drilling of Baleen 2.

D-EXPONENT: This is a normalized rate of penetration which takes into account variables such as weight on bit, rotation, and mud weight. It is designed to quantitatively predict pore pressures in shaley formations. It may also be used as an indicator in Siltstones, silty Shales and calcareous Claystones since the fundamental principle that underbalanced bottom hole conditions result in faster drilling applies to all these formations. A shift in the normal trend (representing a normal compaction trend) to the left (representing relative undercompaction) may indicate overpressure or increased porosity due to lithological changes.

GAS: Overpressure may be indicated by increases in the background gas, trip gas, and connection gas readings. Similar changes may however also occur as a result of formation porosity changes which are unrelated to pore pressures.

CUTTINGS: Small splintery cuttings indicate overpressured formations. Long propeller-shaped cavings are usually caused by overpressure or by the hydration of reactive or swelling clays.

HOLE CONDITIONS: As mentioned above, cavings resulting from overpressure may be introduced into the hole. Subsequently, increased overpull and drag on the drill collars and stabilizers during connections and trips may occur. Increasing torque trends show deteriorating hole condition for similar reasons. Encountering hole fill on running back to bottom may also be indicative of overpressure.

TEMPERATURE: Changes in downhole temperature can be measured at the surface by means of a temperature sensor positioned in the flow line. The primary factor that enables this measurement to be of use in overpressure studies, is thermal conductivity. In an undercompacted sequence, the presence of an abnormally high percentage of pore fluids causes heat to be trapped. Hence the area immediately above the overpressured unit is a zone of heat starvation. Changes in thermal gradient can therefore be used to map a transition from normally pressured to overpressured environments. Limitations of this technique include riser cooling by seawater, surface mud additions, circulation breaks, changes in ROP, hole size and flow rate, all of which may mask or distort surface mud temperature readings. The use of all these methods in conjunction with each other will give the most reliable indication of any abnormal formation pressures.

A D Exponent plot was maintained to monitor formation pressures while drilling Baleen 2. The known Marls and Calcareous claystones were used to establish a trend in the drillability of the sediments. The D Exponent coefficients used were as follows:

| | |
|---|---|
| Overburden coefficients<br>(Soft Formation) | A = 0.01304<br>B = -0.17314<br>C = 1.4335 |
| Poisson coefficients<br>(Soft Formation) | A = 0.266<br>B = -2.667 |
| Trend line coefficients | A = 0.0002159<br>B = -0.3509563 |
| Sand line | C = -0.098 |

From 280 m onwards, although very high in the well, a slight trend of compaction maybe seen to around 390 m. From this point onwards to 650 m the trend moves to suggest sediments are under compacted and therefore overpressured. However due to the nature of compaction in carbonates and that all mud returns were to the Seafloor, this is of limited validity.

After drilling out of the $9^5/_8$" Casing shoe, the clay increased. With this increase in Claystone there was an increase in the drillability of the formation and a definite leftward trend can be seen in the D exponent curve. Although again the validity of the D exponent can be questioned due to the presence of Calcareous sediments, a slow build up of background gas was observed and this may indicate an increase in formation pressures down to 745 m.

In the cored sections, we see a negative trend in the first core and a positive trend line in the second. Due to the short duration of each run and the fact they are both predominantly sandstone formations, no definite conclusion can be drawn on the formation pressure. The only possible supposition that one could make, is that the gas present in the first core has led to a slight positive abnormal pressure situation.

In the interval 791mRT - 872mRT, the sandstone lithology lead to an erratic plot line, due mainly to a function of change in ROP. The sudden leftward shift in the Dexp was due to coarser and looser sandstones and coincided with gas peaks. This would tend to indicate a fluctuating formation pressure due to variance in the sandstone lithology, thus showing the limitations of Dexp calculations in sandstone lithologies. Other indicators, such as background gas, connection gas, torque and such indicate a normal formation pressure.

Background gas levels in this well reflected lithology type, peaking in the reservoir and decreasing after the GWC. The other formations showed low gas levels. In this way, they indicate the formations to be of generally normal formation pressures. Isolated sand gas peaks did occur in this interval and they may have their own localised pressure regimes. No background level trend due to formation pressures could be readily discerned. Trip gas was negligible and connection gas was not recorded. A table of trip gas peaks appears on the preceding page.

No splintery or unusually shaped cuttings were observed in the cuttings samples during this well.

Hole conditions were closely monitored during this well. Drag, overpull and torque values were noted while drilling the $12^1/_4$" and $8^1/_2$" phases. Drag and overpull were minimal with no increasing trend and no fill encountered after trips. Hole conditions were good in Baleen 2, with the caliper log showing little washout. Erratic torque values were evident during the second core section, due to variance in sandstone lithology, ie cementation and pyrite content.

Mud temperatures were low in this well, ranging up to 37.0°C at 895 m. As drilling progressed temperatures rose gradually from 26.0°C from casing point to 36.0°C at the first core point. After the second core, the temperature rose from an initial 29.5°C to 37.0°C at TD. Plots show no evidence of an abnormal temperature gradient.

# APPENDIX 10

BALEEN-2

## PALYNOLOGICAL REPORT
## BASIC DATA

-BIOSTRATA-

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# Palynological analysis of core and cuttings samples from Baleen–2 well, Gippsland Basin.

# -BASIC DATA-

by

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Biostrata Report 2000/1

29 February 2000

| Table 1: Basic Sample Data from Baleen-2 | | | |
|---|---|---|---|
| **Sample Type** | **Depth metres** | **Lithology** | **Weight (grams)** |
| Cuttings | 660 | Very light grey calcarenite | 19.0 |
| Cuttings | 720 | Light grey calcarenite | 16.1 |
| Cuttings | 747 | Light grey marl | 23.9 |
| Core-1 | 753 | Medium brown-grey muddy glauconitic sandstone | 32.6 |
| Core-1 | 754 | Medium brown-grey muddy glauconitic sandstone | 33.3 |
| Core-1 | 758 | Medium brown-grey muddy micaceous and glauconitic? sandstone | 31.5 |
| Core-1 | 764 | Hard light grey glauconitic sandstone | 29.5 |
| Core-2 | 768 | Medium grey muddy glauconitic sandstone | 18.4 |
| Core-2 | 772 | Medium grey muddy glauconitic sandstone | 25.7 |
| Cuttings | 790 | Medium grey quartz sandstone | 29.9 |
| Cuttings | 795 | Light grey quartz sandstone | 37.5 |
| Cuttings | 800 | Medium grey argillaceous quartz sandstone with ~1% coal or carbonaceous shale | 28.9 |
| Cuttings | 810 | Medium brown-grey argillaceous quartz sandstone with <1% coal or carbonaceous shale | 27.9 |
| Composite picked cuttings | 850-870 | Medium to dark grey carbonaceous mudstone and coally fragments picked from cuttings | 0.9 |
| Cuttings | 880 | Medium grey clumped mudstone? with continued presence of significant coarse quartz sandstone | 26.6 |
| Cuttings | 895 | Clumps of light grey mudstones and sandstone | 19.3 |
| | | **Average:** | **25.1** |

| Table 2: Basic Sample and Palynomorph data from Baleen-2 | | | | | | |
|---|---|---|---|---|---|---|
| **Sample Type** | **Depth metres** | **Visual Yield** | **Palynomorph Concentration** | **Preservation** | **No. SP Spp.** | **No. MP Spp.** |
| Cuttings | 660 | Very Low | Very Low | Poor | 1+ | 1+ |
| Cuttings | 720 | Very Low | Low | Fair | 21+ | 6+ |
| Cuttings | 747 | Low | Moderate | Good | 23+ | 16+ |
| Core–1 | 753 | Moderate | High | Good | 70+ | 21+ |
| Core–1 | 754 | Low | High | Fair–Good | 55+ | 17+ |
| Core–1 | 758 | High | High | Good | 62+ | 16+ |
| Core–1 | 764 | Low | Moderate | Good | 52+ | 20+ |
| Core–2 | 768 | High | Low | Fair | 45+ | 3+ |
| Core–2 | 772 | High | Low–Moderate | Fair–Good | 46+ | 16+ |
| Cuttings | 790 | Low | Moderate | Fair | 38+ | 4+ |
| Cuttings | 795 | Very Low | Low | Poor | 15+ | |
| Cuttings | 800 | High | High | Poor | 30+ | 2+ |
| Cuttings | 810 | Low | Moderate | Poor-fair | 26+ | |
| Composite picked cuttings | 850–870 | Very Low | Low | Good | 25+ | |
| Cuttings | 880 | High | High | Poor-good | 22+ | 1 |
| Cuttings | 895 | High | High | Good | 44+ | 2+ |
| | | | | **AVERAGES:** | 35+ | 9+ |

## Table–3: Tertiary Species Distribution in Baleen–2, Gippsland Basin.

| Sample/Depths (m) | Cts | Cts | Cts | C-1 | C-1 | C-1 | C-1 | C-2 | C-2 | Cts | Cts | Cts | Cts | Cts | Cts |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 660 | 720 | 747 | 753 | 754 | 758 | 764 | 768 | 772 | 790 | 795 | 800 | 810 | 850<br>870 | 895 |
| **SPORE-POLLEN SPECIES** | | | | | | | | | | | | | | | |
| Anacolosidites sectus | | | | | X | | | | | | | | | | |
| Araucariacites australis | | X | X | X | X | | X | X | X | X | X | X | | | |
| Australopollis obscurus | | | | | | | | | | | | | X | | |
| Baculatisporites spp. | X | | | X | X | X | X | X | X | X | | | | | |
| Beaupreaidites elegansiformis | | | | | X | X | | | | | | | | | |
| Beaupreaidites verrucosus | | | | | | X | | | | | | | | | |
| Camarozonosporites heskermensis | | | | X | X | X | | | | | | | X | X | |
| Camarozonosporites horrendus ms | | | | | | | | | | | | | | W | |
| Clavifera triplex | | | | X | X | | | | | | | | X | X | |
| Cranwellia striatus | | | | cf | | | | | | | | | | | |
| Cupanieidites orthoteichus | | | | | | | X | X | X | | | | | | |
| Cupressacites sp. | | | | X | | | | | | | | | | | |
| Cyatheacidites annulatus | | X | | | | | | | | CV | | CV | | | |
| Cyathidites australis | | W | W | | | | | | W | | W | | | | |
| Cyathidites paleospora | | X | | X | X | X | X | X | X | X | X | X | | X | |
| Cyathidites splendens | | | | | | | X | X | X | | | X | | | |
| Cayathidites subtilis | | X | X | | | | | | | | | | | | |
| Dacrycarpites australiensis | | | X | X | | | | | | | | | | | |
| Dicotetradites clavatus | | | | X | X | X | X | | X | X | | X | | | |
| Dictyophyllidites spp. | | | | | | X | X | | X | X | | | | | |
| Dilwynites granulatus | | X | X | X | X | X | X | | X | X | X | X | X | | |
| Dilwynites tuberculatus | | | X | X | | X | X | | X | X | | | | | |
| Diporites delicatus ms | | | | | | | | | | | | | X | | |
| Dryptopollenites semilunatus | | | | | | X | | | | | | | | | |
| Ericipites crassiexinus | | | X | X | | X | | | | | | | | | |
| Ericipites scabratus | | | | X | X | | X | X | | | | X | | | |
| Foveotriletes balteus | | | | X | | X | | | | | | | | | |
| Gambierina rudata | | | | | | | | | | | | | X | X | |
| Gleicheniidites circinidites | | | X | X | X | X | X | X | X | X | | X | X | X | |
| Haloragacidites harrisii | | X | X | X | X | X | X | X | | X | X | X | X | X | CV |
| Haloragacidites trioratus | | | | X | X | X | X | | | | | | | | |
| Herkosporites elliottii | | | | X | X | X | | | | | | X | X | | |
| Ilexpollenites spp. | | | | X | | X | | X | X | X | | | | | |
| Ischyosporites gremius | | X | X | X | | | | | X | | X | | | | |
| Ischyosporites irregularis ms | | | | X | | X | X | X | X | | | X | X | | |
| Laevigatosporites major | | X | X | | X | X | X | X | X | | | X | | | |
| Laevigatosporites ovatus | | X | X | X | X | | X | | X | X | X | X | X | X | |
| Latrobosporites crassus | | | | | | | | | | | | | X | X | |
| Latrobosporites marginatus | | | | X | | X | | | X | | | | | | |
| Liliacidites spp. | | | | X | X | | | | | | | | | | |
| Lygistepollenites balmei | | | | | | W | | | | | | X | X | X | CV |
| Lygistepollenites florinii | | X | X | X | X | X | X | X | X | X | X | X | X | X | |
| Malvacipollis robustus ms | | | | X | X | X | X | X | | | | | | | |
| Malvacipollis subtilis | | | | X | X | X | X | X | X | X | | X | | | |
| Matonisporites ornamentalis | | | X | X | | | X | | | | | | | | |
| Microcachryidites antacticus | | | | X | X | X | X | | | X | | X | | X | |
| Microalatidites paleogenicus | | | | X | | | | | | | | X | X | | |
| Milfordia homeopunctatus | | | | | X | | | | | | | | | | |
| Monosulcites gemmatus | | | | | cf | | | | | | | | | | |
| Myrtaceidites parvus/mesonesus | | | | | | X | X | | | X | | | | | |
| Nothofagidites asperus | | X | | X | X | X | X | X | | X | | | | | |
| Nothofagidites brachyspinulosus | | | | X | X | X | | X | X | | | | | | |
| Nothofagidites deminutus | | | | X | X | X | X | X | X | | | | | | |
| Nothofagidites emarcidus/heturus | | | X | X | X | X | X | X | X | X | X | X | X | | CV |
| Nothofagidites endurus | | | | | | | | | | | | X | X | | |
| Nothofagidites falcatus | | | X | X | X | X | X | X | X | X | | | | | |
| Nothofagidites flemingii | | | | X | X | X | X | X | X | X | X | | | | |

**Table–3: Tertiary Species Distribution in Baleen–2, Gippsland Basin.**

| Sample/Depths (m) | Cts | Cts | Cts | C-1 | C-1 | C-1 | C-1 | C-2 | C-2 | Cts | Cts | Cts | Cts | Cts | Cts |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 660 | 720 | 747 | 753 | 754 | 758 | 764 | 768 | 772 | 790 | 795 | 800 | 810 | 850 870 | 895 |
| Nothofagidites goniatus | | | | X | X | X | X | X | X | X | | | | | |
| Nothofagidites longispinosus | | | | | X | | | | | | | | | | |
| Nothofagidites vansteenisii | | | | X | X | X | | | | X | | | | | |
| Paripollis ochesis | | | | | | | | | | | | | | X | |
| Parvisaccites catastus | | X | | X | X | X | | | | | | | | | |
| Peninsulapollis gillii | | | | | | | | | | | | | | X | |
| Periporopollenites demarcatus | | | | X | X | X | X | | X | X | | | | | |
| Periporopollenites polyoratus | | | | | | X | | | | X | | X | | | |
| Periporopollenites vesicus | | | | | | | | X | | | | | | | |
| Peromonolites densus | | | | | | | | | | | | X | | | |
| Peromonolites vellosus | | | | X | X | | | X | | X | | | | | |
| Perotrilites n.sp. | | | | | | | X | | | | | | | | |
| Phyllocladidites mawsonii | | X | X | X | X | X | X | X | X | X | X | X | X | X | |
| Phyllocladidites verrucosus | | | | | | | | | | | | | X | X | |
| Podocarpidites spp. | | X | X | X | X | X | X | X | X | X | X | X | X | X | |
| Polypodiidites perverrucatus | | | | X | X | | X | X | X | | | | | | |
| Proteacidites adenanthoides | | | | X | X | | X | X | X | | | | | X | |
| Proteacidites alveolatus | | | | cf | | cf | | | | | | | | | |
| Proteacidites annularis | | | | X | X | X | X | | | | | | | X | |
| Proteacidites asperopolus | | | | | | X | | | | X | | | | | |
| Proteacidites callosus | | | | | X | | | | | X | | | | | |
| Proteacidites carobelindiae | | | | X | | | | | | | | | | | |
| Proteacidites crassus | | | | | | X | X | | X | | | | | | |
| Proteacidites grandis | | W | W | | | | | | | | | | | | |
| Proteacidites kopiensis | | | | | | | | X | X | | | | | | |
| Proteacidites latrobensis | | | | X | X | | X | | | | | | | | |
| Proteacidites nasus | | | | | | X | | | | | | | | | |
| Proteacidites obscurus | | | | X | X | X | X | X | X | | | | | | |
| Proteacidites pachypolus | | | | X | | X | | X | X | | | | | | |
| Proteacidites prodigus | | | | | | | | | | | | X | | | |
| Proteacidites pseudomoides | | | | X | X | X | | | X | | | | | | |
| Proteacidites recavus | | | | | | | | X | X | | | | | | |
| Proteacidites rectomarginis | | X | | | | | | | | | | | | | |
| Proteacidites reflexus | | | | X | | | | | | | | | | | |
| Proteacidites reticuloscabratus | | | | X | | X | X | X | | | | | | | |
| Proteacidites tenuiexinus | | | | | | X | X | | X | | | X | | | |
| Proteacidites truncatus | | X | | | | | | | | | | | | | |
| Proteacidites tuberculatus | | | | | | | | | | | CV | | | | |
| Proteacidites tuberculiformis | | | | | | | | | X | | | | | | |
| Proteacidites uncinatus ms | | | | | | | | X | | | | | | | |
| Proteacidites spp. | | | | X | X | X | X | X | X | X | X | X | X | X | CV |
| Pseudowinterapollis couperi | | | | | X | | | | | | | | | | |
| Pseudowinterapollis cranwellae | | | | | | | | | | | | | X | | |
| Reticuloidosporites escharus ms | | | | X | X | | | | X | | | | | | |
| Retitriletes spp. | | | X | X | X | X | X | X | | | | | | | |
| Rhoipites alveolatus | | | | X | | | | X | | | | | | | |
| Ricciaesporites boxatus ms | | | | X | | | | | | | | | | | |
| Rugulatisporites mallatus | | | X | X | X | | | | X | | | | | | |
| Santalumidites cainozoicus | | | | | | X | X | X | X | X | | | | | |
| Sapotaceoidaepollenites rotundus | | | | | | X | | | | | | | | | |
| Schizocolpus marlinensis | | | | | | | | X | | | | | | | |
| Sparganiaceaepollenites barungensis | | | | X | | | | | | | | | | | |
| Stereisporites antiquisporites | | X | | X | X | X | | X | X | X | | | | X | |
| Tetracolporites multistrixus ms | | | | | | | | | | | | | | X | |
| Tetracolporites textus ms | | | | | | | | | | | | | X | X | |
| Tetradopollis securus ms | | | | | | | | | | | | | | W | |
| Trichotomosulcites subgranulatus | | | | X | | | X | | | X | | X | X | X | |
| Tricolpites phillipsii | | | | X | | X | | X | | X | | X | X | | |

# Table–3: Tertiary Species Distribution in Baleen–2, Gippsland Basin.

| Sample/Depths (m) | Cts | Cts | Cts | C-1 | C-1 | C-1 | C-1 | C-2 | C-2 | Cts | Cts | Cts | Cts | Cts | Cts |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 660 | 720 | 747 | 753 | 754 | 758 | 764 | 768 | 772 | 790 | 795 | 800 | 810 | 850 870 | 895 |
| Tricolpites simatus | | | | | | X | X | | | X | | | | | |
| Tricolporites spp. | | | X | X | X | X | X | X | X | X | X | X | X | | |
| Tricolporites adelaidensis | | X | X | X | X | X | | X | | | | | | | |
| Tricolporites leuros | | | | X | | | X | X | X | | | | | | |
| Tricolporites lilliei | | | | | | | | | | | | | | W | |
| Tricolporites paenestriatus | | | | | | | X | | | X | | | | | |
| Tricolporites scabratus | | | | | X | | | | | X | | | | | |
| Tricolporites sphaerica | | | | | | | X | | | | | X | | | |
| Triletes tuberculiformis | | | | | | | | | | | | X | | | |
| Triporopollenites ambiguus | | | | | | X | X | | | | | | | | |
| Tripunctisporis maastrichtiensis | | | | X | X | X | X | X | | X | | | | X | |
| Verrucatosporites attinatus ms | | | | cf | | cf | | | | | | | | | |
| Verrucosisporites kopukuensis | | X | | X | X | X | X | X | X | | X | | | | |
| **MICROPLANKTON SPECIES** | | | | | | | | | | | | | | | |
| Achomosphaera spp. | | | X | | | X | | | | X | | | | | |
| Apteodinium australiense | | | | | | | | | | X | | X | | | |
| Batiacasphaera amplectus ms | | | | X | | X | X | | | | | | | | |
| Batiacasphaera denticulia ms | | | | X | | | | | X | | | | | | |
| Cooksonidium capricornum | | | | cf | | | | | | | | | | | |
| Cordosphaeridium inodes | | | | | | X | | | | | | | | | |
| Corrudinium corrugatum ms | | | | X | | | X | | X | | | | | | |
| Cyclopsiella vieta | | | X | | | | | | | | | | | | |
| Dapsilidinium pseudocolligerum | | | X | | | | | | | | | | | | CV |
| Deflandrea antarctica | | | | X | | | | | | | | | | | |
| Deflandrea heterophlycta | | | | X | | | X | | X | | | | | | |
| Deflandrea phosphoritica | | | | | cf | | cf | | | | | | | | |
| Deflandrea sp. indent. | | | | X | | | X | | | | | | | | |
| Diphyes colligerum | | | | | | | | | X | | | cf | | | |
| Enneadocysta arcuata | | | | | cf | | cf | | cf | | | | | | |
| Enneadocysta partridgei | | | | X | X | X | | | X | | | | | | |
| Heteraulacacysta paxilla | | | | | X | | | | X | | | | | | |
| Hystiocysta variata ms | | | | X | | | X | | X | | | | | | |
| Hystrichokolpoma rigaudae | | | X | | | | | | | CV | | | | | |
| Hystrichosphaeridium tubiferum | | | | | | | X | | | | | | | | |
| Impagidinium spp. | X | X | | X | | | | | | X | | | | | |
| Impagidinium dispertitum | | | | | X | | X | | X | | | | | | |
| Impagidinium maculatum | | | cf | | | | | | | | | | | | |
| Impagidinium victorianum | | | | X | | X | | | | | | CV | | | |
| Lingulodinium machaerophorum | | | X | | | | | | X | CV | | | | | |
| Lingulodinium solarum | | | X | | | X | | | | CV | | | | | |
| Micrhystridium sp. | | | | | | | | | | | | X | | | |
| Nematosphaeropsis rhizoma ms | | | X | | | | | | | | | | | | |
| Operculodinium centrocarpum | | X | X | X | X | X | X | X | X | CV | | | | | CV |
| Operculodinium tabulatum ms | | | X | | | | | | | | | | | | |
| Paralecaniella indentata | | | | X | X | X | X | X | X | | | | | | |
| Paucilobimorpha inaequalis | | | | X | | | | | | | | | | | |
| Pentadinium laticinctum | | | X | | | | | | | | | | | | |
| Phthanoperidinium comatum | | | | X | X | X | X | | | X | | | | | |
| Phthanoperidinium eocenicum | | | | | X | X | X | | | | | | | | |
| Protoellipsodinium simplex ms. | | X | X | | | | | | | CV | CV | CV | | | |
| Pyxidinopsis pontus ms | | X | X | | | | | | | CV | CV | | | | |
| Rhombodinium glabrum | | | | | X | | X | | | | | | | | |
| Rottnestia borussica | | | X | | | | | | | | | | | | |
| Samlandia reticulifera | | | | | | | X | | | | | | | | |
| Spinidinium macmurdoense | | | | X | X | | | | | cf | | | | | |
| Spiniferites ramosus | | X | X | X | X | X | X | X | X | CV | | | | | CV |
| Stoveracysta sp. | | | cf | | | | | | | | | | | | |
| Surculosphaeridium oceanica | | | | cf | cf | cf | cf | | cf | | | | | | |

## Table–3: Tertiary Species Distribution in Baleen–2, Gippsland Basin.

| Sample/Depths (m) | Cts | Cts | Cts | C-1 | C-1 | C-1 | C-1 | C-2 | C-2 | Cts | Cts | Cts | Cts | Cts | Cts |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 660 | 720 | 747 | 753 | 754 | 758 | 764 | 768 | 772 | 790 | 795 | 800 | 810 | 850<br>870 | 895 |
| Systematophora placacantha | | | X | | | | | | | | | | | | |
| Tectatodinium marlum ms | | | | | X | X | | | | X | | | | | |
| Tectatodinium scabroellipticus ms | | cf | | | | | | | | | | | | | |
| Thalassiphora pelagica | | | | | | X | X | | X | | | | | | |
| Valensiella clathroderma | | | | cf | cf | | | | | | | | | | |
| Vozzhennikova apertura | | | | X | X | X | X | | | | | | | | |
| Indeterminate Micro-dinoflagellates | | X | X | X | X | X | X | | X | CV | | | | | |
| **OTHER PALYNOMORPHS** | | | | | | | | | | | | | | | |
| Botryococcus braunii | | | | X | | | | X | | | | | | | X |
| Fungal fruiting bodies | | | | X | X | X | | X | | | | | | | |
| Fungal spores & hyphae | | | X | X | X | X | X | X | X | X | | X | | | |
| Microforaminiferal liners | | X | X | X | | | X | X | X | X | CV | X | X | | CV |
| Scolecodonts | | X | X | | | | | | | | | | | | |
| ABBREVIATIONS | | | | | | | | | | | | | | | |
| X = Present | | | | | | | | | | | | | | | |
| W = Reworked | | | | | | | | | | | | | | | |
| CV = Caved | | | | | | | | | | | | | | | |
| cf = Compared with | | | | | | | | | | | | | | | |

# APPENDIX 11

BALEEN-2

## VSP / GEOGRAM REPORT

-SCHLUMBERGER-

Schlumberger GeoQuest

Schlumberger Oilfield Australia Pty Limited
A.C.N. 003 264 597
Level 4, 150 Albert Road
South Melbourne Victoria 3205
Ph: (03) 9696 6266 Fax: (03) 9690 0309

## *CULTUS PETROLEUM NL*

## WELL SEISMIC PROCESSING REPORT

# VSP/Geogram

## *Baleen-2*

FIELD: Patricia-Baleen

COUNTRY: AUSTRALIA

COORDINATES: Longitude : 148 24'37.5496" E
: Latitude : 38 01'55.758" S

DATE OF VSP SURVEY: 17 Oct 1999

REFERENCE NO: AMF-561295/561296

INTERVAL: 885-100 MKb

Prepared by:
Yuri Solovyov (Schlumberger Geoquest)

CONTENTS

## List of Figures

## 1. Introduction

One vertical seismic profile was recorded with the Combinable Seismic Acquisition Tool (CSAT) at the *Baleen-2* well. The survey was run on 17 October 1999.

Processing of the data consisted of performing the VSP processing, sonic calibration and generating a Geogram. This report describes the processing, explains the parameter choices and presents the results.

## 2. Data Acquisition

The data were acquired in one logging run using the three components Combinable Seismic Acquisition Tool (CSAT). An Air Gun was used as the source. The gun was positioned 6 meters below the sea level . The hydrophone was attached 3 m below the gun. Recording was made on the Schlumberger Maxis 500 Unit using DLIS format .

Table 1. Survey Parameters

| | |
|---|---|
| Elevation of KB | 26 M |
| Elevation of DF | 26 M |
| Elevation of GL | -55 M |
| Energy Source | Airgun |
| Source Offset | 40 M |
| Source Depth | 6 M below Sea Level |
| Reference Sensor | Hydrophone |
| Hydrophone Offset | 40 M |
| Hydrophone Depth | 9 M below Sea Level |
| Source & Hyd. Azimuth | 40 Degr. |
| Tool Type | CSAT |
| Tool Combination | GAC geophone |
| De-coupled Geophones | Yes |
| Shaker Fitted | Yes |
| Number of Axis | 3 |
| Geophone Type | GAC |
| Frequency Response (GAC) | 3-200 Hz |
| Sampling Rate | 1 ms. |
| Recording Time | 3.0 sec. |
| Acquisition Unit | MAXIS |
| Recording Format | DLIS |

## 3. Well Seismic Edit

Each shot of the raw geophone data was evaluated and edited as necessary.
The hydrophone data were also evaluated for signature changes and timing shifts.

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.

### 3.1 Data Quality

The overall quality of the data is good. Some tube wave noise was present in raw data. It was effectively reduced after velocity filtering.

### 3.2 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 on the gun or sensors positioned near the source. In this case, a hydrophone positioned 3 m below the gun was used as the reference. First break picking algorithms were used on both the hydrophone and the geophone.

### 3.3 Correction to Datum

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

The source was positioned 6 meters below the sea level. A hydrophone was located 3 meter below airgun. A static correction of 5.9 msec (OWT) was thus applied to all data to correct it to SRD.

## 4. VSP Processing

The vertical component of the VSP data was processed using the conventional zero offset vertical incidence processing chain. The following subsections describe the main aspects of the processing chain the final VSP data set.

- load data
- edit bad records and sort raw VSP traces
- Z component median stack
- peak break time
- bandpass filter : 5-140 HZ
- time varying gain : (T0/T1)exp1
- static shifting to SRD : 0.0059 S
- wavefield separation (mean filter, 9 levels, 1 sample)
- waveshaping deconvolution (decon operator created by filtered unit impulse, 5-80 HZ,
- filter length : 2.5 S)
- upgoing wavefield enhancement (median filter, 7 levels, 1 sample)
- corridor stack : 0.2 S window, (all traces except the deepest 5)

### 4.1 Stacking

After reordering and selecting the raw shots, a median stack was performed on the vertical component data. In this method of stacking, at each sample time, the amplitudes of the input traces are read and sorted in ascending order. The output is the median amplitude value from this ordering. If an even number of traces are input, the first is dropped and a median calculated. Then the last is dropped and another median found. The final output is the average of these two median values. The surface sensor (hydrophone) breaks are used as the zero time for stacking. The break time of each trace is recomputed after stacking.

The data quality is good with. The Amplitude Spectrum of vertical component for each stacked level is presented in Figure 1.

### 4.2 Spherical Divergence Correction and Bandpass Filter

A bandpass filter of 5-140 hertz bandwidth was applied and time varying gain function of the exponential form :

$$Gain(T) = \left(\frac{T}{T_0}\right)^{\alpha}$$

where T is the recorded time, $T_O$ is the first break time and a = 1

Trace equalization was applied by normalizing the RMS amplitude of the first break to correct for transmission losses of the direct wave. A normalization window of 100 millisecs was used.
Static shifting to SRD= - 0.0059 s was applied to Z component stacked data.
Stacked Z component data presented in Plot1.

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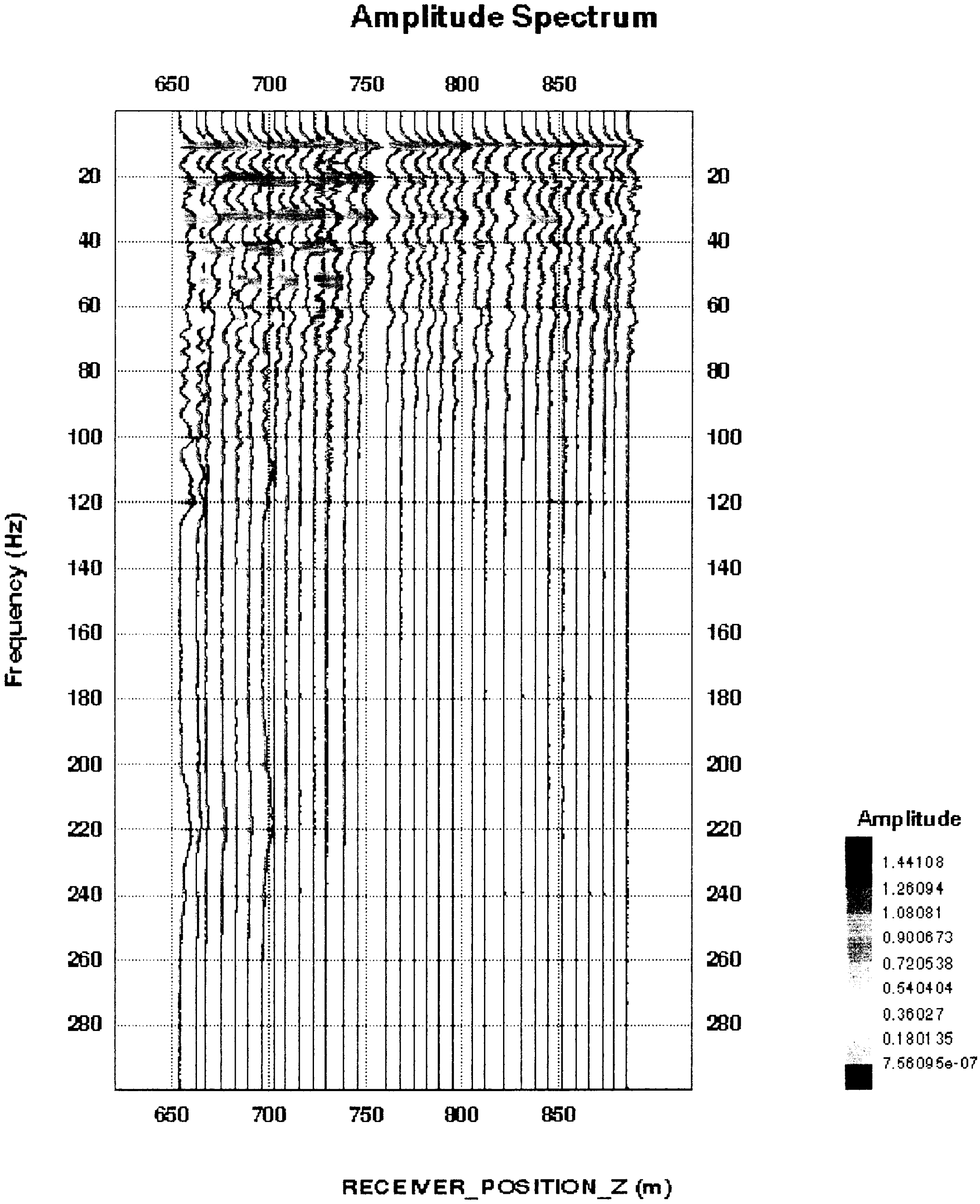
Figure 1. Amplitude Spectrum



### 4.3 Velocity filter

The downgoing coherent energy is estimated using nine levels mean velocity filter. The filter array is moved down one level after each computation and the process is repeated level by level over the entire dataset. As a result, the deepest and shallowest levels are lost because of edge effects.

The residual wavefield is obtained by subtracting the downgoing coherent energy from the total wavefield. The residual wavefield is dominated by reflected compressional events (Plot 3).

The downoing wavefield is displayed in one way time (Plot 2).

### 4.4 Waveshaping Deconvolution

The Waveshaping deconvolution operator is a double sided operator and is designed trace by trace opening 20 ms before the first break with a window length of 1 S. The desired outputs were chosen to be zero phase with a band width of 5-80 Hz. Once the design is made upon the downgoing wavefield, it is applied to the downgoing and subtracted wavefield at the same level. The upgoing compressional wavefield is enhanced in an exactly analogous manner to before.

The trace by trace deconvolution is applied in order to collapse the multiple sequence of shear arrivals, diffractions or out of plane reflections. The result of Waveshaping deconvolution on the upgoing wavefield, enhanced by 7 level median filter is shown in Plot 5.

The downoing wavefield is displayed in one way time (Plot 4).

A corridor stack was computed on the Waveshaping deconvolution output by defining a constant 200 ms timing window along the time depth curve and stacking the data onto a single trace. All traces were used except the deepest 5 traces. This trace under normal circumstances should satisfy the assumption of one dimensionality and provide the best seismic representation of the borehole. This is displayed in Plot 6 (Normal Polarity) and Plot 7 (Reversed Polarity) .

# 5. Sonic Calibration Processing

## 5.1 Sonic Calibration

A 'drift' curve is obtained using the sonic log and the vertical check level 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 above difference, or to identify the gradient of drift versus increasing depth, or to identify a difference of drift between two levels.

The gradient of drift, that is the slope of the drift curve, can be negative or positive.

For a negative drift ($\Delta$drift/$\Delta$depth $< 0$ ) the sonic time is greater than the seismic time over a certain section of the log.

For a positive drift ($\Delta$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. $\Delta$T Minimum. In the case of negative drift a second method is used, called $\Delta$ 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 $\Delta t$ values which are higher than a threshold, the $\Delta t_{min}$ . Values of $\Delta$which are lower than the threshold are not corrected. The correction is a reduction of the excess of $\Delta t$ over $\Delta t_{min}$, $\Delta t - \Delta t_{min}$.

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

$$G = 1 + \frac{\text{drift}}{(\Delta t - \Delta t_{min})dZ}$$

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

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

### 5.2 Open Hole Logs

The DTCO curve after STC processing (see Plots 6,7) was used for a drift computation.

