# LAKES OIL N.L.

(A.B.N. 62 004 247 214)

# DEADMAN HILL No.1

# STRATIGRAPHIC WELL

# WELL COMPLETION REPORT

BY

D.R. HORNER & J.N. MULREADY

LAKES OIL N.L.
LEVEL 11,
500 COLLINS STREET,
MELBOURNE 3000

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Petroleum Development

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# Deadman Hill 1
# Location Map

914410 005Y

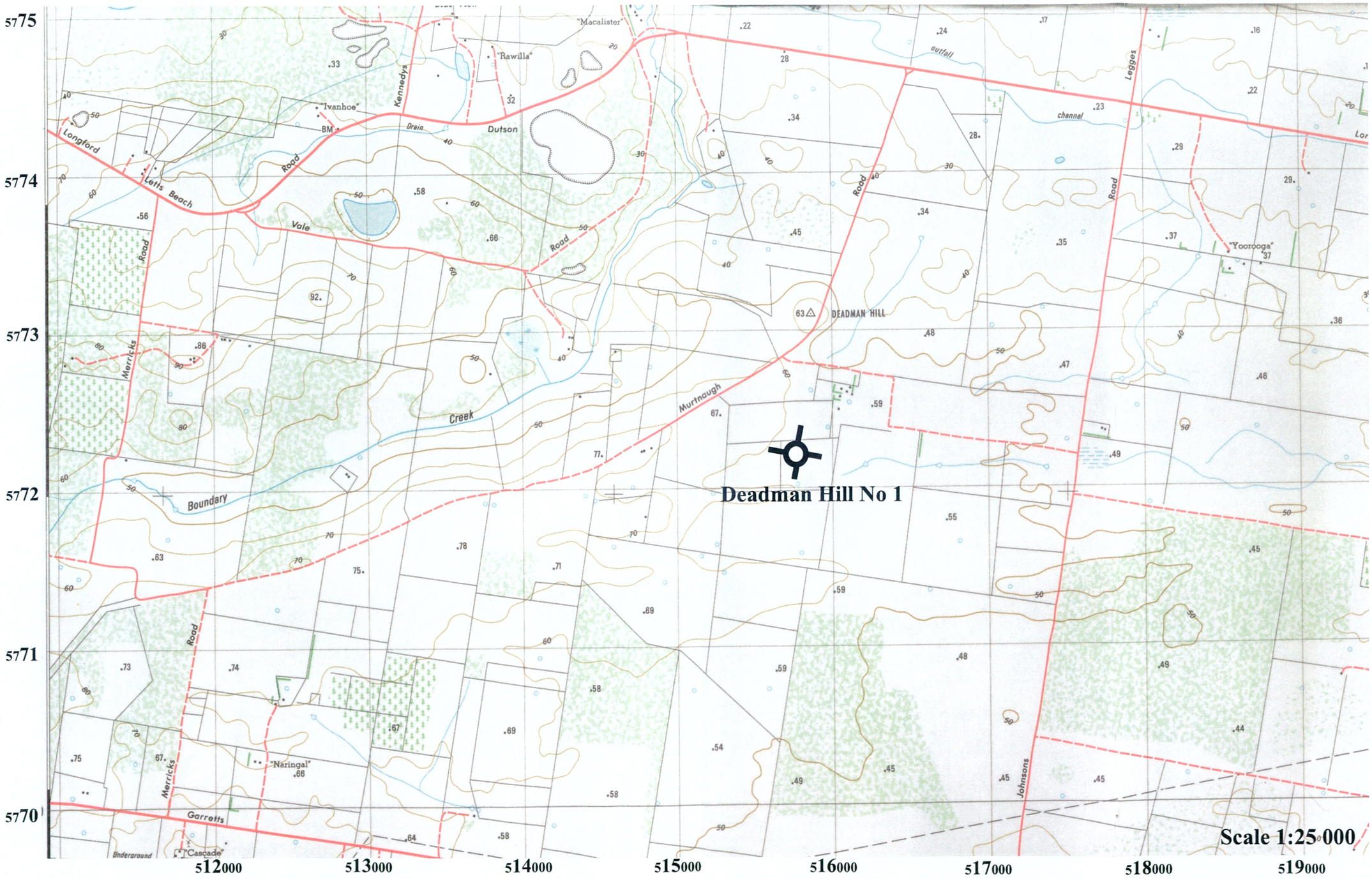



Figure 1

# 2.0 WELL HISTORY

## 2.1 GENERAL DATA

| | |
|---|---|
| Well Name and Number | Deadman Hill No.1 |
| Location | 515827 E<br>5772245 N |
| Elevations | G.L. 58.6 m A.S.L.<br>R.T. 59.6 m A.S.L.<br>Latitude 38° 11' 50.9" S<br>Longitude 147° 10' 50.7" E |
| Petroleum Tenement | PEP 157 |
| Name of Operator | LAKES OIL N.L.<br>A.C.N. 004 247 214<br>11TH Level,<br>500 Collins Street,<br>Melbourne. |
| Other Participants | None |
| Date Drilling Commenced | 12th May, 2002 |
| Date Drilling Completed | 28th May, 2002 |
| Date Rig Released | 30th May, 2002 |
| Drilling Time to T.D. | 18 days |
| Total Depth | 839 m. |
| Status | Plugged and abandoned |

# 1.0 SUMMARY

Deadman Hill No.1 stratigraphic hole, located in PEP 157, was drilled as a follow up well to Boundary Creek No.1A corehole. Boundary Creek No.1A encountered good reservoir quality within the Strzelecki Formation section. Deadman Hill No.1 is located onshore in the Longford area of Gippsland, off Murtnaugh Road, Longford, approximately 14 Km SE of Sale (Figure 1).

The well was designed to provide stratigraphic and reservoir information regarding both the Golden Beach Formation and Strzelecki Formation at this location. The Golden Beach Formation was intersected at 554m.

Two cores were cut from for selected palynological and porosity/permeability analysis. Core No.1 from 565 to 574m, Core No.2 from 827 to 839m.

Deadman Hill No.1 was spudded at 0900hrs 12th May, 2002, and a 311 mm (12.25") hole was drilled to 60m with a freshwater/gel spud mud. The well drilled through surface Quaternary gravel, with the Gippsland Limestone being encountered at 25m. 244 mm (9-5/8") casing was set at 49m. The BOP's were nippled up and 216 mm (8-1/2") hole was drilled to 564m. The Lakes Entrance Formation was encountered at 82m. The Latrobe Group was encountered at 101m and continued to 554m where the Golden Beach Formation was penetrated. Gas readings through the Latrobe Group were between zero and 1 unit, with no oil fluorescence observed. 178 mm (7") casing was run to 549m.

The 178 mm (7") shoe track was drilled out and a 60 mm (2-3/8") conventional core was cut from 565 to 574m with 41% recovery. Selected samples were taken for palynological and porosity/permeability analysis. Drilling then resumed to 827m. through Golden Beach Formation. No shows were encountered, and background gas readings remained within the 2 to 8 unit range. With the hole showing signs of instability, a bottom hole core was taken from 827 to 839m with 75% recovery. Selected samples were taken for palynological and porosity/permeability analysis. No Strzelecki Formation was encountered.

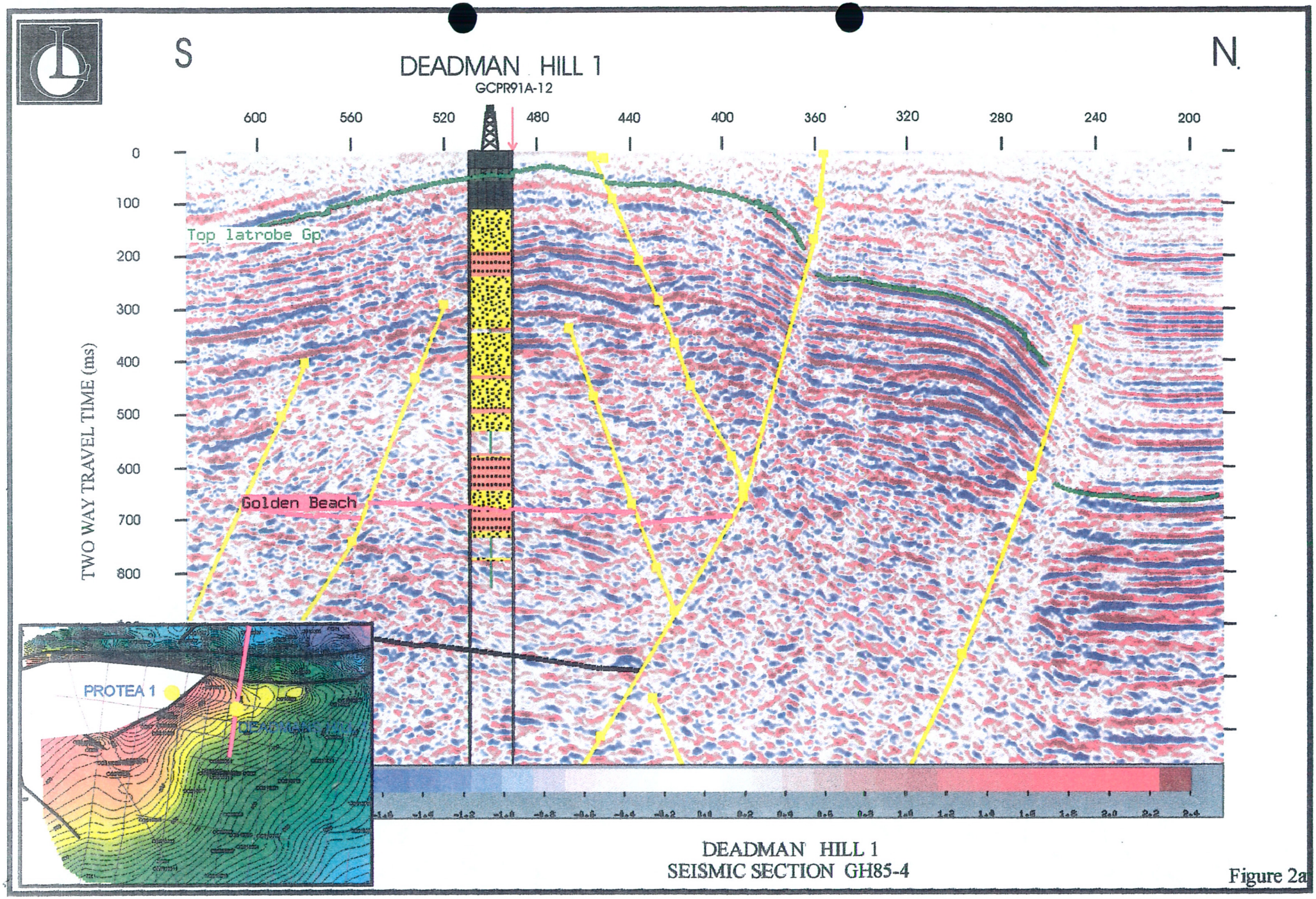
The well was subsequently plugged and abandoned on the 30th May, 2002 with a total depth of 839m.

## 1.1 PERMIT PEP 137 (now PEP 157)

Lakes Oil N.L. acquired the PEP 137 permit in April 1999, following the drilling by Roma Petroleum N.L. of the McCreesh-1 well, an unsuccessful test of the top Latrobe Group sands. PEP 137 covered an area of 1,680 square kilometers within the onshore Gippsland Basin. The permit extends over the northern part of the Seaspray Depression, the southern portion of the Lake Wellington Depression and part of the Baragwanath Anticline. Nine exploration wells have been drilled from 1962 - 2002, with Lakes Oil N.L. having tested gas at the North Seaspray-3, Trifon-1 and Gangell-1. North Seaspray-3 was a follow up to Woodside/Lakes Oil North Seaspray-1 well, which also flowed gas from the top of the Strzelecki Formation.

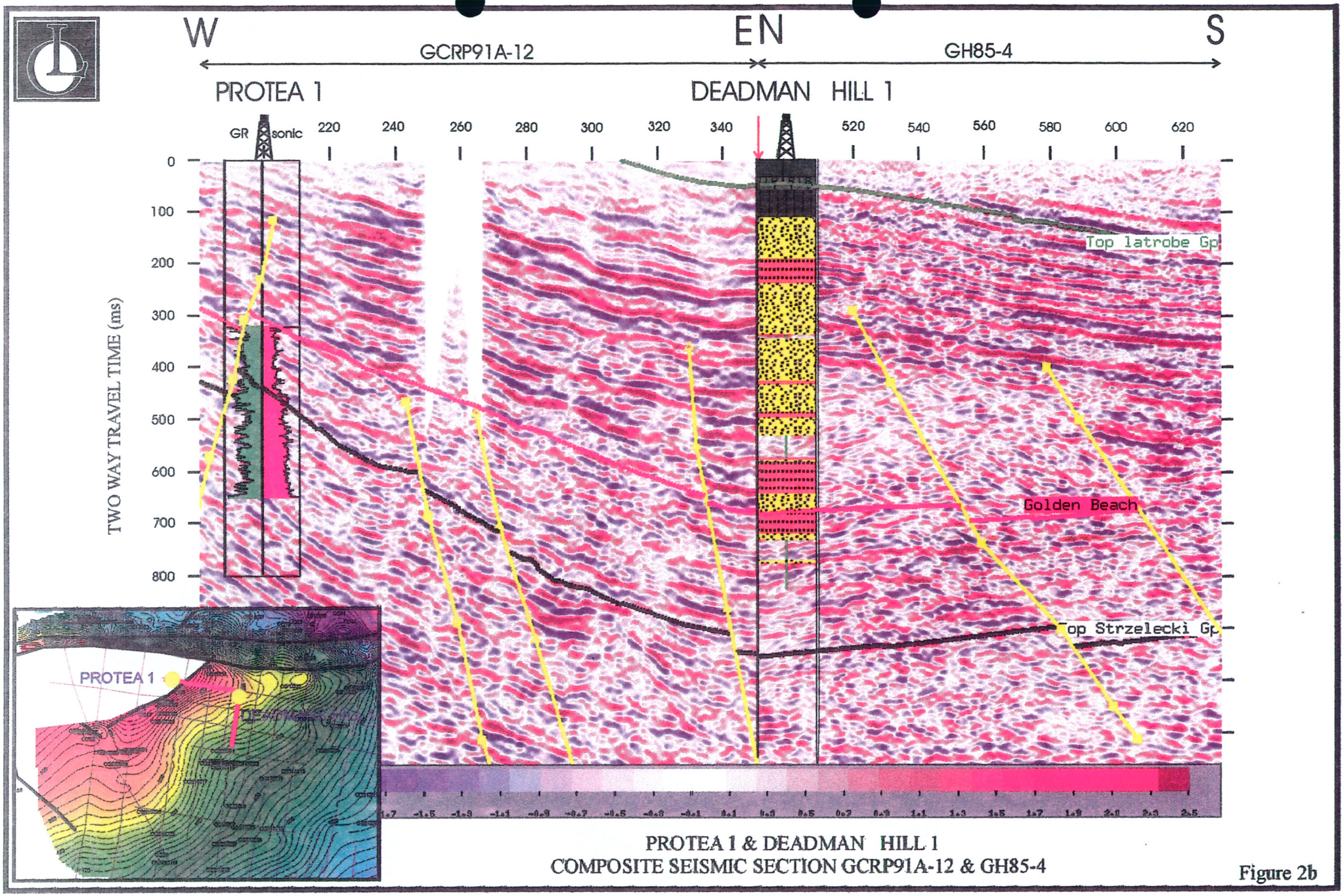
## 2.2 RIG DATA

| | | |
|---|---|---|
| 2.2.1 | Drilling Contractor | Sides Engineering Pty Ltd<br>25 Garden Road, Clayton, Vic. 3168 |
| 2.2.2 | Rig | Bourne 2000THD |
| 2.2.3 | Rig Carrier | Twin Steer Tri-axle |
| 2.2.4 | Weight Indicator | Hydraulic Pressure |
| 2.2.5 | Power | Cummins - Truck Engine |
| 2.2.6 | Rotary | Top Drive |
| 2.2.7 | Blocks | Not applicable |
| 2.2.8 | Pumps | Clarke 5.5X10 3 Cylinder Duplex |
| 2.2.9 | Mud mixing | Gardner Denver Duplex |
| 2.2.10 | Sump pump | Not applicable |
| 2.2.11 | Transfer Pump | Wreckair - Worm Drive |
| 2.2.12 | Tubulars | 3.5" X 13.30 D.P. & 2.875" D.P. |
| 2.2.13 | Fishing Tools | None on Site |
| 2.2.14 | Handling Tools | Rented Tasman |
| 2.2.15 | Stablizer | 12.25", 8.5" , 6" |
| 2.2.16 | Spare Parts | As reasonably required to conduct operations for programmed well. |
| 2.2.17 | Personnel | Driller plus 4 crew |
| 2.2.18 | Operation hours | Rig Operated Daylight Hours Only. |