The density log has been edited to take into account bad hole condition and extended from 628 mSRD to mean sea level, using constant value of 2.0 g/cm3.

The gamma ray, induction resistivity, neutron porosity and caliper logs are included as correlation curves.

### 5.3 Correction to Datum and Velocity Modeling

The sonic calibration processing has been referenced to mean sea level which the seismic reference datum . Static corrections are applied to correct for source offset and source depth.

### 5.4 Sonic Calibration Results

The top of the sonic log (628 meters below SRD) is chosen as the origin for the calibration drift curve.

The drift curve is the correction imposed upon the sonic log. The adjusted sonic curve is considered to be the best result using the available data. A list of shifts used on the sonic data is given in A2 Listing.

Raw sonic log, adjusted sonic log and integrated raw and adjusted travel times are displayed in Plot 8 - Drift Corrected Sonic.

Velocity Crossplot is presented in Plot 9.

## 6. Synthetic Seismogram Processing

GEOGRAM plots were generated using 40, 50 and 60 HZ –90deg 0 Phase Ricker Wavelets.

The presentations include both normal and reversed polarity on a time scale of 20 cm/sec (Plots 6,7).

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 the following:

- Depth to time conversion
- Reflection coefficient generation
- Attenuation coefficient calculation
- Convolution
- Output

### 6.1 Depth to Time Conversion

Open hole logs are recorded from the bottom to top with a depth index. This data is converted to a two-way time index.

### 6.2 Primary Reflection Coefficients

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

$$R = \frac{r_2 . v_2 - r_1 . v_1}{r_2 . v_2 + r_1 . v_1}$$

where:

$r_1$ = density of the layer above the reflection interface
$r_2$ = 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.

### 6.3 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:

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

### 6.4 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.

### 6.5 Multiples Only

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

### 6.6 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.

### 6.7 Polarity Convention

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. Polarity conventions are displayed in figure 2.

### 6.8 Convolution

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

## A Summary of Geophysical Listings

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

### A1 Check Shot Data

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, $\frac{\text{dsrd}}{\text{shtm}}$.

### A2 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 $\Delta t_{min}$.

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.

**A3 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.

**A4 Time to Depth**

1. Two Way Sonic Time from SRD

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

**A5 Depth to Time Report**

1. Vertical Depth from SRD

2-11. Two Way Travel Time 0-27 m: moveout depths every 3 m.

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**VSP PLOTS**

Plot 1 Z Median Stack

Plot 2 Downgoing Wavefield after VELF

Plot 3 Upgoing Wavefield after VELF

Plot 4 Downgoing Wavefield after WSF

Plot 5 Upgoing Wavefield after WSF

Plot 6 Composite Display - normal polarity 20 cm/sec

Plot 7 Composite Display - reversed polarity 20 cm/sec

**GEOGRAM PLOTS**

Plot 8 Drift Corrected Sonic

Plot 9 Velocity Crossplot

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# GEOGRAM+
## Well Seismic Report

DATE 11/4/99

## Client and Well Information

| | |
|---|---|
| Country | AUSTRALIA |
| State | VICTORIA |
| Logging Date | 16-OCT-1999 |
| Company | |
| Field | WILDCAT |
| Well | BALEEN 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 | SEISMIC INTERVAL VELOCITY m/s | SEISMIC AVERAGE VELOCITY m/s |
|---|---|---|---|---|---|---|---|---|
| 1 | 0.0 | | | 0.0000 | | | | |
| | | | | | | | 1573 | |
| 2 | 74.0 | 100.0 | 0.0480 | 0.0470 | | | | 1573 |
| | | | | | 50.0 | 0.0268 | 1863 | |
| 3 | 124.0 | 150.0 | 0.0719 | 0.0739 | | | | 1678 |
| | | | | | 50.0 | 0.0264 | 1893 | |
| 4 | 174.0 | 200.0 | 0.0971 | 0.1003 | | | | 1735 |
| | | | | | 50.0 | 0.0232 | 2155 | |
| 5 | 224.0 | 250.0 | 0.1196 | 0.1235 | | | | 1814 |
| | | | | | 50.0 | 0.0218 | 2298 | |
| 6 | 274.0 | 300.0 | 0.1409 | 0.1452 | | | | 1886 |
| | | | | | 50.0 | 0.0233 | 2149 | |
| 7 | 324.0 | 350.0 | 0.1639 | 0.1685 | | | | 1923 |
| | | | | | 50.0 | 0.0228 | 2191 | |
| 8 | 374.0 | 400.0 | 0.1865 | 0.1913 | | | | 1955 |
| | | | | | 50.0 | 0.0236 | 2122 | |

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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 | SEISMIC INTERVAL VELOCITY m/s | SEISMIC AVERAGE VELOCITY m/s |
|---|---|---|---|---|---|---|---|---|
| 9 | 424.0 | 450.0 | 0.2100 | 0.2149 | | | | 1973 |
| | | | | | 50.0 | 0.0228 | 2197 | |
| 10 | 474.0 | 500.0 | 0.2326 | 0.2377 | | | | 1994 |
| | | | | | 50.0 | 0.0220 | 2270 | |
| 11 | 524.0 | 550.0 | 0.2545 | 0.2597 | | | | 2018 |
| | | | | | 50.0 | 0.0212 | 2359 | |
| 12 | 574.0 | 600.0 | 0.2757 | 0.2809 | | | | 2044 |
| | | | | | 54.0 | 0.0227 | 2377 | |
| 13 | 628.0 | 654.0 | 0.2983 | 0.3036 | | | | 2068 |
| | | | | | 9.0 | 0.0040 | 2226 | |
| 14 | 637.0 | 663.0 | 0.3024 | 0.3076 | | | | 2071 |
| | | | | | 5.0 | 0.0020 | 2522 | |
| 15 | 642.0 | 668.0 | 0.3043 | 0.3096 | | | | 2073 |
| | | | | | 8.0 | 0.0032 | 2491 | |
| 16 | 650.0 | 676.0 | 0.3075 | 0.3128 | | | | 2078 |
| | | | | | 7.0 | 0.0029 | 2399 | |
| 17 | 657.0 | 683.0 | 0.3104 | 0.3158 | | | | 2081 |
| | | | | | 7.0 | 0.0030 | 2301 | |
| 18 | 664.0 | 690.0 | 0.3135 | 0.3188 | | | | 2083 |
| | | | | | 7.0 | 0.0035 | 1988 | |
| 19 | 671.0 | 697.0 | 0.3170 | 0.3223 | | | | 2082 |
| | | | | | 6.0 | 0.0027 | 2250 | |
| 20 | 677.0 | 703.0 | 0.3197 | 0.3250 | | | | 2083 |
| | | | | | 6.0 | 0.0029 | 2084 | |
| 21 | 683.0 | 709.0 | 0.3225 | 0.3279 | | | | 2083 |

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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 | SEISMIC INTERVAL VELOCITY m/s | SEISMIC AVERAGE VELOCITY m/s |
|---|---|---|---|---|---|---|---|---|
| | | | | | 7.0 | 0.0032 | 2168 | |
| 22 | 690.0 | 716.0 | 0.3258 | 0.3311 | | | | 2084 |
| | | | | | 7.0 | 0.0037 | 1913 | |
| 23 | 697.0 | 723.0 | 0.3294 | 0.3348 | | | | 2082 |
| | | | | | 7.0 | 0.0029 | 2439 | |
| 24 | 704.0 | 730.0 | 0.3323 | 0.3376 | | | | 2085 |
| | | | | | 9.0 | 0.0040 | 2262 | |
| 25 | 713.0 | 739.0 | 0.3362 | 0.3416 | | | | 2087 |
| | | | | | 7.0 | 0.0030 | 2341 | |
| 26 | 720.0 | 746.0 | 0.3392 | 0.3446 | | | | 2089 |
| | | | | | 14.0 | 0.0067 | 2082 | |
| 27 | 734.0 | 760.0 | 0.3459 | 0.3513 | | | | 2089 |
| | | | | | 8.0 | 0.0031 | 2584 | |
| 28 | 742.0 | 768.0 | 0.3490 | 0.3544 | | | | 2094 |
| | | | | | 7.0 | 0.0029 | 2447 | |
| 29 | 749.0 | 775.0 | 0.3519 | 0.3573 | | | | 2096 |
| | | | | | 6.0 | 0.0024 | 2522 | |
| 30 | 755.0 | 781.0 | 0.3543 | 0.3597 | | | | 2099 |
| | | | | | 7.0 | 0.0029 | 2413 | |
| 31 | 762.0 | 788.0 | 0.3572 | 0.3626 | | | | 2102 |
| | | | | | 7.0 | 0.0028 | 2534 | |
| 32 | 769.0 | 795.0 | 0.3599 | 0.3653 | | | | 2105 |
| | | | | | 10.0 | 0.0041 | 2469 | |
| 33 | 779.0 | 805.0 | 0.3640 | 0.3694 | | | | 2109 |
| | | | | | 7.0 | 0.0029 | 2449 | |

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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 | SEISMIC INTERVAL VELOCITY m/s | SEISMIC AVERAGE VELOCITY m/s |
|---|---|---|---|---|---|---|---|---|
| 34 | 786.0 | 812.0 | 0.3668 | 0.3722 | | | | 2112 |
| | | | | | 10.0 | 0.0036 | 2796 | |
| 35 | 796.0 | 822.0 | 0.3704 | 0.3758 | | | | 2118 |
| | | | | | 9.0 | 0.0032 | 2797 | |
| 36 | 805.0 | 831.0 | 0.3736 | 0.3790 | | | | 2124 |
| | | | | | 7.0 | 0.0024 | 2922 | |
| 37 | 812.0 | 838.0 | 0.3760 | 0.3814 | | | | 2129 |
| | | | | | 7.0 | 0.0027 | 2553 | |
| 38 | 819.0 | 845.0 | 0.3787 | 0.3842 | | | | 2132 |
| | | | | | 7.0 | 0.0025 | 2799 | |
| 39 | 826.0 | 852.0 | 0.3812 | 0.3867 | | | | 2136 |
| | | | | | 7.0 | 0.0024 | 2864 | |
| 40 | 833.0 | 859.0 | 0.3836 | 0.3891 | | | | 2141 |
| | | | | | 7.0 | 0.0023 | 3092 | |
| 41 | 840.0 | 866.0 | 0.3859 | 0.3914 | | | | 2146 |
| | | | | | 7.0 | 0.0025 | 2807 | |
| 42 | 847.0 | 873.0 | 0.3884 | 0.3939 | | | | 2151 |
| | | | | | 5.0 | 0.0019 | 2654 | |
| 43 | 852.0 | 878.0 | 0.3903 | 0.3957 | | | | 2153 |
| | | | | | 7.0 | 0.0030 | 2326 | |
| 44 | 859.0 | 885.0 | 0.3933 | 0.3988 | | | | 2154 |
| | | | | | | | | |

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# GEOGRAM+

## Drift & Sonic Adjustment

DATE 11/4/99

## Client and Well Information

| | |
|---|---|
| Country | AUSTRALIA |
| State | VICTORIA |
| Logging Date | 16-OCT-1999 |
| Company | |
| Field | WILDCAT |
| Well | BALEEN 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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# GEOGRAM+
## 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/ft | DELTA_T MINIMUM us/ft | REDUCTION FACTOR G | SELECTED DRIFT GRADIENT us/ft |
|---|---|---|---|---|---|---|---|
| 1 | 653.7 | 627.7 | -0.0001 | | | | |
| | | | | 7.2 | | | 7.2 |
| 2 | 723.6 | 697.6 | 0.0015 | | | | |
| | | | | | 128.4 | 0.99 | -0.1 |
| 3 | 761.4 | 735.4 | 0.0015 | | | | |
| | | | | 2.6 | | | 2.6 |
| 4 | 791.8 | 765.8 | 0.0018 | | | | |
| | | | | 0.9 | | | 0.9 |
| 5 | 814.2 | 788.2 | 0.0019 | | | | |
| | | | | 0.1 | | | 0.1 |
| 6 | 863.8 | 837.8 | 0.0019 | | | | |
| | | | | 2.8 | | | 2.8 |
| 7 | 879.2 | 853.2 | 0.0020 | | | | |
| | | | | 66.5 | | | 66.5 |
| 8 | | 860.6 | 0.0036 | | | | |

## 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 |
|---|---|---|---|---|---|---|---|---|
| | 0.0 | 0.0 | 0.0 | | | | | |

# GEOGRAM+

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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 |
|---|---|---|---|---|---|---|---|---|
| | | | | | | 1573 | | |
| 100.0 | 74.0 | 47.0 | 47.0 | | | | 1573 | 1573 |
| | | | | | | 1573 | | |
| 150.0 | 124.0 | 73.9 | 73.9 | | | | 1684 | 1678 |
| | | | | | | 1863 | | |
| 200.0 | 174.0 | 100.3 | 100.3 | | | | 1741 | 1735 |
| | | | | | | 1893 | | |
| 250.0 | 224.0 | 123.5 | 123.5 | | | | 1826 | 1814 |
| | | | | | | 2298 | | |
| 300.0 | 274.0 | 145.2 | 145.2 | | | | 1904 | 1886 |
| | | | | | | 2149 | | |
| 350.0 | 324.0 | 168.5 | 168.5 | | | | 1940 | 1923 |
| | | | | | | 2190 | | |
| 400.0 | 374.0 | 191.3 | 191.3 | | | | 1972 | 1955 |
| | | | | | | 2190 | | |
| 450.0 | 424.0 | 214.9 | 214.9 | | | | 1989 | 1973 |
| | | | | | | 2122 | | |
| 500.0 | 474.0 | 237.7 | 237.7 | | | | 2010 | 1994 |
| | | | | | | 2197 | | |
| 550.0 | 524.0 | 259.7 | 259.7 | | | | 2033 | 2018 |
| | | | | | | 2270 | | |
| 600.0 | 574.0 | 280.9 | 280.9 | | | | 2059 | 2043 |
| | | | | | | 2378 | | |
| 654.0 | 628.0 | 303.6 | 303.6 | 0.0 | 0.0 | | 2085 | 2068 |
| | | | | | | 2041 | | |

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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 |
|---|---|---|---|---|---|---|---|---|
| 663.0 | 637.0 | 307.6 | 307.6 | 0.3 | 0.1 | | 2088 | 2071 |
| | | | | | | 2226 | | |
| 668.0 | 642.0 | 309.6 | 309.5 | 0.4 | 0.1 | | 2091 | 2074 |
| | | | | | | 2535 | | |
| 676.0 | 650.0 | 312.8 | 312.8 | 0.6 | 0.0 | | 2095 | 2078 |
| | | | | | | 2223 | | |
| 683.0 | 657.0 | 315.8 | 315.8 | 0.6 | -0.1 | | 2098 | 2080 |
| | | | | | | 2205 | | |
| 690.0 | 664.0 | 318.8 | 319.0 | 0.7 | -0.2 | | 2099 | 2082 |
| | | | | | | 2029 | | |
| 697.0 | 671.0 | 322.3 | 322.3 | 1.0 | 0.0 | | 2099 | 2082 |
| | | | | | | 1908 | | |
| 703.0 | 677.0 | 325.0 | 325.3 | 0.9 | -0.3 | | 2098 | 2081 |
| | | | | | | 2131 | | |
| 709.0 | 683.0 | 327.9 | 328.1 | 1.1 | -0.2 | | 2099 | 2082 |
| | | | | | | 2056 | | |
| 716.0 | 690.0 | 331.1 | 331.4 | 1.1 | -0.3 | | 2099 | 2082 |
| | | | | | | 2140 | | |
| 723.0 | 697.0 | 334.8 | 334.8 | 1.6 | -0.1 | | 2098 | 2082 |
| | | | | | | 2032 | | |
| 730.0 | 704.0 | 337.6 | 337.9 | 1.4 | -0.3 | | 2100 | 2084 |
| | | | | | | 2479 | | |
| 739.0 | 713.0 | 341.6 | 341.7 | 1.5 | -0.1 | | 2103 | 2087 |
| | | | | | | 2274 | | |
| 746.0 | 720.0 | 344.6 | 344.6 | 1.6 | -0.0 | | 2106 | 2089 |

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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 |
|---|---|---|---|---|---|---|---|---|
| | | | | | | 2453 | | |
| 760.0 | 734.0 | 351.3 | 351.4 | 1.5 | -0.1 | | 2105 | 2089 |
| | | | | | | 2294 | | |
| 768.0 | 742.0 | 354.4 | 354.5 | 1.6 | -0.1 | | 2110 | 2093 |
| | | | | | | 2390 | | |
| 775.0 | 749.0 | 357.3 | 357.3 | 1.7 | -0.1 | | 2113 | 2096 |
| | | | | | | 2451 | | |
| 781.0 | 755.0 | 359.7 | 359.8 | 1.7 | -0.1 | | 2116 | 2098 |
| | | | | | | 2485 | | |
| 788.0 | 762.0 | 362.6 | 362.6 | 1.8 | -0.1 | | 2119 | 2101 |
| | | | | | | 2503 | | |
| 795.0 | 769.0 | 365.3 | 365.4 | 1.8 | -0.1 | | 2122 | 2104 |
| | | | | | | 2349 | | |
| 805.0 | 779.0 | 369.4 | 369.5 | 1.8 | -0.2 | | 2126 | 2108 |
| | | | | | | 2413 | | |
| 812.0 | 786.0 | 372.2 | 372.3 | 1.9 | -0.1 | | 2129 | 2111 |
| | | | | | | 2673 | | |
| 822.0 | 796.0 | 375.8 | 375.9 | 1.8 | -0.1 | | 2136 | 2118 |
| | | | | | | 2616 | | |
| 831.0 | 805.0 | 379.0 | 379.4 | 1.6 | -0.4 | | 2141 | 2122 |
| | | | | | | 3046 | | |
| 838.0 | 812.0 | 381.4 | 381.7 | 1.7 | -0.3 | | 2148 | 2127 |
| | | | | | | 3060 | | |
| 845.0 | 819.0 | 384.2 | 384.2 | 1.9 | -0.0 | | 2152 | 2132 |
| | | | | | | 2614 | | |

# GEOGRAM+

## Drift & Sonic Adjustment

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## 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 |
|---|---|---|---|---|---|---|---|---|
| 852.0 | 826.0 | 386.7 | 386.7 | 1.9 | -0.1 | | 2157 | 2136 |
| | | | | | | 2802 | | |
| 859.0 | 833.0 | 389.1 | 389.2 | 1.9 | -0.1 | | 2162 | 2140 |
| | | | | | | 3190 | | |
| 866.0 | 840.0 | 391.4 | 391.5 | 1.9 | -0.1 | | 2168 | 2146 |
| | | | | | | 3128 | | |
| 873.0 | 847.0 | 393.9 | 394.0 | 1.9 | -0.2 | | 2173 | 2150 |
| | | | | | | 2238 | | |
| 878.0 | 852.0 | 395.7 | 396.2 | 1.7 | -0.4 | | 2174 | 2151 |
| | | | | | | 2566 | | |
| 885.0 | 859.0 | 398.8 | 397.5 | 3.6 | 1.2 | | | 2161 |
| | | | | | | | | |

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# GEOGRAM+
## Time To Depth Report

Schlumberger

DATE 11/4/99

## Client and Well Information

| | |
|---|---|
| Country | AUSTRALIA |
| State | VICTORIA |
| Logging Date | 16-OCT-1999 |
| Company | |
| Field | WILDCAT |
| Well | BALEEN 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 | 0.0 | 0.8 | 1.5 | 2.3 | 3.2 | 4.0 | 4.7 | 5.5 | 6.2 | 7.0 |
| 10 | 7.9 | 8.7 | 9.4 | 10.2 | 11.0 | 11.7 | 12.6 | 13.4 | 14.2 | 14.9 |
| 20 | 15.7 | 16.5 | 17.4 | 18.1 | 18.9 | 19.7 | 20.4 | 21.2 | 22.1 | 22.9 |
| 30 | 23.6 | 24.4 | 25.1 | 25.9 | 26.8 | 27.6 | 28.3 | 29.1 | 29.9 | 30.6 |
| 40 | 31.4 | 32.3 | 33.1 | 33.8 | 34.6 | 35.4 | 36.1 | 37.0 | 37.8 | 38.6 |
| 50 | 39.3 | 40.1 | 40.8 | 41.8 | 42.5 | 43.3 | 44.0 | 44.8 | 45.6 | 46.5 |
| 60 | 47.2 | 48.0 | 48.8 | 49.5 | 50.3 | 51.2 | 52.0 | 52.7 | 53.5 | 54.3 |
| 70 | 55.0 | 55.8 | 56.7 | 57.5 | 58.2 | 59.0 | 59.7 | 60.5 | 61.4 | 62.2 |
| 80 | 62.9 | 63.7 | 64.5 | 65.2 | 66.1 | 66.9 | 67.7 | 68.4 | 69.2 | 70.0 |
| 90 | 70.9 | 71.6 | 72.4 | 73.2 | 73.9 | 74.8 | 75.7 | 76.7 | 77.7 | 78.6 |
| 100 | 79.6 | 80.5 | 81.4 | 82.3 | 83.2 | 84.1 | 85.0 | 86.1 | 87.0 | 87.9 |
| 110 | 88.8 | 89.8 | 90.7 | 91.6 | 92.5 | 93.4 | 94.5 | 95.4 | 96.3 | 97.2 |
| 120 | 98.1 | 99.1 | 100.0 | 100.9 | 101.8 | 102.9 | 103.8 | 104.7 | 105.6 | 106.5 |
| 130 | 107.4 | 108.4 | 109.3 | 110.2 | 111.3 | 112.2 | 113.1 | 114.0 | 114.9 | 115.8 |
| 140 | 116.7 | 117.7 | 118.6 | 119.6 | 120.5 | 121.5 | 122.4 | 123.3 | 124.2 | 125.1 |

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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 |
|---|---|---|---|---|---|---|---|---|---|---|
| 150 | 126.2 | 127.1 | 128.0 | 128.9 | 129.8 | 130.9 | 131.8 | 132.7 | 133.7 | 134.6 |
| 160 | 135.6 | 136.6 | 137.5 | 138.4 | 139.3 | 140.4 | 141.3 | 142.2 | 143.1 | 144.0 |
| 170 | 145.1 | 146.0 | 146.9 | 147.8 | 148.9 | 149.8 | 150.7 | 151.6 | 152.6 | 153.6 |
| 180 | 154.5 | 155.4 | 156.4 | 157.3 | 158.3 | 159.3 | 160.2 | 161.1 | 162.0 | 163.1 |
| 190 | 164.0 | 164.9 | 165.8 | 166.9 | 167.8 | 168.7 | 169.6 | 170.5 | 171.6 | 172.5 |
| 200 | 173.4 | 174.5 | 175.6 | 176.6 | 177.7 | 178.8 | 179.8 | 180.9 | 182.0 | 183.0 |
| 210 | 184.1 | 185.2 | 186.2 | 187.3 | 188.4 | 189.6 | 190.7 | 191.7 | 192.8 | 193.9 |
| 220 | 194.9 | 196.0 | 197.1 | 198.1 | 199.2 | 200.3 | 201.3 | 202.4 | 203.5 | 204.7 |
| 230 | 205.7 | 206.8 | 207.9 | 208.9 | 210.0 | 211.1 | 212.1 | 213.2 | 214.3 | 215.3 |
| 240 | 216.4 | 217.5 | 218.5 | 219.8 | 220.8 | 221.9 | 223.0 | 224.0 | 225.1 | 226.3 |
| 250 | 227.4 | 228.6 | 229.7 | 230.9 | 232.1 | 233.2 | 234.4 | 235.5 | 236.7 | 237.7 |
| 260 | 239.0 | 240.0 | 241.2 | 242.3 | 243.5 | 244.8 | 245.8 | 247.0 | 248.1 | 249.3 |
| 270 | 250.4 | 251.6 | 252.7 | 253.9 | 255.0 | 256.2 | 257.3 | 258.5 | 259.7 | 260.8 |
| 280 | 262.0 | 263.0 | 264.3 | 265.3 | 266.5 | 267.6 | 268.8 | 269.9 | 271.1 | 272.2 |
| 290 | 273.4 | 274.5 | 275.5 | 276.6 | 277.7 | 278.7 | 280.0 | 281.0 | 282.1 | 283.2 |
| 300 | 284.2 | 285.3 | 286.4 | 287.4 | 288.5 | 289.6 | 290.6 | 291.7 | 292.8 | 293.8 |
| 310 | 294.9 | 296.0 | 297.0 | 298.1 | 299.2 | 300.4 | 301.4 | 302.5 | 303.6 | 304.6 |
| 320 | 305.7 | 306.8 | 307.8 | 308.9 | 310.0 | 311.0 | 312.1 | 313.2 | 314.2 | 315.3 |
| 330 | 316.4 | 317.4 | 318.5 | 319.6 | 320.6 | 321.9 | 322.9 | 324.0 | 325.1 | 326.1 |
| 340 | 327.2 | 328.3 | 329.5 | 330.6 | 331.6 | 332.7 | 333.8 | 334.8 | 336.0 | 337.1 |
| 350 | 338.2 | 339.2 | 340.3 | 341.5 | 342.6 | 343.7 | 344.7 | 345.8 | 347.0 | 348.1 |
| 360 | 349.1 | 350.2 | 351.3 | 352.3 | 353.6 | 354.6 | 355.7 | 356.8 | 357.8 | 359.1 |
| 370 | 360.1 | 361.2 | 362.3 | 363.3 | 364.5 | 365.6 | 366.7 | 367.7 | 368.8 | 369.9 |
| 380 | 371.1 | 372.2 | 373.2 | 374.3 | 375.4 | 376.4 | 377.5 | 378.6 | 379.6 | 380.7 |

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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 |
|---|---|---|---|---|---|---|---|---|---|---|
| 390 | 381.8 | 382.8 | 383.9 | 385.0 | 386.0 | 387.1 | 388.2 | 389.2 | 390.3 | 391.4 |
| 400 | 392.4 | 393.3 | 394.4 | 395.5 | 396.5 | 397.6 | 398.7 | 399.7 | 400.8 | 401.9 |
| 410 | 402.9 | 404.0 | 405.1 | 406.1 | 407.2 | 408.3 | 409.3 | 410.4 | 411.5 | 412.5 |
| 420 | 413.6 | 414.7 | 415.7 | 416.8 | 417.9 | 418.9 | 420.0 | 421.1 | 422.0 | 423.1 |
| 430 | 424.1 | 425.3 | 426.4 | 427.5 | 428.5 | 429.6 | 430.8 | 431.9 | 433.0 | 434.0 |
| 440 | 435.1 | 436.3 | 437.4 | 438.5 | 439.5 | 440.7 | 441.8 | 442.9 | 443.9 | 445.0 |
| 450 | 446.2 | 447.3 | 448.4 | 449.4 | 450.5 | 451.7 | 452.8 | 453.8 | 454.9 | 456.0 |
| 460 | 457.2 | 458.3 | 459.3 | 460.4 | 461.5 | 462.7 | 463.8 | 464.8 | 465.9 | 467.1 |
| 470 | 468.2 | 469.2 | 470.3 | 471.4 | 472.6 | 473.7 | 474.7 | 475.9 | 477.0 | 478.1 |
| 480 | 479.3 | 480.4 | 481.6 | 482.7 | 483.9 | 484.9 | 486.2 | 487.2 | 488.3 | 489.5 |
| 490 | 490.6 | 491.8 | 492.9 | 494.1 | 495.1 | 496.4 | 497.4 | 498.5 | 499.7 | 500.8 |
| 500 | 502.0 | 503.1 | 504.3 | 505.4 | 506.6 | 507.6 | 508.9 | 509.9 | 511.0 | 512.2 |
| 510 | 513.3 | 514.5 | 515.6 | 516.8 | 517.9 | 519.1 | 520.1 | 521.2 | 522.4 | 523.5 |
| 520 | 524.7 | 525.9 | 527.0 | 528.2 | 529.4 | 530.7 | 531.7 | 532.9 | 534.2 | 535.4 |
| 530 | 536.4 | 537.7 | 538.9 | 540.1 | 541.2 | 542.4 | 543.6 | 544.7 | 545.9 | 547.1 |
| 540 | 548.3 | 549.4 | 550.6 | 551.8 | 553.1 | 554.1 | 555.3 | 556.6 | 557.8 | 558.9 |
| 550 | 560.1 | 561.3 | 562.5 | 563.6 | 564.8 | 566.0 | 567.2 | 568.3 | 569.5 | 570.7 |
| 560 | 571.8 | 573.0 | 574.2 | 575.5 | 576.7 | 577.7 | 579.0 | 580.2 | 581.4 | 582.6 |
| 570 | 583.7 | 584.9 | 586.1 | 587.3 | 588.6 | 589.6 | 590.9 | 592.1 | 593.3 | 594.5 |
| 580 | 595.6 | 596.8 | 598.0 | 599.2 | 600.5 | 601.5 | 602.7 | 604.0 | 605.2 | 606.4 |
| 590 | 607.5 | 608.7 | 609.9 | 611.1 | 612.3 | 613.4 | 614.6 | 615.8 | 617.1 | 618.3 |
| 600 | 619.4 | 620.6 | 621.8 | 623.0 | 624.2 | 625.3 | 626.5 | 627.7 | 628.8 | 629.9 |
| 610 | 631.1 | 632.3 | 633.5 | 634.4 | 635.5 | 636.9 | 638.1 | 639.5 | 640.7 | 641.9 |
| 620 | 643.1 | 644.2 | 645.3 | 646.8 | 648.0 | 649.4 | 650.4 | 651.7 | 652.9 | 653.9 |

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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 | 655.0 | 656.2 | 657.3 | 658.4 | 659.4 | 660.7 | 661.7 | 663.1 | 664.2 | 665.1 |
| 640 | 666.1 | 667.2 | 668.3 | 669.3 | 670.4 | 671.3 | 672.2 | 673.3 | 674.4 | 675.3 |
| 650 | 676.4 | 677.4 | 678.5 | 679.6 | 680.6 | 681.7 | 682.9 | 684.0 | 685.0 | 686.0 |
| 660 | 687.0 | 688.1 | 689.0 | 690.2 | 691.3 | 692.4 | 693.4 | 694.3 | 695.4 | 696.3 |
| 670 | 697.4 | 698.4 | 699.5 | 700.7 | 701.8 | 703.0 | 704.2 | 705.5 | 706.7 | 707.9 |
| 680 | 709.1 | 710.2 | 711.4 | 712.5 | 713.7 | 714.8 | 716.0 | 717.2 | 718.4 | 719.6 |
| 690 | 720.9 | 722.1 | 723.0 | 724.1 | 725.0 | 726.0 | 727.1 | 728.2 | 729.1 | 730.0 |
| 700 | 731.1 | 732.0 | 733.0 | 734.1 | 735.3 | 736.5 | 737.9 | 739.3 | 740.5 | 742.0 |
| 710 | 743.3 | 744.5 | 745.7 | 746.9 | 748.1 | 749.4 | 750.6 | 751.8 | 753.0 | 754.2 |
| 720 | 755.4 | 756.8 | 758.0 | 759.3 | 760.5 | 761.7 | 762.9 | 764.1 | 765.4 | 766.7 |
| 730 | 767.9 | 769.2 | 770.4 | 771.6 | 772.8 | 774.0 | 775.1 | 776.5 | 777.7 | 778.9 |
| 740 | 780.1 | 781.2 | 782.6 | 783.8 | 785.2 | 786.5 | 787.8 | 789.3 | 790.7 | 792.0 |
| 750 | 793.5 | 794.9 | 796.1 | 797.5 | 798.7 | 800.1 | 801.3 | 802.5 | 803.9 | 805.3 |
| 760 | 807.0 | 808.5 | 809.9 | 811.4 | 812.9 | 814.3 | 815.8 | 817.2 | 818.5 | 819.8 |
| 770 | 821.1 | 822.5 | 824.0 | 825.4 | 826.8 | 828.1 | 829.5 | 831.0 | 832.4 | 833.9 |
| 780 | 835.5 | 837.0 | 838.5 | 840.0 | 841.6 | 843.1 | 844.4 | 845.8 | 846.9 | 848.1 |
| 790 | 849.2 | 850.4 | 851.6 | 852.8 | 853.7 | 854.7 | | | | |

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Schlumberger

# GEOGRAM+
## Velocity Report

DATE 11/4/99

### Client and Well Information

| | |
|---|---|
| Country | AUSTRALIA |
| State | VICTORIA |
| Logging Date | 16-OCT-1999 |
| Company | |
| Field | WILDCAT |
| Well | BALEEN 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 |
|---|---|---|---|---|---|
| 0 | | 0.0 | | | |
| | | | | | 1573 |
| 2 | | 1.5 | 1573 | 1573 | |
| | | | | | 1573 |
| 4 | | 3.2 | 1573 | 1573 | |
| | | | | | 1573 |
| 6 | | 4.7 | 1573 | 1573 | |
| | | | | | 1573 |
| 8 | | 6.2 | 1573 | 1573 | |
| | | | | | 1573 |
| 10 | | 7.9 | 1573 | 1573 | |
| | | | | | 1573 |
| 12 | | 9.4 | 1573 | 1573 | |
| | | | | | 1573 |
| 14 | | 11.0 | 1573 | 1573 | |

# GEOGRAM+

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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 |
|---|---|---|---|---|---|
| | | | | | 1573 |
| 16 | | 12.6 | 1573 | 1573 | |
| | | | | | 1573 |
| 18 | | 14.2 | 1573 | 1573 | |
| | | | | | 1573 |
| 20 | | 15.7 | 1573 | 1573 | |
| | | | | | 1573 |
| 22 | | 17.4 | 1573 | 1573 | |
| | | | | | 1573 |
| 24 | | 18.9 | 1573 | 1573 | |
| | | | | | 1573 |
| 26 | | 20.4 | 1573 | 1573 | |
| | | | | | 1573 |
| 28 | | 22.1 | 1573 | 1573 | |
| | | | | | 1573 |
| 30 | | 23.6 | 1573 | 1573 | |
| | | | | | 1573 |
| 32 | | 25.1 | 1573 | 1573 | |
| | | | | | 1573 |
| 34 | | 26.8 | 1573 | 1573 | |
| | | | | | 1573 |
| 36 | | 28.3 | 1573 | 1573 | |
| | | | | | 1573 |
| 38 | | 29.9 | 1573 | 1573 | |

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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 |
|---|---|---|---|---|---|
| | | | | | 1573 |
| 40 | | 31.4 | 1573 | 1573 | |
| | | | | | 1573 |
| 42 | | 33.1 | 1573 | 1573 | |
| | | | | | 1573 |
| 44 | | 34.6 | 1573 | 1573 | |
| | | | | | 1573 |
| 46 | | 36.1 | 1573 | 1573 | |
| | | | | | 1573 |
| 48 | | 37.8 | 1573 | 1573 | |
| | | | | | 1573 |
| 50 | | 39.3 | 1573 | 1573 | |
| | | | | | 1573 |
| 52 | | 40.8 | 1573 | 1573 | |
| | | | | | 1573 |
| 54 | | 42.5 | 1573 | 1573 | |
| | | | | | 1573 |
| 56 | | 44.0 | 1573 | 1573 | |
| | | | | | 1573 |
| 58 | | 45.6 | 1573 | 1573 | |
| | | | | | 1573 |
| 60 | | 47.2 | 1573 | 1573 | |
| | | | | | 1573 |
| 62 | | 48.8 | 1573 | 1573 | |

# GEOGRAM+

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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 |
|---|---|---|---|---|---|
| | | | | | 1573 |
| 64 | | 50.3 | 1573 | 1573 | |
| | | | | | 1573 |
| 66 | | 52.0 | 1573 | 1573 | |
| | | | | | 1573 |
| 68 | | 53.5 | 1573 | 1573 | |
| | | | | | 1573 |
| 70 | | 55.0 | 1573 | 1573 | |
| | | | | | 1573 |
| 72 | | 56.7 | 1573 | 1573 | |
| | | | | | 1573 |
| 74 | | 58.2 | 1573 | 1573 | |
| | | | | | 1573 |
| 76 | | 59.7 | 1573 | 1573 | |
| | | | | | 1573 |
| 78 | | 61.4 | 1573 | 1573 | |
| | | | | | 1573 |
| 80 | | 62.9 | 1573 | 1573 | |
| | | | | | 1573 |
| 82 | | 64.5 | 1573 | 1573 | |
| | | | | | 1573 |
| 84 | | 66.1 | 1573 | 1573 | |
| | | | | | 1573 |
| 86 | | 67.7 | 1573 | 1573 | |

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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 |
|---|---|---|---|---|---|
| | | | | | 1573 |
| 88 | | 69.2 | 1573 | 1573 | |
| | | | | | 1573 |
| 90 | | 70.9 | 1573 | 1573 | |
| | | | | | 1573 |
| 92 | | 72.4 | 1573 | 1573 | |
| | | | | | 1573 |
| 94 | | 73.9 | 1573 | 1573 | |
| | | | | | 1573 |
| 96 | 101.7 | 75.7 | 1579 | 1579 | |
| | | | | | 1573 |
| 98 | 103.7 | 77.7 | 1585 | 1586 | |
| | | | | | 1863 |
| 100 | 105.6 | 79.6 | 1590 | 1592 | |
| | | | | | 1863 |
| 102 | 107.4 | 81.4 | 1596 | 1597 | |
| | | | | | 1863 |
| 104 | 109.2 | 83.2 | 1601 | 1603 | |
| | | | | | 1863 |
| 106 | 111.0 | 85.0 | 1606 | 1608 | |
| | | | | | 1863 |
| 108 | 113.0 | 87.0 | 1611 | 1613 | |
| | | | | | 1863 |
| 110 | 114.8 | 88.8 | 1615 | 1618 | |

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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 |
|---|---|---|---|---|---|
| | | | | | 1863 |
| 112 | 116.7 | 90.7 | 1619 | 1623 | |
| | | | | | 1863 |
| 114 | 118.5 | 92.5 | 1624 | 1627 | |
| | | | | | 1863 |
| 116 | 120.5 | 94.5 | 1628 | 1632 | |
| | | | | | 1863 |
| 118 | 122.3 | 96.3 | 1632 | 1636 | |
| | | | | | 1863 |
| 120 | 124.1 | 98.1 | 1636 | 1640 | |
| | | | | | 1863 |
| 122 | 126.0 | 100.0 | 1639 | 1644 | |
| | | | | | 1863 |
| 124 | 127.8 | 101.8 | 1643 | 1648 | |
| | | | | | 1863 |
| 126 | 129.8 | 103.8 | 1647 | 1651 | |
| | | | | | 1863 |
| 128 | 131.6 | 105.6 | 1650 | 1655 | |
| | | | | | 1863 |
| 130 | 133.4 | 107.4 | 1653 | 1658 | |
| | | | | | 1863 |
| 132 | 135.3 | 109.3 | 1656 | 1661 | |
| | | | | | 1863 |
| 134 | 137.3 | 111.3 | 1659 | 1665 | |

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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 |
|---|---|---|---|---|---|
| | | | | | 1863 |
| 136 | 139.1 | 113.1 | 1662 | 1668 | |
| | | | | | 1863 |
| 138 | 140.9 | 114.9 | 1665 | 1671 | |
| | | | | | 1863 |
| 140 | 142.7 | 116.7 | 1668 | 1674 | |
| | | | | | 1863 |
| 142 | 144.6 | 118.6 | 1671 | 1676 | |
| | | | | | 1863 |
| 144 | 146.5 | 120.5 | 1674 | 1679 | |
| | | | | | 1863 |
| 146 | 148.4 | 122.4 | 1676 | 1682 | |
| | | | | | 1863 |
| 148 | 150.2 | 124.2 | 1679 | 1684 | |
| | | | | | 1863 |
| 150 | 152.2 | 126.2 | 1682 | 1687 | |
| | | | | | 1893 |
| 152 | 154.0 | 128.0 | 1684 | 1690 | |
| | | | | | 1893 |
| 154 | 155.8 | 129.8 | 1687 | 1693 | |
| | | | | | 1893 |
| 156 | 157.8 | 131.8 | 1690 | 1696 | |
| | | | | | 1893 |
| 158 | 159.7 | 133.7 | 1692 | 1698 | |

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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 |
|---|---|---|---|---|---|
| | | | | | 1893 |
| 160 | 161.6 | 135.6 | 1695 | 1701 | |
| | | | | | 1893 |
| 162 | 163.5 | 137.5 | 1697 | 1703 | |
| | | | | | 1893 |
| 164 | 165.3 | 139.3 | 1699 | 1706 | |
| | | | | | 1893 |
| 166 | 167.3 | 141.3 | 1702 | 1708 | |
| | | | | | 1893 |
| 168 | 169.1 | 143.1 | 1704 | 1710 | |
| | | | | | 1893 |
| 170 | 171.1 | 145.1 | 1706 | 1713 | |
| | | | | | 1893 |
| 172 | 172.9 | 146.9 | 1708 | 1715 | |
| | | | | | 1893 |
| 174 | 174.9 | 148.9 | 1711 | 1717 | |
| | | | | | 1893 |
| 176 | 176.7 | 150.7 | 1713 | 1719 | |
| | | | | | 1893 |
| 178 | 178.6 | 152.6 | 1715 | 1721 | |
| | | | | | 1893 |
| 180 | 180.5 | 154.5 | 1717 | 1723 | |
| | | | | | 1893 |
| 182 | 182.4 | 156.4 | 1719 | 1725 | |

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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 |
|---|---|---|---|---|---|
| | | | | | 1893 |
| 184 | 184.3 | 158.3 | 1721 | 1727 | |
| | | | | | 1893 |
| 186 | 186.2 | 160.2 | 1722 | 1729 | |
| | | | | | 1893 |
| 188 | 188.0 | 162.0 | 1724 | 1731 | |
| | | | | | 1893 |
| 190 | 190.0 | 164.0 | 1726 | 1733 | |
| | | | | | 1893 |
| 192 | 191.8 | 165.8 | 1728 | 1734 | |
| | | | | | 1893 |
| 194 | 193.8 | 167.8 | 1729 | 1736 | |
| | | | | | 1893 |
| 196 | 195.6 | 169.6 | 1731 | 1738 | |
| | | | | | 1893 |
| 198 | 197.6 | 171.6 | 1733 | 1739 | |
| | | | | | 1893 |
| 200 | 199.4 | 173.4 | 1734 | 1741 | |
| | | | | | 1893 |
| 202 | 201.6 | 175.6 | 1738 | 1745 | |
| | | | | | 1893 |
| 204 | 203.7 | 177.7 | 1742 | 1749 | |
| | | | | | 2155 |
| 206 | 205.8 | 179.8 | 1746 | 1754 | |

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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 |
|---|---|---|---|---|---|
| | | | | | 2155 |
| 208 | 208.0 | 182.0 | 1750 | 1758 | |
| | | | | | 2155 |
| 210 | 210.1 | 184.1 | 1754 | 1762 | |
| | | | | | 2155 |
| 212 | 212.2 | 186.2 | 1757 | 1766 | |
| | | | | | 2155 |
| 214 | 214.4 | 188.4 | 1761 | 1770 | |
| | | | | | 2155 |
| 216 | 216.7 | 190.7 | 1765 | 1774 | |
| | | | | | 2155 |
| 218 | 218.8 | 192.8 | 1768 | 1778 | |
| | | | | | 2155 |
| 220 | 220.9 | 194.9 | 1772 | 1782 | |
| | | | | | 2155 |
| 222 | 223.1 | 197.1 | 1775 | 1785 | |
| | | | | | 2155 |
| 224 | 225.2 | 199.2 | 1779 | 1789 | |
| | | | | | 2155 |
| 226 | 227.3 | 201.3 | 1782 | 1793 | |
| | | | | | 2155 |
| 228 | 229.5 | 203.5 | 1785 | 1796 | |
| | | | | | 2155 |
| 230 | 231.7 | 205.7 | 1789 | 1800 | |

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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 |
|---|---|---|---|---|---|
| | | | | | 2155 |
| 232 | 233.9 | 207.9 | 1792 | 1803 | |
| | | | | | 2155 |
| 234 | 236.0 | 210.0 | 1795 | 1806 | |
| | | | | | 2155 |
| 236 | 238.1 | 212.1 | 1798 | 1810 | |
| | | | | | 2155 |
| 238 | 240.3 | 214.3 | 1801 | 1813 | |
| | | | | | 2155 |
| 240 | 242.4 | 216.4 | 1804 | 1816 | |
| | | | | | 2155 |
| 242 | 244.5 | 218.5 | 1807 | 1819 | |
| | | | | | 2155 |
| 244 | 246.8 | 220.8 | 1810 | 1822 | |
| | | | | | 2155 |
| 246 | 249.0 | 223.0 | 1812 | 1825 | |
| | | | | | 2155 |
| 248 | 251.1 | 225.1 | 1816 | 1828 | |
| | | | | | 2155 |
| 250 | 253.4 | 227.4 | 1819 | 1833 | |
| | | | | | 2298 |
| 252 | 255.7 | 229.7 | 1823 | 1837 | |
| | | | | | 2298 |
| 254 | 258.1 | 232.1 | 1827 | 1841 | |

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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 |
|---|---|---|---|---|---|
| | | | | | 2298 |
| 256 | 260.4 | 234.4 | 1831 | 1845 | |
| | | | | | 2298 |
| 258 | 262.7 | 236.7 | 1834 | 1849 | |
| | | | | | 2298 |
| 260 | 265.0 | 239.0 | 1838 | 1853 | |
| | | | | | 2298 |
| 262 | 267.2 | 241.2 | 1841 | 1857 | |
| | | | | | 2298 |
| 264 | 269.5 | 243.5 | 1845 | 1860 | |
| | | | | | 2298 |
| 266 | 271.8 | 245.8 | 1848 | 1864 | |
| | | | | | 2298 |
| 268 | 274.1 | 248.1 | 1852 | 1868 | |
| | | | | | 2298 |
| 270 | 276.4 | 250.4 | 1855 | 1871 | |
| | | | | | 2298 |
| 272 | 278.7 | 252.7 | 1858 | 1875 | |
| | | | | | 2298 |
| 274 | 281.0 | 255.0 | 1861 | 1878 | |
| | | | | | 2298 |
| 276 | 283.3 | 257.3 | 1865 | 1881 | |
| | | | | | 2298 |
| 278 | 285.7 | 259.7 | 1868 | 1885 | |

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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 |
|---|---|---|---|---|---|
| | | | | | 2298 |
| 280 | 288.0 | 262.0 | 1871 | 1888 | |
| | | | | | 2298 |
| 282 | 290.3 | 264.3 | 1874 | 1891 | |
| | | | | | 2298 |
| 284 | 292.5 | 266.5 | 1877 | 1894 | |
| | | | | | 2298 |
| 286 | 294.8 | 268.8 | 1880 | 1898 | |
| | | | | | 2298 |
| 288 | 297.1 | 271.1 | 1883 | 1901 | |
| | | | | | 2298 |
| 290 | 299.4 | 273.4 | 1886 | 1904 | |
| | | | | | 2298 |
| 292 | 301.5 | 275.5 | 1888 | 1906 | |
| | | | | | 2298 |
| 294 | 303.7 | 277.7 | 1889 | 1907 | |
| | | | | | 2149 |
| 296 | 306.0 | 280.0 | 1891 | 1909 | |
| | | | | | 2149 |
| 298 | 308.1 | 282.1 | 1893 | 1911 | |
| | | | | | 2149 |
| 300 | 310.2 | 284.2 | 1895 | 1913 | |
| | | | | | 2149 |
| 302 | 312.4 | 286.4 | 1896 | 1914 | |

# GEOGRAM+

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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 |
|---|---|---|---|---|---|
| | | | | | 2149 |
| 304 | 314.5 | 288.5 | 1898 | 1916 | |
| | | | | | 2149 |
| 306 | 316.6 | 290.6 | 1900 | 1918 | |
| | | | | | 2149 |
| 308 | 318.8 | 292.8 | 1901 | 1919 | |
| | | | | | 2149 |
| 310 | 320.9 | 294.9 | 1903 | 1921 | |
| | | | | | 2149 |
| 312 | 323.0 | 297.0 | 1904 | 1922 | |
| | | | | | 2149 |
| 314 | 325.2 | 299.2 | 1906 | 1924 | |
| | | | | | 2149 |
| 316 | 327.4 | 301.4 | 1908 | 1925 | |
| | | | | | 2149 |
| 318 | 329.6 | 303.6 | 1909 | 1927 | |
| | | | | | 2149 |
| 320 | 331.7 | 305.7 | 1911 | 1928 | |
| | | | | | 2149 |
| 322 | 333.8 | 307.8 | 1912 | 1930 | |
| | | | | | 2149 |
| 324 | 336.0 | 310.0 | 1913 | 1931 | |
| | | | | | 2149 |
| 326 | 338.1 | 312.1 | 1915 | 1933 | |

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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 |
|---|---|---|---|---|---|
| | | | | | 2149 |
| 328 | 340.2 | 314.2 | 1916 | 1934 | |
| | | | | | 2149 |
| 330 | 342.4 | 316.4 | 1918 | 1935 | |
| | | | | | 2149 |
| 332 | 344.5 | 318.5 | 1919 | 1937 | |
| | | | | | 2149 |
| 334 | 346.6 | 320.6 | 1920 | 1938 | |
| | | | | | 2149 |
| 336 | 348.9 | 322.9 | 1922 | 1939 | |
| | | | | | 2149 |
| 338 | 351.1 | 325.1 | 1923 | 1941 | |
| | | | | | 2149 |
| 340 | 353.2 | 327.2 | 1925 | 1942 | |
| | | | | | 2191 |
| 342 | 355.5 | 329.5 | 1926 | 1944 | |
| | | | | | 2190 |
| 344 | 357.6 | 331.6 | 1928 | 1945 | |
| | | | | | 2190 |
| 346 | 359.8 | 333.8 | 1929 | 1947 | |
| | | | | | 2190 |
| 348 | 362.0 | 336.0 | 1931 | 1948 | |
| | | | | | 2191 |
| 350 | 364.2 | 338.2 | 1932 | 1950 | |

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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 |
|---|---|---|---|---|---|
| | | | | | 2191 |
| 352 | 366.3 | 340.3 | 1934 | 1951 | |
| | | | | | 2190 |
| 354 | 368.6 | 342.6 | 1935 | 1953 | |
| | | | | | 2191 |
| 356 | 370.7 | 344.7 | 1937 | 1954 | |
| | | | | | 2191 |
| 358 | 373.0 | 347.0 | 1938 | 1956 | |
| | | | | | 2190 |
| 360 | 375.1 | 349.1 | 1940 | 1957 | |
| | | | | | 2190 |
| 362 | 377.3 | 351.3 | 1941 | 1958 | |
| | | | | | 2190 |
| 364 | 379.6 | 353.6 | 1942 | 1960 | |
| | | | | | 2191 |
| 366 | 381.7 | 355.7 | 1944 | 1961 | |
| | | | | | 2191 |
| 368 | 383.8 | 357.8 | 1945 | 1962 | |
| | | | | | 2190 |
| 370 | 386.1 | 360.1 | 1946 | 1964 | |
| | | | | | 2191 |
| 372 | 388.3 | 362.3 | 1948 | 1965 | |
| | | | | | 2190 |
| 374 | 390.5 | 364.5 | 1949 | 1966 | |

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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 |
|---|---|---|---|---|---|
| | | | | | 2191 |
| 376 | 392.7 | 366.7 | 1950 | 1967 | |
| | | | | | 2191 |
| 378 | 394.8 | 368.8 | 1952 | 1969 | |
| | | | | | 2190 |
| 380 | 397.1 | 371.1 | 1953 | 1970 | |
| | | | | | 2191 |
| 382 | 399.2 | 373.2 | 1954 | 1971 | |
| | | | | | 2191 |
| 384 | 401.4 | 375.4 | 1955 | 1972 | |
| | | | | | 2190 |
| 386 | 403.5 | 377.5 | 1956 | 1973 | |
| | | | | | 2122 |
| 388 | 405.6 | 379.6 | 1957 | 1974 | |
| | | | | | 2122 |
| 390 | 407.8 | 381.8 | 1958 | 1975 | |
| | | | | | 2122 |
| 392 | 409.9 | 383.9 | 1959 | 1975 | |
| | | | | | 2122 |
| 394 | 412.0 | 386.0 | 1959 | 1976 | |
| | | | | | 2122 |
| 396 | 414.2 | 388.2 | 1960 | 1977 | |
| | | | | | 2122 |
| 398 | 416.3 | 390.3 | 1961 | 1978 | |

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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 |
|---|---|---|---|---|---|
| | | | | | 2122 |
| 400 | 418.4 | 392.4 | 1962 | 1978 | |
| | | | | | 2122 |
| 402 | 420.4 | 394.4 | 1963 | 1979 | |
| | | | | | 2122 |
| 404 | 422.5 | 396.5 | 1963 | 1980 | |
| | | | | | 2122 |
| 406 | 424.7 | 398.7 | 1964 | 1981 | |
| | | | | | 2122 |
| 408 | 426.8 | 400.8 | 1965 | 1981 | |
| | | | | | 2122 |
| 410 | 428.9 | 402.9 | 1966 | 1982 | |
| | | | | | 2122 |
| 412 | 431.1 | 405.1 | 1966 | 1983 | |
| | | | | | 2122 |
| 414 | 433.2 | 407.2 | 1967 | 1983 | |
| | | | | | 2122 |
| 416 | 435.3 | 409.3 | 1968 | 1984 | |
| | | | | | 2122 |
| 418 | 437.5 | 411.5 | 1969 | 1985 | |
| | | | | | 2122 |
| 420 | 439.6 | 413.6 | 1969 | 1985 | |
| | | | | | 2122 |
| 422 | 441.7 | 415.7 | 1970 | 1986 | |

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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 |
|---|---|---|---|---|---|
| | | | | | 2122 |
| 424 | 443.9 | 417.9 | 1971 | 1987 | |
| | | | | | 2122 |
| 426 | 446.0 | 420.0 | 1972 | 1987 | |
| | | | | | 2122 |
| 428 | 448.0 | 422.0 | 1972 | 1988 | |
| | | | | | 2122 |
| 430 | 450.1 | 424.1 | 1973 | 1989 | |
| | | | | | 2122 |
| 432 | 452.4 | 426.4 | 1974 | 1990 | |
| | | | | | 2197 |
| 434 | 454.5 | 428.5 | 1975 | 1991 | |
| | | | | | 2197 |
| 436 | 456.8 | 430.8 | 1976 | 1992 | |
| | | | | | 2197 |
| 438 | 459.0 | 433.0 | 1977 | 1993 | |
| | | | | | 2197 |
| 440 | 461.1 | 435.1 | 1978 | 1994 | |
| | | | | | 2197 |
| 442 | 463.4 | 437.4 | 1979 | 1995 | |
| | | | | | 2197 |
| 444 | 465.5 | 439.5 | 1980 | 1996 | |
| | | | | | 2197 |
| 446 | 467.8 | 441.8 | 1981 | 1997 | |

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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 |
|---|---|---|---|---|---|
| | | | | | 2197 |
| 448 | 469.9 | 443.9 | 1982 | 1998 | |
| | | | | | 2197 |
| 450 | 472.2 | 446.2 | 1983 | 1998 | |
| | | | | | 2197 |
| 452 | 474.4 | 448.4 | 1984 | 1999 | |
| | | | | | 2197 |
| 454 | 476.5 | 450.5 | 1985 | 2000 | |
| | | | | | 2197 |
| 456 | 478.8 | 452.8 | 1986 | 2001 | |
| | | | | | 2197 |
| 458 | 480.9 | 454.9 | 1987 | 2002 | |
| | | | | | 2197 |
| 460 | 483.2 | 457.2 | 1988 | 2003 | |
| | | | | | 2197 |
| 462 | 485.3 | 459.3 | 1989 | 2004 | |
| | | | | | 2197 |
| 464 | 487.5 | 461.5 | 1989 | 2005 | |
| | | | | | 2197 |
| 466 | 489.8 | 463.8 | 1990 | 2006 | |
| | | | | | 2197 |
| 468 | 491.9 | 465.9 | 1991 | 2006 | |
| | | | | | 2197 |
| 470 | 494.2 | 468.2 | 1992 | 2007 | |

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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 |
|---|---|---|---|---|---|
| | | | | | 2197 |
| 472 | 496.3 | 470.3 | 1993 | 2008 | |
| | | | | | 2197 |
| 474 | 498.6 | 472.6 | 1994 | 2009 | |
| | | | | | 2197 |
| 476 | 500.7 | 474.7 | 1995 | 2010 | |
| | | | | | 2197 |
| 478 | 503.0 | 477.0 | 1996 | 2011 | |
| | | | | | 2269 |
| 480 | 505.3 | 479.3 | 1997 | 2012 | |
| | | | | | 2270 |
| 482 | 507.6 | 481.6 | 1998 | 2013 | |
| | | | | | 2269 |
| 484 | 509.9 | 483.9 | 1999 | 2015 | |
| | | | | | 2270 |
| 486 | 512.2 | 486.2 | 2000 | 2016 | |
| | | | | | 2270 |
| 488 | 514.3 | 488.3 | 2001 | 2017 | |
| | | | | | 2269 |
| 490 | 516.6 | 490.6 | 2003 | 2018 | |
| | | | | | 2269 |
| 492 | 518.9 | 492.9 | 2004 | 2019 | |
| | | | | | 2270 |
| 494 | 521.1 | 495.1 | 2005 | 2020 | |

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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 |
|---|---|---|---|---|---|
| | | | | | 2270 |
| 496 | 523.4 | 497.4 | 2006 | 2021 | |
| | | | | | 2269 |
| 498 | 525.7 | 499.7 | 2007 | 2022 | |
| | | | | | 2270 |
| 500 | 528.0 | 502.0 | 2008 | 2023 | |
| | | | | | 2269 |
| 502 | 530.3 | 504.3 | 2009 | 2024 | |
| | | | | | 2270 |
| 504 | 532.6 | 506.6 | 2010 | 2025 | |
| | | | | | 2269 |
| 506 | 534.9 | 508.9 | 2011 | 2026 | |
| | | | | | 2270 |
| 508 | 537.0 | 511.0 | 2012 | 2027 | |
| | | | | | 2270 |
| 510 | 539.3 | 513.3 | 2013 | 2028 | |
| | | | | | 2269 |
| 512 | 541.6 | 515.6 | 2014 | 2029 | |
| | | | | | 2270 |
| 514 | 543.9 | 517.9 | 2015 | 2030 | |
| | | | | | 2270 |
| 516 | 546.1 | 520.1 | 2016 | 2031 | |
| | | | | | 2269 |
| 518 | 548.4 | 522.4 | 2017 | 2032 | |

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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 |
|---|---|---|---|---|---|
| | | | | | 2270 |
| 520 | 550.7 | 524.7 | 2018 | 2033 | |
| | | | | | 2270 |
| 522 | 553.0 | 527.0 | 2019 | 2035 | |
| | | | | | 2359 |
| 524 | 555.4 | 529.4 | 2021 | 2036 | |
| | | | | | 2359 |
| 526 | 557.7 | 531.7 | 2022 | 2037 | |
| | | | | | 2359 |
| 528 | 560.2 | 534.2 | 2023 | 2039 | |
| | | | | | 2359 |
| 530 | 562.4 | 536.4 | 2024 | 2040 | |
| | | | | | 2359 |
| 532 | 564.9 | 538.9 | 2026 | 2041 | |
| | | | | | 2359 |
| 534 | 567.2 | 541.2 | 2027 | 2042 | |
| | | | | | 2359 |
| 536 | 569.6 | 543.6 | 2028 | 2044 | |
| | | | | | 2359 |
| 538 | 571.9 | 545.9 | 2029 | 2045 | |
| | | | | | 2359 |
| 540 | 574.3 | 548.3 | 2031 | 2046 | |
| | | | | | 2359 |
| 542 | 576.6 | 550.6 | 2032 | 2047 | |

 

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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 |
|---|---|---|---|---|---|
| | | | | | 2360 |
| 544 | 579.1 | 553.1 | 2033 | 2049 | |
| | | | | | 2360 |
| 546 | 581.3 | 555.3 | 2034 | 2050 | |
| | | | | | 2359 |
| 548 | 583.8 | 557.8 | 2036 | 2051 | |
| | | | | | 2359 |
| 550 | 586.1 | 560.1 | 2037 | 2052 | |
| | | | | | 2359 |
| 552 | 588.5 | 562.5 | 2038 | 2054 | |
| | | | | | 2359 |
| 554 | 590.8 | 564.8 | 2039 | 2055 | |
| | | | | | 2359 |
| 556 | 593.2 | 567.2 | 2040 | 2056 | |
| | | | | | 2359 |
| 558 | 595.5 | 569.5 | 2041 | 2057 | |
| | | | | | 2359 |
| 560 | 597.8 | 571.8 | 2042 | 2058 | |
| | | | | | 2359 |
| 562 | 600.2 | 574.2 | 2044 | 2059 | |
| | | | | | 2359 |
| 564 | 602.7 | 576.7 | 2045 | 2061 | |
| | | | | | 2378 |
| 566 | 605.0 | 579.0 | 2046 | 2062 | |

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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 |
|---|---|---|---|---|---|
| | | | | | 2378 |
| 568 | 607.4 | 581.4 | 2047 | 2063 | |
| | | | | | 2378 |
| 570 | 609.7 | 583.7 | 2048 | 2064 | |
| | | | | | 2377 |
| 572 | 612.1 | 586.1 | 2049 | 2065 | |
| | | | | | 2377 |
| 574 | 614.6 | 588.6 | 2051 | 2067 | |
| | | | | | 2378 |
| 576 | 616.9 | 590.9 | 2052 | 2068 | |
| | | | | | 2378 |
| 578 | 619.3 | 593.3 | 2053 | 2069 | |
| | | | | | 2378 |
| 580 | 621.6 | 595.6 | 2054 | 2070 | |
| | | | | | 2378 |
| 582 | 624.0 | 598.0 | 2055 | 2071 | |
| | | | | | 2378 |
| 584 | 626.5 | 600.5 | 2056 | 2072 | |
| | | | | | 2378 |
| 586 | 628.7 | 602.7 | 2057 | 2073 | |
| | | | | | 2378 |
| 588 | 631.2 | 605.2 | 2058 | 2075 | |
| | | | | | 2378 |
| 590 | 633.5 | 607.5 | 2059 | 2076 | |

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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 |
|---|---|---|---|---|---|
| | | | | | 2377 |
| 592 | 635.9 | 609.9 | 2061 | 2077 | |
| | | | | | 2377 |
| 594 | 638.3 | 612.3 | 2062 | 2078 | |
| | | | | | 2378 |
| 596 | 640.6 | 614.6 | 2063 | 2079 | |
| | | | | | 2378 |
| 598 | 643.1 | 617.1 | 2064 | 2080 | |
| | | | | | 2378 |
| 600 | 645.4 | 619.4 | 2065 | 2081 | |
| | | | | | 2378 |
| 602 | 647.8 | 621.8 | 2066 | 2082 | |
| | | | | | 2378 |
| 604 | 650.2 | 624.2 | 2067 | 2083 | |
| | | | | | 2378 |
| 606 | 652.5 | 626.5 | 2068 | 2084 | |
| | | | | | 2378 |
| 608 | 654.8 | 628.8 | 2068 | 2085 | |
| | | | | | 2378 |
| 610 | 657.1 | 631.1 | 2069 | 2085 | |
| | | | | | 2168 |
| 612 | 659.5 | 633.5 | 2070 | 2087 | |
| | | | | | 2939 |
| 614 | 661.5 | 635.5 | 2070 | 2087 | |

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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 |
|---|---|---|---|---|---|
| | | | | | 2148 |
| 616 | 664.1 | 638.1 | 2072 | 2088 | |
| | | | | | 2283 |
| 618 | 666.7 | 640.7 | 2074 | 2090 | |
| | | | | | 2436 |
| 620 | 669.1 | 643.1 | 2075 | 2092 | |
| | | | | | 2091 |
| 622 | 671.3 | 645.3 | 2075 | 2092 | |
| | | | | | 2065 |
| 624 | 674.0 | 648.0 | 2077 | 2094 | |
| | | | | | 2456 |
| 626 | 676.4 | 650.4 | 2078 | 2096 | |
| | | | | | 2306 |
| 628 | 678.9 | 652.9 | 2079 | 2097 | |
| | | | | | 2566 |
| 630 | 681.0 | 655.0 | 2080 | 2097 | |
| | | | | | 2124 |
| 632 | 683.3 | 657.3 | 2080 | 2098 | |
| | | | | | 2113 |
| 634 | 685.4 | 659.4 | 2080 | 2098 | |
| | | | | | 1977 |
| 636 | 687.7 | 661.7 | 2081 | 2098 | |
| | | | | | 2380 |
| 638 | 690.2 | 664.2 | 2082 | 2099 | |

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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 |
|---|---|---|---|---|---|
| | | | | | 2443 |
| 640 | 692.1 | 666.1 | 2082 | 2099 | |
| | | | | | 1897 |
| 642 | 694.3 | 668.3 | 2082 | 2099 | |
| | | | | | 2334 |
| 644 | 696.4 | 670.4 | 2082 | 2099 | |
| | | | | | 2050 |
| 646 | 698.2 | 672.2 | 2081 | 2099 | |
| | | | | | 1890 |
| 648 | 700.4 | 674.4 | 2081 | 2098 | |
| | | | | | 1902 |
| 650 | 702.4 | 676.4 | 2081 | 2098 | |
| | | | | | 1945 |
| 652 | 704.5 | 678.5 | 2081 | 2098 | |
| | | | | | 2151 |
| 654 | 706.6 | 680.6 | 2082 | 2099 | |
| | | | | | 1953 |
| 656 | 708.9 | 682.9 | 2082 | 2099 | |
| | | | | | 2952 |
| 658 | 711.0 | 685.0 | 2082 | 2099 | |
| | | | | | 2085 |
| 660 | 713.0 | 687.0 | 2082 | 2099 | |
| | | | | | 2023 |
| 662 | 715.0 | 689.0 | 2082 | 2099 | |

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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 |
|---|---|---|---|---|---|
| | | | | | 1971 |
| 664 | 717.3 | 691.3 | 2082 | 2099 | |
| | | | | | 2325 |
| 666 | 719.4 | 693.4 | 2082 | 2099 | |
| | | | | | 2074 |
| 668 | 721.4 | 695.4 | 2082 | 2099 | |
| | | | | | 2037 |
| 670 | 723.4 | 697.4 | 2082 | 2098 | |
| | | | | | 1946 |
| 672 | 725.5 | 699.5 | 2082 | 2099 | |
| | | | | | 2016 |
| 674 | 727.8 | 701.8 | 2083 | 2099 | |
| | | | | | 2219 |
| 676 | 730.2 | 704.2 | 2084 | 2100 | |
| | | | | | 2369 |
| 678 | 732.7 | 706.7 | 2085 | 2101 | |
| | | | | | 2494 |
| 680 | 735.1 | 709.1 | 2086 | 2102 | |
| | | | | | 2397 |
| 682 | 737.4 | 711.4 | 2086 | 2103 | |
| | | | | | 2366 |
| 684 | 739.7 | 713.7 | 2087 | 2104 | |
| | | | | | 2310 |
| 686 | 742.0 | 716.0 | 2087 | 2104 | |

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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 |
|---|---|---|---|---|---|
| | | | | | 2238 |
| 688 | 744.4 | 718.4 | 2088 | 2105 | |
| | | | | | 2503 |
| 690 | 746.9 | 720.9 | 2090 | 2106 | |
| | | | | | 2447 |
| 692 | 749.0 | 723.0 | 2090 | 2107 | |
| | | | | | 2568 |
| 694 | 751.0 | 725.0 | 2089 | 2106 | |
| | | | | | 1855 |
| 696 | 753.1 | 727.1 | 2090 | 2106 | |
| | | | | | 2089 |
| 698 | 755.1 | 729.1 | 2089 | 2106 | |
| | | | | | 2230 |
| 700 | 757.1 | 731.1 | 2089 | 2106 | |
| | | | | | 1903 |
| 702 | 759.0 | 733.0 | 2088 | 2105 | |
| | | | | | 1920 |
| 704 | 761.3 | 735.3 | 2089 | 2106 | |
| | | | | | 2251 |
| 706 | 763.9 | 737.9 | 2091 | 2108 | |
| | | | | | 2351 |
| 708 | 766.5 | 740.5 | 2092 | 2109 | |
| | | | | | 2287 |
| 710 | 769.3 | 743.3 | 2094 | 2111 | |

# GEOGRAM+

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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 |
|---|---|---|---|---|---|
| | | | | | 2592 |
| 712 | 771.7 | 745.7 | 2095 | 2112 | |
| | | | | | 2457 |
| 714 | 774.1 | 748.1 | 2096 | 2113 | |
| | | | | | 2493 |
| 716 | 776.6 | 750.6 | 2097 | 2114 | |
| | | | | | 2480 |
| 718 | 779.0 | 753.0 | 2098 | 2115 | |
| | | | | | 2430 |
| 720 | 781.4 | 755.4 | 2099 | 2116 | |
| | | | | | 2428 |
| 722 | 784.0 | 758.0 | 2100 | 2117 | |
| | | | | | 2513 |
| 724 | 786.5 | 760.5 | 2101 | 2118 | |
| | | | | | 2451 |
| 726 | 788.9 | 762.9 | 2102 | 2119 | |
| | | | | | 2459 |
| 728 | 791.4 | 765.4 | 2103 | 2120 | |
| | | | | | 2509 |
| 730 | 793.9 | 767.9 | 2104 | 2122 | |
| | | | | | 2435 |
| 732 | 796.4 | 770.4 | 2105 | 2122 | |
| | | | | | 2618 |
| 734 | 798.8 | 772.8 | 2106 | 2124 | |

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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 |
|---|---|---|---|---|---|
| | | | | | 2478 |
| 736 | 801.1 | 775.1 | 2106 | 2124 | |
| | | | | | 2485 |
| 738 | 803.7 | 777.7 | 2108 | 2125 | |
| | | | | | 2355 |
| 740 | 806.1 | 780.1 | 2108 | 2126 | |
| | | | | | 2502 |
| 742 | 808.6 | 782.6 | 2109 | 2127 | |
| | | | | | 2245 |
| 744 | 811.2 | 785.2 | 2111 | 2129 | |
| | | | | | 2542 |
| 746 | 813.8 | 787.8 | 2112 | 2130 | |
| | | | | | 2703 |
| 748 | 816.7 | 790.7 | 2114 | 2132 | |
| | | | | | 2716 |
| 750 | 819.5 | 793.5 | 2116 | 2135 | |
| | | | | | 2418 |
| 752 | 822.1 | 796.1 | 2118 | 2136 | |
| | | | | | 2925 |
| 754 | 824.7 | 798.7 | 2119 | 2138 | |
| | | | | | 2616 |
| 756 | 827.3 | 801.3 | 2120 | 2139 | |
| | | | | | 2661 |
| 758 | 829.9 | 803.9 | 2121 | 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 |
|---|---|---|---|---|---|
| | | | | | 2504 |
| 760 | 833.0 | 807.0 | 2123 | 2143 | |
| | | | | | 2733 |
| 762 | 835.9 | 809.9 | 2126 | 2145 | |
| | | | | | 3166 |
| 764 | 838.9 | 812.9 | 2128 | 2148 | |
| | | | | | 3105 |
| 766 | 841.8 | 815.8 | 2130 | 2150 | |
| | | | | | 2963 |
| 768 | 844.5 | 818.5 | 2132 | 2152 | |
| | | | | | 2543 |
| 770 | 847.1 | 821.1 | 2133 | 2154 | |
| | | | | | 2596 |
| 772 | 850.0 | 824.0 | 2135 | 2156 | |
| | | | | | 2662 |
| 774 | 852.8 | 826.8 | 2136 | 2158 | |
| | | | | | 2821 |
| 776 | 855.5 | 829.5 | 2138 | 2159 | |
| | | | | | 2716 |
| 778 | 858.4 | 832.4 | 2140 | 2161 | |
| | | | | | 2961 |
| 780 | 861.5 | 835.5 | 2142 | 2164 | |
| | | | | | 2892 |
| 782 | 864.5 | 838.5 | 2145 | 2167 | |

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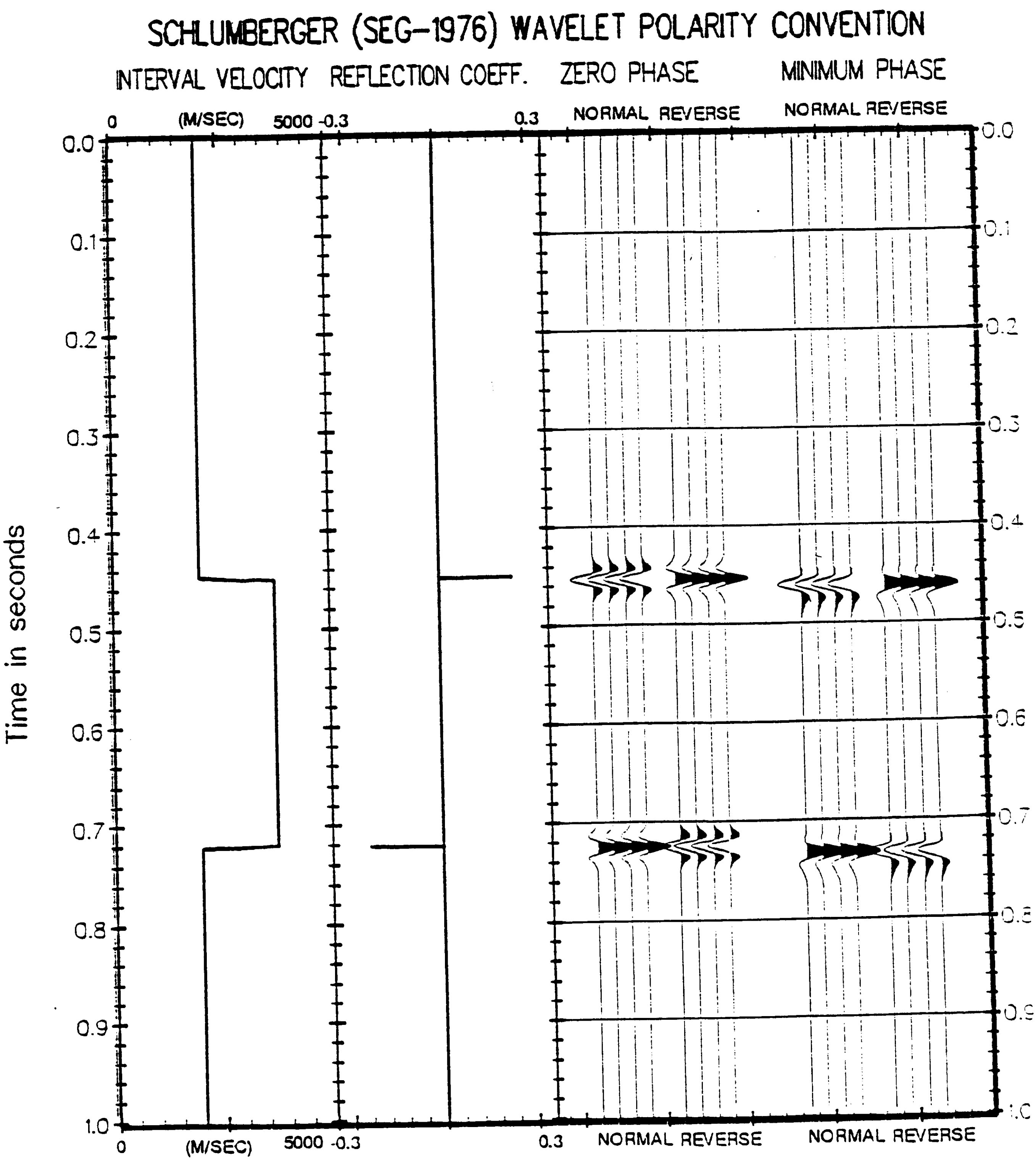
# GEOGRAM+
## Velocity Report

## 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 |
|---|---|---|---|---|---|
| | | | | | 3062 |
| 784 | 867.6 | 841.6 | 2147 | 2170 | |
| | | | | | 2846 |
| 786 | 870.4 | 844.4 | 2149 | 2172 | |
| | | | | | 3135 |
| 788 | 872.9 | 846.9 | 2150 | 2173 | |
| | | | | | 2563 |
| 790 | 875.2 | 849.2 | 2150 | 2173 | |
| | | | | | 2224 |
| 792 | 877.6 | 851.6 | 2150 | 2174 | |
| | | | | | 2329 |
| 794 | 879.7 | 853.7 | 2151 | 2174 | |


SCHLUMBERGER (SEG-1976) WAVELET POLARITY CONVENTION
INTERVAL VELOCITY
REFLECTION COEFF.
ZERO PHASE
MINIMUM PHASE
NORMAL
REVERSE
NORMAL
REVERSE
0
(M/SEC)
5000
-0.3
0.3
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

# APPENDIX 12

BALEEN-2

## ROUTINE CORE ANALYSIS REPORT

-ACS LABORATORIES-

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ACS LABORATORIES PTY. LTD.