DEADMAN HILL 1
SEISMIC SECTION GH85-4

Figure 2a




PROTEA 1 & DEADMAN HILL 1
COMPOSITE SEISMIC SECTION GCRP91A-12 & GH85-4

Figure 2b

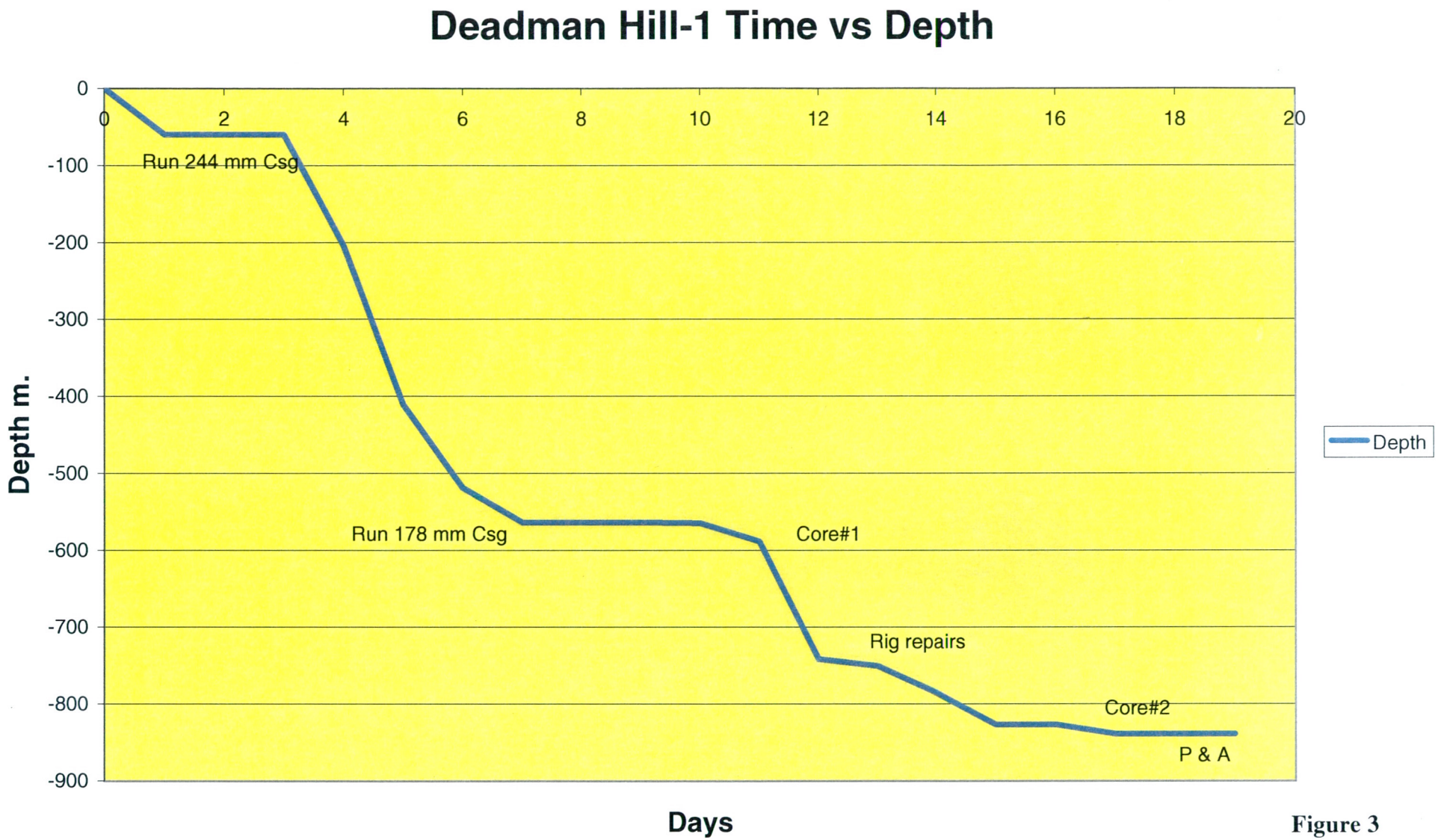



Figure 3

## 2.3 DRILLING DATA

2.3.1 The following is the daily operations summary for Deadman Hill No.1. It has been compiled from the daily drilling reports. Onsite drilling supervision for Lakes Oil N.L. was provided by W. Westman. Refer also to the time/depth curve (Figure 3).

| DATE | HOURS | OPERATION |
|---|---|---|
| 12-05-02 | 0 | Spud Deadman Hill No.1 at 0900 hrs 12th May, 2002. |
| | 7.5 | Drill 12.25" hole to 60m. |
| | 0.5 | Circulate hole clean. |
| | 1.0 | POOH. |
| | 0.5 | Shut down for night. |
| 13-05-02 | 0.5 | Travel from town. Start up. |
| | 1.0 | RIH to bottom. 6" of fill. |
| | 1.0 | Circulate clean. |
| | 1.5 | POOH. |
| | 6.0 | Rig up and run 9.625" casing, cement casing. |
| | 0.5 | Shut down for night. |
| 14-05-02 | 0.5 | Travel from town. Start up. |
| | 11.0 | Back out landing joint. Rig up Braden Head, BOP's, Koomey, Choke Manifold and Flare Line. Mix drilling mud. Function and pressure test BOP's, Choke Manifold and Koomey |
| | 0.5 | Shut down for night. |
| 15-05-02 | 0.5 | Travel from town. Start up. |
| | 1.5 | Make up BHA, RIH. |
| | 0.5 | Safety meeting - all personnel |
| | 1.0 | RIH with 8.5" drilling assembly. |
| | 1.0 | Drill out plug, shoe and rat hole. |
| | 4.5 | Drill 8.5" hole from 60 - 204m. |
| | 0.5 | Circulate and condition mud. |
| | 0.5 | POOH 5 joints |
| | 0.5 | Shut down for night. |
| 16-05-02 | 0.5 | Travel from town. Start up. |
| | 1.5 | Install kelly cock. |
| | 0.5 | RIH with 8.5" drilling assembly. |
| | 3.0 | Drill 8.5" hole 204-335m. |
| | 1.0 | Total loss of returns. Fill hole from top and allow to heal. Lost 40bbls. |
| | 3.5 | Drill 8.5" hole 335-411m. |
| | 0.5 | Circulate and condition mud. |
| | 1.0 | POOH 17 joints. |
| | 0.5 | Shut down for night. |
| 17-05-02 | 0.5 | Travel from town. Start up. |
| | 2.0 | Work on flowline. Fit pipe to direst flow to bottom of possum belly. |
| | 0.5 | RIH with 8.5" drilling assembly. Tag fill at 398m. Ream 398-411m. Circulate. |
| | 1.0 | Drill 8.5" hole 411-418m. |
| | 1.5 | Circulate and condition mud. |
| | 4.0 | Drill 8.5" hole 418-519m. |
| | 0.5 | Circulate and condition mud. |
| | 0.5 | POOH 20 joints. |
| | 0.5 | Shut down for night. |

| | | |
|---|---|---|
| 18-05-02 | 0.5 | Travel from town. Start up. |
| | 1.0 | RIH with 8.5" drilling assembly. Tag fill at 514m. Ream 514-519m. Circulate. |
| | 1.0 | Drill 8.5" hole 519-549m. |
| | 1.5 | Circulate and condition mud. Build mud volume. |
| | 1.5 | Drill 8.5" hole 549-564m. |
| | 0.5 | Circulate geological sample. |
| | 4.5 | POOH to run casing. Work tight spots. |
| | 1.0 | Prepare to run casing |
| | 0.5 | Shut down for night. |
| 19-05-02 | 0.5 | Travel from town. Start up. |
| | 1.0 | Prepare to run 7" casing. Unload truck with extra casing. |
| | 8.5 | Run 7" casing. Tag solid fill at 551m. Hang casing at 548.5m. |
| | 1.0 | Circulate casing and prepare to cement. |
| | 0.5 | Shut down for night. |
| 20-05-02 | 1.5 | Travel from town. Start up. |
| | 0.5 | Cement 7" casing with 270 sx class A at 15.6 ppg. |
| | 0.25 | Displace cement with 71 bbls mud. Bumped plug OK 200 PSI over FCP. Floats held. CIP @ 08:15. Returns throughout. |
| | 9.75 | WOC. Set slips and prepare to lift BOP. |
| | 0.5 | Shut down for night. |
| 21-05-02 | 0.5 | Travel from town. Start up. |
| | 1.5 | RIH. Tag plug at 436m. Pressure test pipe rams, Choke manifold, Annular to 1000 PSI for 10 minutes - pressure test OK. |
| | 1.0 | Ream out plug, float and shoe. Ream out rat hole to 564m. |
| | 0.5 | Drill 6.125" hole 564 to 565m. |
| | 1.0 | Circulate bottom sample. Condition mud. |
| | 3.0 | POOH. |
| | 1.0 | Pick up core barrel. |
| | 3.0 | RIH. |
| | 0.5 | Shut down for night. |
| 22-05-02 | 0.5 | Travel from town. Start up. |
| | 0.5 | Wash to bottom with core barrel. Drop ball. |
| | 2.0 | Cut core #1. 565 to 574m. |
| | 3.0 | POOH. |
| | 1.0 | Recover core #1. 41% recovery 566.0 to 569.7m (3.7m). |
| | 2.0 | RIH with 6.125" bit. Break circulation. |
| | 1.5 | Drill 6.125" hole 574 to 589m. |
| | 1.0 | Circulate bottom sample. Pull back to shoe. Tight hole from filter cake. |
| | 0.5 | Shut down for night. |
| 23-05-02 | 1.0 | Travel from town. Start up. Replace wash pipe packing. |
| | 0.5 | RIH with drilling assembly. Wash to bottom. |
| | 2.5 | Drill 6.125" hole 589 to 648m. |
| | 0.5 | Repair kelly cock. |
| | 5.5 | Drill ahead 648 to 742m. |
| | 1.0 | Circulate bottom sample. Pull back to shoe. |
| | 0.5 | Shut down for night. |
| 24-05-02 | 0.5 | Travel from town. Start up. |
| | 5.5 | Wait on cross-over subs for 2.875" drill pipe. Circulate and condition mud. |
| | 1.0 | RIH with drilling assembly and 3.5" drill pipe. |
| | 1.0 | Ream tight hole from 646 to 742m. |
| | 0.5 | Circulate. |
| | 2.0 | Drill 6.125" hole 742 to 751m. |

| | | |
|---|---|---|
| | 1.0 | POOH to shoe. |
| | 0.5 | Shut down for night. |
| 25-05-02 | 0.5 | Travel from town. Start up. |
| | 1.5 | POOH to 30 joints drill pipe and BHA. |
| | 1.0 | RIH with drilling assembly, 30 joints 3.5" DP, 2.875" DP. |
| | 0.5 | Ream fill 730 to 751m. |
| | 6.5 | Drill 6.125" hole 751 to 786m. |
| | 2.0 | POOH to shoe. |
| | 0.5 | Shut down for night. |
| 26-05-02 | 0.5 | Travel from town. Start up. |
| | 1.5 | RIH with drilling assembly, 30jts 3.5" DP, 2.875" DP. |
| | 1.0 | Wash and ream fill from 730m, firm fill 750 to 786m. |
| | 6.0 | Drill 6.125" hole 786 to 827m. |
| | 2.0 | POOH to shoe. |
| | | Shut down for night. Fuel up. Service rig. |
| 27-05-02 | 0.5 | Travel from town. Start up. |
| | 4.0 | POOH with drilling assembly. |
| | 1.0 | Pick up 18m core barrel. |
| | 2.0 | RIH. Break circulation at shoe. |
| | 0.25 | RIH. Wash through bridge at 576m. |
| | 0.25 | RIH to 600m. |
| | 0.5 | POOH to shoe - insufficient remaining daylight to fill barrel and POOH to shoe. |
| | 0.5 | Shut down for night. |
| 28-05-02 | 0.5 | Travel from town. Start up. |
| | 0.5 | RIH with core barrel. |
| | 1.0 | Wash to bottom. 18m fill. |
| | 8.0 | Cut core #2 827 to 839m. |
| | 1.5 | POOH to shoe. |
| | 0.5 | Shut down for night |
| 29-05-02 | 0.5 | Travel from town. Start up. |
| | 2.5 | POOH with core barrel. |
| | 1.5 | Recover core. Lay down barrel. |
| | 2.5 | RIH open ended to 570m. |
| | 1.5 | Place 50m (40sx) balanced cement plug across shoe. |
| | 0.5 | POOH to 480m. |
| | 1.0 | Circulate. |
| | 1.5 | Shut down for night |
| 30-05-02 | 0.5 | Travel from town. Start up. |
| | 2.0 | RIH open ended, tag cement at 530m. |
| | 2.0 | POOH. |
| | 1.5 | Nipple down BOP's. |
| | 0.5 | Set surface plug. |
| | 5.5 | Rig down and prepare to move. |
| | 0.5 | Shut down for night. |

2.3.2 Hole sizes and depths:

12.25" (311mm) Spud to 60m.
8.5" (216mm) 60 to 564m.
6.125" (156mm) 564 to 839m.

2.3.3 Casing and cementing:

SURFACE:

| | |
|---|---|
| SIZE: | 9.625" / 244MM |
| Weight: | 64.9 kg/m |
| Grade: | K55 |
| Shoe setting depth: | 49 m |

INTERMEDIATE:

| | |
|---|---|
| SIZE: | 7" / 178MM |
| Weight: | 34.2kg/m |
| Grade: | K55 |
| Shoe setting depth: | 548.5m |
| Cement quantity: | x class "A" 15.6 lb/gal |

2.3.4 Deviation Surveys:

None taken.

2.3.5 Drilling Fluid:

(A) Spud - 60 meters: Type: Freshwater/Gel spud mud.

(B) 60 - 839m. KCl/Polymer/PHPA.

2.3.6 Physical Mud Properties:

| DEPTH | PPG | VIS | KCL% | PHPA LB/GAL |
|---|---|---|---|---|
| 130 | 8.8 | 30 | 4.0 | 0.5 |
| 204 | 9.2 | 53 | 6.0 | 0.33 |
| 220 | 9.2 | 33 | 6 | 0.5 |
| 411 | 9 | 33 | 6 | 0.5 |
| 519 | 9.1 | 36 | 6 | 1.0 |
| 564 | 9.1 | 36 | 4 | 0.5 |
| 575 | 8.5 | 33 | 2 | 0.5 |
| 754 | 8.8 | 38 | 6 | 0.5 |
| 760 | 9.3 | 34 | 6 | 1.0 |
| 783 | 9.4 | 35 | 6 | 1.0 |
| 827 | 9.4 | 38 | 6 | 0.5 |
| 832 | 9.5 | 38 | 6 | 0.5 |

2.3.7 Water Supply:

Water was trucked to site from Sale.

2.3.8 Perforation:

None.