**ROUTINE CORE ANALYSIS FINAL REPORT**

**of**

***BALEEN-2***

**for**

***OMV AUSTRALIA PTY LTD***

**by**

**ACS LABORATORIES PTY LTD**

807960 228

3 April 2000

ACS LABORATORIES PTY. LTD.

OMV Australia Pty Ltd
Level 29, St Martins Tower
44 St Georges Tce
PERTH WA 6000

Attention: Mr Mark Adamson

**FINAL REPORT: 0308-02**
**BALEEN-2**

**CLIENT REFERENCE:** OSA-1999-008

**MATERIAL:** 4" diameter Whole Core

**LOCALITY:** VIC RL5

**WORK REQUIRED:** Routine Core Analysis and Core Stabilization

Please direct technical inquiries regarding this work to the signatory below under whose supervision the work was conducted.

**IAN MANGELSDORF**
Field Services & Core Properties Supervisor

**PETER N CROZIER**
Operations Manager



Brisbane Laboratory: P.O. Box 396, Chermside South, Qld 4032, Australia
☎: 61 7 3350 1222 Facsimile: 3359 0666
E-mail: acs.bris@acslabs.com.au
ACS Laboratories Pty Ltd
ACN: 008 273 005

# CONTENTS

# *CHAPTER 1*

## LOGISTICS AND INTRODUCTION

# 1. LOGISTICS AND INTRODUCTION

## 1.1 Logistics and Core Resination

ACS personnel travelled to the Baleen-2 well site on 11th October 1999 to resinate the core and to supervise the handling of the core to ensure minimal damage prior to arriving in the laboratory. The cored intervals were cut into one metre lengths for processing. The annulus of each length of core was then filled with an expanding iso-cyanate resin to prevent the core from being disturbed during transit. All core was then packed into custom designed core chiller boxes for transport back to the laboratory. The core was picked up at the Toll Energy Logistics yard, Geelong by ACS personnel on the 21st October 1999 and transported to ACS Laboratories Brisbane laboratory for analysis.

| | | |
|---|---|---|
| Core No. 1 | 746.00 m – 762.20 m | (16.20 m) |
| Core No. 2 | 763.70 m – 779.50 m | (15.80 m) |

(Note: Core No. 2 depths have been adjusted to reflect the wireline depths)

## 1.2 Introduction

This final report presents the results from a routine core analysis study performed on core from the Baleen-2 well. The study was undertaken as per instructions received from OMV Australia Pty Ltd on the 26th October 1999.

The following report includes tabular data of ambient and overburden permeability to air and helium injection porosity, and density determinations. Data presented graphically includes a core log plot of the above and porosity versus permeability to air plots.

# *CHAPTER 2*

## STUDY AIMS

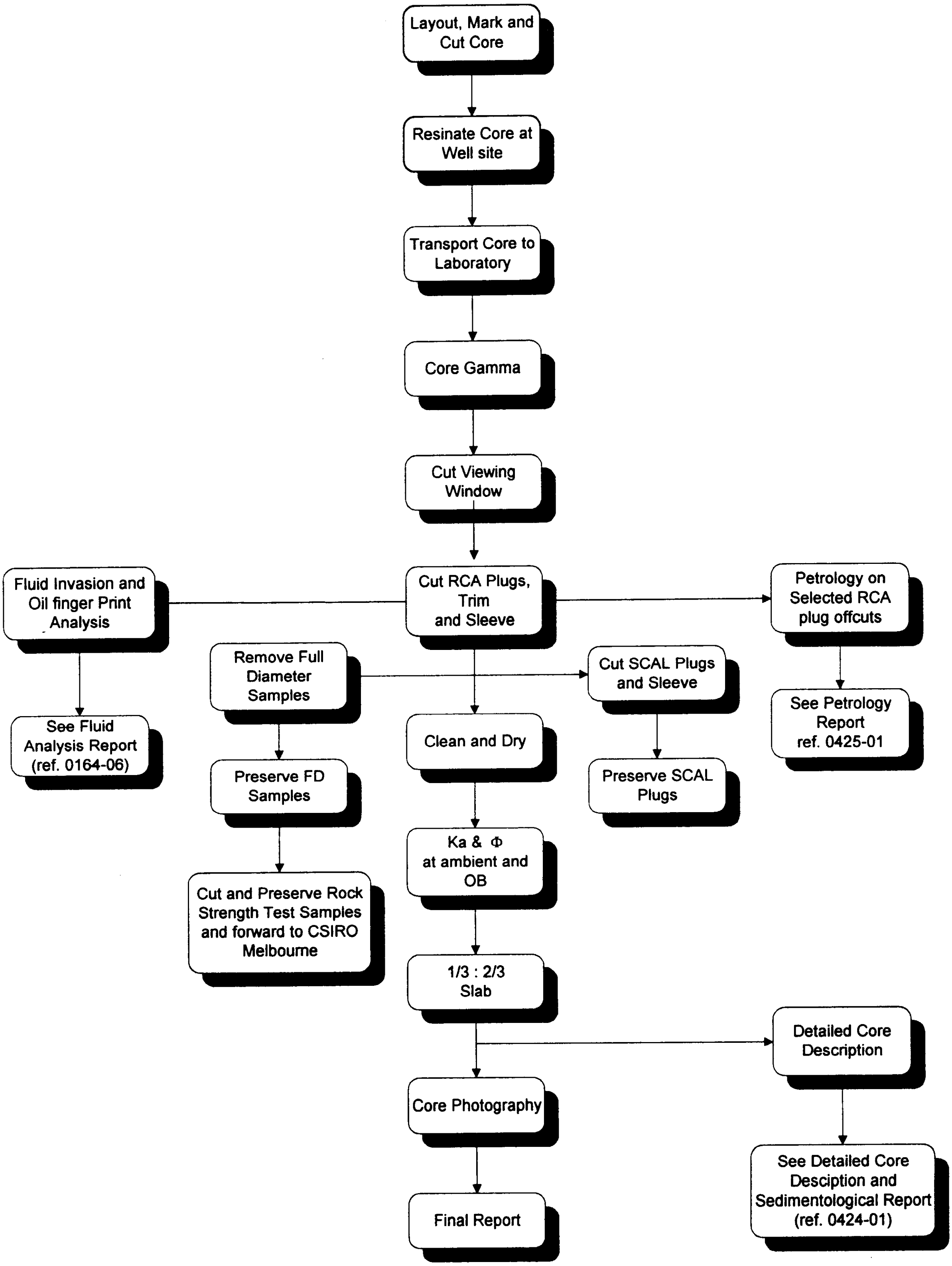
## 2. STUDY AIMS

The analyses were performed with the following aims:

1. To provide depth correlation through the provision of a continuous core gamma log over the cored interval.
2. To provide air permeability, helium injection porosity and density data.
3. To investigate the effects of Overburden Stress on the core through provision of multiple overburden analysis.
4. To investigate invasion of drilling mud and filtrate into the core.
5. Extract oil from zones with show for finger print analysis.
6. Preserve sample for further studies.

The data from the core invasion by drilling mud and filtrate and extracted oil analysis is found in the Fluids Analysis Final Report (ref. 0164-06).

## *STUDY OUTLINE*



# *CHAPTER 3*

## SAMPLING

# 3. SAMPLING

## 3.1 Initial Inspection of Core Slab

A two-inch inspection "window" was cut from the top of the core to ensure samples were selected at the best possible location (ie less likely to be fractured or contain resin).

## 3.2 Routine Core Analysis Samples

A suite of 1½" diameter horizontal plug samples were cut, at a rate of 3 per metre, using liquid $N_2$ as the bit lubricant. All plugs were trimmed to right cylinders and placed in lead sleaves with stainless steel mesh end screens. The off-cuts were labelled and bagged for possible future analysis.

## 3.3 Fluid Invasion Samples

Three samples points were chosen by OMV Australia Pty Ltd personnel for fluid invasion profiles. Each sample was punched from the core using a specially designed soft sediment core sampling apparatus. The sample was then divided into five equal sections prior to being sleeved in lead with stainless steal end screens. The results of this study are found in Fluids Analysis Final Report (ref. 0164-06), dated 23rd February.

## 3.4 Oil Finger Print Samples

Two sample points were chosen to obtain oil samples for finger print analysis. Each sample was punched from the core using a specially designed soft sediment core sampling apparatus. The sample was then crushed and extracted with Di-Chloromethane to remove the oil. The results of this study are found in Fluids Analysis Final Report (ref. 0164-06), dated 23rd February.

## 3.5 Full Diameter Samples

Five whole core sections were taken from the core and preserved for further analysis. These whole core samples were subsequently completely drilled out and the plug samples forwarded to the CSIRO, Melbourne, as requested, for rock strength analysis.

## 3.6 Special Core Analysis Samples

One SCAL sample was taken every metre throughout the core using liquid $N_2$ as the bit lubricant. Each sample was sleeved using Teflon heat shrink tubing and stainless steel end screens. The samples were frozen and stored waiting for further analysis. See sample listing in Appendix IV.

### 3.7 1/3 : 2/3 Core Slab

Upon completion of the sampling, the core was slabbed longitudinally into two sections (1/3 : 2/3) using air as the blade cooling and lubricating medium.

# *CHAPTER 4*

## SAMPLE PREPARATION

# 4. SAMPLE PREPARATION

## 4.1 Sample Extraction

The RCA samples were initially dried under humid conditions at 60°C for two hours to remove the majority of the pore water, aiding the efficiency of the extraction process. They were then placed in a soxhlet extractor to remove any remaining oil and salt from the pore spaces. The solvent used was 3:1 chloroform:methanol. Cleaning continued until a sample of solvent from the soxhlet chamber tested negative to salt precipitation, using silver nitrate, and no fluorescence was observed in the sample under ultra-violet light. The sample fluorescence was checked by carefully removing the screens of a representative selection of samples. The screens were then replaced.

## 4.2 Sample Drying

After extraction, the samples were humidity dried at 60°C and 40% relative humidity to a constant weight. Once dried, they were stored in an airtight container and allowed to cool to room temperature before analysis.

# *CHAPTER 5*

## TEST PROCEDURES

# 5. TEST PROCEDURES

## 5.1 Continuous Core Gamma

The core was laid out according to depth markings, and a continuous core gamma trace produced by passing the core beneath a gamma radiation detector. The detector is protected from extraneous radiation by a lead tunnel. The detector signal is amplified and digitised to produce a gamma trace for comparison with the down hole log. After comparison with the down hole gamma log it was decided by OMV Australia Pty Ltd personnel that the depth of Core No.2 was to be shifted to match with the down hole data. A plus 1.4 metre correction was made to the drillers depths of core 2 to match the Schlumberger GR log.

## 5.2 Porosity

The porosity of the cleaned and dried core plugs was determined as follows. Each plug was first placed in a sealed matrix cup. Helium held at 100 psi reference pressure was then introduced to the cup. From the resultant pressure change the unknown grain volume was calculated using Boyle's Law.

$$P_1V_1 = P_2V_2$$
$$\Rightarrow P_1Vr = P_2(Vr+Vc-Vg)$$

*where:*
$P_1$ = *initial pressure (atmospheres)*
$P_2$ = *final pressure (atmospheres)*
$Vr$ = *reference cell volume (cm³)*
$Vc$ = *matrix cup volume (cm³)*
$Vg$ = *grain volume (cm³)*

To determine the pore volume of the core plug at overburden pressure, the sample was placed in a thick walled rubber sleeve. This assembly was then loaded into a hydrostatic cell. A confining pressure of 400 psi was then applied to the samples and the pore volume determined.

The bulk volume is determined by the addition of the pore volume and the grain volume. The porosity is calculated as the volume percentage of the pore space with respect to the bulk volume.

$$Vb = Vp + Vg$$

$$\text{Porosity \%} = \frac{Vp}{Vb} x 100$$

*where:*
$Vp$ = *pore volume (cm³)*
$Vb$ = *bulk volume (cm³)*
$Vg$ = *grain volume (cm³)*

## 5.3 Permeability

The plugs were placed in a Hassler cell at a confining pressure of 400 psig. This pressure is used to prevent bypassing of air around the sample when the measurement is made.

During the measurement a known air pressure is applied to the upstream face of the sample, creating a flow of air through the sample. Permeability for each sample is then calculated using Darcy's Law, through knowledge of the upstream pressure and flow rate during the test, the viscosity of air and the plug dimensions.

$$Ka = \frac{2000.BP.\mu.q.L}{(P_1^2 - P_2^2).A}$$

where
- $Ka$ = *air permeability (milliDarcy's)*
- $BP$ = *barometric pressure (atmospheres)*
- $\mu$ = *gas viscosity (cP)*
- $q$ = *flow rate ($cm^3/s$) at barometric pressure*
- $L$ = *sample length (cm)*
- $P_1$ = *upstream pressure (atmospheres)*
- $P_2$ = *downstream pressure (atmospheres)*
- $A$ = *sample cross sectional area ($cm^2$)*

## 5.4 Apparent Grain Density

The apparent grain density is calculated by dividing the weight of the plug by the grain volume determined from the helium injection porosity measurement.

## 5.5 Porosity and Permeability at Overburden Pressure

To determine the porosity and permeability of the core plug at overburden pressure, the sample is placed in a heavy duty Hassler sleeve. The assembly is loaded into a thick walled hydrostatic cell capable of withstanding the simulated reservoir overburden stress. After loading, helium injection porosity and air permeability are determined at simulated reservoir load conditions. Two reservoir pressures (700 psi and 1040 psi) as supplied by OMV Australia Pty Ltd, were used.

## 5.6 Core Photography

The core photography was carried out on the 2/3 slab of core.

Photographs of the core were taken in a 5 metre format under white and ultra violet light. 30cm, 1:1 scale photos were taken over sections of core where SCAL plugs were taken. The sections of core coinciding with SCAL samples #15 and #29 were not photographed as this core had been sealed for rock strength analysis. The film was then digitally scanned, edited and printed.

# *CHAPTER 6*

## COMMENTS

## 6. COMMENTS

Due to the soft nature of the core while wet, special care and attention was given to make sure the core was in good condition, and representative core analysis data could be obtained when the core arrived in the laboratory. This process relied on the co-operation of the DBS coring contactors, the ACS core hands, the well site geologist, and the drill and deck crew of the rig. The laying down and cutting up of the core was organized so as to keep the movement of the core to a minimum. Each one-meter section was inspected to determine the state of the annulus and it was decided that the best method of stabilizing the core was to pump the resin into the barrels. On inspection of the core after slabbing it can be seen that the resin has filled the entire anulus as well as intruding into some of the fractured sections of the core.

Once the resin had set, the core was placed in a rig chiller container for transport to shore. The container was kept at a temperature of 2-3°C. This reduced temperature helps keep the pore structure of the core intact. Once on shore the core was transferred to special ACS core transport boxes for transport to our Brisbane laboratory. Dry Ice was used to keep the temperature low.

The porosity versus permeability cross plots indicate a regular trend throughout the cored interval, with the few outliers that do appear, likely to be associated with lithology rather than fracturing. The grain densities vary throughout the core because of the presence of many siderite and pyrite filled burrows.

# *CHAPTER 7*

## SAMPLE DISTRIBUTION AND STORAGE

## 7. SAMPLE DISTRIBUTION AND STORAGE

The 2/3 slab of core has been forwarded to OMV Australia Pty Ltd Core and Cuttings Store at Kestrel Information Management Pty Ltd, Welshpool, WA.

The 1/3 slab of core has been forwarded to the Victorian Department of Natural Resources and energy Core Store at Werribee, Victoria.

All RCA samples and off-cuts have been sent to OMV Australia Pty Ltd Core and Cuttings Store.

# *APPENDIX I*

## TEST RESULTS

# OVERBURDEN CORE ANALYSIS FINAL REPORT

**Client:** : OMV Australia Pty Ltd
**Well** : Baleen-2
**Field** : Baleen
**Core Int.** : 746.00m - 762.20m
**Core Int.** : 763.70m - 779.50m

**Date** : 2/11/1999
**File** : 0308-02
**Location** : VIC/RL5
**Analysts** : pnc, ijm, kw

| Sample Number | Depth | Dir | Porosity @ 400 psi | Porosity @ 700 psi | Porosity @1040 psi | Grain Density | Ka @ 400 psi | Ka @ 700psi | Ka @ 1040psi |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 746.20 | R | 28.6 | 27.9 | 27.3 | 3.04 | 69.5 | 43.0 | 31.5 |
| 2 | 746.56 | R | 34.4 | 33.4 | 32.3 | 2.80 | 49.9 | 26.0 | 17.0 |
| 3 | 746.81 | R | 35.6 | 34.8 | 33.8 | 2.88 | 209 | 172 | 141 |
| 4 | 747.07 | R | 7.4 | 7.3 | 7.3 | 3.17 | 0.03 | 0.02 | 0.02 |
| 5 | 747.54 | R | 31.8 | 31.6 | 31.0 | 2.66 | 60.6 | 55.2 | 41.9 |
| 6 | 747.80 | R | 33.8 | 33.4 | 32.9 | 2.67 | 132 | 113 | 93.8 |
| 7 | Failed | | | | | | | | |
| 8 | 748.45 | R | 36.9 | 36.0 | 35.1 | 2.66 | 299 | 247 | 215 |
| 9 | 748.82 | R | 34.9 | 34.0 | 33.3 | 2.65 | 188 | 165 | 146 |
| 10 | 749.19 | R | 35.3 | 35.0 | 34.0 | 2.67 | 158 | 151 | 126 |
| 11 | 749.56 | R | 25.2 | 24.9 | 24.6 | 2.77 | 34.0 | 29.2 | 26.6 |
| 12 | 749.80 | R | 33.9 | 33.0 | 32.3 | 2.66 | 103 | 87.3 | 80.0 |
| 13 | 750.19 | R | 32.2 | 31.7 | 30.9 | 2.67 | 57.6 | 46.1 | 36.6 |
| 14 | 750.50 | R | 33.2 | 32.3 | 31.7 | 2.65 | 92.3 | 75.5 | 65.2 |
| 15 | 750.80 | R | 31.4 | 30.6 | 30.1 | 2.66 | 40.5 | 33.3 | 28.2 |
| 16 | 751.20 | R | 32.4 | 31.5 | 30.7 | 2.66 | 36.5 | 27.5 | 22.6 |
| 17 | 751.50 | R | 30.4 | 29.5 | 28.9 | 2.84 | 50.1 | 40.1 | 33.9 |
| 18 | 751.81 | R | 31.6 | 30.4 | 29.8 | 2.66 | 28.0 | 19.0 | 16.4 |
| 19 | 752.12 | R | 33.7 | 32.8 | 32.3 | 2.66 | 89.0 | 68.3 | 58.6 |
| 20 | 752.44 | R | 13.5 | 13.4 | 13.3 | 3.03 | 2.89 | 2.83 | 2.80 |
| 21 | 752.81 | R | 35.5 | 34.8 | 34.1 | 2.68 | 169 | 136 | 115 |
| 22 | 753.19 | R | 35.7 | 35.4 | 34.8 | 2.66 | 184 | 171 | 158 |
| 23 | 753.49 | R | 35.3 | 34.6 | 34.1 | 2.65 | 154 | 137 | 126 |
| 24 | 753.79 | R | 36.7 | 36.1 | 35.7 | 2.68 | 234 | 217 | 205 |
| 25 | 754.20 | R | 36.0 | 35.5 | 35.1 | 2.67 | 327 | 302 | 282 |
| 26 | 754.51 | R | 36.2 | 35.7 | 35.5 | 2.68 | 346 | 318 | 301 |
| 27 | 754.81 | R | 36.5 | 36.0 | 35.6 | 2.69 | 342 | 313 | 293 |
| 28 | 755.11 | R | 27.9 | 27.6 | 27.3 | 2.79 | 66.7 | 63.8 | 62.3 |
| 29 | 755.49 | R | 28.4 | 28.1 | 27.8 | 2.78 | 96.4 | 93.3 | 90.8 |
| 30 | 755.78 | R | 30.8 | 30.6 | 30.3 | 2.75 | 217 | 208 | 203 |
| 31 | 756.18 | R | 37.7 | 37.2 | 36.6 | 2.67 | 433 | 393 | 363 |
| 32 | 756.50 | R | 37.4 | 36.5 | 36.0 | 2.65 | 355 | 324 | 295 |
| 33 | 756.82 | R | 37.0 | 36.2 | 35.8 | 2.66 | 301 | 279 | 256 |
| 34 | 757.14 | R | 37.4 | 36.5 | 35.9 | 2.66 | 309 | 273 | 244 |
| 35 | 757.50 | R | 36.3 | 35.5 | 34.9 | 2.65 | 222 | 193 | 171 |
| 36 | 757.81 | R | 33.9 | 33.1 | 32.6 | 2.64 | 124 | 107 | 96.4 |
| 37 | 758.18 | R | 34.6 | 33.8 | 33.3 | 2.63 | 175 | 154 | 138 |
| 38 | 758.49 | R | 33.1 | 32.4 | 31.9 | 2.63 | 89.6 | 77.5 | 68.9 |
| 39 | 758.80 | R | 32.3 | 31.6 | 31.1 | 2.63 | 59.3 | 46.6 | 40.2 |
| 40 | 759.17 | R | 34.4 | 33.7 | 33.3 | 2.65 | 134 | 119 | 110 |
| 41 | 759.50 | R | 36.4 | 35.5 | 34.8 | 2.73 | 256 | 176 | 147 |
| 42 | 759.82 | R | 36.9 | 36.2 | 35.7 | 2.69 | 187 | 167 | 153 |
| 43 | 760.19 | R | 36.7 | 36.3 | 35.8 | 2.73 | 482 | 382 | 328 |
| 44 | 760.45 | R | 32.7 | 32.4 | 32.1 | 2.80 | 394 | 218 | 167 |
| 45 | 760.72 | R | 14.4 | 14.2 | 14.1 | 3.01 | 6.5 | 6.3 | 6.2 |

| Sample Number | Depth | Dir | Porosity @ 400 psi | Porosity @ 700 psi | Porosity @1040 psi | Grain Density | Ka @ 400 psi | Ka @ 700psi | Ka @ 1040psi |
|---|---|---|---|---|---|---|---|---|---|
| 46 | 761.19 | R | 24.9 | 24.7 | 24.5 | 2.94 | 28.1 | 26.2 | 25.2 |
| 47 | 763.87 | R | 9.2 | 9.1 | 9.0 | 3.09 | 0.07 | 0.05 | 0.03 |
| 48 | 764.19 | R | 26.8 | 26.6 | 26.4 | 2.95 | 72.8 | 70.5 | 68.8 |
| 49 | 764.60 | R | 34.8 | 34.5 | 34.3 | 2.80 | 276 | 262 | 253 |
| 50 | 764.89 | R | 37.5 | 37.0 | 36.7 | 2.77 | 310 | 289 | 274 |
| 51 | 765.15 | R | 39.0 | 38.4 | 37.9 | 2.71 | 242 | 217 | 198 |
| 52 | 765.59 | R | 14.4 | 14.4 | 14.3 | 3.04 | 0.05 | 0.03 | 0.02 |
| 53 | 765.86 | R | 30.9 | 30.5 | 30.1 | 2.90 | 176 | 165 | 159 |
| 54 | 766.22 | R | 22.6 | 22.4 | 22.3 | 3.07 | 2.76 | 2.28 | 2.00 |
| 55 | 766.59 | R | 37.8 | 37.1 | 36.4 | 2.77 | 148 | 118 | 103 |
| 56 | 766.91 | R | 34.7 | 34.1 | 33.5 | 2.89 | 120 | 90.1 | 76.2 |
| 57 | 767.18 | R | 25.1 | 24.8 | 24.6 | 3.01 | 57.0 | 41.4 | 33.6 |
| 58 | 767.64 | R | 13.8 | 13.7 | 13.7 | 3.03 | 0.39 | 0.35 | 0.33 |
| 59 | 767.99 | R | 22.3 | 22.1 | 21.9 | 3.00 | 14.4 | 14.0 | 13.8 |
| 60 | 768.32 | R | 33.1 | 32.3 | 31.6 | 2.67 | 91.9 | 80.4 | 73.2 |
| 61 | 768.60 | R | 32.2 | 31.1 | 30.3 | 2.66 | 29.6 | 19.3 | 15.7 |
| 62 | 768.90 | R | 31.0 | 30.1 | 29.4 | 2.65 | 32.8 | 19.3 | 15.4 |
| 63 | 769.22 | R | 36.6 | 35.1 | 33.7 | 2.80 | 215 | 108 | 67.0 |
| 64 | 769.63 | R | 31.2 | 30.3 | 29.6 | 2.67 | 19.6 | 15.2 | 12.6 |
| 65 | 769.97 | R | 31.0 | 29.9 | 29.1 | 2.68 | 12.4 | 8.5 | 6.7 |
| 66 | 770.22 | R | 30.0 | 29.1 | 28.3 | 2.65 | 17.2 | 11.8 | 8.7 |
| 67 | 770.59 | R | 31.3 | 30.3 | 29.5 | 2.64 | 73.1 | 37.8 | 25.0 |
| 68 | 770.89 | R | 31.7 | 30.6 | 29.8 | 2.66 | 31.1 | 22.0 | 17.7 |
| 69 | 771.29 | R | 31.3 | 30.4 | 29.4 | 2.69 | 30.4 | 21.0 | 16.1 |
| 70 | 771.60 | R | 11.7 | 11.7 | 11.6 | 3.13 | 0.13 | 0.13 | 0.12 |
| 71 | 771.90 | R | 34.7 | 33.8 | 33.1 | 2.69 | 76.5 | 63.9 | 56.5 |
| 72 | 772.22 | R | 34.8 | 34.1 | 33.3 | 2.67 | 73.2 | 59.8 | 52.6 |
| 73 | 772.58 | R | 35.9 | 34.8 | 34.1 | 2.66 | 107 | 72.3 | 57.7 |
| 74 | 772.91 | R | 36.7 | 35.7 | 34.9 | 2.71 | 189 | 140 | 113 |
| 75 | 773.21 | R | 35.3 | 34.5 | 34.0 | 2.69 | 78.6 | 64.9 | 58.0 |
| 76 | 773.58 | R | 34.5 | 33.8 | 33.1 | 2.71 | 70.6 | 53.9 | 46.7 |
| 77 | 773.90 | R | 34.7 | 34.0 | 33.3 | 2.68 | 79.8 | 67.0 | 59.6 |
| 78 | 774.26 | R | 33.4 | 33.1 | 32.8 | 2.76 | 124 | 118 | 113 |
| 79 | 774.52 | R | 39.1 | 38.5 | 38.0 | 2.70 | 523 | 471 | 434 |
| 80 | 774.90 | R | 35.5 | 34.9 | 34.5 | 2.66 | 186 | 168 | 155 |
| 81 | 775.20 | R | 35.6 | 34.8 | 34.3 | 2.66 | 163 | 137 | 119 |
| 82 | 775.62 | R | 38.9 | 37.7 | 36.9 | 2.73 | 498 | 389 | 319 |
| 83 | 775.91 | R | 36.7 | 36.0 | 35.5 | 2.66 | 356 | 294 | 258 |
| 84 | 776.25 | R | 36.6 | 35.9 | 35.4 | 2.65 | 304 | 263 | 238 |
| 85 | 776.60 | R | 36.4 | 35.8 | 35.3 | 2.66 | 308 | 279 | 256 |
| 86 | 776.91 | R | 37.0 | 36.0 | 35.3 | 2.79 | 464 | 371 | 318 |
| 87 | 777.20 | R | 36.4 | 35.9 | 35.4 | 2.65 | 327 | 294 | 272 |
| 88 | 777.60 | R | 34.9 | 34.4 | 34.0 | 2.66 | 297 | 272 | 257 |
| 89 | 777.91 | R | 35.9 | 35.2 | 34.8 | 2.65 | 358 | 320 | 297 |
| 90 | 778.21 | R | 35.8 | 35.1 | 34.7 | 2.66 | 328 | 297 | 280 |
| 91 | 778.63 | R | 35.7 | 35.1 | 34.7 | 2.65 | 311 | 279 | 260 |

## *APPENDIX II*

**AMBIENT AND OVERBURDEN
POROSITY vs PERMEABILITY PLOTS**

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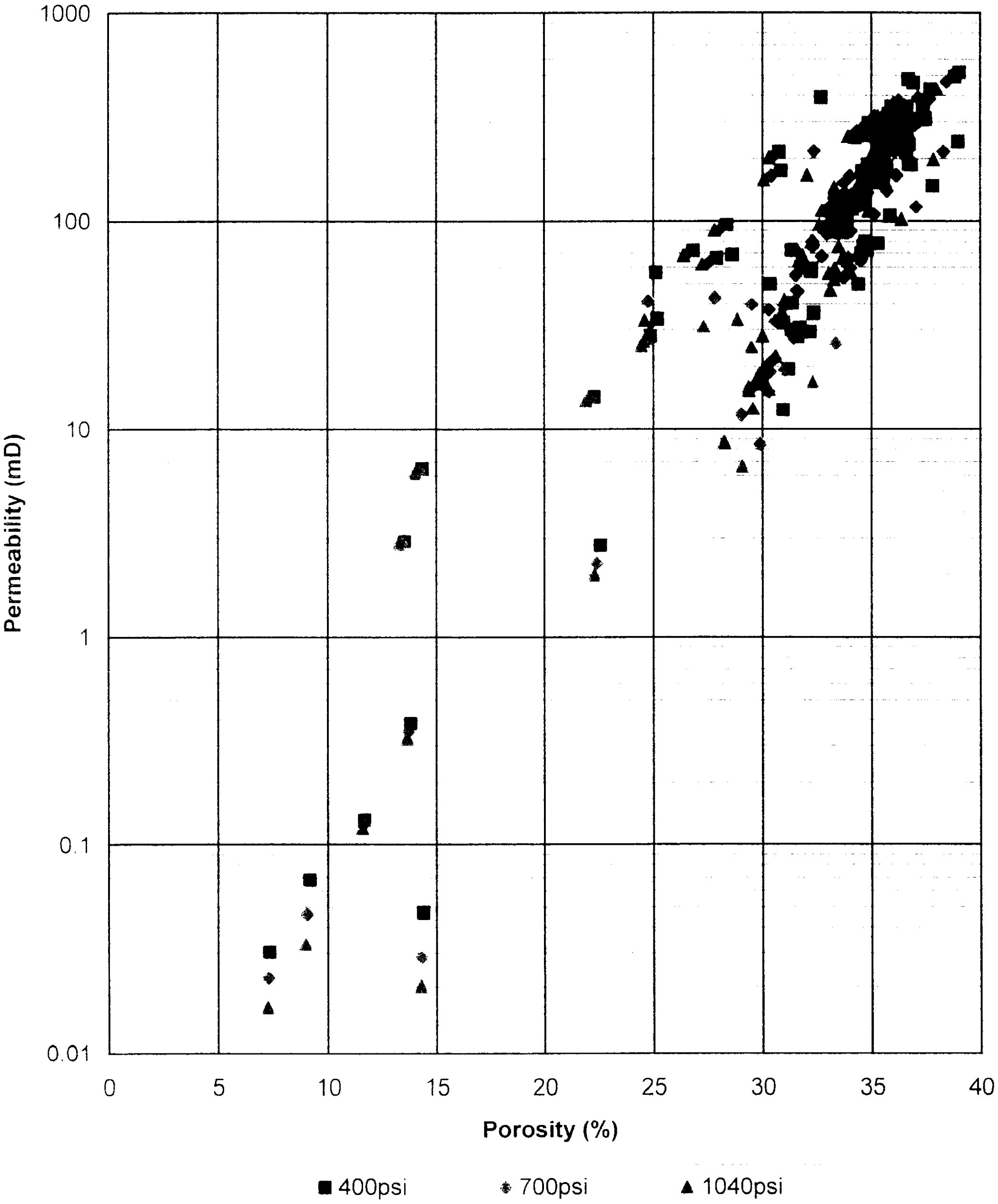
# *POROSITY vs PERMEABILITY*
## *Ambient & Overburden*