2.3.9 Plugging and Cementing:

Plug 1. 570 to 530m (across shoe) with 40 sacks of cement.
Plug 2. Surface

2.3.10 Bit Data

| BIT RUN | 1 | 2 | 3RR | 4CH | 4 | 3RR |
|---|---|---|---|---|---|---|
| Diameter | 12.25" | 8.5" | 6.125" | 6" | 6.125" | 6" |
| Type & Manufacture | Security S33 | Varel L114 | Varel L114 | Core Head | Varel ETD14 | Core Head |
| IADC code | 114 | 114 | 127 | | 437 | |
| Serial number | 209393 | 105479 | 180115 | | 146729 | |
| Nozzles | Open | 14,14,11 | 12,12,12 | | 14,14,11 | |
| Depth in (m) | 3 | 60 | 574 | | 742 | 827 |
| Depth out (m) | 60 | 564 | | | 827 | 839 |
| Drilled (cum/daily) | 57 | 504 | 168 | | 85 | 12 |
| Hours (cum/daily) | 7.5 | 16.5 | 9 | | 14.5 | 8 |
| Dull grade | | 6.6.WT.E.1/16/TD | | | 1.1.WT.A.E.I.CP | 1.1.I |
| Av. ROP m/hr | | 28.0 | | | 5.8 | |
| WOB Klbs | | 5/10 | 5 | | 5 | |
| RPM | | 70 | 90 | | 90 | |
| Jet Velocity | | | | | 145 | |
| HHP@Bit | | | | | 17 | |
| BHA | | Bit/2XDC/Stab/4 XDC | Bit/2DC/Stab/9X 4.75"DC | | Bit/2DC/Stab/9X4.7 5"DC | Core Barrel/10X4.75"DC |

## 2.4 LOGGING AND TESTING

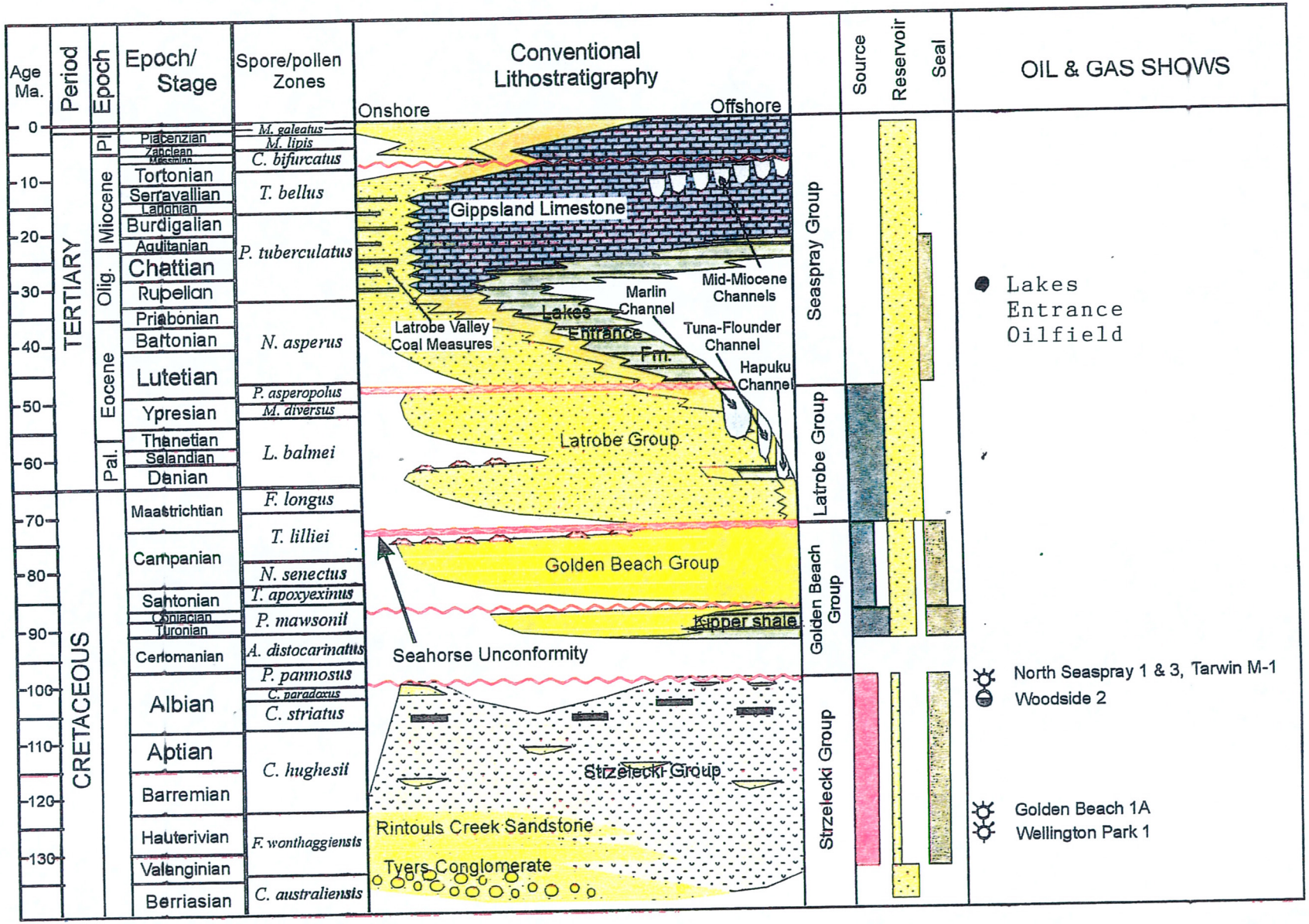
Wellsite Geologist:
David Horner

Mudlogging:
Hot wire hydrocarbon detection, depth and drill rate monitoring was provided by Denis Sisely.

Ditch Cutting Samples:
Cuttings were collected at 10 meter intervals from spud to 60m, then at 3m intervals to 839m (T.D.)
These being 1 set 500gm unwashed calico bag, and 1 set washed samplex tray.

Coring:
1 X 9m core was cut from 565 to 574m. Recovered 3.7m (566.0 to 569.7m - 41%).
1 X 12m core was cut from 827 to 839m. Recovered 9.0m (827.0 to 836.0m - 75%).
See core analysis report.

Sidewall Cores:
No sidewall cores were taken.

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LITHOSTRATIGRAPHY
GIPPSLAND BASIN

TABLE 1

Testing:
No tests were conducted.

Wireling Logs:
No wireline logs were run.

Bottom Hole Temperature :
No bottom hole temperature was recorded.

Velocity Survey:
No velocity survey was conducted.

# 3.0 GEOLOGY

## 3.1 REGIONAL GEOLOGY

The Gippsland Basin is an early Cretaceous to Cainozoic basin occupying approximately 46,000 square kilometers of the southeastern margin of the Australian continent. The basin is flanked on the north, west and south-west by Palaeozoic rocks and confined between the structural uplifts of the Victorian Highlands in the north and the Bassian Rise in the south. The eastern margin of the basin is open to the Tasman sea. The Gippsland Basin is an east-west trending half graben feature with 70% of its area beneath Bass Strait and 30% onshore.

With the exception of occasional wildcat drilling in the boom of the 1980's, exploration of the onshore Gippsland Basin has been largely ignored since the 1970's.

The early exploration activities in the onshore part were aimed primarily at the Early Cretaceous Strzelecki Group and, later on after successful drilling offshore, at the top of the Latrobe Group "coarse clastics", but a lack of understanding of the stratigraphy and the mechanism of hydrocarbon generation, migration and timing of structures, along with the poor quality of the seismic and well log data, resulted in a downgrading of the hydrocarbon potential of the onshore area.

## 3.2 EXPLORATION HISTORY

Hydrocarbon exploration commenced in the onshore region of the basin in 1924 when the Lake Bunga well encountered traces of oil, leading to the discovery and development of the Lakes Entrance oil field. The oil accumulation is found in a stratigraphic trap within a glauconitic sand member of the Oligocene Lakes Entrance Formation. The field produced a total of 10,000 bbls of 15.7 API gravity oil before production ceased in 1956. Aside from the Lakes Entrance oil accumulation, wet gas flowed to the surface during testing from the Strzelecki sandstones at North Seaspray 1 and 3, Gangell-1 and Trifon-1.

Petroleum exploration in the permit commenced in the early 1960's and continued into the early 1970's, conducted mainly by Woodside and Arco with eight wells being drilled within the permit. This exploration originally had as its main objective the Strzelecki Group with emphasis moving to the Latrobe Group later in this period. Few of these wells, except for North Seaspray-1, are thought to be located within closure at the Top Latrobe Group level.

Several shallow bores have been drilled in the vicinity of PEP 157 by Victoria Electricity, Coal and Water Resources authorities; however, none of these bores encountered Latrobe Group reservoirs at a significant depth or within closure.

During 1985, Hartogen Energy Ltd drilled Burong-1 to test the Top Latrobe at the crest of a northeast trending asymmetrical anticline which is fault controlled to the northwest. While the Latrobe section contained excellent reservoir rock, no significant shows were recorded within this section.

Recently, Lakes Oil has drilled nine wells within their onshore Gippsland permits; PetroTech-1 targeted greensands of the Lakes Entrance Formation but was not tested; Hunters Lane-1 produced oil from the same formation but at a non-economic rate; Baudin-1 and Investigator-1, which both targeted Lower Latrobe Formation sands, were unsuccessful, probably due to lack of seal. North Seaspray-3, Trifon-1 and Gangell-1 drilled between 2000 and 2001, all targeted Strzelecki Formation sands. Boundary Creek-1 corehole was drilled in 2001 to obtain information on reservoir quality within the Strzelecki Formation.

## 3.3 TECTONIC HISTORY

The Gippsland Basin is a rift basin, which originated in the Late Jurassic to Early Cretaceous and consists of alternating half graben structures along its east-west trend. It is characterised by a deep central basin, flanked by northern and southern terraces. In the onshore area, the Late Cretaceous movements were accompanied with volcanism in the western margin of the basin. Several phases of positive structural inversion occurred in the Gippsland Basin from Mid-Oligocene to the present time, creating the major hydrocarbon bearing structures seen in the offshore region. The main phase occurred during the Late Miocene, which resulted in inversion of existing features and the creation of anticlinal structures.

## 3.4 STRUCTURAL ELEMENTS

The onshore area can be tectonically sub-divided into six major areas:

(A) Lakes Entrance Platform (Northern Platform): This lies immediately south of the Eastern Highlands, where the Palaeozoic Basement gently slopes southwards and is unconformably overlapped by Oligocene - Miocene marine sediments and thin Pliocene - Quartenary continental deposits.

(B) Latrobe Valley Depression: This lies between the Palaeozoic Eastern Highlands to the north and the Early Cretaceous Balook Block to the south. Over 700 meters of continental Latrobe Valley sediments are present in this area.

(C) Lake Wellington Depression: This lies to the south of the Lakes Entrance Platform, where over 1200 meters of Eocene to Pliocene sediments unconformably overlie the Early Cretaceous rocks. This trough is offset from the Latrobe Valley Depression to the west, by left lateral displacement on the Yinnar Transfer Fault Zone which occurred during the Tertiary. The boundary also closely coincides with the western limit of marine Tertiary sediments. To the east it merges with the Strzelecki Terrace.

# TABLE II : DEADMAN HILL No.1

## STRATIGRAPHIC TABLE

| AGE | FORMATION | DEPTH RT | ELEVATION | THICKNESS |
|---|---|---|---|---|
| Quartenary | Quartenary Gravel | 1 | +59 | 24 |
| Miocene-Oligocene | Gippsland Limestone | 25 | +35 | 57 |
| Oligocene | Lakes Entrance Fm | 82 | -22 | 19 |
| E Oligocene - Eocene | Latrobe Group | 101 | -41 | 453 |
| Tertiary-Cretaceous | Golden Beach Fm | 554 | -494 | 210 |
| Tertiary-Cretaceous | Strzelecki Fm | Not encountered | | |
| | Total Depth | 839 | -779 | |

- all depth are in meters.

(D) Baragwanath Anticline: This is the eastern extension of the outcropping Balook High. It is an Early Cretaceous block, which was elevated during the Late Miocene time as a result of the renewed lateral strike slip wrenching along the Boundary Fault Systems. It separates the Lake Wellington Depression to the north from the Seaspray Depression to the south. On the crest of the structure, thin Miocene strata are succeeded unconformably by a veneer of Pliocene-Pleistocence sediments. On the flanks of the structure, however, the Miocene sediments wedge out towards the crest by onlap at the base and erosion at the top of the sequence.

(E) Seaspray Depression: This is the onshore extension of the Central Deep. It occupies the southern onshore part of the basin, where the most complete stratigraphic section is present. The permit occupies the northeastern end of the Seaspray Depression.

(F) South Terrace: Wilson's Promontory is an erosional remnant of a broad shallow basement platform bounding the Gippsland Basin on its southern side. The Southern Terrace represents the edge of this platform. The Chitts Creek Conglomerate onlaps the South Terrace as a mirror image to the Tyers Conglomerate on the North Terrace.

## 3.5 REASONS FOR DRILLING

Deadman Hill-1 was drilled to provide stratigraphic and reservoir information on the Golden Beach Formation at this location. A 9 meter core was programmed to be taken at the top of the Golden Beach Formation for palynological analysis.

## 3.6 STRATIGRAPHIC PROGNOSIS

The stratigraphic prognosis was made utilising the sparse nearby well data and the available seismic coverage.

A comparison between prognosed and actual formation tops is given below:

| FORMATION | PROGNOSED (mKB) | ACTUAL (mKB) | ACTUAL (mSS) | DIFFERENCE (m) |
|---|---|---|---|---|
| Quartenary Gravel | Surface | Surface | Surface | 0 |
| Gippsland Limestone | 4 | 25 | +35 | 21 Low |
| Lakes Entrance Formation | 84 | 82 | -22 | 2 High |
| Latrobe Group | 96 | 101 | -41 | 5 Low |
| Golden Beach Formation | 371 | 554 | -494 | 183 Low |
| Strzelecki Formation | 497 | Not encountered | Not encountered | 342+ Low |
| Total Depth | 600 | 839 | -779 | Low |

## 3.7 STRATIGRAPHY

### QUARTENARY GRAVEL (1 - 25 metres)

**1.0 - 25 metres**
SANDSTONE: (100%) light orange, very fine to coarse, dominantly fine to medium, angular to rounded, dominantly subangular, moderately sorted, clear to opaque quartz grains often with orange iron oxide staining, trace grey black and red brown volcanogenic lithic grains, abundant off white to light orange grey argillaceous and silt matrix in part, nil to occasional weak silica cement, unconsolidated to friable, very poor to good inferred porosity, no oil fluorescence.

### GIPPSLAND LIMESTONE (25 - 82 metres)

**25 - 82 metres**
LIMESTONE: (100%) off white to light orange at top becoming light to medium grey with depth, slightly to moderately argillaceous, moderate cryptocrystalline calcite cement, common fossil fragments including bryozoa, shells and forams, trace to common glauconite, rare pyrite, hard, very poor visual porosity, no oil fluorescence.

With depth grading to:

LIMESTONE: (50%) (calcilutite) off white to light grey, slightly to occasionally very argillaceous, trace fossil fragments including bryozoa, shells and forams, trace glauconite, very soft and sticky, non fissile, Grading to and increasing with depth of:

MARL: (50%) light to medium grey, slight to moderate argillaceous content, trace fossil fragments, trace glauconite, very soft sticky, non fissile.

### LAKES ENTRANCE FORMATION (82 - 101 metres)

**82 - 101 metres**
MARL: (100%) light to medium grey to medium green grey, trace increasing to common with depth fossil fragments including bryozoa, shells and forams, rare glauconite, abundant glauconite at base, very soft sticky, non fissile.

### LATROBE FORMATION (101 - 554 metres)

**101 - 140 metres**
COAL: (90%) black to very dark brown, earthy to occasionally fibrous texture, earthy lustre, often moderately to very argillaceous and silty, trace medium brown resinous material, rare very fine to coarse quartz sand grains, trace pyrite, firm.

With minor:

SANDSTONE: (10%) very light grey, very fine to dominantly coarse, subrounded to rounded, moderately sorted, no visible matrix, no visible cement, clear to opaque quartz grains, common black coal detritus, unconsolidated, very good inferred porosity, no oil fluorescence.

With rare laminated:

SILTSTONE: (Trace) dark brown grey, moderately argillaceous, moderately to very carbonaceous, common to abundant fine black coaly detritus, soft, very dispersive, non fissile.

**140 - 204 metres**
SANDSTONE: (40%) very light brown grey, very fine to coarse, dominantly medium, angular to rounded, dominantly subrounded, poor to moderate sorting, trace off white argillaceous matrix, very weak silica cement, clear to opaque quartz grains, common to abundant off white to light brown to green lithics, abundant clear to green coarse mica flakes, unconsolidated to slightly friable, very good inferred porosity, no oil fluorescence.

Interbedded with:

COAL: (50%) black to very dark brown, earthy to occasionally fibrous texture, earthy lustre, moderately argillaceous and silty in part, often very argillaceous and silty at base of coal units, trace to common pyrite, firm.

In part grading to and occasionally interbedded with:

SILTY CLAYSTONE: (10%) dark brown grey, very carbonaceous, common very fine to fine black coaly detritus, soft, very dispersive, non fissile.

**204 - 242 metres**
SILTY CLAYSTONE: (70%) dark brown to very dark brown grey, very carbonaceous grading to coal, trace pyrite, trace slickensides, trace dolomitization, trace mylonitized dolomitic sandy material, soft , moderately dispersive, non fissile.

Grading to and interbedded with:

COAL: (20%) black to dark brown, earthy texture and lustre, very argillaceous and silty in part grading to silty claystone, trace pyrite, firm. With a massive dolomite bed 208-211m and minor (up to 10%) 211-242m:

DOLOMITE: (10%) medium brown to brown black, cryptocrystalline to microcrystalline, abundant black coaly material with sheared texture in part, very argillaceous in part, occasionally very finely arenaceous, very hard, no visual porosity.

**242 - 284 metres**
SANDSTONE: (40%) light brown, very fine to coarse, dominantly medium, angular to subrounded, dominantly subangular, moderately to well sorted, trace dark brown argillaceous matrix, very weak silica cement, clear to dominantly opaque quartz grains, common off white to yellow to red to green lithics, trace black coaly detritus, unconsolidated to friable, very good inferred porosity, no oil fluorescence.

Interbedded with:

SILTY CLAYSTONE: (50%) medium to very dark brown, moderately to very carbonaceous - grades in part to argillaceous coal, common very fine black carbonaceous flecks in part, trace micromica, rare pyrite, very soft to soft, sticky, moderately dispersive, non fissile.

Grading in part to, laminated with and interbedded with:

COAL: (10%) black to dark brown, earthy texture and lustre, very argillaceous and silty in part grading to silty claystone, trace pyrite, firm.

**284 - 342 metres**
SANDSTONE: (40%) light brown, very fine to coarse, dominantly medium, angular to subrounded, dominantly subangular, moderately to well sorted, trace dark brown argillaceous matrix, very weak silica cement, clear to dominantly opaque quartz grains, common off white to yellow to red to green lithics, trace black coaly detritus, unconsolidated to friable, very good inferred porosity, no oil fluorescence.

Interbedded with:

SILTY CLAYSTONE: (50%) medium to very dark brown, moderately to very carbonaceous - grades in part to argillaceous coal, common very fine black carbonaceous flecks in part, trace micromica, rare pyrite, very soft to soft, sticky, moderately dispersive, non fissile.Grading in part to, laminated with and interbedded with:

COAL: (10%) black to dark brown, earthy texture and lustre, very argillaceous and silty in part grading to silty claystone, trace pyrite, firm.

**342 - 411 metres**
Massive sandstone unit:
SANDSTONE: (100%) very light grey, very fine to rarely pebble, dominantly coarse to very coarse, angular to subrounded, dominantly subangular, moderately sorted, nil to trace white argillaceous matrix, minor dark brown argillaceous matrix at top, very weak silica cement, clear to opaque quartz grains, trace grey green and red lithics, trace black coaly detritus, trace coarse mica flakes in part, trace pyrite, unconsolidated to friable, very good inferred porosity, no oil fluorescence.

**411 - 417 metres**
SILTY CLAYSTONE: (50%) medium brown to occasionally dark brown, trace black carbonaceous flecks, trace micromica, soft, very dispersive, non fissile.

Interbedded with:

CLAYSTONE: (40%) off white, medium green, occasionally very finely arenaceous and slightly calcareous where white, sticky, amorphous.

With in part minor interbeds of:

SANDSTONE: (10%) very light grey, very fine to very coarse, dominantly medium to coarse, angular to subrounded, dominantly subangular, moderately sorted, trace white argillaceous matrix, weak silica cement, clear to opaque quartz grains, trace grey and green lithics, trace black coaly detritus, trace to common coarse mica flakes, unconsolidated to friable, good inferred porosity, no oil fluorescence.

**417 - 471 metres**
Massive sandstone unit:

SANDSTONE: (100%) very light grey, very fine to grit, dominantly coarse, pebbly towards base, angular to subrounded, dominantly subangular, moderately sorted, trace to rarely abundant white argillaceous matrix, weak silica cement, clear to opaque quartz grains, trace grey green and red lithics, trace coarse mica flakes in part, trace black coaly detritus in part, unconsolidated to friable, fair to dominantly very good inferred porosity, no oil fluorescence.

**471 - 481 metres**
Massive silty claystone unit:

SILTY CLAYSTONE: (100%) off white to medium brown, slightly to moderately carbonaceous, minor dispersed very fine to pebble quartz and lithic sand grains, minor black coal laminae, soft, sticky, non fissile.

**481 - 554 metres**
Massive sandstone unit:

SANDSTONE: (100%) very light grey, very fine to pebble, dominantly coarse to grit - in general becoming coarser with depth, angular to subrounded, dominantly subangular, moderately sorted, trace white argillaceous matrix, weak silica cement, clear to opaque quartz grains, trace grey and green lithics, trace coarse mica flakes, trace black coaly detritus, trace pyrite in part, unconsolidated to friable, very good inferred porosity, no oil fluorescence.

## GOLDEN BEACH FORMATION (554 - 839+ meters)

**554 - 574 metres**
SANDSTONE: (100%) very light grey to occasionally light brown grey, very fine to rarely coarse, dominantly very fine to fine, angular to subrounded, dominantly subangular, poor to moderate sorting, common to abundant white argillaceous matrix, quartzose with abundant partially altered feldspar grains, trace to occasionally common grey lithics, trace fine black coaly detritus, friable, fair visual porosity, no oil fluorescence.

Interbedded with:

SILTY CLAYSTONE: (100%) medium grey to occasionally medium dark grey, slightly to very silty, occasionally very finely arenaceous with quartz and partially altered feldspar sand grains, trace to common black coaly specks, trace to occasionally common micromica, firm, non fissile.

**574 - 647 metres**
SILTY CLAYSTONE: (60%) off white to medium grey, slightly to very silty, very finely arenaceous with quartz and partially altered feldspar sand grains in part, rarely slightly calcareous, trace black coaly specks, trace micromica, rare pyrite, firm, sticky in sample, non fissile.

Interbedded with:

SANDSTONE: (39%) very light grey, very fine to rarely coarse, dominantly very fine to fine, angular to subrounded, dominantly subangular, moderately sorted, abundant white argillaceous matrix, weak silica cement, occasional dolomite and pyrite cement, quartzose with common partially altered feldspar grains, trace grey lithics, trace coarse clear mica flakes, trace black coaly detritus, friable, poor to fair inferred porosity, no oil fluorescence.

With minor:

DOLOMITE: (1%) medium brown, cryptocrystalline, common dispersed very fine to fine quartz sand grains, trace pyrite, very hard.

**647 - 693 metres**
SANDSTONE: (70%) very light grey, very fine to medium, dominantly very fine to fine, angular to subrounded, dominantly subangular, moderately sorted, abundant white argillaceous matrix, weak silica cement, trace pyrite cement, quartzose with common partially altered feldspar grains, trace grey green and brown lithics, trace coarse clear and brown mica flakes in part, trace black coaly detritus, friable, poor to fair inferred porosity, no oil fluorescence.

Interbedded with:

SILTY CLAYSTONE: (30%) medium grey, slightly to very silty, rarely very finely arenaceous with quartz and partially altered feldspar sand grains, rarely slightly calcareous, trace black coaly specks and detritus, trace micromica, rare pyrite, firm, sticky in sample, non fissile.

With rare:

DOLOMITE: (Trace) light to medium brown, cryptocrystalline, common to abundant dispersed very fine to fine quartz sand grains, trace pyrite, very hard.

**693 - 742 metres**
SANDSTONE: (20%) very light grey, very fine to medium, dominantly very fine to fine, angular to subrounded, dominantly subangular, moderately sorted, abundant off white argillaceous matrix, weak to moderate silica cement, trace dolomite and pyrite cement, quartzose with abundant partially altered feldspar grains, common grey green and brown lithics, trace black coaly detritus, trace mica flakes, friable, poor inferred porosity, no oil fluorescence.

Interbedded with:

SILTY CLAYSTONE: (80%) light to medium grey, rarely greenish grey, slightly to very silty, very finely arenaceous with quartz and partially altered feldspar sand grains in part, slightly calcareous in part, trace black coaly specks and detritus, trace micromica, rare pyrite, firm, sticky in sample, non fissile.

**742 - 764 metres**
SILTY CLAYSTONE: (100%) medium grey, occasionally light grey, rarely dark grey and very carbonaceous, slightly to very silty, very finely arenaceous with quartz and partially altered feldspar sand grains in part, slightly calcareous in part, common black coaly specks and detritus, common micromica, trace pyrite, firm, sticky in sample, slightly subfissile. With minor interbedded and laminated:

SANDSTONE: light brown grey, very fine to coarse, dominantly fine, angular to subrounded, dominantly subangular, poorly sorted, common off white argillaceous matrix, weak silica cement, strong pyrite cement, strong dolomite cement, quartzose with common partially altered feldspar grains, common grey green and brown lithics, trace coarse mica flakes, trace black coaly detritus, very hard, no visual porosity, no oil fluorescence.

**764 - 768 metres**
SANDSTONE: (100%) light grey, very fine to medium, dominantly fine, angular to subrounded, dominantly subangular, moderately sorted, abundant off white argillaceous matrix, weak silica cement and calcareous cements, quartzose with abundant partially altered feldspar grains, common grey green and orange brown lithics, trace black coaly detritus, friable to moderately hard, very poor to poor visual porosity, no oil fluorescence.

**768 - 786 meters**
CLAYSTONE: (100%) very light brown to medium brown grey, rarely off white, slightly to very silty, trace black coaly specks, trace micromica, firm, sticky in sample, slightly subfissile.

**786 - 839 (T.D.) meters**
CLAYSTONE: (60%) light to medium grey to light brown, rarely off white, slightly to very silty, rarely very finely arenaceous with quartz and partially altered feldspar grains, trace black coaly specks, trace micromica, rare pyrite, firm, sticky in sample, slightly subfissile.

Interbedded with:

SANDSTONE: (40%) light grey, very fine to medium, dominantly fine, angular to subrounded, dominantly subangular, moderately sorted, common to abundant off white argillaceous matrix, weak to moderate silica and calcareous cements, quartzose with abundant off white partially altered feldspar grains, common grey black green orange and red lithics, trace black coaly detritus, rare pyrite, moderately hard, very poor visual porosity, no oil fluorescence.

**STRZELECKI FORMATION** (Not encountered)

## 4.0 DISCUSSION AND CONCLUSIONS

Deadman Hill No.1 intersected a normal Gippsland Basin section. The Latrobe Group sands showed excellent reservoir potential with clean coarse grained sands, however no hydrocarbon generation or migration was observed throughout this Group.

The Golden Beach Formation was encountered 183 meters low to prognosis, resulting in a far thicker section of Latrobe Group sediments being present than previously thought. The poor quality of the available seismic and lack of adequate velocity and well control are considered to be contributing factors to this discrepancy.

However, as interpreted, the Golden Beach Formation was present. It was found to subcrop between 554 meters and 839m (T.D.), and the objective of the well to achieve a core of the Golden Beach Formation for palynological analysis was achieved.

The Golden Beach Formation, although having no significant hydrocarbon accumulation at this location, showed high potential for future exploration with good reservoir and capping qualities. Also of significance was the relatively high organic content of this formation. Gas readings through the Golden Beach Formation rose gradually with depth from 2 units at the top to 8 units at the base. No oil fluorescence was observed.

No Strzelecki Formation was encountered.

## 5.0 COMPLETION

Deadman Hill No.1 was plugged and abandoned.

# Appendix 1

## Daily Geological Reports

914410 029

# LAKES PETROLEUM N.L.

(A.C.N. 004247214)

## DEADMAN HILL No.1 PEP 157

## DAILY GEOLOGICAL REPORT No. 1 Date: 12-05-2002

**Depth:** 60m **Progress:**60m **Days from Spud:** 1

| | | | |
|---|---|---|---|
| **Rig:** | Sides Bourne 2000THD | **GL(*AHD*):** | 59m |
| **Drilling Rep:** | Wally Westman | **RT:** *(datum)* | 60m |
| **Geologist:** | David Horner | **Last Casing:** | at m |

**Comments:**
Spud Deadman Hill No.1 at 0900hrs 12th May, 2002, with freshwater gel spud mud, drill 12.25" hole to 9.625" casing point at 60m.

| Interval (mRT) | Hydrocarbon Show Summary | Gas |
|---|---|---|
| Surface-25 | No shows | 0 |
| 25-60 | No shows | 0 |

| Formation Tops: | Prognosed (mRT) | Actual* (mRT) | Actual* (mSS) | Difference* (High/Low) |
|---|---|---|---|---|
| Quartenary Gravel | Surface | Surface | Surface | 0 |
| Gippsland Limestone | 4 | 25 | +35 | 21 Low |
| Lakes Entrance Formation | 84 | | | |
| LaTrobe Group | 96 | | | |
| Golden Beach Formation | 371 | | | |
| Strzlecki Formation | 497 | | | |
| T.D. | 600 | | | |

**Provisional, based on mudlog*

| Lithological and Fluorescence Description | |
|---|---|
| **Interval (m)** | **Description** |
| Surface-25 | SANDSTONE: (100%) light orange, very fine to coarse, dominantly fine to medium, angular to rounded, dominantly subangular, moderately sorted, clear to opaque quartz grains often with orange iron oxide staining, trace grey black and red brown volcanogenic lithic grains, abundant off white to light orange grey argillaceous and silt matrix in part, nil to occasional weak silica cement, unconsolidated to friable, very poor to good inferred porosity, no oil fluorescence. |
| 25-45 | LIMESTONE: (100%) off white to light orange, abundant bryozoa fragments, common fossil fragments including forams and shells, rare glauconite and quartz sand grains, common light to medium orange iron oxide staining, weak to moderate calcareous cement, friable to occasionally hard, fair to good inferred porosity, no oil fluorescence. |
| 45-60 | LIMESTONE: (100%) off white to medium grey, slightly to occasionally very argillaceous, very strong cryptocrystalline calcite cement in part, abundant bryozoa fragments and common forams and other fossil fragments in part, trace to common glauconite occasionally as fossil infill, friable to very hard, very poor to poor inferred porosity, no oil fluorescence. |

# LAKES PETROLEUM N.L.

(A.C.N. 004247214)

## DEADMAN HILL No.1 PEP 157

## DAILY GEOLOGICAL REPORT No. 2 Date: 13-05-2002

**Depth:** 60m **Progress:**0m **Days from Spud:** 2

| | | | |
|---|---|---|---|
| **Rig:** | Sides Bourne 2000THD | **GL*(AHD)*:** | 59m |
| **Drilling Rep:** | Wally Westman | **RT:** *(datum)* | 60m |
| **Geologist:** | David Horner | **Last Casing:** | 9.625" at 49m |

**Comments:**
Run 9.625" casing, casing hung up on ledge at 49m, cement 9.625" casing at 49m.

| Interval (mRT) | Hydrocarbon Show Summary | Gas |
|---|---|---|
| | No new formation drilled. | |

| Formation Tops: | Prognosed (mRT) | Actual* (mRT) | Actual* (mSS) | Difference* (High/Low) |
|---|---|---|---|---|
| Quartenary Gravel | Surface | Surface | Surface | 0 |
| Gippsland Limestone | 4 | 25 | +35 | 21 Low |
| Lakes Entrance Formation | 84 | | | |
| LaTrobe Group | 96 | | | |
| Golden Beach Formation | 371 | | | |
| Strzlecki Formation | 497 | | | |
| T.D. | 600 | | | |

**Provisional, based on mudlog*

| Lithological and Fluorescence Description | |
|---|---|
| **Interval (m)** | **Description** |
| | No new formation drilled. |

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# LAKES PETROLEUM N.L.

(A.C.N. 004247214)

## DEADMAN HILL No.1 PEP 157

## DAILY GEOLOGICAL REPORT No. 3

**Date: 14-05-2002**

**Depth:** 60m **Progress:**0m **Days from Spud:** 3

| | | | |
|---|---|---|---|
| **Rig:** | Sides Bourne 2000THD | **GL*(AHD)*:** | 59m |
| **Drilling Rep:** | Wally Westman | **RT:** *(datum)* | 60m |
| **Geologist:** | David Horner | **Last Casing:** | 9.625" at 49m |

**Comments:**
Nipple up and pressure test BOP's.

| Interval (mRT) | Hydrocarbon Show Summary | Gas |
|---|---|---|
| | No new formation drilled. | |

| Formation Tops: | Prognosed (mRT) | Actual* (mRT) | Actual* (mSS) | Difference* (High/Low) |
|---|---|---|---|---|
| Quartenary Gravel | Surface | Surface | Surface | 0 |
| Gippsland Limestone | 4 | 25 | +35 | 21 Low |
| Lakes Entrance Formation | 84 | | | |
| LaTrobe Group | 96 | | | |
| Golden Beach Formation | 371 | | | |
| Strzlecki Formation | 497 | | | |
| T.D. | 600 | | | |

**Provisional, based on mudlog*

**Lithological and Fluorescence Description**

| Interval (m) | Description |
|---|---|
| | No new formation drilled. |

# LAKES PETROLEUM N.L.

(A.C.N. 004247214)

## DEADMAN HILL No.1 PEP 157

## DAILY GEOLOGICAL REPORT No. 4 Date: 15-05-2002

**Depth:** 204m **Progress:**144m **Days from Spud:** 4

| | | | |
|---|---|---|---|
| **Rig:** | Sides Bourne 2000THD | **GL*(AHD)*:** | 59m |
| **Drilling Rep:** | Wally Westman | **RT:** *(datum)* | 60m |
| **Geologist:** | David Horner | **Last Casing:** | 9.625" at 49m |

**Comments:**

Make up 8.5" BHA, RIH, drill ahead with 8.5" hole to 204m.

Pick reliability of Lakes Entrance Formation is poor due to gradational lithology's at the base of the Gippsland Limestone.