OMV

ACS LABORATORIES PTY LTD

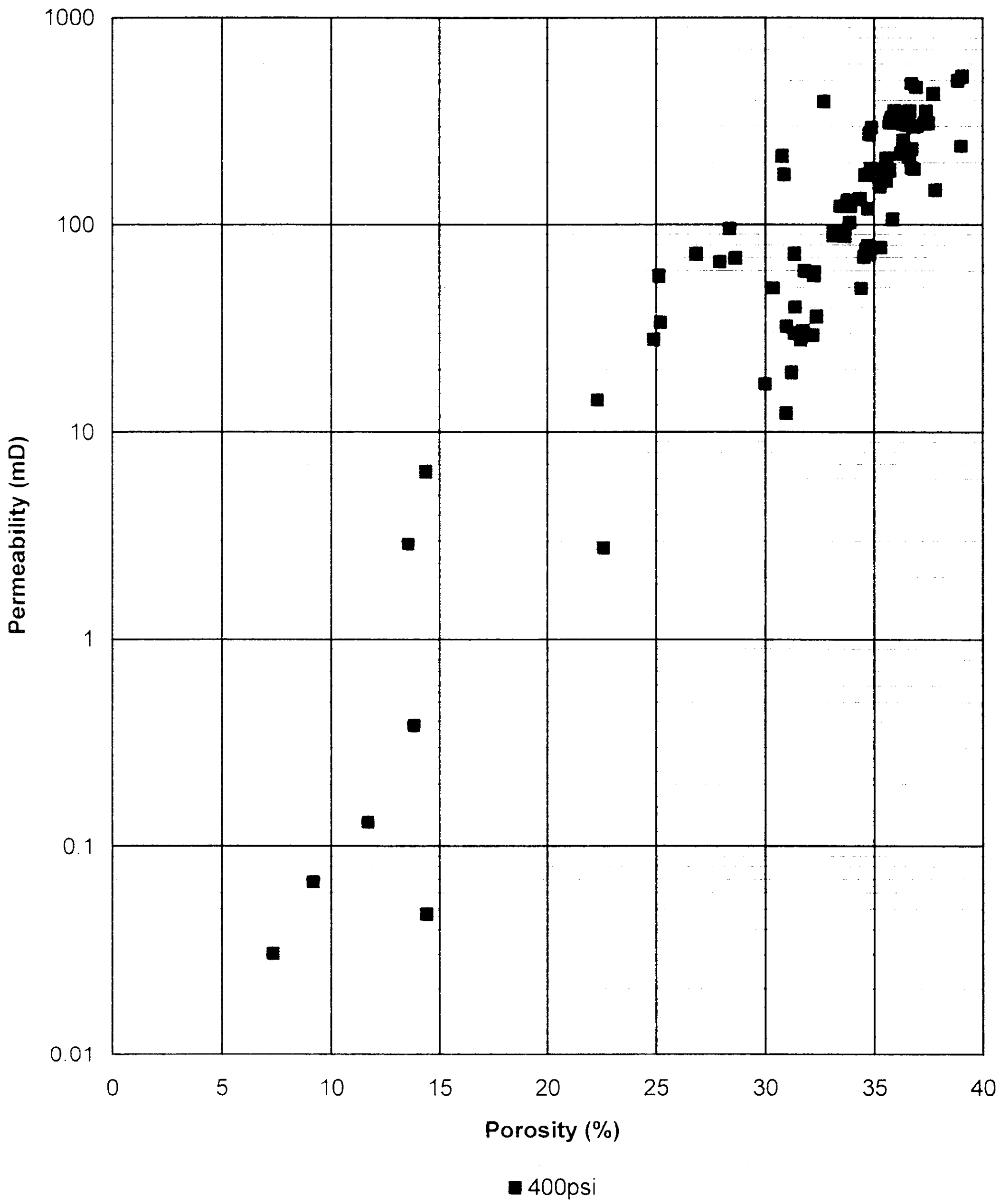
**Client:** OMV Australia Pty Ltd
**Well:** Baleen-2
**Depth:** 746.00m - 779.50m



OMV

# *POROSITY vs PERMEABILITY*
## *Ambient*

**Client:** OMV Australia Pty Ltd
**Well:** Baleen-2
**Depth:** 746.00m - 779.50m



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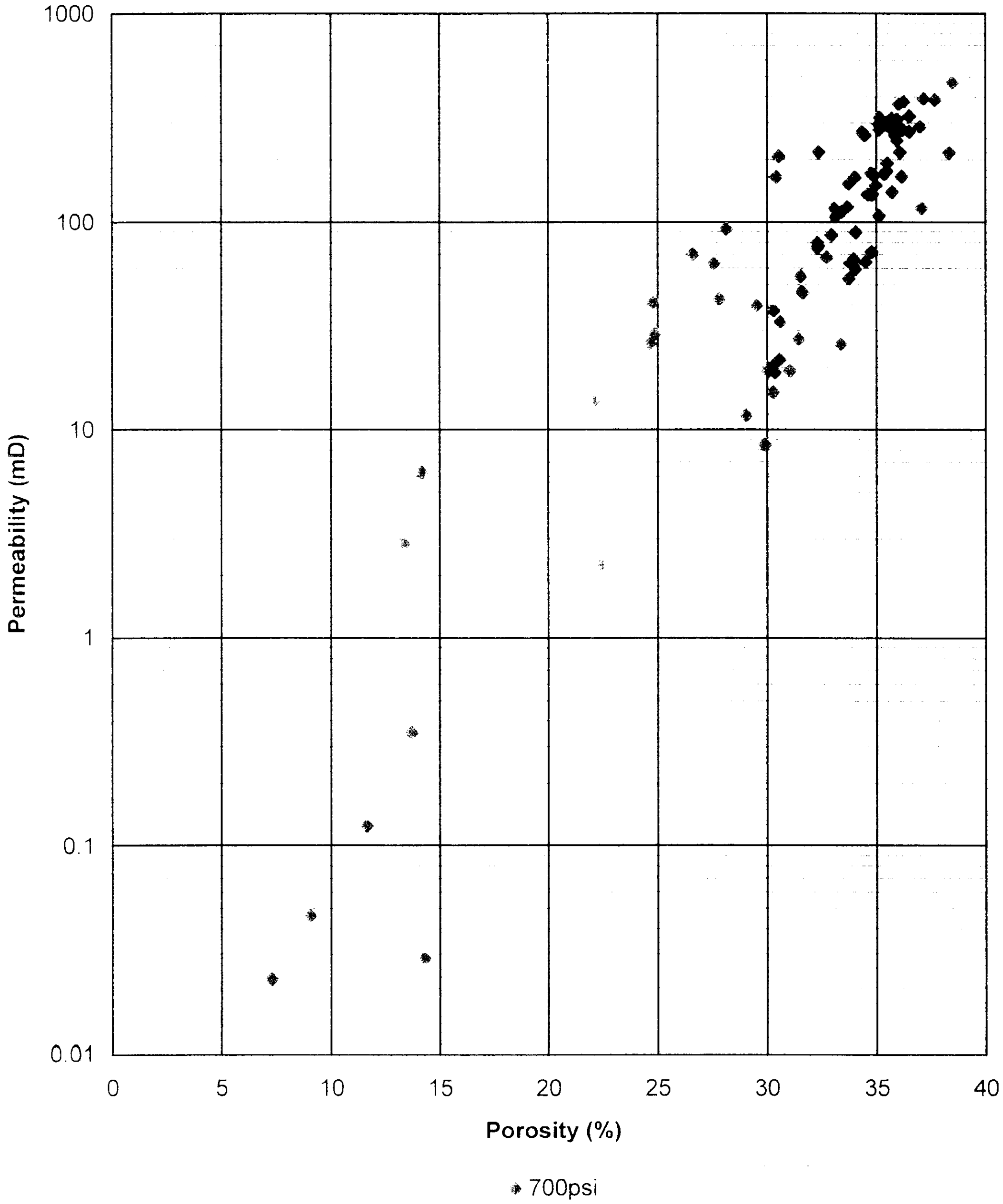
# POROSITY vs PERMEABILITY
## Overburden

**Client:** OMV Australia Pty Ltd
**Well:** Baleen-2
**Depth:** 746.00m - 779.50m



PE907960-10/cr024

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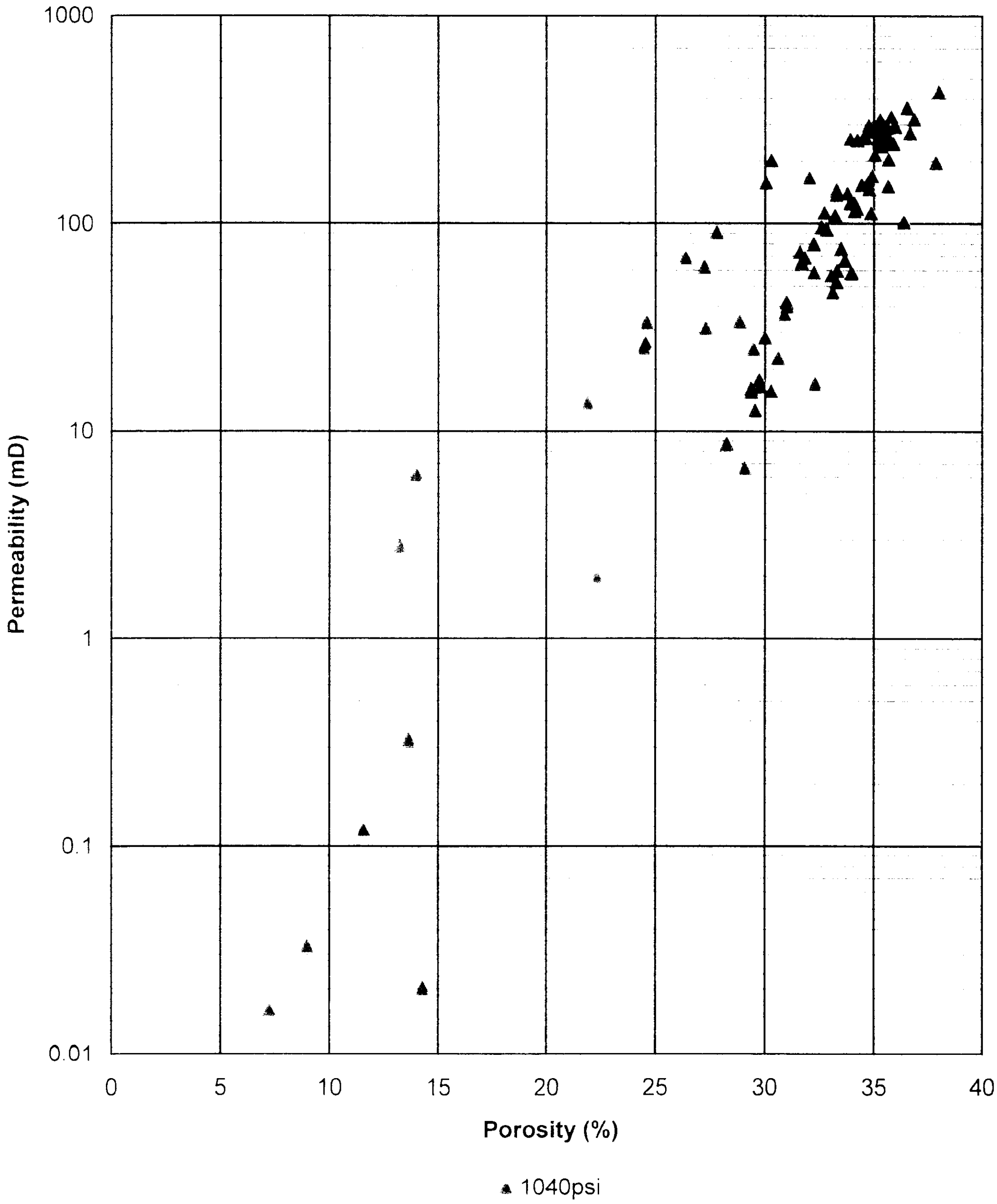
# *POROSITY vs PERMEABILITY*
## *Overburden*

**Client:** OMV Australia Pty Ltd
**Well:** Baleen-2
**Depth:** 746.00m - 779.50m



# *APPENDIX III*

## CORE LOG PLOT

**OMV**

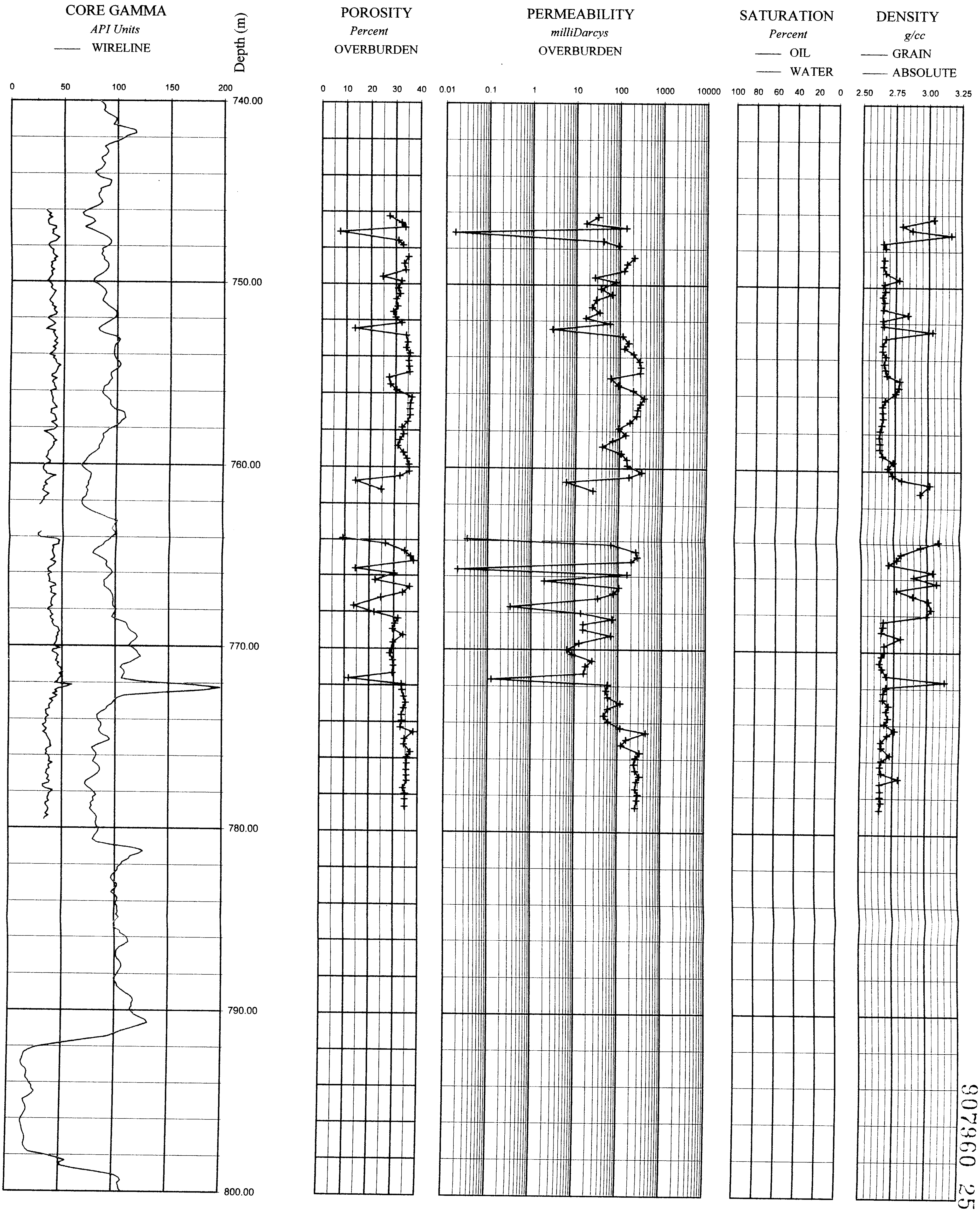
# CORE PLOT

Scale 1:200

**ACS LABORATORIES PTY LTD**

Client: OMV Australia Pty Ltd
Well: Baleen-2
File No.: 0308-02

Core 1 : 746.00m - 762.20m
Core 2 : 763.70m - 779.50m

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ACN: 008 273 005

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# *APPENDIX IV*

## SPECIAL CORE ANALYSIS SAMPLE LISTING

# PRESERVED SPECIAL CORE ANALYSIS SAMPLE LISTING

**Client:** OMV Australia Pty Ltd
**Well:** Baleen-2

| Number | Depth (m) | Approximate Length (cm) | Similar RCA plugs | Remarks |
|---|---|---|---|---|
| S1 | 746.63 | 6.0 | 2 | SCAL study |
| S2 | 747.41 | 7.5 | 5 | SCAL study |
| S3 | 748.36 | 5.5 | 8 | |
| S4 | 749.40 | 7.0 | 10 | |
| S5 | 750.41 | 6.5 | 14 | SCAL study |
| S6 | 751.42 | 6.5 | 17 | SCAL study |
| S7 | 752.50 | 9.0 | 20 | |
| S8 | 753.42 | 5.5 | 23 | Slight irreg. surface |
| S9 | 754.41 | 9.0 | 26 | SCAL study |
| S10 | 755.39 | 3.5 | 29 | SCAL study |
| S11 | 756.40 | 7.5 | 31, 32 | SCAL study |
| S12 | 757.42 | 6.5 | 35 | SCAL study |
| S13 | 758.58 | 6.5 | 38 | |
| S14 | 759.42 | 7.0 | 41 | |
| S15 | 760.38 | 4.0 | | Short, off-cuts bagged |
| S16 | 763.78 | 3.5 | 47 | Short, off-cuts bagged |
| S17 | 764.82 | 7.0 | 50 | |
| S18 | 765.76 | 9.5 | | |
| S19 | 766.81 | 7.0 | 56 | |
| S20 | 767.87 | 10.0 | 59 | SCAL study |
| S21 | 768.79 | 7.0 | 62 | SCAL study |
| S22 | 770.05 | 6.5 | 65 | |
| S23 | 770.97 | 7.5 | 68 | SCAL study |
| S24 | 771.81 | 7.0 | 71 | SCAL study |
| S25 | 772.99 | 7.0 | 74 | SCAL study |
| S26 | 773.79 | 7.0 | 77 | SCAL study |
| S27 | 774.80 | 7.0 | 80 | SCAL study |
| S28 | 775.82 | 7.0 | 83 | SCAL study |
| S29 | 776.80 | 7.0 | | SCAL study |
| S30 | 777.80 | 8.5 | 89 | SCAL study |

# APPENDIX 13

BALEEN-2

## FLUIDS ANALYSIS REPORT

-ACS LABORATORIES-

23 February, 2000

ACS LABORATORIES PTY. LTD.

OMV Australia Pty Ltd
Level 29
44 St Georges Terrace
PERTH WA 6000

Attention: Mark Adamson

## FLUIDS ANALYSIS - FINAL REPORT 0164-06

## BALEEN-2

### Drilling Fluid Invasion Analysis:

Two full length plug samples were cut through the core, at depths selected by OMV Australia representatives, to try to ascertain, and quantify, if any drilling mud invasion into the core had occurred. These samples were cut into 5 equal pieces along their length (marked A to E) and the pore water extracted from them. Standard 10 ion water analysis and nitrate content analysis was performed on each of the extracted water samples, plus two formation water samples and two mud filtrate samples, to try and determine the degree of mud invasion in the core.

It is evident from the nitrate concentrations and cation and anion data that the core has been invaded by the drilling fluid filtrate.

### Extracted Oil Analysis:

In an attempt to type the oil in the core, three samples of core were extracted of residual oil for analysis. Due to the oil saturation being too low to extract by centrifuge, it was decided to extract the residual oil with solvent (Dichloromethane – DCM). A portion of the core was taken at selected depths, crushed, and extracted of the residual oil. Due to the small amounts of oil extracted it was necessary to concentrate the solution by evaporating off the majority of the DCM. The resulting concentrated samples were then run through a liquid chromatograph to determine their composition.

On the attached chromatographs the first peak (retention time of approximately 6.2 minutes) is Dichloromethane. All fractions lighter than DCM, if any were present, would have been lost in the extraction and concentration processes.

Based on the compositional analyses, the extracted oil is likely to be hydrocarbon, but due to the small volumes of extracted oil, and the lack of any other physical properties, no further comment can be made.

Please find enclosed final results of fluid analyses for water and extracted oil samples from the above well.

If ACS can assist you in any way or if you require any further information, please do not hesitate to contact the undersigned.

**LINGANATHAN SIVACHALAM**
RFL Laboratory Supervisor

**PETER N CROZIER**
Operations Manager



Brisbane Laboratory: P.O. Box 396, Chermside South Qld 4032, Australia
☎: 61 7 3350 1222 Facsimile: 61 7 3359 0666.
E-mail: acs.bris@acslabs.com.au
ACS Laboratories Pty Ltd
ACN: 008 273 005

# CONTENTS



## *APPENDICES*

# *CHAPTER 1*

## WATER ANALYSIS RESULTS

ACS
LABORATORIES
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**FLUIDS ANALYSIS FINAL REPORT**

**of**

***BALEEN-2***

**for**

***OMV AUSTRALIA PTY LTD***

**by**

**ACS LABORATORIES PTY LTD**

# WATER ANALYSIS

| | | | |
|---|---|---|---|
| **Client :** | OMV Australia Pty Ltd | **File:** | 0164-06 |
| **Well:** | Baleen-2 | **Sample:** | Water 1.01 |
| **Tool:** | N/A | | |

## CHEMICAL COMPOSITION

**Cations**

| | mg/L | meq/L |
|---|---|---|
| Sodium (Na): | 2980 | 129.6 |
| Calcium (Ca): | 76 | 3.8 |
| Magnesium (Mg): | 82.0 | 6.7 |
| Iron (Fe): | <0.1 | 0.0 |
| Potassium (K): | 142 | 3.6 |

**Anions**

| | mg/L | meq/L |
|---|---|---|
| Chloride (Cl): | 4610 | 129.8 |
| Bi-Carbonate ($HCO_3$): | 616 | 12.3 |
| Sulphate ($SO_4$): | 80 | 1.7 |
| Carbonate ($CO_3$): | <1 | 0.0 |
| Fluoride (F) | 1.10 | 0.1 |
| Hydroxide (OH): | <1 | 0.0 |

## DERIVED DATA

| | mg/L |
|---|---|
| Total Dissolved Solids: | |
| Based on E.C | 8470 |
| Calculated ($HCO_3 = CO_3$) | 9430 |
| Total Hardness (as Ca $CO_3$) | 525 |
| Total Alkalinity (as Ca $CO_3$) | 616 |

## TOTAL AND BALANCE

| | |
|---|---|
| Cations | 144 |
| Anions | 144 |
| Ion Balance (Diff*100/sum) | 0.026 |
| Sodium Adsorption Ratio | 56.5 |
| Difference (Anions - Cations) | 0.07 |
| Sum (Anions + Cations) | 287.7 |

## OTHER ANALYSES

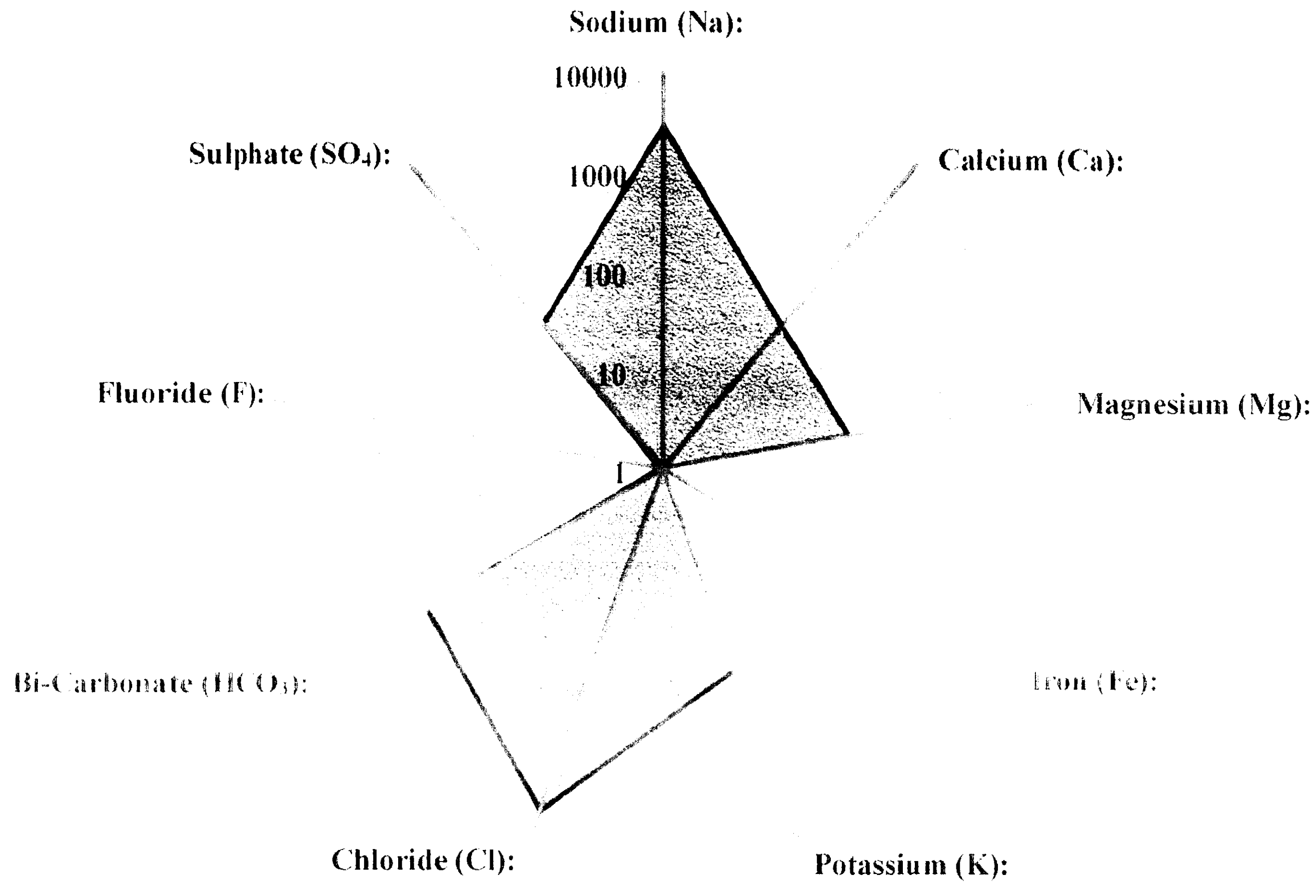
| | | |
|---|---|---|
| Resistivity | 0.690 | ohm.m @ 25 °C |
| Conductivity (E.C) | 14500.0 | µS/cm @ 25 °C |
| Reaction - pH | 7.4 | |
| Specific Gravity | 1.0039 | at 25.0°C/15.6°C |

**Nitrate (N) Content = 10.4 mg/L**

## *WATER ANALYSIS (mg/L)*

**Client :** OMV Australia Pty Ltd
**Well:** Baleen-2

**File:** 0164-06
**Sample:** Water 1.01



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PE907960_color026

# *WATER ANALYSIS*

**Client :** OMV Australia Pty Ltd
**Well:** Baleen-2
**Tool:** N/A

**File:** 0164-06
**Sample:** Water 1.06

## CHEMICAL COMPOSITION

| Cations | mg/L | meq/L | Anions | mg/L | meq/L |
|---|---|---|---|---|---|
| Sodium (Na): | 3000 | 130.5 | Chloride (Cl): | 4610 | 129.8 |
| Calcium (Ca): | 76 | 3.8 | Bi-Carbonate ($HCO_3$): | 618 | 12.3 |
| Magnesium (Mg): | 82.0 | 6.7 | Sulphate ($SO_4$): | 79 | 1.6 |
| Iron (Fe): | <0.1 | 0.0 | Carbonate ($CO_3$): | <1 | 0.0 |
| Potassium (K): | 142 | 3.6 | Fluoride (F) | 1.00 | 0.1 |
| | | | Hydroxide (OH): | <1 | 0.0 |

## DERIVED DATA

| | mg/L |
|---|---|
| Total Dissolved Solids: | |
| Based on E.C | 8490 |
| Calculated ($HCO_3$ = $CO_3$) | 9170 |
| Total Hardness (as Ca $CO_3$) | 527 |
| Total Alkalinity (as Ca $CO_3$) | 618 |

## TOTAL AND BALANCE

| | |
|---|---|
| Cations | 145 |
| Anions | 144 |
| Ion Balance (Diff*100/sum) | -0.271 |
| Sodium Adsorption Ratio | 56.8 |
| Difference (Anions - Cations) | -0.78 |
| Sum (Anions + Cations) | 288.6 |

## OTHER ANALYSES

| | | |
|---|---|---|
| Resistivity | 0.709 | ohm.m @ 25 °C |
| Conductivity (E.C) | 14100.0 | µS/cm @ 25 °C |
| Reaction - pH | 7.4 | |
| Specific Gravity | 1.0041 | at 25.0°C/15.6°C |

**Nitrate (N) Content = 10.4 mg/L**

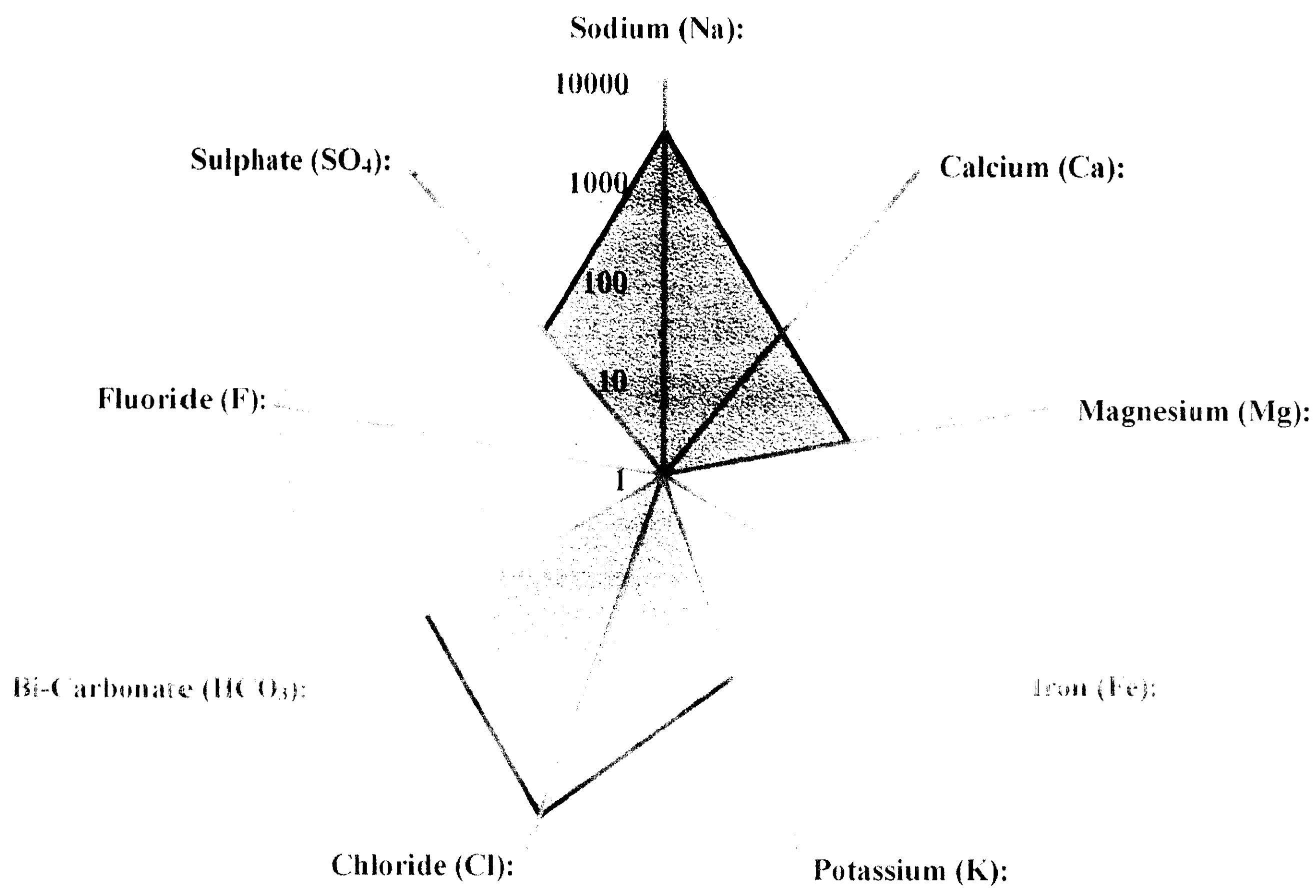
## WATER ANALYSIS (mg/L)

**Client :** OMV Australia Pty Ltd

**Well:** Baleen-2

**File:** 0164-06

**Sample:** Water 1.06






907960 269

PE907964_ccla427

# *WATER ANALYSIS*

| | | | |
|---|---|---|---|
| **Client :** | OMV Australia Pty Ltd | **File:** | 0164-06 |
| **Well:** | Baleen-2 | **Sample:** | 1A - 754.08m |
| **Tool:** | N/A | | |

## CHEMICAL COMPOSITION

**Cations**

| | mg/L | meq/L |
|---|---|---|
| Sodium (Na): | 11500 | 500.3 |
| Calcium (Ca): | <50 | 0.0 |
| Magnesium (Mg): | 80.0 | 6.6 |
| Iron (Fe): | <5 | 0.0 |
| Potassium (K): | 80 | 2.0 |

**Anions**

| | mg/L | meq/L |
|---|---|---|
| Chloride (Cl): | 17700 | 498.5 |
| Bi-Carbonate ($HCO_3$): | <1 | 0.0 |
| Sulphate ($SO_4$): | 400 | 8.3 |
| Carbonate ($CO_3$): | <1 | 0.0 |
| Fluoride (F) | <5 | 0.0 |
| Hydroxide (OH): | <1 | 0.0 |

## DERIVED DATA

| Total Dissolved Solids: | mg/L |
|---|---|
| Based on E.C | 29700 |
| Calculated ($HCO_3$ = $CO_3$) | 33100 |
| Total Hardness (as Ca $CO_3$) | 360 |
| Total Alkalinity (as Ca $CO_3$) | <1 |

## OTHER ANALYSES

| | | |
|---|---|---|
| Resistivity | 0.181 | ohm.m @ 25 °C |
| Conductivity (E.C) | 55200.0 | µS/cm @ 25 °C |
| Reaction - pH | 4.5 | |

## TOTAL AND BALANCE

| | |
|---|---|
| Cations | 509 |
| Anions | 507 |
| Ion Balance (Diff*100/sum) | -0.198 |
| Sodium Adsorption Ratio | 0.0 |
| Difference (Anions - Cations) | -2.01 |
| Sum (Anions + Cations) | 1015.7 |

**Nitrate (N) Content = 44.8 mg/L**

Specific Gravity not measurable due to low sample volume.

907960 271

PE907960-0001 028

## WATER ANALYSIS (mg/L)

**Client :** OMV Australia Pty Ltd
**Well:** Baleen-2

**File:** 0164-06
**Sample:** 1A - 754.08m

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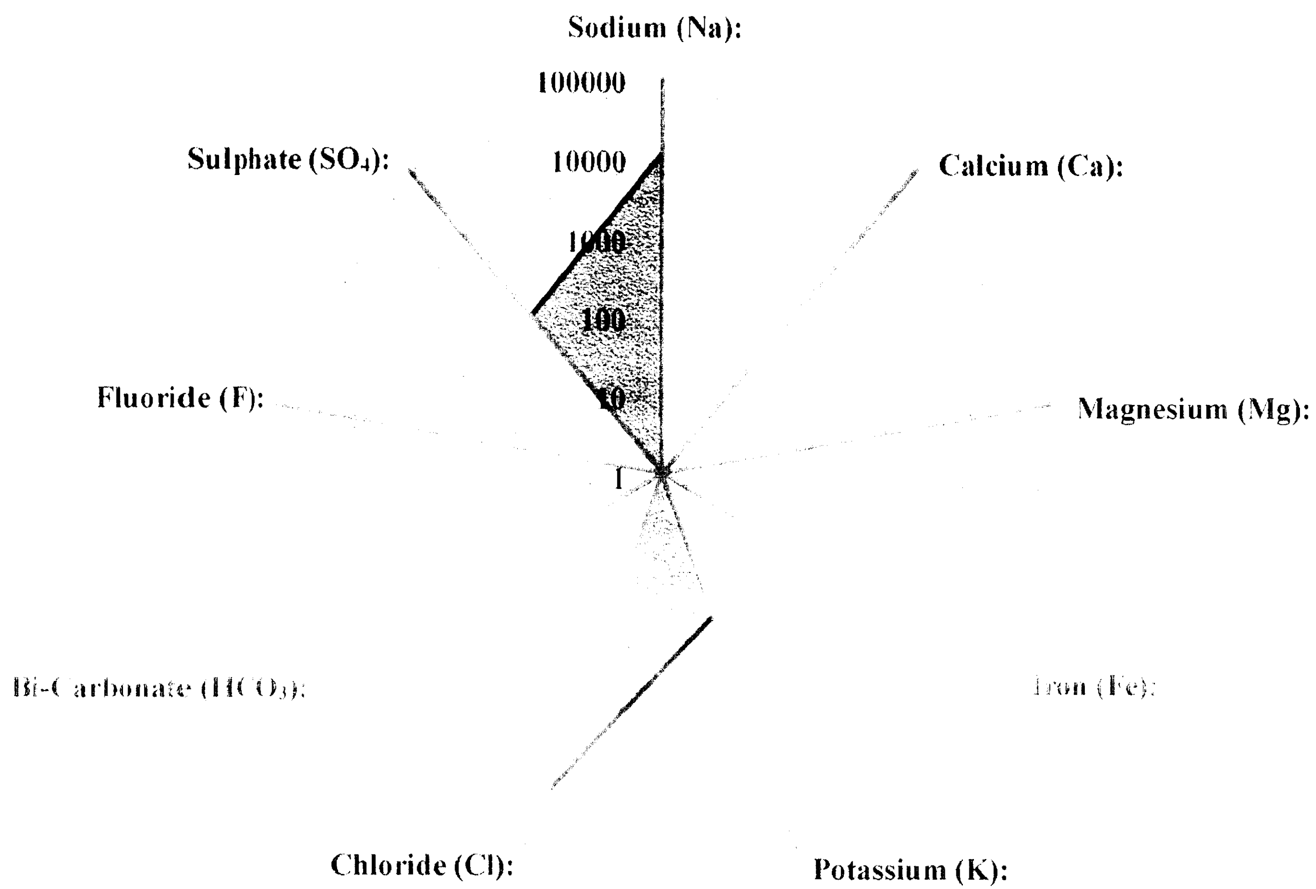

# *WATER ANALYSIS*

| | | | |
|---|---|---|---|
| **Client :** | OMV Australia Pty Ltd | **File:** | 0164-06 |
| **Well:** | Baleen-2 | **Sample:** | 1B - 754.08m |
| **Tool:** | N/A | | |

## CHEMICAL COMPOSITION

**Cations**

| | mg/L | meq/L |
|---|---|---|
| Sodium (Na): | 11600 | 504.6 |
| Calcium (Ca): | <50 | 0.0 |
| Magnesium (Mg): | 120.0 | 9.9 |
| Iron (Fe): | <5 | 0.0 |
| Potassium (K): | 160 | 4.1 |

**Anions**

| | mg/L | meq/L |
|---|---|---|
| Chloride (Cl): | 18100 | 509.8 |
| Bi-Carbonate ($HCO_3$): | <1 | 0.0 |
| Sulphate ($SO_4$): | 560 | 11.7 |
| Carbonate ($CO_3$): | <1 | 0.0 |
| Fluoride (F) | <5 | 0.0 |
| Hydroxide (OH): | <1 | 0.0 |

## DERIVED DATA

| Total Dissolved Solids: | mg/L |
|---|---|
| Based on E.C | 30600 |
| Calculated ($HCO_3 = CO_3$) | 36000 |
| Total Hardness (as Ca $CO_3$) | 480 |
| Total Alkalinity (as Ca $CO_3$) | <1 |

## TOTAL AND BALANCE

| | |
|---|---|
| Cations | 519 |
| Anions | 521 |
| Ion Balance (Diff*100/sum) | 0.278 |
| Sodium Adsorption Ratio | 0.0 |
| Difference (Anions - Cations) | 2.90 |
| Sum (Anions + Cations) | 1040.0 |

## OTHER ANALYSES

| | | |
|---|---|---|
| Resistivity | 0.167 | ohm.m @ 25 °C |
| Conductivity (E.C) | 60000.0 | µS/cm @ 25 °C |
| Reaction - pH | 4.1 | |

**Nitrate (N) Content = 111 mg/L**

Specific Gravity not measurable due to low sample volume.

# WATER ANALYSIS (mg/L)

**Client :** OMV Australia Pty Ltd
**Well:** Baleen-2

**File:** 0164-06
**Sample:** 1B - 754.08m

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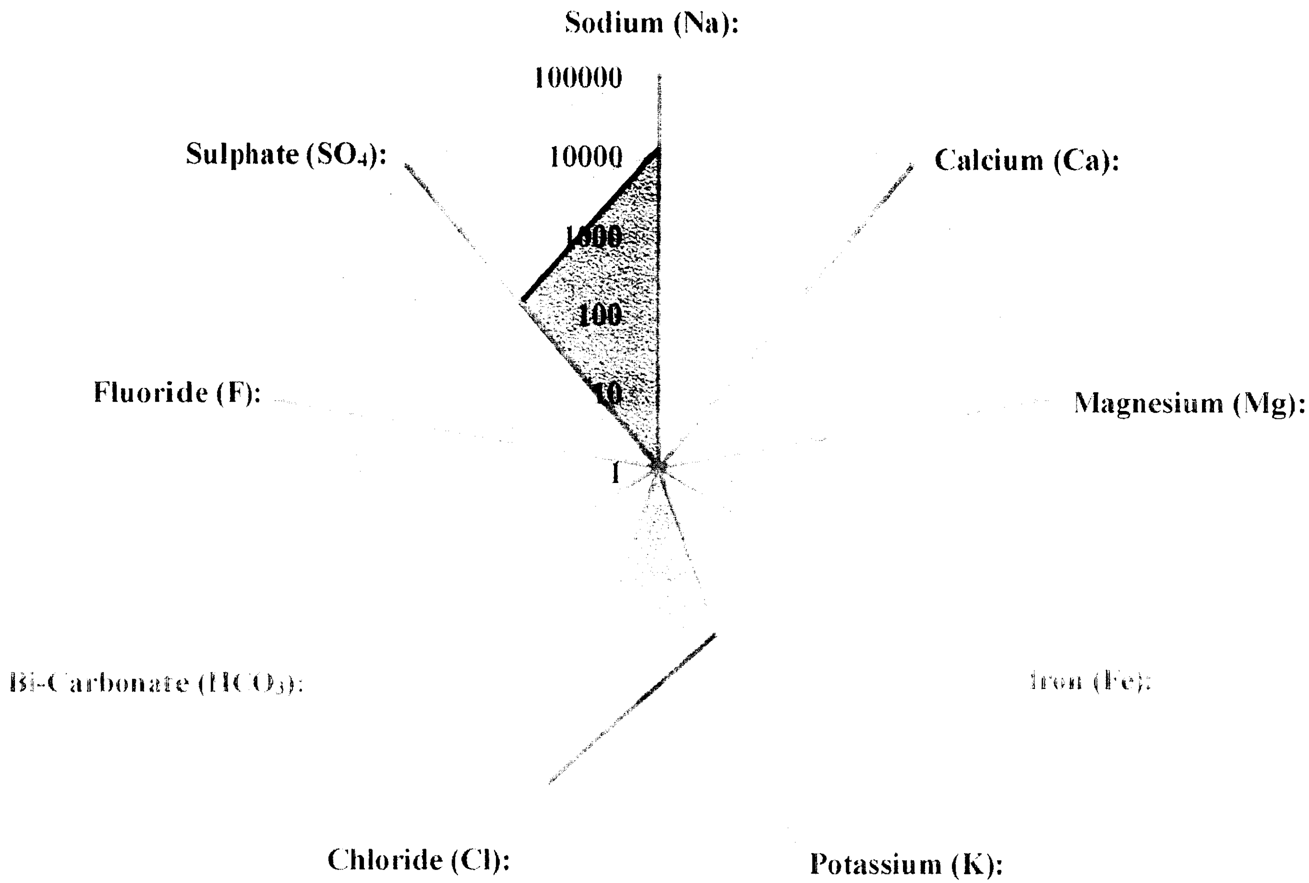





907960 273

PE907960_color029

# *WATER ANALYSIS*

| | | | |
|---|---|---|---|
| **Client :** | OMV Australia Pty Ltd | **File:** | 0164-06 |
| **Well:** | Baleen-2 | **Sample:** | 1C - 754.08m |
| **Tool:** | N/A | | |

## CHEMICAL COMPOSITION

| Cations | mg/L | meq/L | Anions | mg/L | meq/L |
|---|---|---|---|---|---|
| Sodium (Na): | 12700 | 552.5 | Chloride (Cl): | 19800 | 557.7 |
| Calcium (Ca): | <50 | 0.0 | Bi-Carbonate ($HCO_3$): | 3 | 0.1 |
| Magnesium (Mg): | 150.0 | 12.3 | Sulphate ($SO_4$): | 650 | 13.5 |
| Iron (Fe): | <5 | 0.0 | Carbonate ($CO_3$): | <1 | 0.0 |
| Potassium (K): | 150 | 3.8 | Fluoride (F) | <5 | 0.0 |
| | | | Hydroxide (OH): | <1 | 0.0 |

## DERIVED DATA

| Total Dissolved Solids: | mg/L |
|---|---|
| Based on E.C | 33500 |
| Calculated ($HCO_3$ = $CO_3$) | 39000 |
| Total Hardness (as Ca $CO_3$) | 550 |
| Total Alkalinity (as Ca $CO_3$) | 3 |

## TOTAL AND BALANCE

| | |
|---|---|
| Cations | 569 |
| Anions | 571 |
| Ion Balance (Diff*100/sum) | 0.232 |
| Sodium Adsorption Ratio | 0.0 |
| Difference (Anions - Cations) | 2.65 |
| Sum (Anions + Cations) | 1139.9 |

## OTHER ANALYSES

| | | |
|---|---|---|
| Resistivity | 0.154 | ohm.m @ 25 °C |
| Conductivity (E.C) | 65000.0 | µS/cm @ 25 °C |
| Reaction - pH | 5.8 | |

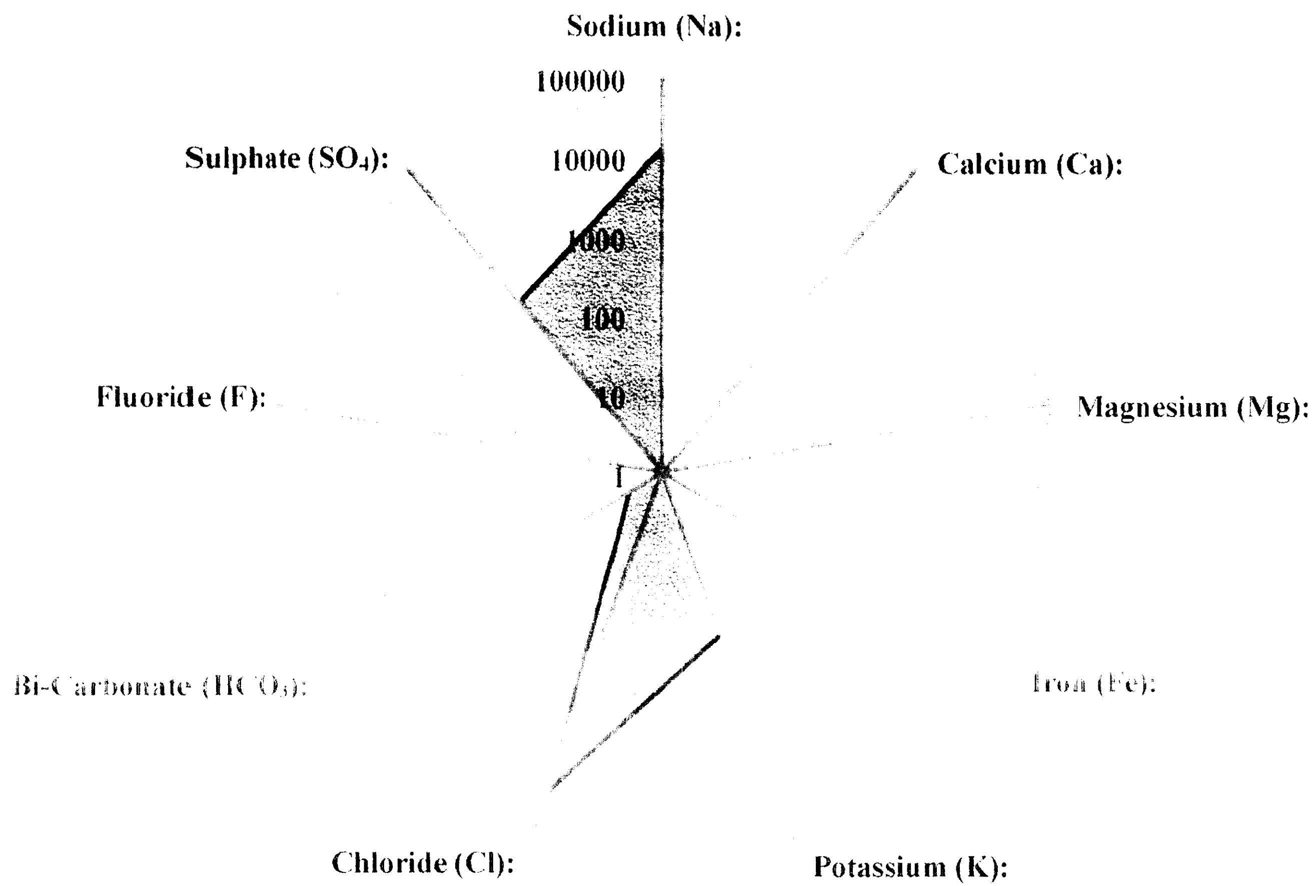
**Nitrate(N) Content = 27.5 mg/L**

Specific Gravity not measurable due to low sample volume.

## *WATER ANALYSIS (mg/L)*

**Client :** OMV Australia Pty Ltd
**Well:** Baleen-2

**File:** 0164-06
**Sample:** IC - 754.08m



# *WATER ANALYSIS*

| | | | |
|---|---|---|---|
| **Client :** | OMV Australia Pty Ltd | **File:** | 0164-06 |
| **Well:** | Baleen-2 | **Sample:** | 1D - 754.08m |
| **Tool:** | N/A | | |

## CHEMICAL COMPOSITION

| Cations | mg/L | meq/L | Anions | mg/L | meq/L |
|---|---|---|---|---|---|
| Sodium (Na): | 11800 | 513.3 | Chloride (Cl): | 18500 | 521.1 |
| Calcium (Ca): | <50 | 0.0 | Bi-Carbonate ($HCO_3$): | 1 | 0.0 |
| Magnesium (Mg): | 100.0 | 8.2 | Sulphate ($SO_4$): | 750 | 15.6 |
| Iron (Fe): | <5 | 0.0 | Carbonate ($CO_3$): | <1 | 0.0 |
| Potassium (K): | 150 | 3.8 | Fluoride (F) | <5 | 0.0 |
| | | | Hydroxide (OH): | <1 | 0.0 |

## DERIVED DATA

| Total Dissolved Solids: | mg/L |
|---|---|
| Based on E.C | 31400 |
| Calculated ($HCO_3$ = $CO_3$) | 36600 |
| Total Hardness (as Ca $CO_3$) | 500 |
| Total Alkalinity (as Ca $CO_3$) | 1 |

## TOTAL AND BALANCE

| | |
|---|---|
| Cations | 525 |
| Anions | 537 |
| Ion Balance (Diff*100/sum) | 1.068 |
| Sodium Adsorption Ratio | 0.0 |
| Difference (Anions - Cations) | 11.34 |
| Sum (Anions + Cations) | 1062.1 |

## OTHER ANALYSES

| | | |
|---|---|---|
| Resistivity | 0.164 | ohm.m @ 25 °C |
| Conductivity (E.C) | 61000.0 | µS/cm @ 25 °C |
| Reaction - pH | 4.9 | |

**Nitrate(N) Content = 47.5 mg/L**

Specific Gravity not measurable due to low sample volume.

# WATER ANALYSIS (mg/L)

**Client :** OMV Australia Pty Ltd
**Well:** Baleen-2

**File:** 0164-06
**Sample:** ID - 754.08m

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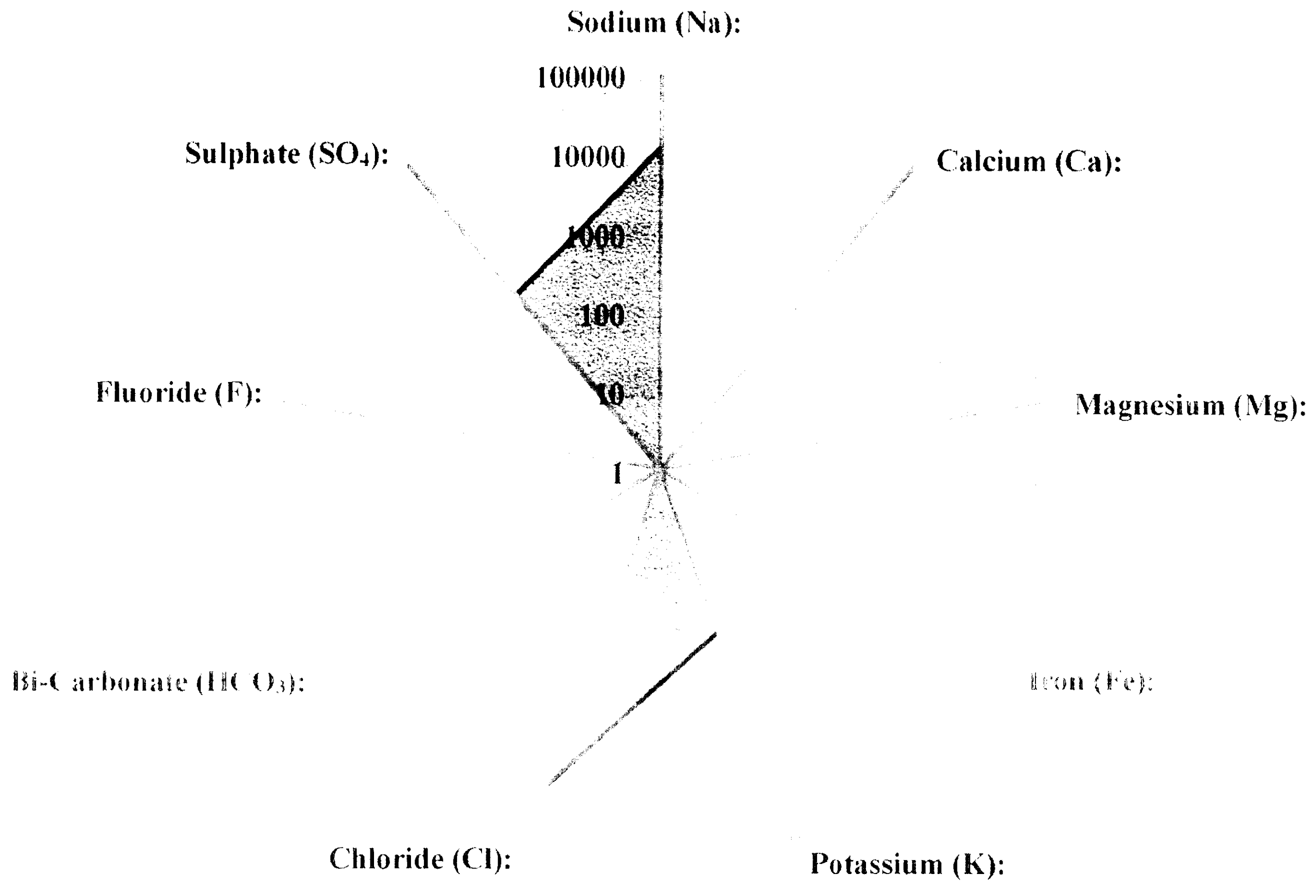


# *WATER ANALYSIS*

| | | | |
|---|---|---|---|
| **Client :** | OMV Australia Pty Ltd | **File:** | 0164-06 |
| **Well:** | Baleen-2 | **Sample:** | 1E - 754.08m |
| **Tool:** | N/A | | |

## CHEMICAL COMPOSITION

**Cations**

| | mg/L | meq/L |
|---|---|---|
| Sodium (Na): | 14700 | 639.5 |
| Calcium (Ca): | <50 | 0.0 |
| Magnesium (Mg): | 100.0 | 8.2 |
| Iron (Fe): | <5 | 0.0 |
| Potassium (K): | 150 | 3.8 |

**Anions**

| | mg/L | meq/L |
|---|---|---|
| Chloride (Cl): | 22800 | 642.2 |
| Bi-Carbonate ($HCO_3$): | <1 | 0.0 |
| Sulphate ($SO_4$): | 750 | 15.6 |
| Carbonate ($CO_3$): | <1 | 0.0 |
| Fluoride (F) | <5 | 0.0 |
| Hydroxide (OH): | <1 | 0.0 |

## DERIVED DATA

| Total Dissolved Solids: | mg/L |
|---|---|
| Based on E.C | 38600 |
| Calculated ($HCO_3$ = $CO_3$) | 44100 |
| Total Hardness (as Ca $CO_3$) | 500 |
| Total Alkalinity (as Ca $CO_3$) | <1 |

## TOTAL AND BALANCE

| | |
|---|---|
| Cations | 652 |
| Anions | 658 |
| Ion Balance (Diff*100/sum) | 0.480 |
| Sodium Adsorption Ratio | 0.0 |
| Difference (Anions - Cations) | 6.28 |
| Sum (Anions + Cations) | 1309.3 |

## OTHER ANALYSES

| | | |
|---|---|---|
| Resistivity | 0.136 | ohm.m @ 25 °C |
| Conductivity (E.C) | 73500.0 | µS/cm @ 25 °C |
| Reaction - pH | 4.2 | |

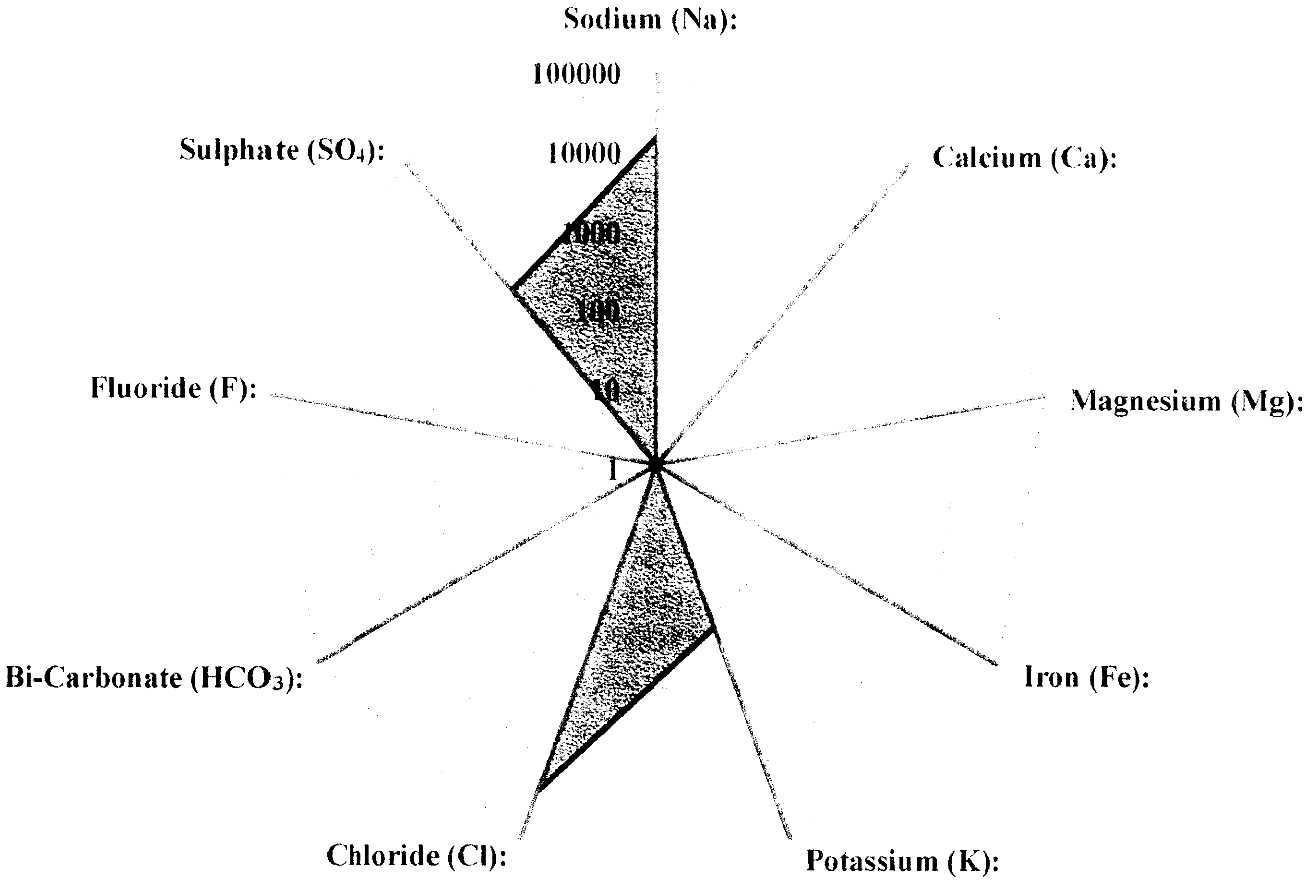
**Nitrate(N) Content = 111 mg/L**

Specific Gravity not measurable due to low sample volume.

# WATER ANALYSIS (mg/L)

**Client :** OMV Australia Pty Ltd
**Well:** Baleen-2

**File:** 0164-06
**Sample:** 1E - 754.08m



# *WATER ANALYSIS*

**Client :** OMV Australia Pty Ltd
**Well:** Baleen-2
**Tool:** N/A

**File:** 0164-06
**Sample:** 2A - 778.34m

## CHEMICAL COMPOSITION

**Cations**

| | mg/L | meq/L |
|---|---|---|
| Sodium (Na): | 9640 | 419.3 |
| Calcium (Ca): | <50 | 0.0 |
| Magnesium (Mg): | 120.0 | 9.9 |
| Iron (Fe): | <5 | 0.0 |
| Potassium (K): | 80 | 2.0 |

**Anions**

| | mg/L | meq/L |
|---|---|---|
| Chloride (Cl): | 15200 | 428.1 |
| Bi-Carbonate ($HCO_3$): | 1 | 0.0 |
| Sulphate ($SO_4$): | 520 | 10.8 |
| Carbonate ($CO_3$): | <1 | 0.0 |
| Fluoride (F) | <5 | 0.0 |
| Hydroxide (OH): | <1 | 0.0 |

## DERIVED DATA

| Total Dissolved Solids: | mg/L |
|---|---|
| Based on E.C | 25300 |
| Calculated ($HCO_3$ = $CO_3$) | 29000 |
| Total Hardness (as Ca $CO_3$) | 560 |
| Total Alkalinity (as Ca $CO_3$) | 1 |

## TOTAL AND BALANCE

| | |
|---|---|
| Cations | 431 |
| Anions | 439 |
| Ion Balance (Diff*100/sum) | 0.886 |
| Sodium Adsorption Ratio | 0.0 |
| Difference (Anions - Cations) | 7.71 |
| Sum (Anions + Cations) | 870.2 |

## OTHER ANALYSES

| | | |
|---|---|---|
| Resistivity | 0.206 | ohm.m @ 25 °C |
| Conductivity (E.C) | 48400.0 | µS/cm @ 25 °C |
| Reaction - pH | 4.8 | |

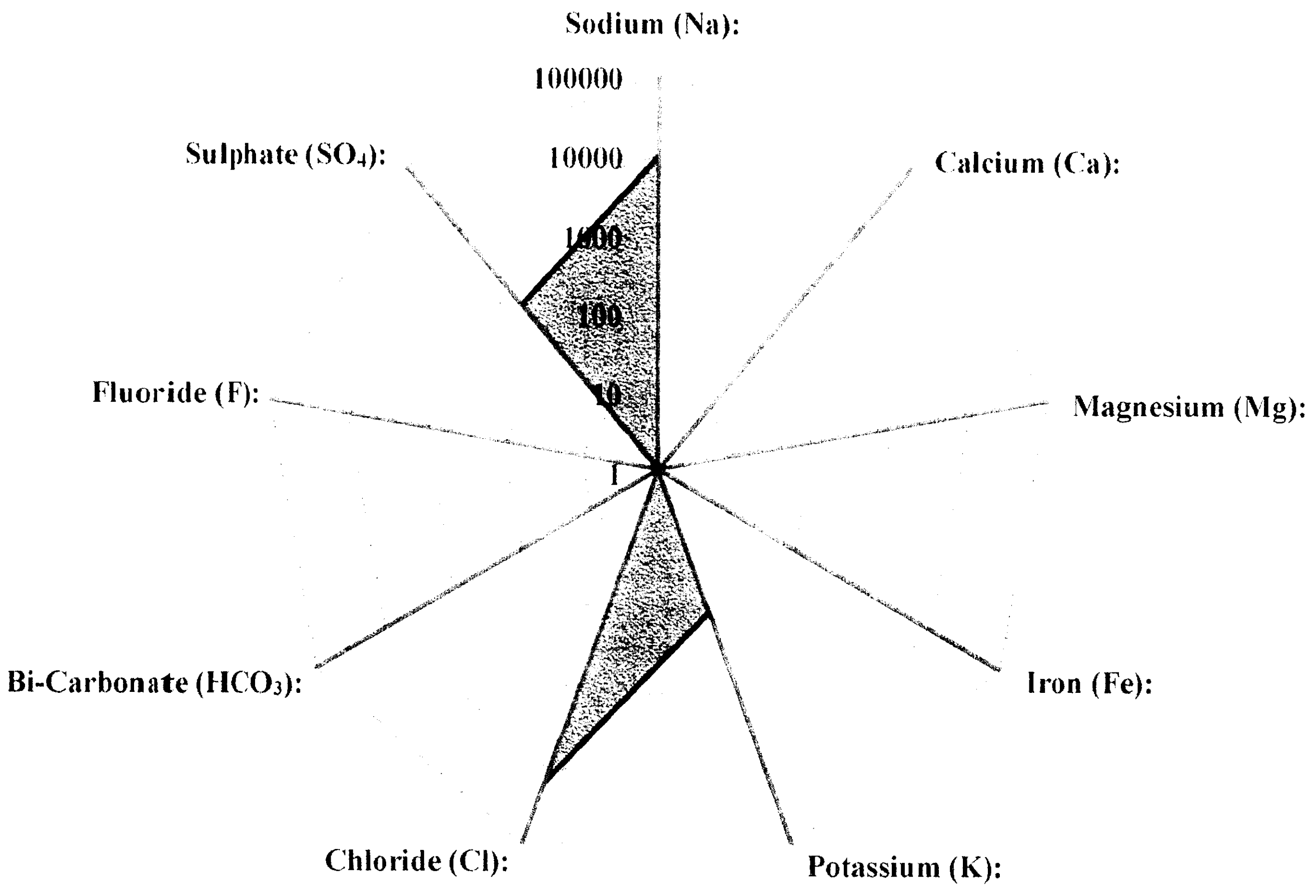
**Nitrate (N) Content = 61.2 mg/L**

Specific Gravity not measurable due to low sample volume.

# WATER ANALYSIS (mg/L)

**Client :** OMV Austral ia Pty Ltd
**Well:** Baleen-2

**File:** 0164-06
**Sample:** 2A - 778.34m



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# *WATER ANALYSIS*

**Client :** OMV Australia Pty Ltd
**Well:** Baleen-2
**Tool:** N/A

**File:** 0164-06
**Sample:** 2B - 778.34m

## CHEMICAL COMPOSITION

| Cations | mg/L | meq/L |
|---|---|---|
| Sodium (Na): | 7280 | 316.7 |
| Calcium (Ca): | <50 | 0.0 |
| Magnesium (Mg): | 40.0 | 3.3 |
| Iron (Fe): | <5 | 0.0 |
| Potassium (K): | 80 | 2.0 |

| Anions | mg/L | meq/L |
|---|---|---|
| Chloride (Cl): | 11200 | 315.5 |
| Bi-Carbonate ($HCO_3$): | <1 | 0.0 |
| Sulphate ($SO_4$): | 80 | 1.7 |
| Carbonate ($CO_3$): | <1 | 0.0 |
| Fluoride (F) | <5 | 0.0 |
| Hydroxide (OH): | <1 | 0.0 |

## DERIVED DATA

| Total Dissolved Solids: | mg/L |
|---|---|
| Based on E.C | 18600 |
| Calculated ($HCO_3$ = $CO_3$) | 20200 |
| Total Hardness (as Ca $CO_3$) | 240 |
| Total Alkalinity (as Ca $CO_3$) | <1 |

## TOTAL AND BALANCE

| | |
|---|---|
| Cations | 322 |
| Anions | 317 |
| Ion Balance (Diff*100/sum) | -0.766 |
| Sodium Adsorption Ratio | 0.0 |
| Difference (Anions - Cations) | -4.89 |
| Sum (Anions + Cations) | 639.1 |

## OTHER ANALYSES

| | | |
|---|---|---|
| Resistivity | 0.298 | ohm.m @ 25 °C |
| Conductivity (E.C) | 33600.0 | µS/cm @ 25 °C |
| Reaction - pH | 3.8 | |

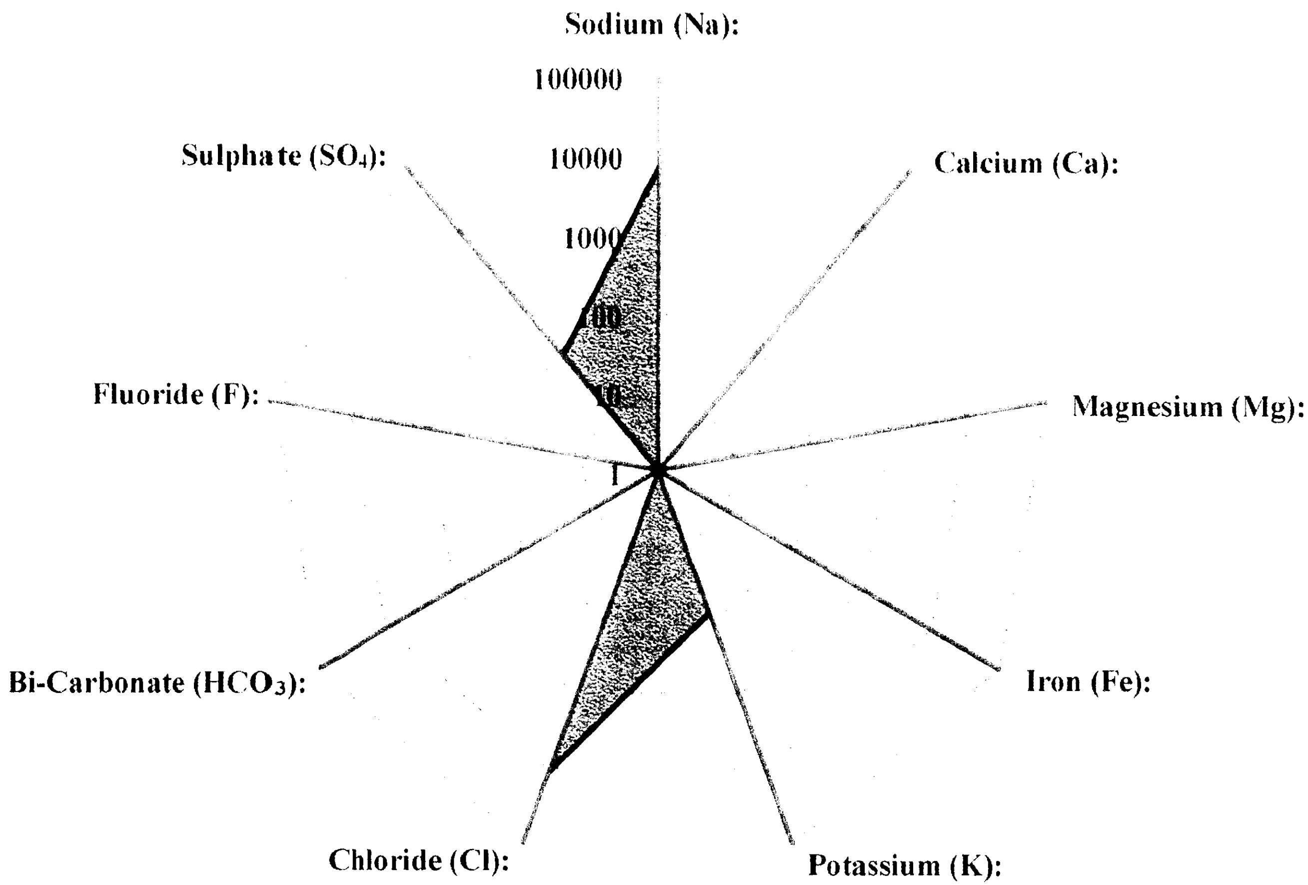
**Nitrate (N) Content = 136 mg/L**

Specific Gravity not measurable due to low sample volume.