Pick reliability of LaTrobe Group - good.

| Interval (mRT) | Hydrocarbon Show Summary | Gas |
|---|---|---|
| 60-82 | No show | 0 |
| 82-101 | No show | 0-1 units |
| 101-204 | No show | 0-1 units |

| Formation Tops: | Prognosed (mRT) | Actual* (mRT) | Actual* (mSS) | Difference* (High/Low) |
|---|---|---|---|---|
| Quartenary Gravel | Surface | Surface | Surface | 0 |
| Gippsland Limestone | 4 | 25 | +35 | 21 Low |
| Lakes Entrance Formation | 84 | 82 | -22 | 2 High |
| LaTrobe Group | 96 | 101 | -41 | 5 Low |
| Golden Beach Formation | 371 | | | |
| Strzlecki Formation | 497 | | | |
| T.D. | 600 | | | |

**Provisional, based on mudlog*

| Lithological and Fluorescence Description | |
|---|---|
| **Interval (m)** | **Description** |
| 60 - 82 | LIMESTONE: (100%) light to medium grey, slightly to moderately argillaceous, moderate cryptocrystalline calcite cement, common fossil fragments including bryozoa, shells and forams, trace to common glauconite, rare pyrite, hard, very poor visual porosity, no oil fluorescence.<br>With depth grading to:<br>LIMESTONE: (50%) (calcilutite) off white to light grey, slightly to occasionally very argillaceous, trace fossil fragments including bryozoa, shells and forams, trace glauconite, very soft and sticky, non fissile,<br>Grading to and increasing with depth of:<br>MARL: (50%) light to medium grey, slight to moderate argillaceous content, trace fossil fragments, trace glauconite, very soft sticky, non fissile. |
| 82 - 101 | MARL: (100%) light to medium grey to medium green grey, trace increasing to common with depth fossil fragments including bryozoa, shells and forams, rare glauconite, abundant glauconite at base, very soft sticky, non fissile. |
| 101-140 | COAL: (90%) black to very dark brown, earthy to occasionally fibrous texture, earthy lustre, often moderately to very argillaceous and silty, trace medium brown resinous material, rare very fine to coarse quartz sand grains, trace pyrite, firm.<br>With minor:<br>SANDSTONE: (10%) very light grey, very fine to dominantly coarse, subrounded to rounded, moderately sorted, no visible matrix, no visible cement, clear to opaque quartz grains, common black coal detritus, unconsolidated, very good inferred porosity, no oil fluorescence.<br>With rare laminated:<br>SILTSTONE: (Trace) dark brown grey, moderately argillaceous, moderately to very carbonaceous, common to abundant fine black coaly detritus, soft, very dispersive, non fissile. |
| 140-204 | SANDSTONE: (40%) very light brown grey, very fine to coarse, dominantly medium, angular to rounded, dominantly subrounded, poor to moderate sorting, trace off white argillaceous matrix, very weak silica cement, clear to opaque quartz grains, common to abundant off white to light brown to green lithics, abundant clear to green coarse mica flakes, unconsolidated to slightly friable, very good inferred porosity, no oil fluorescence.<br>Interbedded with:<br>COAL: (50%) black to very dark brown, earthy to occasionally fibrous texture, earthy lustre, moderately argillaceous and silty in part, often very argillaceous and silty at base of coal units, trace to common pyrite, firm.<br>In part grading to and occasionally interbedded with:<br>SILTY CLAYSTONE: (10%) dark brown grey, very carbonaceous, common very fine to fine black coaly detritus, soft, very dispersive, non fissile. |

# LAKES PETROLEUM N.L.

(A.C.N. 004247214)

## DEADMAN HILL No.1 PEP 157

## DAILY GEOLOGICAL REPORT No. 5 Date: 16-05-2002

**Depth:** 411m **Progress:**207m **Days from Spud:** 5

| | | | |
|---|---|---|---|
| **Rig:** | Sides Bourne 2000THD | **GL(*AHD*):** | 59m |
| **Drilling Rep:** | Wally Westman | **RT:** *(datum)* | 60m |
| **Geologist:** | David Horner | **Last Casing:** | 9.625" at 49m |

**Comments:**

Drill 8.5" hole from 204m lost total returns at 335m. Drill 8.5" hole to 411m.

Trip gas at 204m = 1 unit with estimated 1m of fill.

Possible fracture/fault plane 208-211m - evidenced by strong dolomitization and a sheared texture to the cuttings. From 211-242m cuttings show evidence of slickensides, mylonitization and dolomitization.

| Interval (mRT) | Hydrocarbon Show Summary | Gas |
|---|---|---|
| 204-327 | No show | 0-1 units |
| 327-335 | Lost returns | NR |
| 335-411 | No show | 0-1 units |

| Formation Tops: | Prognosed (mRT) | Actual* (mRT) | Actual* (mSS) | Difference* (High/Low) |
|---|---|---|---|---|
| Quartenary Gravel | Surface | Surface | Surface | 0 |
| Gippsland Limestone | 4 | 25 | +35 | 21 Low |
| Lakes Entrance Formation | 84 | 82 | -22 | 2 High |
| LaTrobe Group | 96 | 101 | -41 | 5 Low |
| Golden Beach Formation | 371 | | | |
| Strzlecki Formation | 497 | | | |
| T.D. | 600 | | | |

**Provisional, based on mudlog*

| Lithological and Fluorescence Description | |
|---|---|
| **Interval (m)** | **Description** |
| 204-242 | SILTY CLAYSTONE: (70%) dark brown to very dark brown grey, very carbonaceous grading to coal, trace pyrite, trace slickensides, trace dolomitization, trace mylonitized dolomitic sandy material, soft , moderately dispersive, non fissile.<br>Grading to and interbedded with:<br>COAL: (20%) black to dark brown, earthy texture and lustre, very argillaceous and silty in part grading to silty claystone, trace pyrite, firm.<br>With a massive dolomite bed 208-211m and minor (up to 10%) 211-242m:<br>DOLOMITE: (10%) medium brown to brown black, cryptocrystalline to microcrystalline, abundant black coaly material with sheared texture in part, very argillaceous in part, occasionally very finely arenaceous, very hard, no visual porosity. |
| 242- 284 | SANDSTONE: (40%) light brown, very fine to coarse, dominantly medium, angular to subrounded, dominantly subangular, moderately to well sorted, trace dark brown argillaceous matrix, very weak silica cement, clear to dominantly opaque quartz grains, common off white to yellow to red to green lithics, trace black coaly detritus, unconsolidated to friable, very good inferred porosity, no oil fluorescence.<br>Interbedded with:<br>SILTY CLAYSTONE: (50%) medium to very dark brown, moderately to very carbonaceous - grades in part to argillaceous coal, common very fine black carbonaceous flecks in part, trace micromica, rare pyrite, very soft to soft, sticky, moderately dispersive, non fissile.<br>Grading in part to, laminated with and interbedded with:<br>COAL: (10%) black to dark brown, earthy texture and lustre, very argillaceous and silty in part grading to silty claystone, trace pyrite, firm. |
| 284-327 | SANDSTONE: (40%) very light brown, very fine to pebble, dominantly coarse to very coarse, angular to subrounded, dominantly subangular, poor to moderate sorting, trace dark brown argillaceous matrix, very weak silica cement, clear to opaque quartz grains, trace coarse mica flakes, unconsolidated to friable, very good to excellent inferred porosity, no oil fluorescence.<br>Interbedded with:<br>SILTY CLAYSTONE: (50%) very dark brown to brown black, moderately to very carbonaceous - grades to argillaceous coal, common very fine black carbonaceous flecks in part, very soft to soft, sticky, moderately dispersive, non fissile.<br>Grading in part to, laminated and interbedded with:<br>COAL: (10%) black to dark brown, earthy texture and lustre, often very argillaceous and silty -grades to silty claystone, trace pyrite, firm. |
| 327-335 | Lost returns - no samples or gas readings. |
| 335-342 | SANDSTONE: very light grey to light brown, very fine to very coarse, dominantly coarse, angular to subrounded, dominantly subangular, poor to moderate sorting, nil to trace medium brown argillaceous and silt matrix, weak silica cement, clear to opaque quartz grains, trace off white to yellow orange to red to green lithics, trace clear to green coarse mica flakes, trace black coaly detritus, unconsolidated to friable, very good inferred porosity, no oil fluorescence.<br>interbedded with:<br>SILTY CLAYSTONE: medium to very dark brown, moderately to very carbonaceous - grades to argillaceous coal, common very fine black carbonaceous flecks in part, trace micromica, trace pyrite, very soft to soft, sticky, moderately dispersive, non fissile.<br>Grading in part to, laminated and interbedded with:<br>COAL: black to dark brown, earthy texture and lustre, often very argillaceous and silty - grades to silty claystone, trace pyrite, firm. |

| | |
|---|---|
| 342-411 | Massive sandstone unit:<br>SANDSTONE: very light grey, very fine to rarely pebble, dominantly coarse to very coarse, angular to subrounded, dominantly subangular, moderately sorted, nil to trace white argillaceous matrix, minor dark brown argillaceous matrix at top, very weak silica cement, clear to opaque quartz grains, trace grey green and red lithics, trace black coaly detritus, trace coarse mica flakes in part, trace pyrite, unconsolidated to friable, very good inferred porosity, no oil fluorescence. |

# LAKES PETROLEUM N.L.

(A.C.N. 004247214)

## DEADMAN HILL No.1 PEP 157

## DAILY GEOLOGICAL REPORT No. 6

**Date: 17-05-2002**

**Depth:** 519m **Progress:** 108m **Days from Spud:** 6

| | | | |
|---|---|---|---|
| **Rig:** | Sides Bourne 2000THD | **GL*(AHD)*:** | 59m |
| **Drilling Rep:** | Wally Westman | **RT:** *(datum)* | 60m |
| **Geologist:** | David Horner | **Last Casing:** | 9.625" at 49m |

**Comments:**
Drill 8.5" hole from 411 to 519m. Trip gas at 411m = 1 unit, 0.5m of fill. Circulated sample at 418m.

| Interval (mRT) | Hydrocarbon Show Summary | Gas |
|---|---|---|
| 411-519 | No show | 0-1 units |

| Formation Tops: | Prognosed (mRT) | Actual* (mRT) | Actual* (mSS) | Difference* (High/Low) |
|---|---|---|---|---|
| Quartenary Gravel | Surface | Surface | Surface | 0 |
| Gippsland Limestone | 4 | 25 | +35 | 21 Low |
| Lakes Entrance Formation | 84 | 82 | -22 | 2 High |
| LaTrobe Group | 96 | 101 | -41 | 5 Low |
| Golden Beach Formation | 371 | | | |
| Strzlecki Formation | 497 | | | |
| T.D. | 600 | | | |

**Provisional, based on mudlog*

| Lithological and Fluorescence Description | |
|---|---|
| **Interval (m)** | **Description** |
| 411-417 | SILTY CLAYSTONE: medium brown to occasionally dark brown, trace black carbonaceous flecks, trace micromica, soft, very dispersive, non fissile.<br>Interbedded with:<br>CLAYSTONE: off white, medium green, occasionally very finely arenaceous and slightly calcareous where white, sticky, amorphous.<br>With in part minor interbeds of:<br>SANDSTONE: very light grey, very fine to very coarse, dominantly medium to coarse, angular to subrounded, dominantly subangular, moderately sorted, trace white argillaceous matrix, weak silica cement, clear to opaque quartz grains, trace grey and green lithics, trace black coaly detritus, trace to common coarse mica flakes, unconsolidated to friable, good inferred porosity, no oil fluorescence. |
| 417-471 | Massive sandstone unit:<br>SANDSTONE: very light grey, very fine to grit, dominantly coarse, pebbly towards base, angular to subrounded, dominantly subangular, moderately sorted, trace to rarely abundant white argillaceous matrix, weak silica cement, clear to opaque quartz grains, trace grey green and red lithics, trace coarse mica flakes in part, trace black coaly detritus in part, unconsolidated to friable, fair to dominantly very good inferred porosity, no oil fluorescence. |
| 471-481 | Massive silty claystone unit:<br>SILTY CLAYSTONE: off white to medium brown, slightly to moderately carbonaceous, minor dispersed very fine to pebble quartz and lithic sand grains, minor black coal laminae, soft, sticky, non fissile. |
| 481-519 | Massive sandstone unit:<br>SANDSTONE: very light grey, very fine to pebble, dominantly coarse to very coarse, angular to subrounded, dominantly subangular, moderately sorted, trace white argillaceous matrix, weak silica cement, clear to opaque quartz grains, trace grey and green lithics, trace coarse mica flakes, trace black coaly detritus, trace pyrite in part, unconsolidated to friable, very good inferred porosity, no oil fluorescence. |

914410 040

# LAKES PETROLEUM N.L.

(A.C.N. 004247214)

## DEADMAN HILL No.1 PEP 157

## DAILY GEOLOGICAL REPORT No. 7 Date: 18-05-2002

**Depth:** 564m **Progress:**45m **Days from Spud:** 7

| | | | |
|---|---|---|---|
| **Rig:** | Sides Bourne 2000THD | **GL*(AHD)*:** | 59m |
| **Drilling Rep:** | Wally Westman | **RT:** *(datum)* | 60m |
| **Geologist:** | David Horner | **Last Casing:** | 9.625" at 49m |

**Comments:**
Drill 8.5" hole from 519 to 564. Trip gas at 519m = 1 unit, 5m of fill. Circulate sample at 564m. POOH to run 7" casing.

| Interval (mRT) | Hydrocarbon Show Summary | Gas |
|---|---|---|
| 519-554 | No show | 0 units |
| 554-564 | No show | 0 units |

| Formation Tops: | Prognosed (mRT) | Actual* (mRT) | Actual* (mSS) | Difference* (High/Low) |
|---|---|---|---|---|
| Quartenary Gravel | Surface | Surface | Surface | 0 |
| Gippsland Limestone | 4 | 25 | +35 | 21 Low |
| Lakes Entrance Formation | 84 | 82 | -22 | 2 High |
| LaTrobe Group | 96 | 101 | -41 | 5 Low |
| Golden Beach Formation | 371 | 554 | -494 | 183 Low |
| Strzlecki Formation | 497 | | | |
| T.D. | 600 | | | |

**Provisional, based on mudlog*

### Lithological and Fluorescence Description

| Interval (m) | Description |
|---|---|
| 519-554 | Massive sandstone unit:<br>SANDSTONE: very light grey, very fine to pebble, dominantly grit, angular to subrounded, dominantly angular, poorly sorted, trace to common white argillaceous matrix, weak silica cement, clear to milky quartz grains, trace grey green lithics, trace black coaly detritus, trace pyrite, unconsolidated to friable, very good inferred porosity, no oil fluorescence. |

| | |
|---|---|
| 554-564 | Massive claystone (Golden Beach Formation):<br>CLAYSTONE: medium grey, rarely light grey, rarely medium brown grey, moderately silty, trace black carbonaceous specks, rarely slightly calcareous, rare pyrite, sticky flocculated muddy ooze. |

914410 042

# LAKES PETROLEUM N.L.

(A.C.N. 004247214)

## DEADMAN HILL No.1 PEP 157

## DAILY GEOLOGICAL REPORT No. 8 Date: 19-05-2002

**Depth:** 564m **Progress:**0m **Days from Spud:** 8

| | | | |
|---|---|---|---|
| **Rig:** | Sides Bourne 2000THD | **GL*(AHD)*:** | 59m |
| **Drilling Rep:** | Wally Westman | **RT:** *(datum)* | 60m |
| **Geologist:** | David Horner | **Last Casing:** | 7´ at 549m |

**Comments:**
Run 7" casing to 549m.

| Interval (mRT) | Hydrocarbon Show Summary | Gas |
|---|---|---|
| | No new formation drilled | |

| Formation Tops: | Prognosed (mRT) | Actual* (mRT) | Actual* (mSS) | Difference* (High/Low) |
|---|---|---|---|---|
| Quartenary Gravel | Surface | Surface | Surface | 0 |
| Gippsland Limestone | 4 | 25 | +35 | 21 Low |
| Lakes Entrance Formation | 84 | 82 | -22 | 2 High |
| LaTrobe Group | 96 | 101 | -41 | 5 Low |
| Golden Beach Formation | 371 | 554 | -494 | 183 Low |
| Strzlecki Formation | 497 | | | |
| T.D. | 600 | | | |

**Provisional, based on mudlog*

**Lithological and Fluorescence Description**

| Interval (m) | Description |
|---|---|
| | No new formation drilled |

# LAKES PETROLEUM N.L.

(A.C.N. 004247214)

## DEADMAN HILL No.1 PEP 157

## DAILY GEOLOGICAL REPORT No. 9 Date: 20-05-2002

**Depth:** 564m **Progress:**0m **Days from Spud:** 9

| | | | |
|---|---|---|---|
| **Rig:** | Sides Bourne 2000THD | **GL*(AHD)*:** | 59m |
| **Drilling Rep:** | Wally Westman | **RT:** *(datum)* | 60m |
| **Geologist:** | David Horner | **Last Casing:** | 7´ at 549m |