# WATER ANALYSIS (mg/L)

**Client :** OMV Australia Pty Ltd
**Well:** Baleen-2

**File:** 0164-06
**Sample:** 2B - 778.34m



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907960 283

# *WATER ANALYSIS*

| | | | |
|---|---|---|---|
| **Client :** | OMV Australia Pty Ltd | **File:** | 0164-06 |
| **Well:** | Baleen-2 | **Sample:** | 2C - 778.34m |
| **Tool:** | N/A | | |

## CHEMICAL COMPOSITION

| Cations | mg/L | meq/L | Anions | mg/L | meq/L |
|---|---|---|---|---|---|
| Sodium (Na): | 6360 | 276.7 | Chloride (Cl): | 9920 | 279.4 |
| Calcium (Ca): | <50 | 0.0 | Bi-Carbonate ($HCO_3$): | 3 | 0.1 |
| Magnesium (Mg): | <50 | 0.0 | Sulphate ($SO_4$): | 80 | 1.7 |
| Iron (Fe): | <5 | 0.0 | Carbonate ($CO_3$): | <1 | 0.0 |
| Potassium (K): | 80 | 2.0 | Fluoride (F) | <5 | 0.0 |
| | | | Hydroxide (OH): | <1 | 0.0 |

## DERIVED DATA

| Total Dissolved Solids: | mg/L |
|---|---|
| Based on E.C | 16500 |
| Calculated ($HCO_3$ = $CO_3$) | 18700 |
| Total Hardness (as Ca $CO_3$) | 200 |
| Total Alkalinity (as Ca $CO_3$) | 3 |

## OTHER ANALYSES

| | | |
|---|---|---|
| Resistivity | 0.320 | ohm.m @ 25 °C |
| Conductivity (E.C) | 31200.0 | µS/cm @ 25 °C |
| Reaction - pH | 5.3 | |

## TOTAL AND BALANCE

| | |
|---|---|
| Cations | 279 |
| Anions | 281 |
| Ion Balance (Diff*100/sum) | 0.433 |
| Sodium Adsorption Ratio | 0.0 |
| Difference (Anions - Cations) | 2.43 |
| Sum (Anions + Cations) | 559.8 |

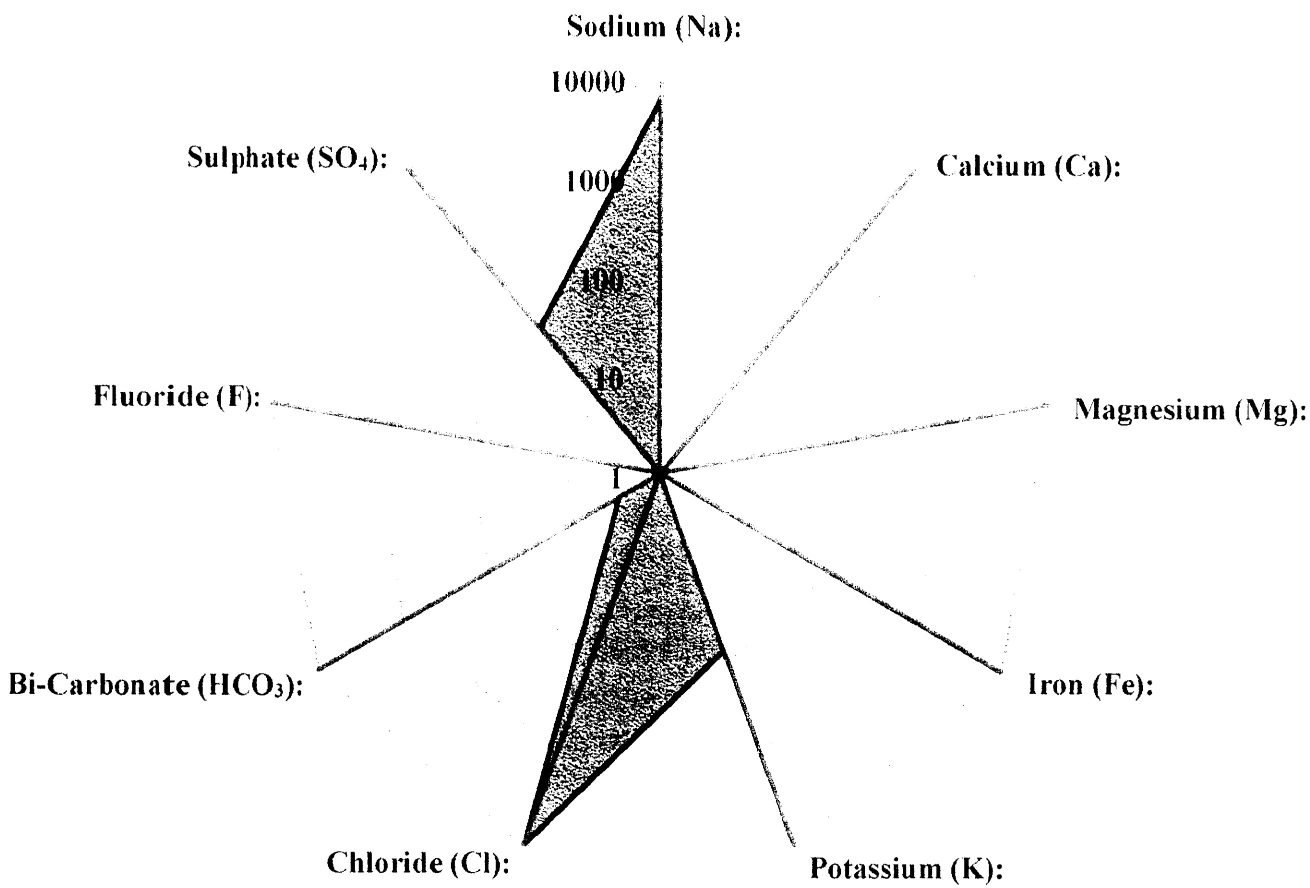
**Nitrate (N) Content = 32.0 mg/L**

Specific Gravity not measurable due to low sample volume.

# WATER ANALYSIS (mg/L)

**Client :** OMV Australia Pty Ltd
**Well:** Baleen-2

**File:** 0164-06
**Sample:** 2C - 778.34m



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PE907960 - color035

# *WATER ANALYSIS*

| | | | |
|---|---|---|---|
| **Client :** | OMV Australia Pty Ltd | **File:** | 0164-06 |
| **Well:** | Baleen-2 | **Sample:** | 2D - 778.34m |
| **Tool:** | N/A | | |

## CHEMICAL COMPOSITION

**Cations**

| | mg/L | meq/L |
|---|---|---|
| Sodium (Na): | 7000 | 304.5 |
| Calcium (Ca): | <50 | 0.0 |
| Magnesium (Mg): | <50 | 0.0 |
| Iron (Fe): | <5 | 0.0 |
| Potassium (K): | 80 | 2.0 |

**Anions**

| | mg/L | meq/L |
|---|---|---|
| Chloride (Cl): | 11000 | 309.8 |
| Bi-Carbonate ($HCO_3$): | 3 | 0.1 |
| Sulphate ($SO_4$): | 40 | 0.8 |
| Carbonate ($CO_3$): | <1 | 0.0 |
| Fluoride (F) | <5 | 0.0 |
| Hydroxide (OH): | <1 | 0.0 |

## DERIVED DATA

| Total Dissolved Solids: | mg/L |
|---|---|
| Based on E.C | 18200 |
| Calculated ($HCO_3 = CO_3$) | 21200 |
| Total Hardness (as Ca $CO_3$) | 80 |
| Total Alkalinity (as Ca $CO_3$) | 3 |

## TOTAL AND BALANCE

| | |
|---|---|
| Cations | 307 |
| Anions | 311 |
| Ion Balance (Diff*100/sum) | 0.676 |
| Sodium Adsorption Ratio | 0.0 |
| Difference (Anions - Cations) | 4.17 |
| Sum (Anions + Cations) | 617.3 |

## OTHER ANALYSES

| | | |
|---|---|---|
| Resistivity | 0.282 | ohm.m @ 25 °C |
| Conductivity (E.C) | 35400.0 | μS/cm @ 25 °C |
| Reaction - pH | 6.1 | |

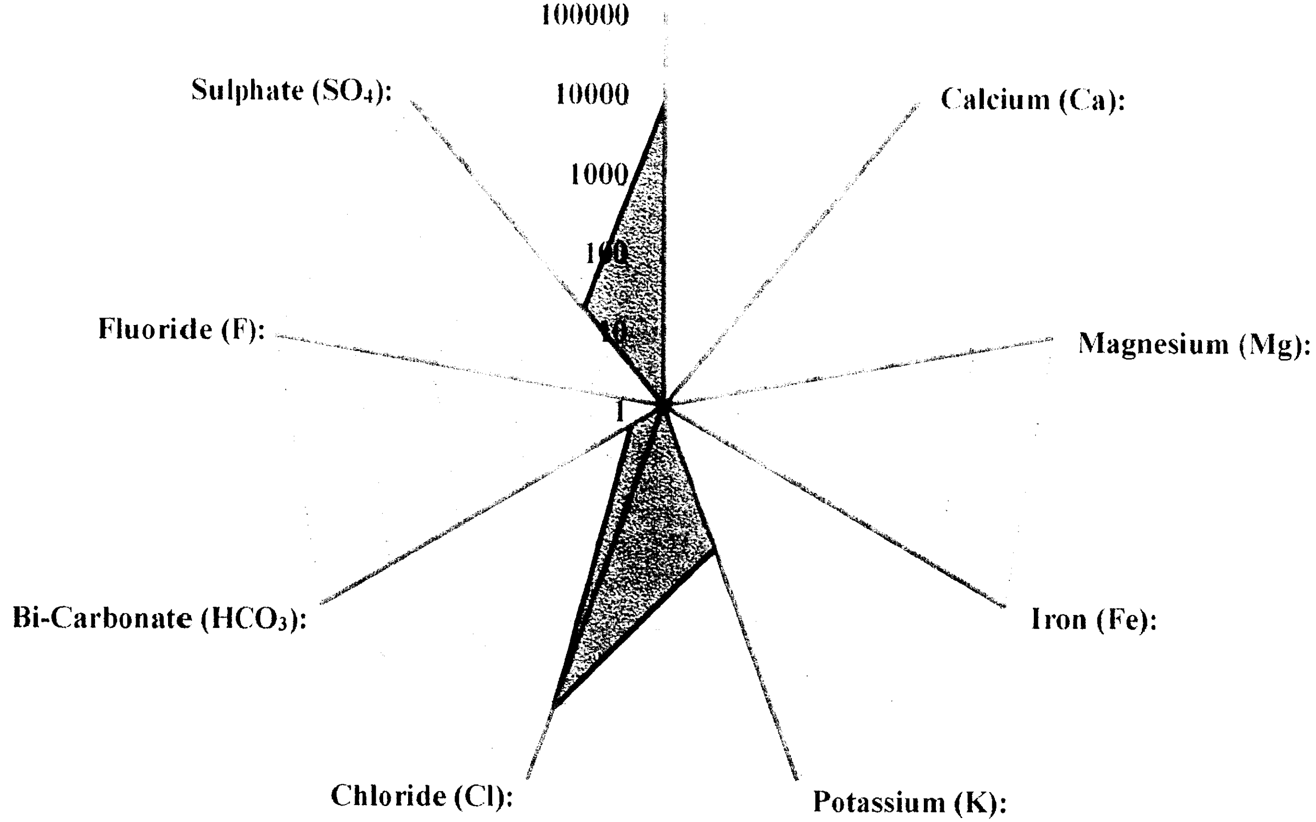
**Nitrate (N) Content = 10.0 mg/L**

Specific Gravity not measurable due to low sample volume.

## WATER ANALYSIS (mg/L)

**Client :** OMV Australia Pty Ltd
**Well:** Baleen-2

**File:** 0164-06
**Sample:** 2D - 778.34m



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PE907960_col01036

# *WATER ANALYSIS*

| | | | |
|---|---|---|---|
| **Client :** | OMV Australia Pty Ltd | **File:** | 0164-06 |
| **Well:** | Baleen-2 | **Sample:** | 2E - 778.34m |
| **Tool:** | N/A | | |

## CHEMICAL COMPOSITION

**Cations**

| | mg/L | meq/L |
|---|---|---|
| Sodium (Na): | 6520 | 283.6 |
| Calcium (Ca): | <50 | 0.0 |
| Magnesium (Mg): | <50 | 0.0 |
| Iron (Fe): | <5 | 0.0 |
| Potassium (K): | 80 | 2.0 |

**Anions**

| | mg/L | meq/L |
|---|---|---|
| Chloride (Cl): | 10200 | 287.3 |
| Bi-Carbonate ($HCO_3$): | <1 | 0.0 |
| Sulphate ($SO_4$): | 80 | 1.7 |
| Carbonate ($CO_3$): | <1 | 0.0 |
| Fluoride (F) | <5 | 0.0 |
| Hydroxide (OH): | <1 | 0.0 |

## DERIVED DATA

| Total Dissolved Solids: | mg/L |
|---|---|
| Based on E.C | 16800 |
| Calculated ($HCO_3$ = $CO_3$) | 20200 |
| Total Hardness (as Ca $CO_3$) | 120 |
| Total Alkalinity (as Ca $CO_3$) | <1 |

## TOTAL AND BALANCE

| | |
|---|---|
| Cations | 286 |
| Anions | 289 |
| Ion Balance (Diff*100/sum) | 0.573 |
| Sodium Adsorption Ratio | 0.0 |
| Difference (Anions - Cations) | 3.29 |
| Sum (Anions + Cations) | 574.6 |

## OTHER ANALYSES

| | | |
|---|---|---|
| Resistivity | 0.298 | ohm.m @ 25 °C |
| Conductivity (E.C) | 33600.0 | µS/cm @ 25 °C |
| Reaction - pH | 4.3 | |

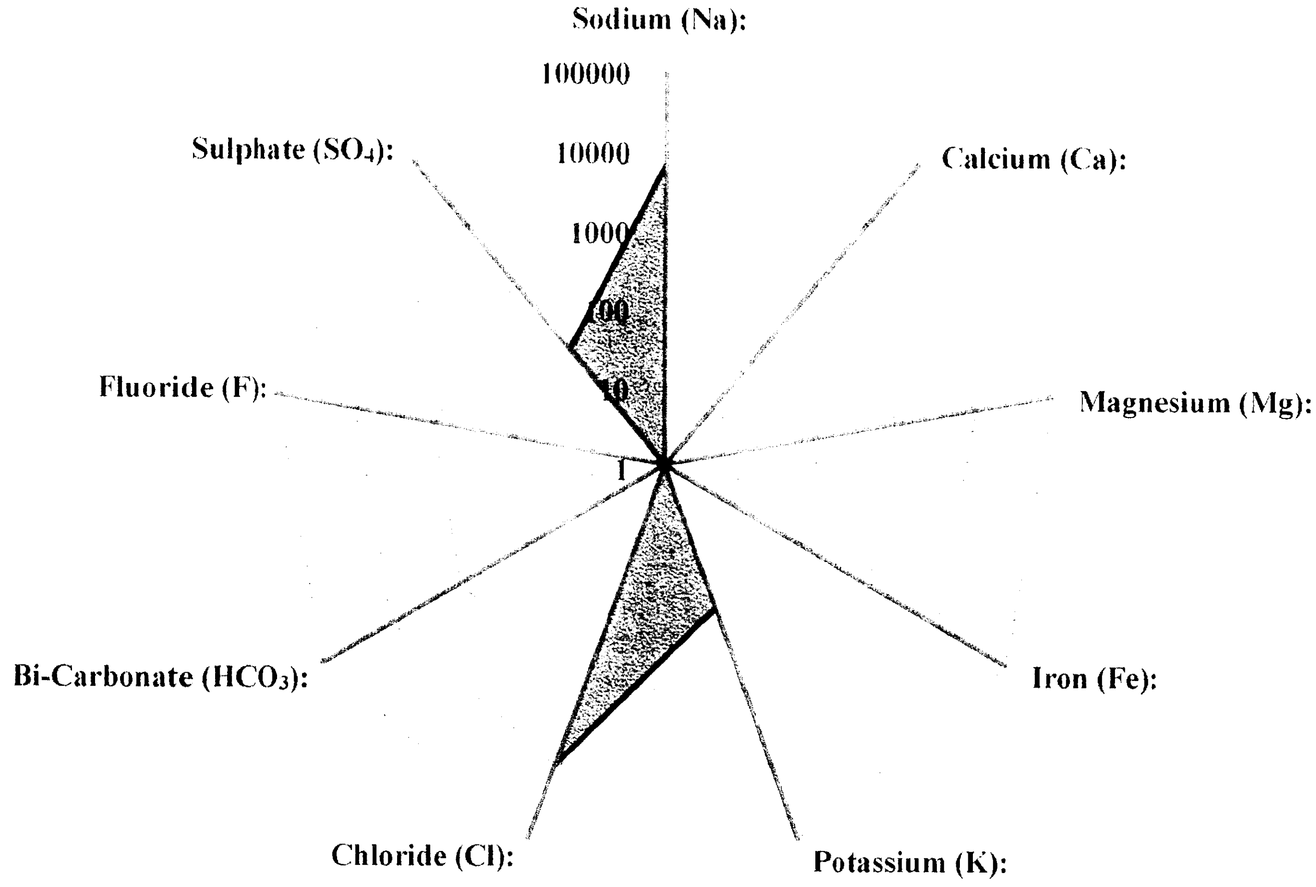
**Nitrate (N) Content = 51.6 mg/L**

Specific Gravity not measurable due to low sample volume.

# WATER ANALYSIS (mg/L)

**Client :** OMV Australia Pty Ltd
**Well:** Baleen-2

**File:** 0164-06
**Sample:** 2E - 778.34m



# *WATER ANALYSIS*

| | | | |
|---|---|---|---|
| **Client :** | OMV Australia Pty Ltd | **File:** | 0164-06 |
| **Well:** | Baleen-2 | **Sample:** | Filtrate |
| **Tool:** | N/A | | |

## CHEMICAL COMPOSITION

**Cations**

| | mg/L | meq/L |
|---|---|---|
| Sodium (Na): | 28000 | 1218.0 |
| Calcium (Ca): | 160 | 8.0 |
| Magnesium (Mg): | 360.0 | 29.6 |
| Iron (Fe): | <5 | 0.0 |
| Potassium (K): | 440 | 11.3 |

**Anions**

| | mg/L | meq/L |
|---|---|---|
| Chloride (Cl): | 43200 | 1216.8 |
| Bi-Carbonate ($HCO_3$): | 6 | 0.1 |
| Sulphate ($SO_4$): | 1440 | 30.0 |
| Carbonate ($CO_3$): | <1 | 0.0 |
| Fluoride (F) | <5 | 0.0 |
| Hydroxide (OH): | <1 | 0.0 |

## DERIVED DATA

| | mg/L |
|---|---|
| Total Dissolved Solids: | |
| Based on E.C | 74000 |
| Calculated ($HCO_3 = CO_3$) | 80800 |
| Total Hardness (as Ca $CO_3$) | 2000 |
| Total Alkalinity (as Ca $CO_3$) | 6 |

## OTHER ANALYSES

| | | |
|---|---|---|
| Resistivity | 0.075 | ohm.m @ 25 °C |
| Conductivity (E.C) | 134000.0 | µS/cm @ 25 °C |
| Reaction - pH | 6.6 | |

## TOTAL AND BALANCE

| | |
|---|---|
| Cations | 1267 |
| Anions | 1247 |
| Ion Balance (Diff*100/sum) | -0.795 |
| Sodium Adsorption Ratio | 0.0 |
| Difference (Anions - Cations) | -19.99 |
| Sum (Anions + Cations) | 2513.7 |

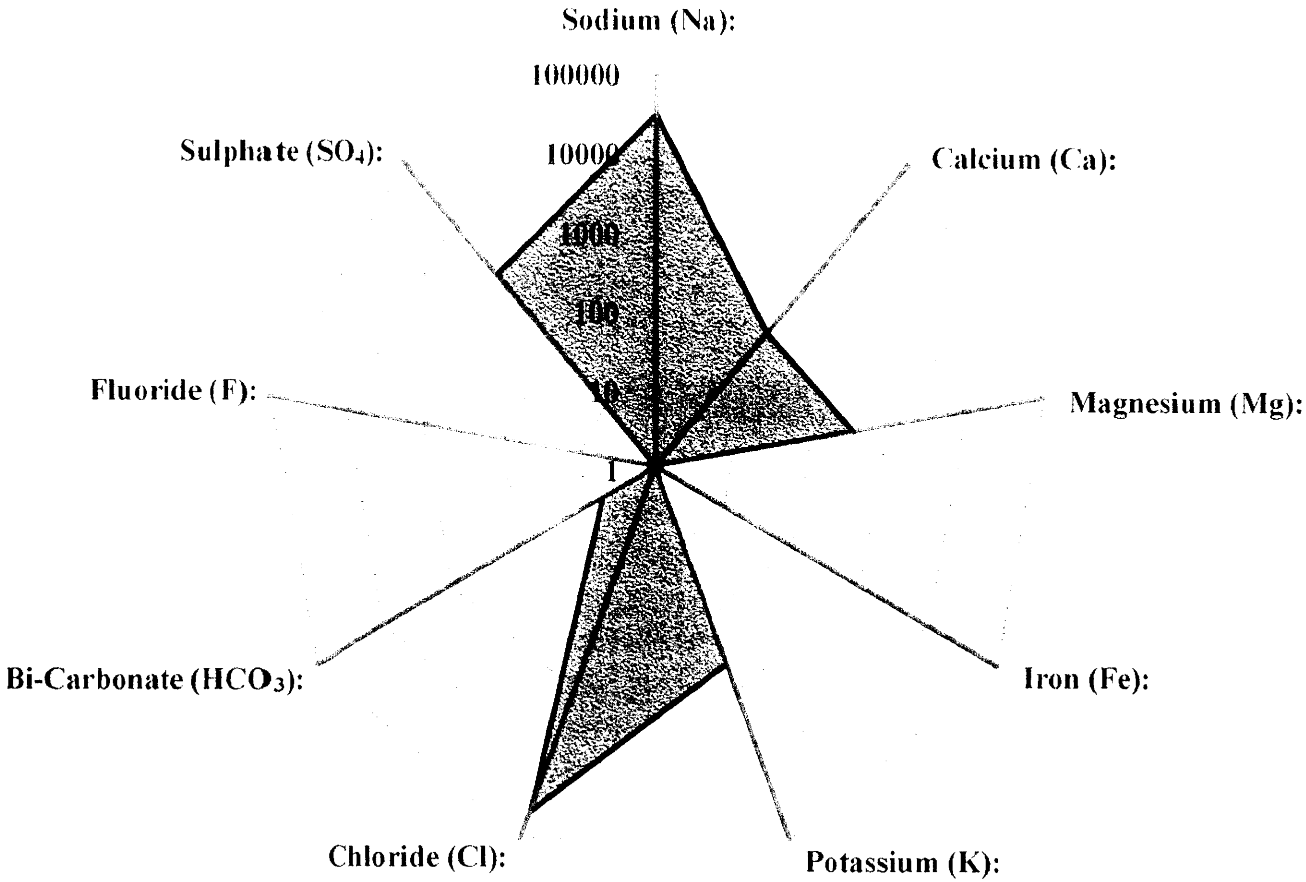
**Nitrate (N) Content = 233 mg/L**

Specific Gravity not measurable due to low sample volume.

## WATER ANALYSIS (mg/L)

**Client :** OMV Australia Pty Ltd
**Well:** Baleen-2

**File:** 0164-06
**Sample:** Filtrate



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PE907960 - color 038

# *WATER ANALYSIS*

**Client :** OMV Australia Pty Ltd
**Well:** Baleen-2
**Tool:** N/A

**File:** 0164-06
**Sample:** Mud,Core 2, 762m

## CHEMICAL COMPOSITION

**Cations**

| | mg/L | meq/L |
|---|---|---|
| Sodium (Na): | 25700 | 1118.0 |
| Calcium (Ca): | 454 | 22.7 |
| Magnesium (Mg): | 348.0 | 28.6 |
| Iron (Fe): | 4.8 | 0.2 |
| Potassium (K): | 434 | 11.1 |

**Anions**

| | mg/L | meq/L |
|---|---|---|
| Chloride (Cl): | 38800 | 1092.8 |
| Bi-Carbonate ($HCO_3$): | 5510 | 110.1 |
| Sulphate ($SO_4$): | 1430 | 29.8 |
| Carbonate ($CO_3$): | <1 | 0.0 |
| Fluoride (F) | <0.1 | 0.0 |
| Hydroxide (OH): | <1 | 0.0 |

## DERIVED DATA

| Total Dissolved Solids: | mg/L |
|---|---|
| Based on E.C | 33900 |
| Calculated ($HCO_3$ = $CO_3$) | 41500 |
| Total Hardness (as Ca $CO_3$) | 2570 |
| Total Alkalinity (as Ca $CO_3$) | 5510 |

## OTHER ANALYSES

| | | |
|---|---|---|
| Resistivity | 0.156 | ohm.m @ 25 °C |
| Conductivity (E.C) | 63800.0 | µS/cm @ 25 °C |
| Reaction - pH | 8.3 | |

## TOTAL AND BALANCE

| | |
|---|---|
| Cations | 1181 |
| Anions | 1233 |
| Ion Balance (Diff*100/sum) | 2.163 |
| Sodium Adsorption Ratio | 0.0 |
| Difference (Anions - Cations) | 52.19 |
| Sum (Anions + Cations) | 2413.2 |

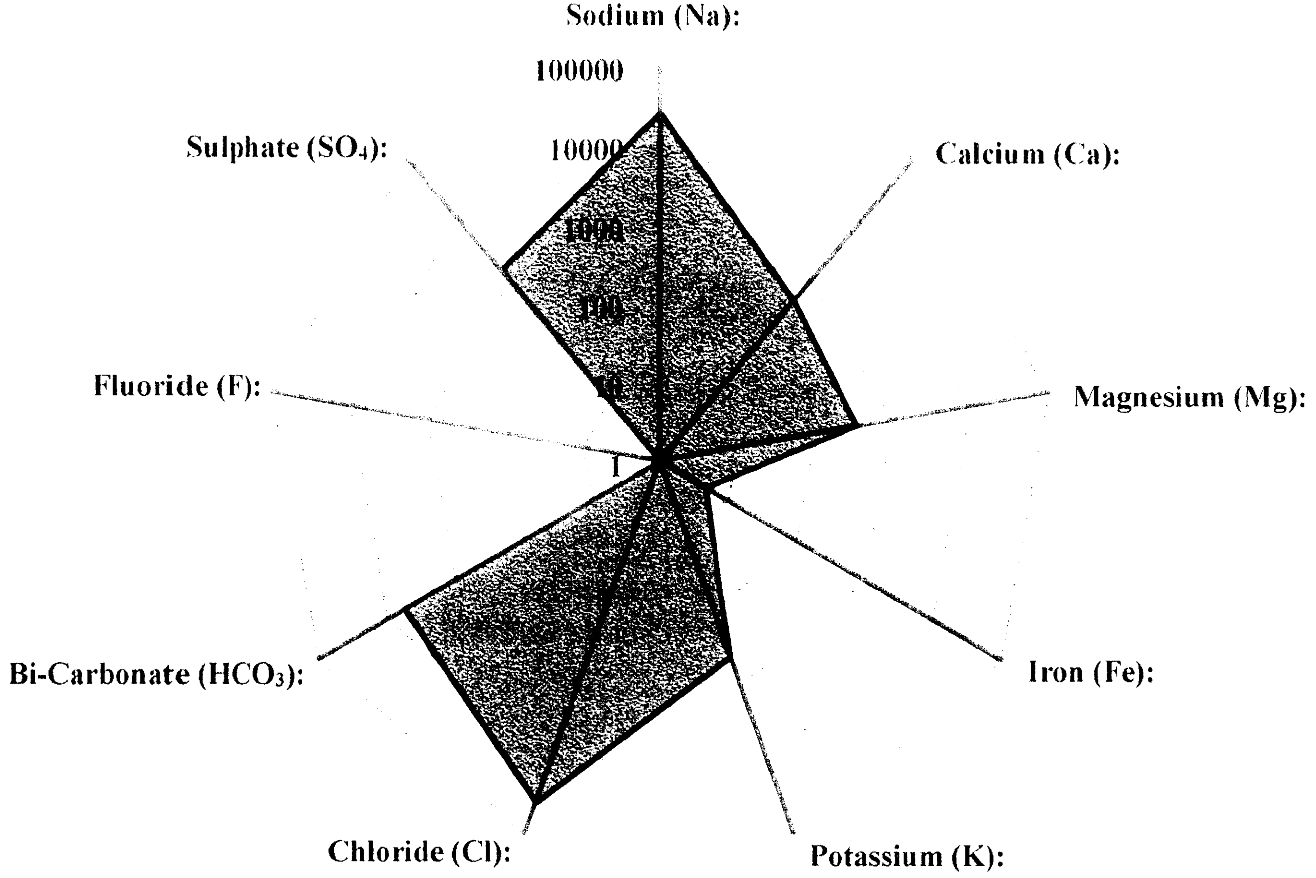
**Nitrate (N) Content = 300 mg/L**

Specific Gravity not measurable due to low sample volume.

# WATER ANALYSIS (mg/L)

**Client :** OMV Australia Pty Ltd
**Well:** Baleen-2

**File:** 0164-06
**Sample:** Mud,Core 2, 762m



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# *CHAPTER 2*

## EXTRACTED OIL COMPOSITION

# COMPOSITION OF OIL EXTRACTED FROM CORE SAMPLE
## (by Chromatography)

**Client:** OMV Australia Pty Ltd
**Well:** Baleen-2
**Cylinder No:** Sample 1

| Component | (Mole %) | (Weight % ) | Density (g/cc) | Molecular Weight |
|---|---|---|---|---|
| Hydrogen Sulphide | 0.00 | 0.00 | 0.80064 | 34.0800 |
| Carbon Dioxide | 0.00 | 0.00 | 0.81720 | 44.0100 |
| Nitrogen | 0.00 | 0.00 | 0.80860 | 28.0134 |
| Methane | 0.00 | 0.00 | 0.29970 | 16.0430 |
| Ethane | 0.00 | 0.00 | 0.35619 | 30.0700 |
| Propane | 0.00 | 0.00 | 0.50698 | 44.0970 |
| iso-Butane | 0.00 | 0.00 | 0.56286 | 58.1230 |
| n-Butane | 0.00 | 0.00 | 0.58402 | 58.1230 |
| iso-Pentane | 0.00 | 0.00 | 0.62441 | 72.1500 |
| n-Pentane | 0.00 | 0.00 | 0.63108 | 72.1500 |
| Hexanes | 0.00 | 0.00 | 0.68500 | 84.0000 |
| Heptanes | 0.00 | 0.00 | 0.72200 | 96.0000 |
| Octanes | 0.00 | 0.00 | 0.74500 | 107.0000 |
| Nonanes | 0.00 | 0.00 | 0.76400 | 121.0000 |
| Decanes | 3.67 | 2.17 | 0.77800 | 134.0000 |
| Undecanes | 4.60 | 2.99 | 0.78900 | 147.0000 |
| Dodecanes | 7.04 | 5.01 | 0.80000 | 161.0000 |
| Tridecanes | 11.61 | 8.98 | 0.81100 | 175.0000 |
| Tetradecanes | 11.02 | 9.25 | 0.82200 | 190.0000 |
| Pentadecanes | 12.44 | 11.32 | 0.83200 | 206.0000 |
| Hexadecanes | 8.99 | 8.82 | 0.83900 | 222.0000 |
| Heptadecanes | 7.29 | 7.63 | 0.84700 | 237.0000 |
| Octadecanes | 6.16 | 6.83 | 0.85200 | 251.0000 |
| Nonadecanes | 5.00 | 5.81 | 0.85700 | 263.0000 |
| Eicosanes | 4.77 | 5.79 | 0.86200 | 275.0000 |
| Heneicosanes | 4.27 | 5.49 | 0.86700 | 291.0000 |
| Docosanes | 3.25 | 4.38 | 0.87200 | 305.0000 |
| Tricosanes | 2.13 | 2.99 | 0.87700 | 318.0000 |
| Tetracosanes | 1.96 | 2.87 | 0.88100 | 331.0000 |
| Pentacosanes | 1.61 | 2.46 | 0.88500 | 345.0000 |
| Hexacosanes | 1.23 | 1.95 | 0.88900 | 359.0000 |
| Heptacosanes | 1.05 | 1.73 | 0.89300 | 374.0000 |
| Octacosanes | 0.71 | 1.22 | 0.89600 | 388.0000 |
| Nonacosanes | 0.44 | 0.79 | 0.89900 | 402.0000 |
| Triacontanes plus | 0.76 | 1.52 | 0.91000 | 450.0000 |
| **TOTALS:** | **100.00** | **100.00** | | |

# *COMPOSITION OF OIL EXTRACTED FROM CORE SAMPLE*
## (by Chromatography)

**Client:** OMV Australia Pty Ltd
**Well:** Baleen-2
**Cylinder No:** Sample 1

**Properties of Plus Fractions**

| Plus Fractions | (Mole %) | (Weight %) | Density (g/cc) | Molecular Weight |
|---|---|---|---|---|
| Heptanes plus | 100.00 | 100.00 | 0.8430 | 226 |
| Undecanes plus | 96.33 | 97.83 | 0.8440 | 230 |
| Pentadecanes plus | 62.06 | 71.60 | 0.8580 | 261 |
| Eicosanes plus | 22.18 | 31.19 | 0.8770 | 318 |
| Triacontanes plus | 0.76 | 1.52 | 0.9100 | 450 |

**Total Sample Properties**

| | |
|---|---|
| Molecular Weight: | 226.3 |
| Calculated Liquid Density at 60°F, g/scc: | 0.8438 |

# COMPOSITION OF OIL EXTRACTED FROM CORE SAMPLE
## (by Chromatography)

**Client:** OMV Australia Pty Ltd
**Well:** Baleen-2
**Cylinder No:** Sample 2

| Component | (Mole %) | (Weight % ) | Density (g/cc) | Molecular Weight |
|---|---|---|---|---|
| Hydrogen Sulphide | 0.00 | 0.00 | 0.80064 | 34.0800 |
| Carbon Dioxide | 0.00 | 0.00 | 0.81720 | 44.0100 |
| Nitrogen | 0.00 | 0.00 | 0.80860 | 28.0134 |
| Methane | 0.00 | 0.00 | 0.29970 | 16.0430 |
| Ethane | 0.00 | 0.00 | 0.35619 | 30.0700 |
| Propane | 0.00 | 0.00 | 0.50698 | 44.0970 |
| iso-Butane | 0.00 | 0.00 | 0.56286 | 58.1230 |
| n-Butane | 0.00 | 0.00 | 0.58402 | 58.1230 |
| iso-Pentane | 0.00 | 0.00 | 0.62441 | 72.1500 |
| n-Pentane | 0.00 | 0.00 | 0.63108 | 72.1500 |
| Hexanes | 0.00 | 0.00 | 0.68500 | 84.0000 |
| Heptanes | 0.00 | 0.00 | 0.72200 | 96.0000 |
| Octanes | 0.00 | 0.00 | 0.74500 | 107.0000 |
| Nonanes | 0.00 | 0.00 | 0.76400 | 121.0000 |
| Decanes | 3.26 | 1.98 | 0.77800 | 134.0000 |
| Undecanes | 5.01 | 3.34 | 0.78900 | 147.0000 |
| Dodecanes | 8.02 | 5.86 | 0.80000 | 161.0000 |
| Tridecanes | 12.87 | 10.22 | 0.81100 | 175.0000 |
| Tetradecanes | 11.63 | 10.03 | 0.82200 | 190.0000 |
| Pentadecanes | 12.98 | 12.14 | 0.83200 | 206.0000 |
| Hexadecanes | 8.97 | 9.04 | 0.83900 | 222.0000 |
| Heptadecanes | 7.27 | 7.82 | 0.84700 | 237.0000 |
| Octadecanes | 6.13 | 6.98 | 0.85200 | 251.0000 |
| Nonadecanes | 4.78 | 5.71 | 0.85700 | 263.0000 |
| Eicosanes | 4.62 | 5.77 | 0.86200 | 275.0000 |
| Heneicosanes | 4.19 | 5.53 | 0.86700 | 291.0000 |
| Docosanes | 2.95 | 4.09 | 0.87200 | 305.0000 |
| Tricosanes | 1.99 | 2.87 | 0.87700 | 318.0000 |
| Tetracosanes | 1.95 | 2.93 | 0.88100 | 331.0000 |
| Pentacosanes | 1.09 | 1.71 | 0.88500 | 345.0000 |
| Hexacosanes | 0.91 | 1.48 | 0.88900 | 359.0000 |
| Heptacosanes | 0.61 | 1.03 | 0.89300 | 374.0000 |
| Octacosanes | 0.30 | 0.53 | 0.89600 | 388.0000 |
| Nonacosanes | 0.09 | 0.16 | 0.89900 | 402.0000 |
| Triacontanes plus | 0.38 | 0.78 | 0.91000 | 450.0000 |
| **TOTALS:** | **100.00** | **100.00** | | |

# *COMPOSITION OF OIL EXTRACTED FROM CORE SAMPLE*
## (by Chromatography)

**Client:** OMV Australia Pty Ltd
**Well:** Baleen-2
**Cylinder No:** Sample 2

**Properties of Plus Fractions**

| Plus Fractions | (Mole %) | (Weight %) | Density (g/cc) | Molecular Weight |
|---|---|---|---|---|
| Heptanes plus | 100.00 | 100.00 | 0.8400 | 220 |
| Undecanes plus | 96.74 | 98.02 | 0.8410 | 223 |
| Pentadecanes plus | 59.21 | 68.57 | 0.8550 | 255 |
| Eicosanes plus | 19.08 | 26.88 | 0.8740 | 310 |
| Triacontanes plus | 0.38 | 0.78 | 0.9100 | 450 |

**Total Sample Properties**

| | |
|---|---|
| Molecular Weight: | 220.3 |
| Calculated Liquid Density at 60°F, g/scc: | 0.8405 |