**Comments:**
Cement 7" casing, nipple up BOP's, RIH with 6.125" bit.

| Interval (mRT) | Hydrocarbon Show Summary | Gas |
|---|---|---|
| | No new formation drilled | |

| Formation Tops: | Prognosed (mRT) | Actual* (mRT) | Actual* (mSS) | Difference* (High/Low) |
|---|---|---|---|---|
| Quartenary Gravel | Surface | Surface | Surface | 0 |
| Gippsland Limestone | 4 | 25 | +35 | 21 Low |
| Lakes Entrance Formation | 84 | 82 | -22 | 2 High |
| LaTrobe Group | 96 | 101 | -41 | 5 Low |
| Golden Beach Formation | 371 | 554 | -494 | 183 Low |
| Strzlecki Formation | 497 | | | |
| T.D. | 600 | | | |

**Provisional, based on mudlog*

| Lithological and Fluorescence Description | |
|---|---|
| **Interval (m)** | **Description** |
| | No new formation drilled |

# LAKES PETROLEUM N.L.

(A.C.N. 004247214)

## DEADMAN HILL No.1 PEP 157

## DAILY GEOLOGICAL REPORT No. 10 Date: 21-05-2002

**Depth:** 565m **Progress:** 1m **Days from Spud:** 10

| | | | |
|---|---|---|---|
| **Rig:** | Sides Bourne 2000THD | **GL*(AHD)*:** | 59m |
| **Drilling Rep:** | Wally Westman | **RT:** *(datum)* | 60m |
| **Geologist:** | David Horner | **Last Casing:** | 7′ at 549m |

**Comments:**
RIH with 6.125" bit, drill out cement and shoe track, drill 6.125" hole to 565m, POOH to core.

| Interval (mRT) | Hydrocarbon Show Summary | Gas |
|---|---|---|
| 564-565 | No show | 0 |

| Formation Tops: | Prognosed (mRT) | Actual* (mRT) | Actual* (mSS) | Difference* (High/Low) |
|---|---|---|---|---|
| Quartenary Gravel | Surface | Surface | Surface | 0 |
| Gippsland Limestone | 4 | 25 | +35 | 21 Low |
| Lakes Entrance Formation | 84 | 82 | -22 | 2 High |
| LaTrobe Group | 96 | 101 | -41 | 5 Low |
| Golden Beach Formation | 371 | 554 | -494 | 183 Low |
| Strzlecki Formation | 497 | | | |
| T.D. | 600 | | | |

**Provisional, based on mudlog*

**Lithological and Fluorescence Description**

| Interval (m) | Description |
|---|---|
| 564-565 | CLAYSTONE: (100%) medium grey, rarely light grey, rarely medium brown grey, moderately silty, trace black carbonaceous specks, sticky flocculated muddy ooze. |

# LAKES PETROLEUM N.L.

(A.C.N. 004247214)

## DEADMAN HILL No.1 PEP 157

## DAILY GEOLOGICAL REPORT No. 11 Date: 22-05-2002

**Depth:** 589m **Progress:**24m **Days from Spud:** 11

| | | | |
|---|---|---|---|
| **Rig:** | Sides Bourne 2000THD | **GL*(AHD)*:** | 59m |
| **Drilling Rep:** | Wally Westman | **RT:** *(datum)* | 60m |
| **Geologist:** | David Horner | **Last Casing:** | 7´ at 549m |

**Comments:**
RIH with core barrel, cut 2.375" core from 565.0-574.0m. Cut 9m. Recovered 566.0-569.7m (3.7m or 41% recovery). RIH with 6.125" drilling assembly, drill ahead 574-589m..

| Interval (mRT) | Hydrocarbon Show Summary | Gas |
|---|---|---|
| 565-589 | No show | 0 |

| Formation Tops: | Prognosed (mRT) | Actual* (mRT) | Actual* (mSS) | Difference* (High/Low) |
|---|---|---|---|---|
| Quartenary Gravel | Surface | Surface | Surface | 0 |
| Gippsland Limestone | 4 | 25 | +35 | 21 Low |
| Lakes Entrance Formation | 84 | 82 | -22 | 2 High |
| LaTrobe Group | 96 | 101 | -41 | 5 Low |
| Golden Beach Formation | 371 | 554 | -494 | 183 Low |
| Strzlecki Formation | 497 | | | |
| T.D. | 600 | | | |

**Provisional, based on mudlog*

| Lithological and Fluorescence Description | |
|---|---|
| **Interval (m)** | **Description** |
| 565-569 | SILTY CLAYSTONE: (100%) medium grey to occasionally medium dark grey, slightly to very silty, occasionally very finely arenaceous with quartz and partially altered feldspar sand grains, trace to common black coaly specks, trace to occasionally common micromica, firm, non fissile. |

| | |
|---|---|
| 569-574 | SANDSTONE: (100%) very light grey to occasionally light brown grey, very fine to rarely coarse, dominantly very fine to fine, angular to subrounded, dominantly subangular, poor to moderate sorting, common to abundant white argillaceous matrix, quartzose with abundant partially altered feldspar grains, trace to occasionally common grey lithics, trace fine black coaly detritus, friable, fair visual porosity, no oil fluorescence. |
| 574-589 | SILTY CLAYSTONE: (50%) medium grey, slightly to very silty, occasionally very finely arenaceous with quartz and partially altered feldspar sand grains, trace black coaly specks, trace micromica, firm, sticky in sample, non fissile.<br>Interbedded with:<br>SANDSTONE: (50%) very light grey, very fine to rarely coarse, dominantly very fine to fine, angular to subrounded, dominantly subangular, moderately sorted, common to abundant white argillaceous matrix, quartzose with common partially altered feldspar grains, trace grey lithics, common coarse clear and brown mica flakes, trace black coaly detritus, friable, poor to fair inferred porosity, no oil fluorescence. |
| CORE # 1 | DEADMANS HILL No.1 CORE No.1 CUT 565.0 - 574.0m<br>RECOVERED 566.0 to 569.7m (3.7m) (41% recovery).<br>From drill rate correlation, the missing section of the core has been assessed to be 1 meter of core (presumably silty claystone) from the top lost due to pump problems and pump pressure build-ups, with the remaining loss of 4.3m (presumably friable very fine to fine gained sandstone) from the base of the core.<br>LITHOLOGY:<br>566.0 - 569.0m<br>SILTY CLAYSTONE: medium grey to occasionally medium dark grey, slightly to very silty, occasionally very finely arenaceous with quartz and partially altered feldspar sand grains, trace to common black coaly specks, trace to occasionally common micromica, firm, non fissile.<br>No apparent sedimentary structure, bedding at 0 degrees, rare slickensides.<br>569.0 - 569.7m<br>SANDSTONE: very light grey to occasionally light brown grey, very fine to rarely coarse, dominantly very fine to fine, angular to subrounded, dominantly subangular, poor to moderate sorting, common to abundant white argillaceous matrix, quartzose with abundant partially altered feldspar grains, trace to occasionally common grey lithics, trace fine black coaly detritus, friable, fair visual porosity, no oil fluorescence.<br>Thin band at top (4 cm) of coarser sandstone. No apparent sedimentary structure, bedding at 0 degrees.<br>DRILL RATES (min/m): 565-566 (11.0), 566-567 (29.0), 567-568 (29.0), 568-569 (23.0), 569-570 (2.0), 570-571 (1.0), 571-572 (3.0), 572-573 (3.0), 573-574 (1.0).<br>No ditch gas was detected whilst coring. No oil fluorescence was observed in the core.<br>SAMPLES TAKEN FOR ANAYSIS:<br>2 plugs were taken from the core for porosity/permeability/grain density analysis (569.22m , 569.55m) and were sent to Core Laboratories in Perth.<br>2 sections of core were taken for palynological analysis (566.1m , 568.4m) and were to sent to Dr. A. Partridge in Perth. |

# LAKES PETROLEUM N.L.

(A.C.N. 004247214)

## DEADMAN HILL No.1 PEP 157

## DAILY GEOLOGICAL REPORT No. 12 Date: 23-05-2002

**Depth:** 742m **Progress:**153m **Days from Spud:** 12

| | | | |
|---|---|---|---|
| **Rig:** | Sides Bourne 2000THD | **GL*(AHD)*:** | 59m |
| **Drilling Rep:** | Wally Westman | **RT:** *(datum)* | 60m |
| **Geologist:** | David Horner | **Last Casing:** | 7´ at 549m |

**Comments:**
RIH with 6.125" drilling assembly, Trip gas at 589m 1 unit, drill ahead 589-742m.

| Interval (mRT) | Hydrocarbon Show Summary | Gas |
|---|---|---|
| 589-693 | No show | 0-Trace |
| 693-742 | No show | Tr - 2 units |

| Formation Tops: | Prognosed (mRT) | Actual* (mRT) | Actual* (mSS) | Difference* (High/Low) |
|---|---|---|---|---|
| Quartenary Gravel | Surface | Surface | Surface | 0 |
| Gippsland Limestone | 4 | 25 | +35 | 21 Low |
| Lakes Entrance Formation | 84 | 82 | -22 | 2 High |
| LaTrobe Group | 96 | 101 | -41 | 5 Low |
| Golden Beach Formation | 371 | 554 | -494 | 183 Low |
| Strzelecki Formation | 497 | | | |
| T.D. | 600 | | | |

**Provisional, based on mudlog*

| Lithological and Fluorescence Description | |
|---|---|
| **Interval (m)** | **Description** |

| | |
|---|---|
| 589-647 | SILTY CLAYSTONE: (60%) off white to medium grey, slightly to very silty, very finely arenaceous with quartz and partially altered feldspar sand grains in part, rarely slightly calcareous, trace black coaly specks, trace micromica, rare pyrite, firm, sticky in sample, non fissile.<br>Interbedded with:<br>SANDSTONE: (39%) very light grey, very fine to rarely coarse, dominantly very fine to fine, angular to subrounded, dominantly subangular, moderately sorted, abundant white argillaceous matrix, weak silica cement, occasional dolomite and pyrite cement, quartzose with common partially altered feldspar grains, trace grey lithics, trace coarse clear mica flakes, trace black coaly detritus, friable, poor to fair inferred porosity, no oil fluorescence.<br>and minor:<br>DOLOMITE: (1%) medium brown, cryptocrystalline, common dispersed very fine to fine quartz sand grains, trace pyrite, very hard. |
| 647-693 | SANDSTONE: (70%) very light grey, very fine to medium, dominantly very fine to fine, angular to subrounded, dominantly subangular, moderately sorted, abundant white argillaceous matrix, weak silica cement, trace pyrite cement, quartzose with common partially altered feldspar grains, trace grey green and brown lithics, trace coarse clear and brown mica flakes in part, trace black coaly detritus, friable, poor to fair inferred porosity, no oil fluorescence.<br>Interbedded with:<br>SILTY CLAYSTONE: (30%) medium grey, slightly to very silty, rarely very finely arenaceous with quartz and partially altered feldspar sand grains, rarely slightly calcareous, trace black coaly specks and detritus, trace micromica, rare pyrite, firm, sticky in sample, non fissile.<br>With rare:<br>DOLOMITE: (Trace) light to medium brown, cryptocrystalline, common to abundant dispersed very fine to fine quartz sand grains, trace pyrite, very hard. |
| 693-742 | SANDSTONE: (20%) very light grey, very fine to medium, dominantly very fine to fine, angular to subrounded, dominantly subangular, moderately sorted, abundant off white argillaceous matrix, weak to moderate silica cement, trace dolomite and pyrite cement, quartzose with abundant partially altered feldspar grains, common grey green and brown lithics, trace black coaly detritus, trace mica flakes, friable, poor inferred porosity, no oil fluorescence.<br>Interbedded with:<br>SILTY CLAYSTONE: (80%) light to medium grey, rarely greenish grey, slightly to very silty, very finely arenaceous with quartz and partially altered feldspar sand grains in part, slightly calcareous in part, trace black coaly specks and detritus, trace micromica, rare pyrite, firm, sticky in sample, non fissile. |

# LAKES PETROLEUM N.L.

(A.C.N. 004247214)

## DEADMAN HILL No.1 PEP 157

## DAILY GEOLOGICAL REPORT No. 13 Date: 24-05-2002

**Depth:** 742m **Progress:**0m **Days from Spud:** 13

| | | | |
|---|---|---|---|
| **Rig:** | Sides Bourne 2000THD | **GL*(AHD)*:** | 59m |
| **Drilling Rep:** | Wally Westman | **RT:** *(datum)* | 60m |
| **Geologist:** | David Horner | **Last Casing:** | 7´ at 549m |

**Comments:**
POOH at 742m, lay out 3.5" drill string, pick up and RIH with 2.875" drill string.

| Interval (mRT) | Hydrocarbon Show Summary | Gas |
|---|---|---|
| | No new formation drilled | |

| Formation Tops: | Prognosed (mRT) | Actual* (mRT) | Actual* (mSS) | Difference* (High/Low) |
|---|---|---|---|---|
| Quartenary Gravel | Surface | Surface | Surface | 0 |
| Gippsland Limestone | 4 | 25 | +35 | 21 Low |
| Lakes Entrance Formation | 84 | 82 | -22 | 2 High |
| LaTrobe Group | 96 | 101 | -41 | 5 Low |
| Golden Beach Formation | 371 | 554 | -494 | 183 Low |
| Strzelecki Formation | 497 | | | |
| T.D. | 600 | | | |

**Provisional, based on mudlog*

**Lithological and Fluorescence Description**

| Interval (m) | Description |
|---|---|
| | No new formation drilled. |

914410 050

# LAKES PETROLEUM N.L.

(A.C.N. 004247214)

## DEADMAN HILL No.1 PEP 157

## DAILY GEOLOGICAL REPORT No. 14 Date: 25-05-2002

**Depth:** 751m **Progress:**9m **Days from Spud:** 14

| | | | |
|---|---|---|---|
| **Rig:** | Sides Bourne 2000THD | **GL*(AHD)*:** | 59m |
| **Drilling Rep:** | Wally Westman | **RT:** *(datum)* | 60m |
| **Geologist:** | David Horner | **Last Casing:** | 7´ at 549m |

**Comments:**
Wait on X-over sub, RIH with 3.5" drill string, drill ahead with 6.125" hole to 751m. Trip gas at 742m 4 units.

| Interval (mRT) | Hydrocarbon Show Summary | Gas |
|---|---|---|
| 742-751 | No show | 1 unit |

| Formation Tops: | Prognosed (mRT) | Actual* (mRT) | Actual* (mSS) | Difference* (High/Low) |
|---|---|---|---|---|
| Quartenary Gravel | Surface | Surface | Surface | 0 |
| Gippsland Limestone | 4 | 25 | +35 | 21 Low |
| Lakes Entrance Formation | 84 | 82 | -22 | 2 High |
| LaTrobe Group | 96 | 101 | -41 | 5 Low |
| Golden Beach Formation | 371 | 554 | -494 | 183 Low |
| Strzelecki Formation | 497 | | | |
| T.D. | 600 | | | |

**Provisional, based on mudlog*

| Lithological and Fluorescence Description | |
|---|---|
| **Interval (m)** | **Description** |

| | |
|---|---|
| 742-751 | SILTY CLAYSTONE: (100%) medium grey, occasionally light grey, rarely dark grey and very carbonaceous, slightly to very silty, very finely arenaceous with quartz and partially altered feldspar sand grains in part, slightly calcareous in part, common black coaly specks and detritus, common micromica, trace pyrite, firm, sticky in sample, slightly subfissile. With minor interbedded and laminated:<br>SANDSTONE: light brown grey, very fine to coarse, dominantly fine, angular to subrounded, dominantly subangular, poorly sorted, common off white argillaceous matrix, weak silica cement, strong pyrite cement, strong dolomite cement, quartzose with common partially altered feldspar grains, common grey green and brown lithics, trace coarse mica flakes, trace black coaly detritus, very hard, no visual porosity, no oil fluorescence. |

914410 052

# LAKES PETROLEUM N.L.

(A.C.N. 004247214)

## DEADMAN HILL No.1 PEP 157

## DAILY GEOLOGICAL REPORT No. 15 Date: 26-05-2002

**Depth:** 786m **Progress:**35m **Days from Spud:** 15

| | | | |
|---|---|---|---|
| **Rig:** | Sides Bourne 2000THD | **GL*(AHD)*:** | 59m |
| **Drilling Rep:** | Wally Westman | **RT:** *(datum)* | 60m |
| **Geologist:** | David Horner | **Last Casing:** | 7´ at 549m |

**Comments:**
Pick up 2.875" drill string, drill ahead from 751 to 786m. Trip gas at 751m 3 units, 20m of fill. Hole indicating signs of instability.

| Interval (mRT) | Hydrocarbon Show Summary | Gas |
|---|---|---|
| 751-764 | No show | 1-2 units |
| 764-786 | No show | 1-2 units |

| Formation Tops: | Prognosed (mRT) | Actual* (mRT) | Actual* (mSS) | Difference* (High/Low) |
|---|---|---|---|---|
| Quartenary Gravel | Surface | Surface | Surface | 0 |
| Gippsland Limestone | 4 | 25 | +35 | 21 Low |
| Lakes Entrance Formation | 84 | 82 | -22 | 2 High |
| LaTrobe Group | 96 | 101 | -41 | 5 Low |
| Golden Beach Formation | 371 | 554 | -494 | 183 Low |
| Strzelecki Formation | 497 | 764 | -704 | 267 Low |
| T.D. | 600 | | | |

**Provisional, based on mudlog*

### Lithological and Fluorescence Description

| Interval (m) | Description |
|---|---|
| 751-755 | SANDSTONE: (100%) light brown grey, very fine to coarse, dominantly fine, angular to subrounded, dominantly subangular, poorly sorted, common off white argillaceous matrix, weak silica cement, strong pyrite cement, strong dolomite cement, quartzose with common partially altered feldspar grains, common grey green and brown lithics, trace coarse mica flakes, trace black coaly detritus, very hard, no visual porosity, no oil fluorescence. |

| | |
|---|---|
| 755-764 | SANDSTONE: (100%) light grey, very fine to medium, dominantly fine, angular to subrounded, dominantly subangular, moderately sorted, common off white argillaceous matrix, weak silica cement, clear to opaque quartz with common partially altered feldspar grains, common grey green and orange brown lithics, trace coarse mica flakes, trace black coaly detritus, trace pyrite, friable, poor to fair inferred porosity, no oil fluorescence. |
| 764-768 | SANDSTONE: (100%) light grey, very fine to medium, dominantly fine, angular to subrounded, dominantly subangular, moderately sorted, abundant off white argillaceous matrix, weak silica cement and calcareous cements, quartzose with abundant partially altered feldspar grains, common grey green and orange brown lithics, trace black coaly detritus, friable to moderately hard, very poor to poor visual porosity, no oil fluorescence. |
| 768-786 | CLAYSTONE: (100%) very light brown to medium brown grey, rarely off white, slightly to very silty, trace black coaly specks, trace micromica, firm, sticky in sample, slightly subfissile. |

914410 054

# LAKES PETROLEUM N.L.

(A.C.N. 004247214)

## DEADMAN HILL No.1 PEP 157

## DAILY GEOLOGICAL REPORT No. 16 Date: 27-05-2002

**Depth:** 827m **Progress:**41m **Days from Spud:** 16

| | | | |
|---|---|---|---|
| **Rig:** | Sides Bourne 2000THD | **GL*(AHD)*:** | 59m |
| **Drilling Rep:** | Wally Westman | **RT:** *(datum)* | 60m |
| **Geologist:** | David Horner | **Last Casing:** | 7´ at 549m |

**Comments:**
RIH, ream 50m tight hole and fill, trip gas at 786m 5 units. Drill ahead 786 to 827m. Hole condition unstable. Background gas gradually increasing (from 1 unit at 786m to 5 units by 827m).

| Interval (mRT) | Hydrocarbon Show Summary | Gas |
|---|---|---|
| 786-827 | No show | 1-5 units |

| Formation Tops: | Prognosed (mRT) | Actual* (mRT) | Actual* (mSS) | Difference* (High/Low) |
|---|---|---|---|---|
| Quartenary Gravel | Surface | Surface | Surface | 0 |
| Gippsland Limestone | 4 | 25 | +35 | 21 Low |
| Lakes Entrance Formation | 84 | 82 | -22 | 2 High |
| LaTrobe Group | 96 | 101 | -41 | 5 Low |
| Golden Beach Formation | 371 | 554 | -494 | 183 Low |
| Strzelecki Formation | 497 | 764 | -704 | 267 Low |
| T.D. | 600 | | | |

**Provisional, based on mudlog*

| Lithological and Fluorescence Description | |
|---|---|
| **Interval (m)** | **Description** |

| | |
|---|---|
| 786-827 | CLAYSTONE: (60%) light to medium grey to light brown, rarely off white, slightly to very silty, rarely very finely arenaceous with quartz and partially altered feldspar grains, trace black coaly specks, trace micromica, rare pyrite, firm, sticky in sample, slightly subfissile.<br>Interbedded with:<br>SANDSTONE: (40%) light grey, very fine to medium, dominantly fine, angular to subrounded, dominantly subangular, moderately sorted, common to abundant off white argillaceous matrix, weak to moderate silica and calcareous cements, quartzose with abundant off white partially altered feldspar grains, common grey black green orange and red lithics, trace black coaly detritus, rare pyrite, moderately hard, very poor visual porosity, no oil fluorescence. |

# LAKES PETROLEUM N.L.

(A.C.N. 004247214)

## DEADMAN HILL No.1 PEP 157

## DAILY GEOLOGICAL REPORT No. 17 Date: 28-05-2002

**Depth:** 827m **Progress:**0m **Days from Spud:** 17

| | | | |
|---|---|---|---|
| **Rig:** | Sides Bourne 2000THD | **GL*(AHD)*:** | 59m |
| **Drilling Rep:** | Wally Westman | **RT:** *(datum)* | 60m |
| **Geologist:** | David Horner | **Last Casing:** | 7´ at 549m |

**Comments:**

POOH, pick up 18m core barrel, RIH to shoe.

Core #2 is to clarify age and formation at this depth, and also, if sands are encountered for porosity/permeability data. Note: the cuttings samples are non-definitive as to whether the formation below 764m is Strzelecki Formation or the basal section of the Golden Beach Formation which is composed primarily of re-worked Strzelecki Formation.

| Interval (mRT) | Hydrocarbon Show Summary | Gas |
|---|---|---|
| | No new formation drilled. | |

| Formation Tops: | Prognosed (mRT) | Actual* (mRT) | Actual* (mSS) | Difference* (High/Low) |
|---|---|---|---|---|
| Quartenary Gravel | Surface | Surface | Surface | 0 |
| Gippsland Limestone | 4 | 25 | +35 | 21 Low |
| Lakes Entrance Formation | 84 | 82 | -22 | 2 High |
| LaTrobe Group | 96 | 101 | -41 | 5 Low |
| Golden Beach Formation | 371 | 554 | -494 | 183 Low |
| Strzelecki Formation | 497 | 764 | -704 | 267 Low |
| T.D. | 600 | | | |

**Provisional, based on mudlog*

**Lithological and Fluorescence Description**

| Interval (m) | Description |
|---|---|
| | No new formation drilled. |

# LAKES PETROLEUM N.L.

(A.C.N. 004247214)

## DEADMAN HILL No.1 PEP 157

## DAILY GEOLOGICAL REPORT No. 18 Date: 29-05-2002

**Depth:** 839m **Progress:** 12m **Days from Spud:** 18

| | | | |
|---|---|---|---|
| **Rig:** | Sides Bourne 2000THD | **GL*(AHD)*:** | 59m |
| **Drilling Rep:** | Wally Westman | **RT:** *(datum)* | 60m |
| **Geologist:** | David Horner | **Last Casing:** | 7´ at 549m |

**Comments:**
RIH with core barrel, 18m of fill, trip gas at 827m 15 units. Run carbide at 827m = 165 units. Cut core #2 827.0 to 839.0m (12m). POOH to shoe.

| Interval (mRT) | Hydrocarbon Show Summary | Gas |
|---|---|---|
| 827-839 | No show | 3-8 units |

| Formation Tops: | Prognosed (mRT) | Actual* (mRT) | Actual* (mSS) | Difference* (High/Low) |
|---|---|---|---|---|
| Quartenary Gravel | Surface | Surface | Surface | 0 |
| Gippsland Limestone | 4 | 25 | +35 | 21 Low |
| Lakes Entrance Formation | 84 | 82 | -22 | 2 High |
| LaTrobe Group | 96 | 101 | -41 | 5 Low |
| Golden Beach Formation | 371 | 554 | -494 | 183 Low |
| Strzelecki Formation | 497 | 764 | -704 | 267 Low |
| T.D. | 600 | 839 | -779 | 239 Low |

**Provisional, based on mudlog*

| Lithological and Fluorescence Description | |
|---|---|
| **Interval (m)** | **Description** |

| | |
|---|---|
| 827-839<br>T.D. | CLAYSTONE: (60%) light to medium grey, light brown grey, slightly to very silty, rarely very finely arenaceous with quartz and partially altered feldspar grains, trace black coaly specks, trace micromica, firm, sticky in sample, slightly subfissile..<br>Interbedded and laminated with:<br>SANDSTONE: (40%) off white to light grey, very fine to rarely medium, dominantly very fine to fine, angular to subrounded, dominantly subangular, moderately sorted, abundant off white argillaceous matrix, weak to moderate silica and calcareous cements, quartzose with abundant off white partially altered feldspar grains, common grey black green orange and red lithics, trace black coaly detritus, moderately hard, very poor visual porosity, no oil fluorescence. |

# LAKES PETROLEUM N.L.

(A.C.N. 004247214)

## DEADMAN HILL No.1 PEP 157

## DAILY GEOLOGICAL REPORT No. 19 Date: 30-05-2002

**Depth:** 839m **Progress:**0m **Days from Spud:** 19

| | | | |
|---|---|---|---|
| **Rig:** | Sides Bourne 2000THD | **GL*(AHD)*:** | 59m |
| **Drilling Rep:** | Wally Westman | **RT:** *(datum)* | 60m |
| **Geologist:** | David Horner | **Last Casing:** | 7´ at 549m |

**Comments:**
POOH with core #2 827-839m (Cut 12m. Rec 9m. (75%)). RIH to P&A.

| Interval (mRT) | Hydrocarbon Show Summary | Gas |
|---|---|---|
| | No new formation drilled | |

| Formation Tops: | Prognosed (mRT) | Actual* (mRT) | Actual* (mSS) | Difference* (High/Low) |
|---|---|---|---|---|
| Quartenary Gravel | Surface | Surface | Surface | 0 |
| Gippsland Limestone | 4 | 25 | +35 | 21 Low |
| Lakes Entrance Formation | 84 | 82 | -22 | 2 High |
| LaTrobe Group | 96 | 101 | -41 | 5 Low |
| Golden Beach Formation | 371 | 554 | -494 | 183 Low |
| Strzelecki Formation | 497 | 764 | -704 | 267 Low |
| T.D. | 600 | 839 | -779 | 239 Low |

**Provisional, based on mudlog*

| Lithological and Fluorescence Description | |
|---|---|
| **Interval (m)** | **Description** |

| | |
|---|---|
| CORE#2 | CORE No.2 827.0 to 839.0m. Cut 12m. Rec 9.0m. (75%).<br>Note: missing section of core although deleted from bottom of the cored interval, is believed to be missing from several intervals throughout the core length. The core shows many rotational surfaces.<br><br>827.0 to 828.35 m.<br>Massive Claystone (100%).<br>CLAYSTONE: very dark grey, very silty, very carbonaceous, trace micromica, firm, non fissile. Occasional slickensided surfaces, no visible bedding or sedimentary structure.<br><br>828.35 to 832.5m.<br>Sandstone (50%) with finely interbedded interlaminated and grading to Claystone (50%).<br>SANDSTONE: light to medium grey, very fine to medium, occasional to common clay clasts to 4mm, angular to subrounded, dominantly subangular, poorly sorted, weak silica cement, composed of altered feldspars, grey green claystone clasts, minor quartz grains, trace to abundant black coaly detritus, friable to moderately hard, very poor visual porosity, no oil fluorescence.<br>CLAYSTONE: very dark grey, very silty, very carbonaceous, trace micromica, firm, non fissile, grading to CLAYSTONE: light to medium grey to grey brown, moderately to very silty, common to abundant black coaly detritus, occasionally very arenaceous with altered feldspar grains, trace micromica, firm, non fissile.<br>Bedding 0-5 degrees, common diffused bedding (dewatering?), common sedimentary bedding.<br><br>832.5 to 834.1m.<br>Massive Sandstone (100%)<br>SANDSTONE: light grey, occasionally light greenish grey, very fine to rarely medium, dominantly fine, angular to subrounded, dominantly subangular, moderately sorted, weak silica cement, nil to strong calcareous cement, common off white argillaceous matrix, composed of altered feldspar grains with common quartz and green grey black lithics, trace orange red lithics, trace brown and clear mica flakes, common to abundant black coaly detritus, friable to moderately hard, very poor visual porosity, no oil fluorescence.<br>Bedding 0-5 degrees, common diffused bedding (dewatering?).<br><br>834.1 to 836.0m.<br>Sandstone (50%) interbedded, interlaminated and grading to Claystone (50%).<br>SANDSTONE: light grey to slightly greenish grey, very fine to fine, dominantly fine, angular to subrounded, dominantly subangular, moderately to well sorted, weak silica and calcareous cements, common to abundant white argillaceous matrix, occasionally abundant light to medium grey argillaceous matrix, composed of feldspar grains with common quartz and grey green black lithics, trace red orange lithics, trace clear and brown mica flakes, abundant black coaly detritus, friable to moderately hard, very poor visual porosity, no oil fluorescence.<br>CLAYSTONE: light to medium grey to grey brown, moderately to very silty, common to abundant black coaly detritus, occasionally very arenaceous with altered feldspar grains, trace micromica, firm, non fissile, grading to CLAYSTONE: very dark grey, very silty, very carbonaceous, trace to common micromica, firm, non fissile.<br>Bedding 0-8 degrees, common diffused bedding (dewatering?), common sedimentary bedding. |

# Appendix 2:

# Palynology

# Palynological analysis of Upper Cretaceous in Deadman Hill–1, onshore Gippsland Basin.

by

Alan D. Partridge

Biostrata Pty Ltd
A.B.N. 39 053 800 945

Biostrata Report 2002/16

28th June 2002

# Palynological analysis of Upper Cretaceous in Deadman Hill–1, onshore Gippsland Basin.

by Alan D. Partridge

## INTERPRETATIVE DATA



## BASIC DATA

# Palynological analysis of Upper Cretaceous in Deadman Hill–1, onshore Gippsland Basin.

by Alan D. Partridge

## INTERPRETATIVE DATA


### SUMMARY

Five core and three cuttings samples have been analysed over a 272 metre interval between 564 and 836.4m in the Deadman Hill-1 exploration well located on the Baragwanath Anticline in the onshore Gippsland Basin. The palynomorph assemblages extracted are assigned to the *Phyllocladidites mawsonii* spore-pollen Zone and *Rimosicysta* microplankton Superzone, which jointly confirm a Turonian age and assign the interval to the Emperor Subgroup (formerly the lower part of the Golden Beach Group).

These Turonian assemblage contain between 1% and 9% non-marine microplankton including several species of the distinctive algal genera *Rimosicysta* and *Wuroia*. The associated spore-pollen are dominated by the gymnosperm pollen *Dilwynites* and *Araucariacites* which combined average 42% of the assemblage counts, and are interpreted to represent a strong Neves effect. The combination of both these features indicate the shales sampled for the palynological analyses were deposited in distal non-marine lacustrine environments.

Caved spore-pollen, which dominate the assemblage recovered from the shallowest cuttings at 564m, indicate that both Paleocene and Middle and Late Eocene sediments occur at shallower depths in the well. This caved component is dominated by *Nothofagidites* pollen characteristic of the Eocene Lower and Middle *N. asperus* Zones, whereas indicator species for the Paleocene *L. balmei* Zone are extremely rare. These zones and ages indicate that sediments representative of the Burong and Barracouta or Yarram Formations occur at shallower depths in the well.


### INTRODUCTION

The five core and three cuttings samples from the Deadman Hill-1 well drilled by Lakes Oil N.L. were submitted for a mixture of urgent and routine analysis between the 20th to 31st May 2002, with the objective of confirming the penetration of the Golden Beach Group as used in the sense of Lowry & Longley (1991). All samples were forwarded directly to Laola Pty Ltd in Perth for processing and slide preparation and the latter were returned to the author for microscope analysis between the 22nd May and 11th June. A series of five Provisional Reports on the initial results were then submitted between the 22nd May and 14th June 2002.

The zones and ages assigned to the samples, zone confident ratings, microplankton abundances and zone identification criteria for each of the samples are summarised on Table 1. All the samples gave moderate to high organic residue yields which contained moderate to high concentrations of palynomorphs whose preservation was mostly poor to fair (Table 2). Recorded diversity of the spore-pollen assemblages was high at an average of 31+ species per sample, whereas the microplankton assemblages have a low diversity of 4+ species per sample. The species recorded during the microscope examination are listed in Table 3 and 4. Author citations for most of the recorded spore-pollen species can be sourced from the papers by Dettmann (1963), Helby *et al.* (1987) or Stover & Partridge (1973, 1982), while the author citations for the microplankton species can be sourced from the indexes for dinocysts and other organic-walled microplankton prepared by Fensome *et al.* (1990) and Williams *et al.* (1998). Informal manuscript species are distinguished by the addition of "ms" to the binomial names.