# *COMPOSITION OF OIL EXTRACTED FROM CORE SAMPLE*
## (by Chromatography)

**Client:** OMV Australia Pty Ltd
**Well:** Baleen-2
**Cylinder No:** Sample 3

| Component | (Mole %) | (Weight % ) | Density (g/cc) | Molecular Weight |
|---|---|---|---|---|
| Hydrogen Sulphide | 0.00 | 0.00 | 0.80064 | 34.0800 |
| Carbon Dioxide | 0.00 | 0.00 | 0.81720 | 44.0100 |
| Nitrogen | 0.00 | 0.00 | 0.80860 | 28.0134 |
| Methane | 0.00 | 0.00 | 0.29970 | 16.0430 |
| Ethane | 0.00 | 0.00 | 0.35619 | 30.0700 |
| Propane | 0.00 | 0.00 | 0.50698 | 44.0970 |
| iso-Butane | 0.00 | 0.00 | 0.56286 | 58.1230 |
| n-Butane | 0.00 | 0.00 | 0.58402 | 58.1230 |
| iso-Pentane | 0.00 | 0.00 | 0.62441 | 72.1500 |
| n-Pentane | 0.00 | 0.00 | 0.63108 | 72.1500 |
| Hexanes | 0.00 | 0.00 | 0.68500 | 84.0000 |
| Heptanes | 0.00 | 0.00 | 0.72200 | 96.0000 |
| Octanes | 0.00 | 0.00 | 0.74500 | 107.0000 |
| Nonanes | 0.00 | 0.00 | 0.76400 | 121.0000 |
| Decanes | 2.55 | 1.56 | 0.77800 | 134.0000 |
| Undecanes | 5.10 | 3.42 | 0.78900 | 147.0000 |
| Dodecanes | 8.61 | 6.33 | 0.80000 | 161.0000 |
| Tridecanes | 12.97 | 10.36 | 0.81100 | 175.0000 |
| Tetradecanes | 11.83 | 10.26 | 0.82200 | 190.0000 |
| Pentadecanes | 13.78 | 12.98 | 0.83200 | 206.0000 |
| Hexadecanes | 8.87 | 8.99 | 0.83900 | 222.0000 |
| Heptadecanes | 7.12 | 7.70 | 0.84700 | 237.0000 |
| Octadecanes | 6.60 | 7.56 | 0.85200 | 251.0000 |
| Nonadecanes | 4.37 | 5.25 | 0.85700 | 263.0000 |
| Eicosanes | 4.68 | 5.87 | 0.86200 | 275.0000 |
| Heneicosanes | 4.15 | 5.51 | 0.86700 | 291.0000 |
| Docosanes | 2.89 | 4.03 | 0.87200 | 305.0000 |
| Tricosanes | 1.95 | 2.83 | 0.87700 | 318.0000 |
| Tetracosanes | 1.76 | 2.66 | 0.88100 | 331.0000 |
| Pentacosanes | 1.10 | 1.73 | 0.88500 | 345.0000 |
| Hexacosanes | 0.71 | 1.17 | 0.88900 | 359.0000 |
| Heptacosanes | 0.46 | 0.79 | 0.89300 | 374.0000 |
| Octacosanes | 0.12 | 0.22 | 0.89600 | 388.0000 |
| Nonacosanes | 0.03 | 0.06 | 0.89900 | 402.0000 |
| Triacontanes plus | 0.35 | 0.72 | 0.91000 | 450.0000 |
| **TOTALS:** | **100.00** | **100.00** | | |

# *COMPOSITION OF OIL EXTRACTED FROM CORE SAMPLE*
## (by Chromatography)

**Client:** OMV Australia Pty Ltd
**Well:** Baleen-2
**Cylinder No:** Sample 3

**Properties of Plus Fractions**

| Plus Fractions | (Mole %) | (Weight %) | Density (g/cc) | Molecular Weight |
|---|---|---|---|---|
| Heptanes plus | 100.00 | 100.00 | 0.8390 | 219 |
| Undecanes plus | 97.45 | 98.44 | 0.8400 | 221 |
| Pentadecanes plus | 58.94 | 68.07 | 0.8540 | 253 |
| Eicosanes plus | 18.20 | 25.59 | 0.8740 | 308 |
| Triacontanes plus | 0.35 | 0.72 | 0.9100 | 450 |

**Total Sample Properties**

| | |
|---|---|
| Molecular Weight: | 219 |
| Calculated Liquid Density at 60°F, g/scc: | 0.8397 |

# *APPENDIX I*

## SUMMARY OF WATER ANALYSIS RESULTS

## *SUMMARY OF WATER ANALYSIS RESULTS*

| | 1.01 | 1.06 | Filtrate | Mud, Core 2 | 1A mg/L | 1B mg/L | 1C mg/L | 1D mg/L | 1E mg/L |
|---|---|---|---|---|---|---|---|---|---|
| Sodium | 2980. | 3000. | 28000. | 25700. | 11500. | 11600. | 12700. | 11800. | 14700. |
| Calcium | 76. | 76. | 160. | 454. | <50 | <50 | <50 | <50 | <50 |
| Magnesium | 82. | 82. | 360. | 348. | 80. | 120. | 150. | 100. | 100. |
| Iron | <0.1 | <0.1 | <5 | 4.8 | <5 | <5 | <5 | <5 | <5 |
| Potassium | 142. | 142. | 440. | 434. | 80. | 160. | 150. | 150. | 150. |
| Chloride | 4610. | 4610. | 43200. | 38800. | 17700. | 18100. | 19800. | 18500. | 22800. |
| Bicarbonate | 616. | 618. | 6. | 5510. | <1 | <1 | 3. | 1. | <1 |
| Sulphate | 81. | 79. | 1440. | 1430. | 400. | 560. | 650. | 750. | 750. |
| Carbonate | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| Fluoride | 1.1 | 1. | <5 | <0.1 | <5 | <5 | <5 | <5 | <5 |
| Hydroxide | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| Nitrate | 10.4 | 10.4 | 233. | 300. | 44.8 | 111. | 27.5 | 47.5 | 111. |
| T.D.S EC | 525. | 8490. | 74000. | 33900. | 29700. | 30600. | 33500. | 31400. | 38600. |
| T.D.S Calc | 616. | 9170. | 80800. | 41500. | 33100. | 36000. | 39000. | 36600. | 44100. |
| Cations | 144. | 145. | 1267. | 1181. | 509. | 519. | 569. | 525. | 652. |
| Anions | 144. | 144. | 1247. | 1233. | 507. | 521. | 571. | 537. | 658. |

| | 1.01 | 1.06 | Filtrate | Mud, Core 2 | 2A mg/L | 2B mg/L | 2C mg/L | 2D mg/L | 2E mg/L |
|---|---|---|---|---|---|---|---|---|---|
| Sodium | 2980. | 3000. | 28000. | 25700. | 9640. | 7280. | 6360. | 7000. | 6520. |
| Calcium | 76. | 76. | 160. | 454. | <50 | <50 | <50 | <50 | <50 |
| Magnesium | 82. | 82. | 360. | 348. | 120. | 40. | <50 | <50 | <50 |
| Iron | <0.1 | <0.1 | <5 | 4.8 | <5 | <5 | <5 | <5 | <5 |
| Potassium | 142. | 142. | 440. | 434. | 80. | 80. | 80. | 80. | 80. |
| Chloride | 4610. | 4610. | 43200. | 38800. | 15200. | 11200. | 9920. | 11000. | 10200. |
| Bicarbonate | 616. | 618. | 6. | 5510. | 1. | <1 | 3. | 3. | <1 |
| Sulphate | 81. | 79. | 1440. | 1430. | 520. | 80. | 80. | 40. | 80. |
| Carbonate | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| Fluoride | 1.1 | 1. | <5 | <0.1 | <5 | <5 | <5 | <5 | <5 |
| Hydroxide | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| Nitrate | 10.4 | 10.4 | 233. | 300. | 61.2 | 136. | 32. | 10. | 51.6 |
| T.D.S EC | 525. | 8490. | 74000. | 33900. | 25300. | 18600. | 16500. | 18200. | 16800. |
| T.D.S Calc | 616. | 9170. | 80800. | 41500. | 29000. | 20200. | 18700. | 21200. | 20200. |
| Cations | 144. | 145. | 1267. | 1181. | 431. | 322. | 279. | 307. | 286. |
| Anions | 144. | 144. | 1247. | 1233. | 439. | 317. | 281. | 311. | 289. |

# *APPENDIX II*

## CHROMATOGRAMS FOR OIL ANALYSIS

Title :
Run File : C:\STAR\SAMPL032.RUN
Method File : C:\STAR\STD6DHA.MTH
Sample ID : Baleen No.1

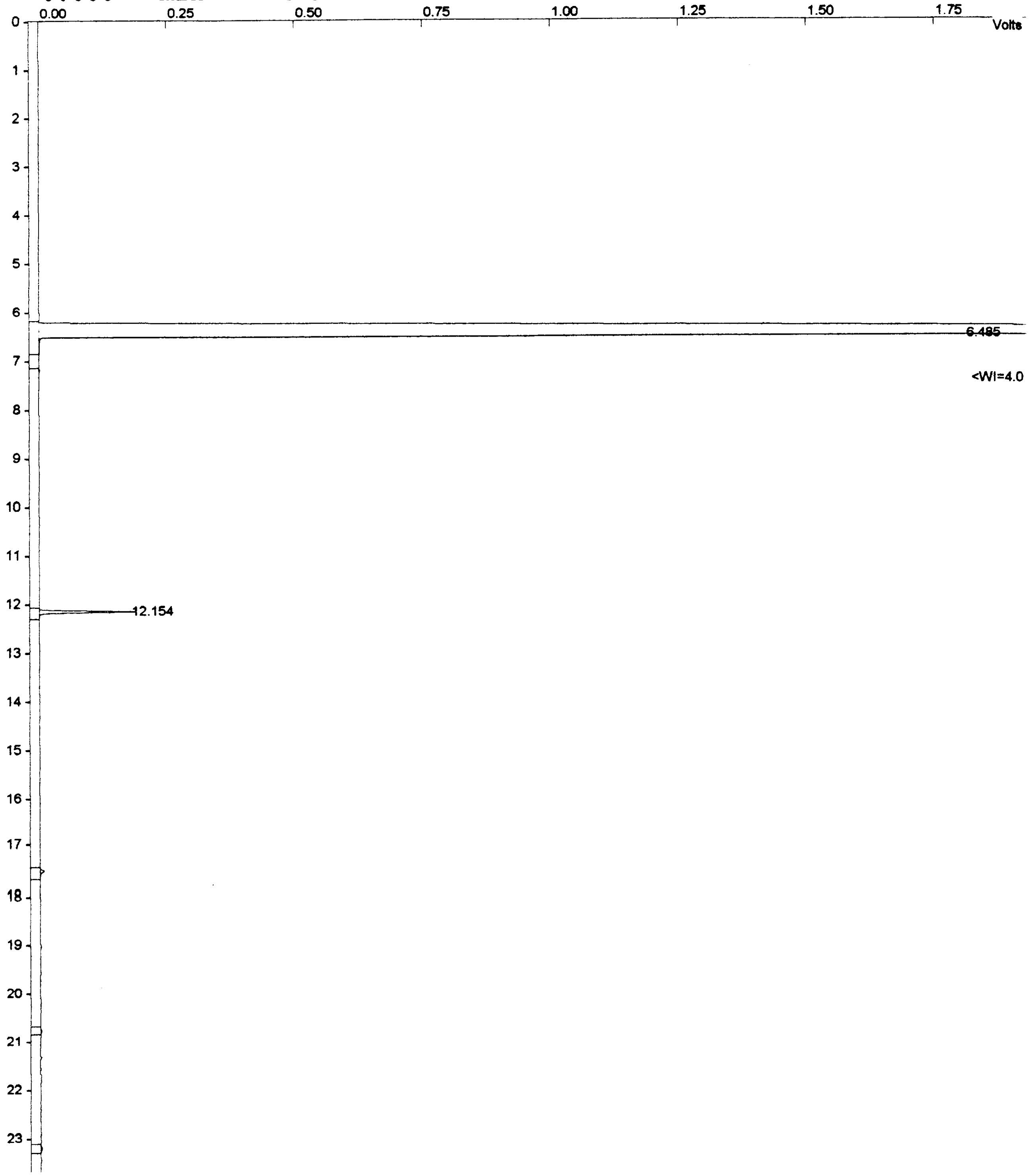
907960 304

Injection Date: 8-NOV-99 2:30 PM    Calculation Date: 8-NOV-99 5:03 PM

Operator : ACS Lab Brisbane    Detector Type: ADCB (10 Volts)
Workstation:    Bus Address : 16
Instrument : Varian Star #1    Sample Rate : 10.00 Hz
Channel : A = FID 10 VOLTS    Run Time : 152.048 min

*********** Star Chromatography Workstation ******* Version 4.5 ***************

Chart Speed = 0.81 cm/min    Attenuation = 800    Zero Offset = 1%
Start Time = 0.000 min    End Time = 152.048 min    Min / Tick = 1.00



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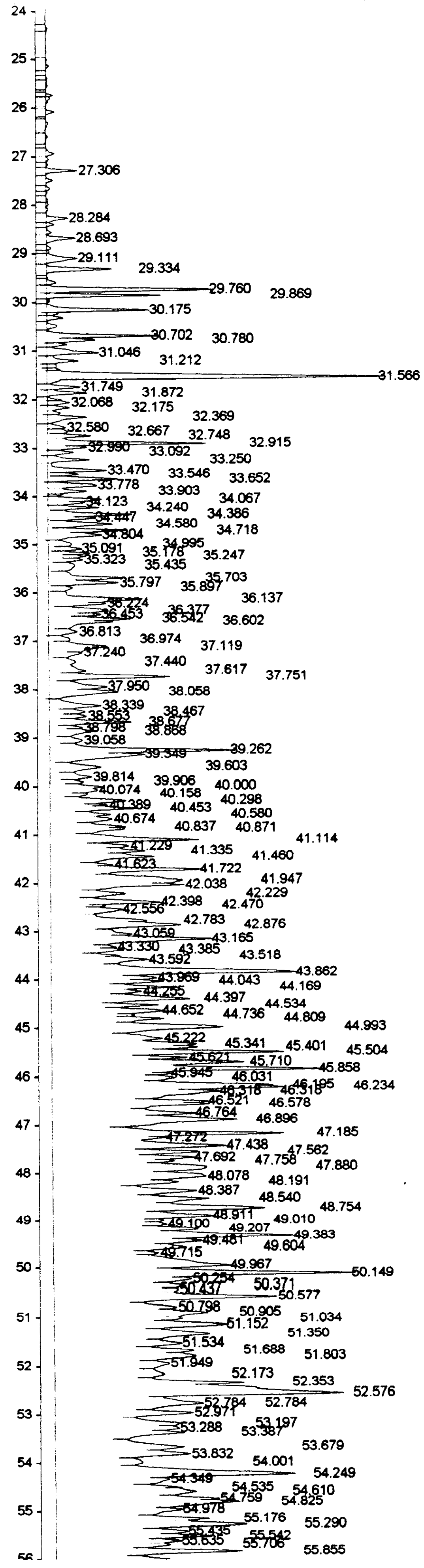

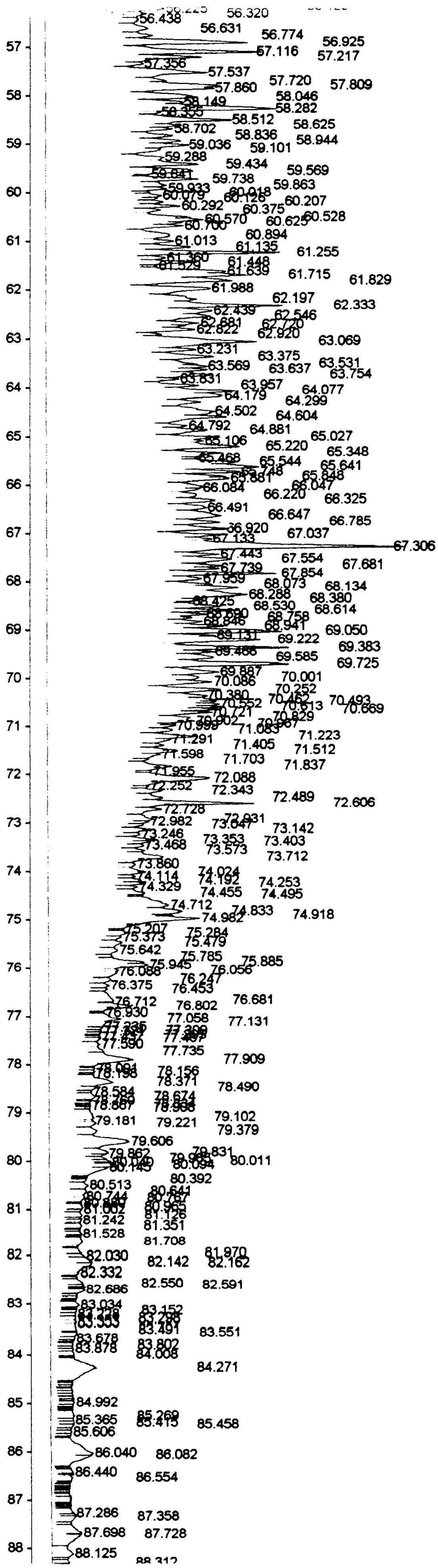
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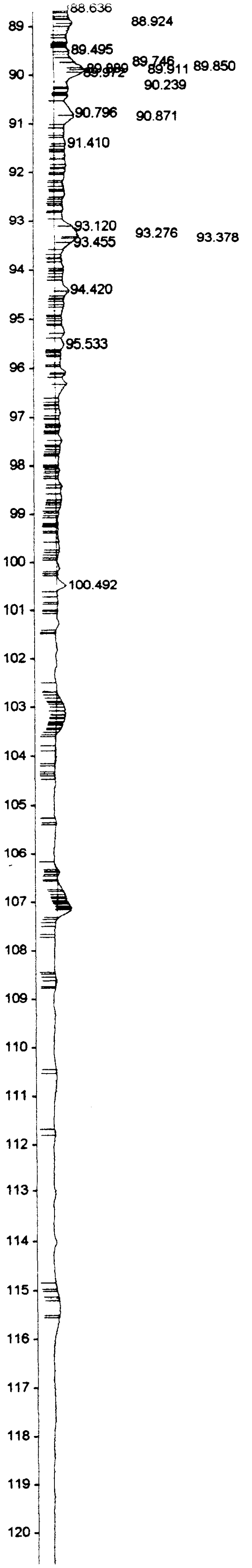


<WI=2.0

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<WI=2.0

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Title :
Run File : C:\STAR\SAMPL033.RUN
Method File : C:\STAR\STD6DHA.MTH
Sample ID : Baleen No.2

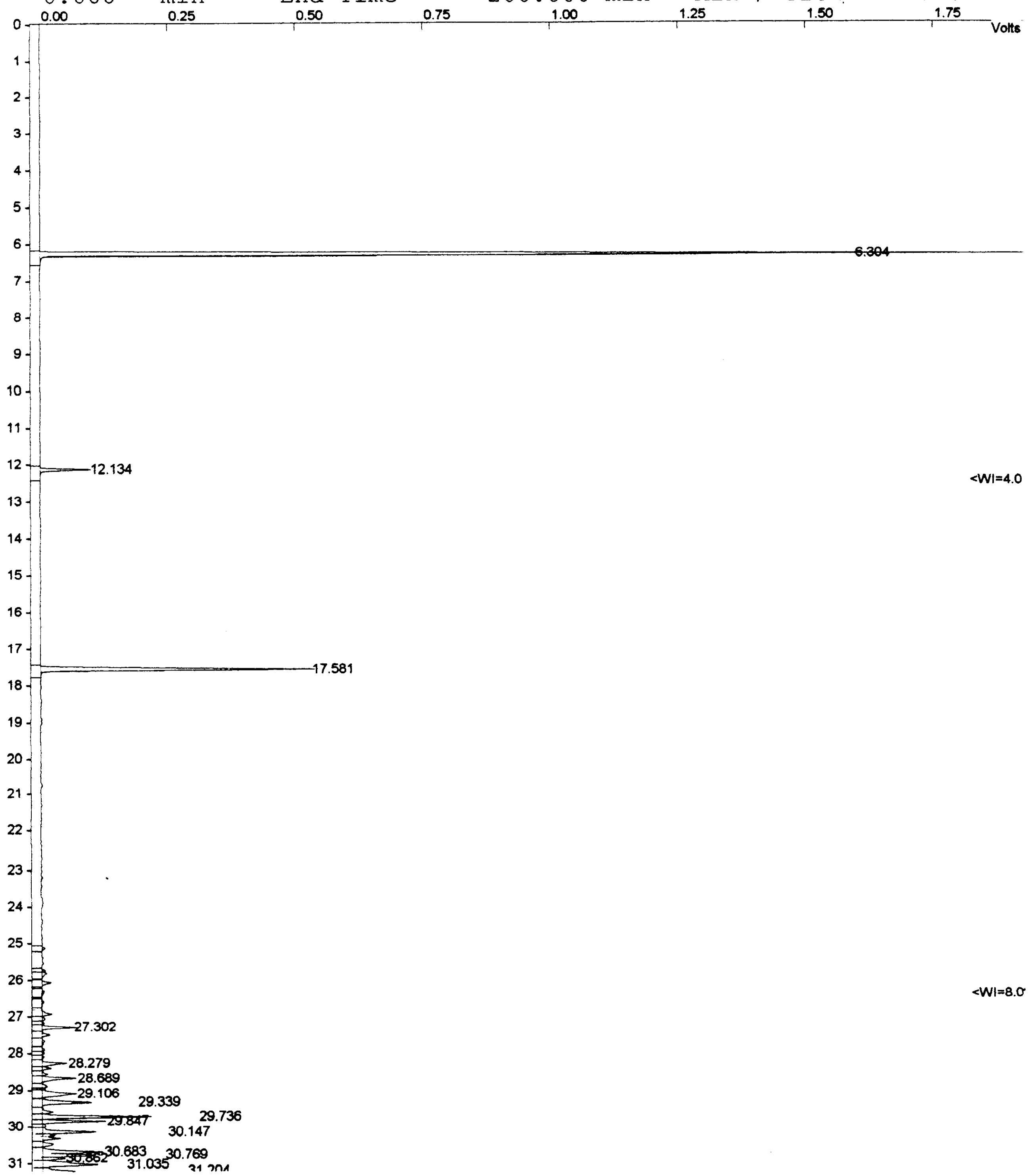
907960 309

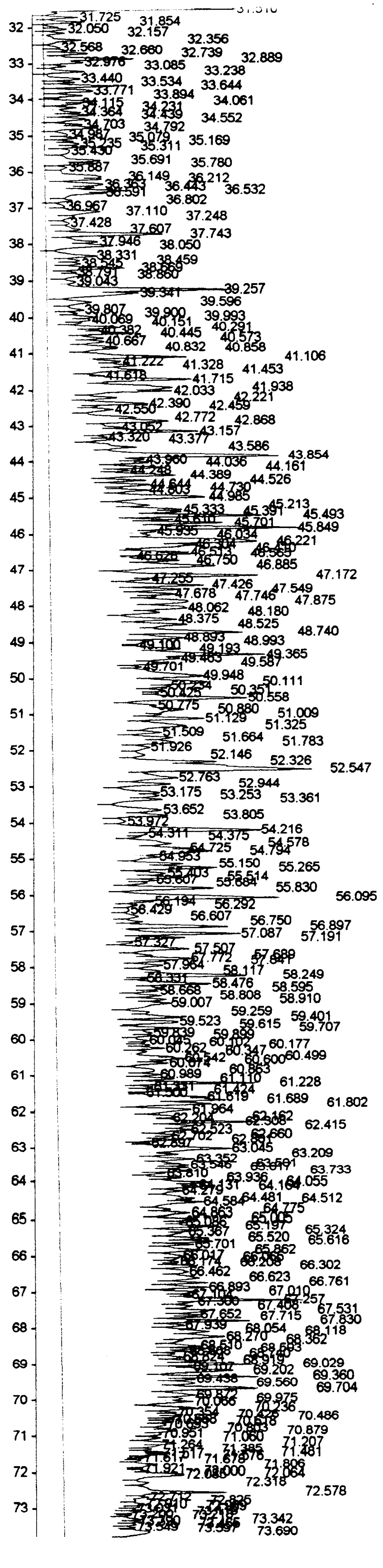
Injection Date: 8-NOV-99 5:13 PM    Calculation Date: 8-NOV-99 8:33 PM

Operator : ACS Lab Brisbane    Detector Type: ADCB (10 Volts)
Workstation:    Bus Address : 16
Instrument : Varian Star #1    Sample Rate : 10.00 Hz
Channel : A = FID 10 VOLTS    Run Time : 200.002 min

*********** Star Chromatography Workstation ******* Version 4.5 ***************

Chart Speed = 0.62 cm/min    Attenuation = 800    Zero Offset = 1%
Start Time = 0.000 min    End Time = 200.000 min    Min / Tick = 1.00

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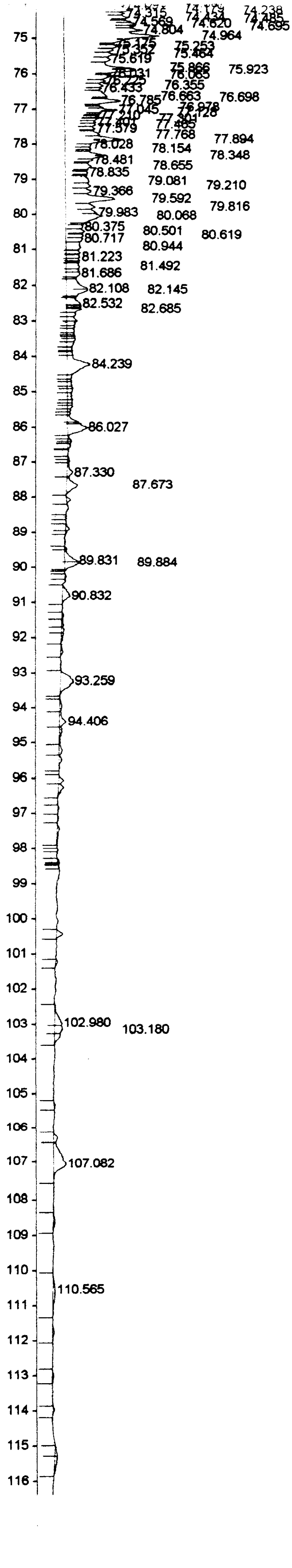
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Title : SANTOS LTD.
Run File : C:\STAR\SAMPL034.RUN
Method File : C:\STAR\STD6DHA.MTH
Sample ID : Baleen No.3

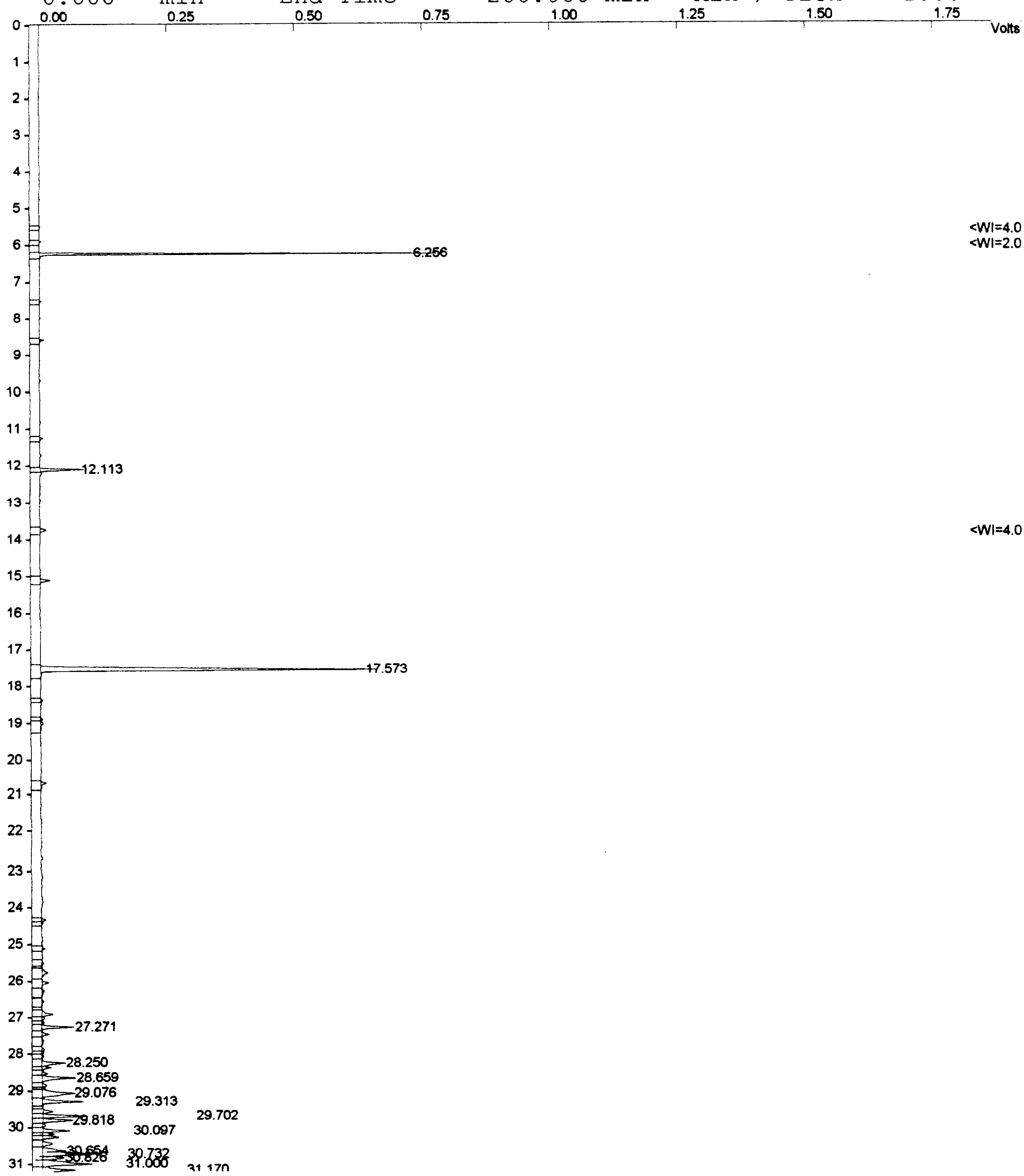
907960 314

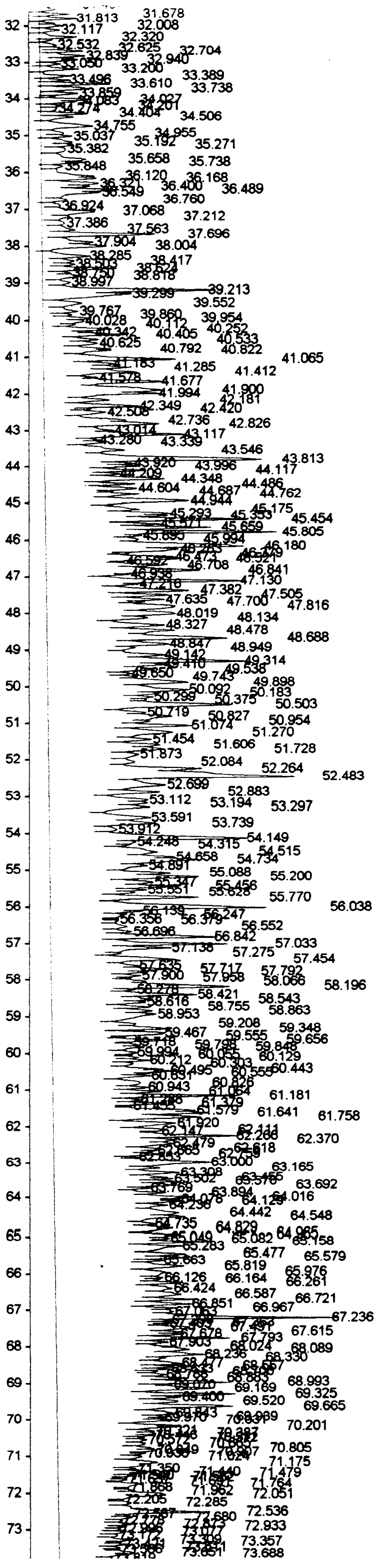
Injection Date: 9-NOV-99 9:25 AM     Calculation Date: 9-NOV-99 12:46 PM

Operator : ACS Lab Brisbane     Detector Type: ADCB (10 Volts)
Workstation:     Bus Address : 16
Instrument : Varian Star #1     Sample Rate : 10.00 Hz
Channel : A = FID 10 VOLTS     Run Time : 200.002 min

*********** Star Chromatography Workstation ******* Version 4.5 ***************

Chart Speed = 0.62 cm/min     Attenuation = 800     Zero Offset = 1%
Start Time = 0.000 min     End Time = 200.000 min     Min / Tick = 1.00

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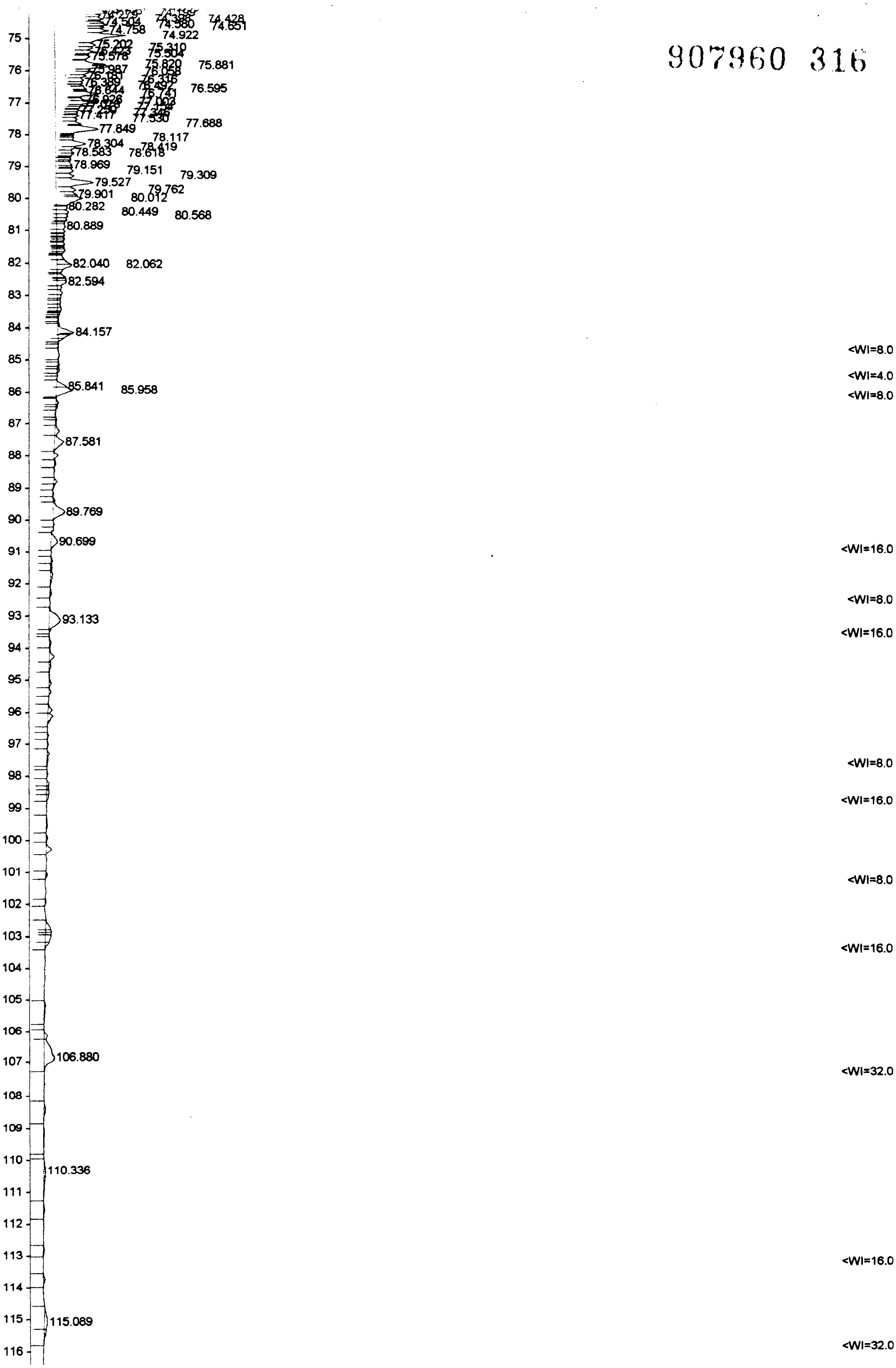
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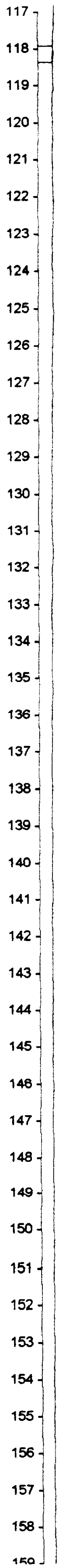
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