## GEOLOGICAL DISCUSSION

All samples analysed from the deepest 270+ metres of section penetrated in Deadman Hill-1 gave good assemblages that are typical of the *P. mawsonii* Zone and *Rimosicysta* Superzone as previously encountered in the Gippsland Basin. These two zones are jointly diagnostic of the Turonian age Emperor Subgroup of Partridge (1999) and Bernecker & Partridge (2001). This stratigraphic unit represents the oldest of four subgroups recognised within the siliciclastic Latrobe Group, and formerly constituted the lower part of the Golden Beach Group erected by Lowry & Longley (1991). The identification of an angular unconformity associated with significant missing section within the original concept of the latter stratigraphic unit necessitated the subdivision of the Golden Beach Group as proposed by Bernecker & Partridge (2001). These authors argue that the most appropriate stratigraphic rank for these new subdivisions is that of subgroups of a broad Latrobe Group rather than the higher rank of group as favoured by Lowry & Longley (1991).

The spore-pollen assemblages recovered are characterised by high abundances of the gymnosperm pollen *Dilwynites*, *Araucariacites*, *Podocarpidites* and *Cupressacites*. The particularly high abundance of the first two genera is interpreted as a Neves effect indicative of a distal offshore environment of deposition for the shales analysed. The associated microplankton assemblages are comprised mainly of well-preserved diaphanous algal cysts species of the genera *Rimosicysta* and *Wuroia*. This suite of largely endemic microplankton was originally described from the Kipper Shale by Marshall (1989), and has subsequently been defined as the *Rimosicysta* Superzone by Partridge (1999). The gross microplankton assemblage is interpreted to represent a fresh-water lacustrine environment of deposition. This combination of lacustrine characteristics in both the spore-pollen and microplankton assemblages is diagnostic of the Kipper Shale and lacustrine interbeds in the laterally equivalent Curlip and Admiral Formations (Partridge, 1999; Bernecker & Partridge, 2001).

Caved spore-pollen in the cuttings samples also provide information of the section penetrated above the Cretaceous Emperor Subgroup. The identification of spore pollen of both the Paleocene *L. balmei* Zone and younger Eocene Lower and Middle *N. asperus* Zones indicates the presence of stratigraphic section equivalent to the Barracouta or Yarram Formations and younger Burong Formation (Partridge, 1999). In contrast, not species diagnostic of either the *T. apoxyexinus* and *N. senectus* Zones were found, and therefore it is unlikely that any stratigraphic section equivalent to the Golden Beach Subgroup is present in Deadman Hill-1 well.

## BIOSTRATIGRAPHY

***Nothofagidites asperus* spore-pollen Zone**
**Caved at: 564 metres**
**Age: Middle to Late Eocene.**

Approximately 90% of the palynomorph assemblage recorded from the shallowest cuttings sample analysed consists of spore-pollen species caved from the Middle to Late Eocene portion of the Latrobe Group. This component of the assemblage is dominated by *Nothofagidites* pollen (31% of caved palynomorphs), *Haloragacidites harrisii* pollen (16%) and the gymnosperm pollen *Phyllocladidites mawsonii* (14%). Based on the presence of the index species *Nothofagidites falcatus*, *Triorites magnificus* and *Tricolporites leuros* the bulk of the caved fossils are interpreted to come from the Lower and Middle *N. asperus* Zones of Stover & Partridge (1982), and therefore from the Burong Formation of Partridge (1999) and Bernecker & Partridge (2001; fig.2).

***Lygistepollenites balmei* spore-pollen Zone**
**Caved at: 564 metres**
**Age: Paleocene.**

The presence of very rare specimens of *Lygistepollenites balmei* and *Camarozonosporites bullatus* in the mixed assemblage from the shallowest cuttings sample is interpreted to indicate that sediments belonging in to the *L. balmei* Zone have been penetrated in Deadman Hill-1. This Paleocene stratigraphic interval would belong to either the Barracouta or Yarram Formations (Partridge, 1999).

***Phyllocladidites mawsonii* spore-pollen Zone and *Rimosicysta* microplankton Superzone**
**Interval: 564 to 836.4 metres.**
**Age: Turonian.**

All eight samples analysed contain spore-pollen assemblages diagnostic of the broad *P. mawsonii* Zone, and non-marine microplankton diagnostic of the *Rimosicysta* Superzone. The samples from the bottom hole core clearly belong to the *P. mawsonii* Zone based on the presence of small primitive specimens of the eponymous species, and the LADs (Last appearance Datums) of the spores *Cicatricosisporites cuneiformis, C. pseudotripartitus* and *Interulobites intraverrucatus,* which are not known to range above the zone (Helby *et al.*, 1987). The shallower samples in contrast are assigned to the *P. mawsonii* Zone on the overall composition of the assemblages combined with the negative evidence of lack of younger index species.

The spore-pollen assemblages are overwhelmingly dominated by gymnosperm pollen (average 84%), with minor spores (16%) and only rare angiosperm pollen (0.5%). The low abundance of the last category is a useful feature that restricts the samples to the *P. mawsonii* Zone as angiosperm pollen increase markedly in abundance in the immediately younger *T. apoxyeximus* and *N. senectus* Zones, which are found in the overlying Golden Beach Subgroup. The abundance of the gymnosperm pollen *Dilwynites* spp. (average 35%), *Araucariacites australis* (average 7%) and *Cupressacites* sp. (average 10%) are also considered typical of the *P. mawsonii* Zone from the Emperor Subgroup, even though all three categories have significantly longer stratigraphic ranges.

The high abundance of *Dilwynites* and *Araucariacites* (combined average 42%) in the samples is believed to be the manifestation of a strong Neves effect. The latter reflects the tendency for certain more buoyant spores or pollen to have greater relative abundances in sediments deposited in more distal marine or lacustrine environments (Traverse, 1988; Partridge, 1996, 1999). The Neves effect is most prominent in the samples between 566.1 and 872.25m where *Dilwynites* and *Araucariacites* combined average >50%, and therefore these samples represent the most distal of the lacustrine environments. An unfortunate corollary of strong Neves effects in the spore-pollen assemblages can be the rarity of other index species which decrease in abundance in more distal environments. In the Deadman Hill-1 this is reflected in the absence of the diagnostic index species of the subzones of the *P. mawsonii* Zone recognised in the Otway Basin (Partridge, 1999, 2001). Any subdivision of the *P. mawsonii* Zone must consequently rely on gross assemblage features, and of these the only characteristic that may be reliable is the abundance of *Cupressacites* pollen in the core and cuttings between 566.1 and 795m where this pollen averages >20%. This abundance maximum is tentatively correlated with the spike in *Cupressacites* pollen recorded near the top of the *Gleicheniidites ancorus* Subzone in the Otway Basin (Partridge, 1999, 2001). If this correlation is valid it would suggest that most of the Emperor Subgroup penetrated in Deadman Hill-1 correlates with the Flaxman Formation in the Otway Basin.

The *Rimosicysta* Superzone is the name given to the unusual suite of algal cysts described from the Kipper Shale by Marshall (1989). The association is represented in Deadman Hill-1 by four species

of *Rimosicysta*, with the type species *R. kipperii* the most prominent, and two species of *Wuroia*, with *Wuroia tubiformis* the most prominent. In addition, *Micrhystridium* sp. A Marshall 1989 was recorded in most samples and the dinocyst *Luxadinium* sp. tentatively recorded at 566.1m. All microplankton recorded are interpreted as non-marine and predominantly fresh-water forms that are diagnostic of lacustrine environments.

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**Table 1: Interpretative data for Deadman Hill–1, onshore Gippsland Basin.**

| Sample Type | Depth | Palynology Zones STAGE/AGE | CR* | MP% | Comments and Key Species Present |
|---|---|---|---|---|---|
| Cuttings | 564m | *P. mawsonii* SP Zone and *Rimosicysta* Superzone **TURONIAN** mixed with **CAVED** Lower & Middle *N. asperus* and *L. balmei* Zones **EOCENE & PALEOCENE** | D4 D3 D1 D3 | ~5% | LADs of rare specimens of algal cysts *Rimosicysta* spp. and *Wuroia tubiformis* mixed with abundant *Nothofagidites* pollen and younger index taxa *Triorites magnificus*, *Tricolpites simatus* and *Lygistepollenites balmei*. |
| Core 1 | 566.1m | *P. mawsonii* SP Zone and *Rimosicysta* MP Superzone **TURONIAN** | A1 A3 | 9% | SP dominated by gymnosperm pollen: *Dilwynites* 35% & *Araucariacites* 47% of SP count. *Cupressacites* pollen also common at 14% of count. |
| Core 1 | 568.4m | *P. mawsonii* SP Zone and *Rimosicysta* MP Superzone **TURONIAN** | A1 A3 | <1% | *Cupressacites* pollen dominant at 33% with *Dilwynites* 28% & *Araucariacites* 14%. |
| Cuttings | 795m | *P. mawsonii* SP Zone and *Rimosicysta* MP Superzone **TURONIAN** | D1 D3 | 6% | *Dilwynites* pollen dominant at 27% with *Araucariacites* 4% and *Cupressacites* pollen 13%. |
| Cuttings | 826m | *P. mawsonii* SP Zone and *Rimosicysta* MP Superzone **TURONIAN** | D1 D3 | 3% | *Dilwynites* pollen dominant at 44% with *Araucariacites* 5% and *Cupressacites* pollen 8%. |
| Core 2 | 827.25m | *P. mawsonii* SP Zone and *Rimosicysta* MP Superzone **TURONIAN** | A1 A3 | <2% | FADs of algae *Rimosicysta* spp. and *Wuroia* spp. SP overwhelmingly dominated by *Dilwynites* 87% and *Araucariacites* 7% while *Cupressacites* declines to 1%. |
| Core 2 | 831.8m | *P. mawsonii* SP Zone and *Rimosicysta* MP Superzone **TURONIAN** | A1 A4 | 7% | LADs of spore *Cicatricosisporites cuneiformis* and *C. pseudotripartitus* in assemblage dominated by bisaccate pollen *Podocarpidites* 46%, with *Dilwynites* & *Araucariacites* only 18%. |
| Core 2 | 836.4m | *P. mawsonii* SP Zone **TURONIAN** | A2 A4 | 5% | FAD of *Phyllocladidites mawsonii* in assemblage dominated by bisaccate pollen *Podocarpidites* 35%, with *Dilwynites* and *Araucariacites* only 20%. |

FAD & LAD = Last & First Appearance Datums.
MP = Microplankton
SP = Spore-pollen

***Confidence Ratings used in STRATDAT database and applied to Table 1.**

| Alpha codes: Linked to sample | | Numeric codes: Linked to fossil assemblage | | |
|---|---|---|---|---|
| A | Core | 1 | **Excellent confidence:** | High diversity assemblage recorded with key zone species. |
| B | Sidewall core | 2 | **Good confidence:** | Moderately diverse assemblage with key zone species. |
| C | Coal cuttings | 3 | **Fair confidence:** | Low diversity assemblage recorded with key zone species. |
| D | Ditch cuttings | 4 | **Poor confidence:** | Moderate to high diversity assemblage without key zone species. |
| E | Junk basket | 5 | **Very low confidence:** | Low diversity assemblage without key zone species. |

# BASIC DATA

**Table 2: Basic assemblage data for Deadman Hill–1, onshore Gippsland Basin.**

| Sample Type | Depth | Visual Yield | Palynomorph Concentration | Preservation | No. SP Species | No. MP Species |
|---|---|---|---|---|---|---|
| Cuttings | 564m | High | High | Poor-good | 71+ | 5+ |
| Core-1 | 566.1m | High | High | Poor-good | 28+ | 7+ |
| Core-1 | 568.4m | Moderate | Very high | Good-poor | 22+ | 3+ |
| Cuttings | 795m | High | High | Poor-fair | 33+ | 3+ |
| Cuttings | 826m | High | Moderate | Poor-fair | 26+ | 3+ |
| Core-2 | 827.25m | High-moderate | Very high | Fair-good | 20+ | 4+ |
| Core-2 | 831.8m | High | Moderate | Poor-good | 16+ | 4+ |
| Core-2 | 836.4 | High | Moderate | Poor-fair | 37+ | 4+ |
| | | | | Averages: | 31+ | 4+ |

**Table 3: Caved species abundances and occurrences in Deadman Hill–1.**

| Sample Type: | Cuttings | Cuttings | Cuttings |
|---|---|---|---|
| Depth (metres): | 564 | 795 | 826 |
| **Spore-Pollen Species** | | | |
| *Aglaoreidia qualumis* | X | | |
| Angiosperm pollen undiff. | 1.5% | | |
| *Araucariacites australis* | 2.9% | | |
| *Baculatisporites* spp. | 0.7% | | |
| *Camarozonosporites bullatus* | X | | |
| *Clavifera triplex* | X | | |
| *Cyathidites paleospora* | 0.7% | | |
| *Cyathidites splendens* | 0.7% | | |
| *Dacrycarpites australiensis* | 0.7% | | |
| *Dicotetradites clavatus* | 0.7% | | |
| *Dilwynites granulatus* | 8.0% | | |
| *Dilwynites tuberculatus* | X | | |
| *Gleicheniidites circinidites* | 2.9% | | |
| *Haloragacidites harrisii* | 16.1% | CV | CV |
| *Herkosporites elliottii* | X | | |
| *Laevigatosporites* spp. | 1.5% | | |
| *Latrobosporites ovatus* | X | CV | |
| *Lygistepollenites balmei* | 0.7% | | |
| *Lygistepollenites florinii* | X | CV | |

**Table 3: Caved species abundances and occurrences in Deadman Hill–1 (continued).**

| Sample Type: | Cuttings | Cuttings | Cuttings |
|---|---|---|---|
| Depth: | 564m | 795m | 826m |
| *Malvacipollis subtilis* | 0.7% | | |
| *Nothofagidites brachyspinulosus* | 1.5% | | |
| *Nothofagidites deminutus* | 5.8% | | |
| *Nothofagidites emarcidus/heterus* | 17.5% | CV | CV |
| *Nothofagidites falcatus* | X | | |
| *Nothofagidites flemingii* | 0.7% | | |
| *Nothofagidites goniatus* | X | | |
| *Nothofagidites vansteenisii* | 5.8% | | |
| *Periporopollenites demarcatus* | 2.2% | | |
| *Phyllocladidites mawsonii* | 13.9% | CV | |
| *Podocarpidites* spp. | 7.3% | | |
| *Proteacidites adenanthoides* | X | | |
| *Proteacidites annularis* | X | | |
| *Proteacidites crassus* | X | | |
| *Proteacidites grandis/leightonii* | 0.7% | | |
| *Proteacidites kopiensis* | X | | |
| *Proteacidites obscurus* | 0.7% | | |
| *Proteacidites recavus* | X | | |
| *Proteacidites* spp. | 2.2% | CV | CV |
| *Retitriletes* spp. | X | | |
| *Sapotaceoidaepollenites rotundus* | X | | |
| *Trichotomosulcites subgranulatus* | X | | |
| Tricolp(or)ates spp. | 1.5% | CV | CV |
| *Tricolpites simatus* | X | | |
| *Tricolporites adelaidensis* | X | | |
| *Tricolporites leuros* | X | | |
| *Tricolporites sphaerica* | X | | |
| Trilete spores undiff. | 2.2% | | |
| *Triorites magnificus* | X | | |
| *Verrucosisporites kopukuensis* | X | | |
| **Total Spores:** | **8.8%** | | |
| **Total Gymnosperms:** | **33.6%** | | |
| **Total Angiosperms:** | **57.7%** | | |
| **Total Spore-Pollen:** | **137** | | |

Abbreviations: X= Present; CV = Caved; RW = Reworked;
cf. = Compared with; † = Manuscript species

**Table 4: Upper Cretaceous species abundances and occurrences in Deadman Hill–1.**

| Sample Type: | Cutts | Core-1 | Core-1 | Cutts | Cutts | Core-2 | Core-2 | Core-2 |
|---|---|---|---|---|---|---|---|---|
| Depth (metres): | 564 | 566.1 | 568.4 | 795 | 826 | 827.25 | 831.8 | 836.4 |
| **Spore-Pollen Species** | | | | | | | | |
| *Annulisporites microannulata* | | | RW | | | | | |
| *Aratrisporites* spp. | | RW | | | | | | RW |
| *Araucariacites australis* | X | 11.9% | 13.6% | 4.2% | 4.9% | 6.7% | 4.3% | 5.7% |
| *Baculatisporites* spp. | | 0.6% | 0.6% | | | X | | 1.4% |
| *Callialasporites segmentatus* | | X | | X | 0.7% | | | X |
| *Ceratosporites equalis* | | 0.6% | | | | | | X |
| *Cicatricosisporites* spp. | | | 0.6% | | | | | |
| *Cicatricosisporites cuneiformis* | | | | | | | X | |
| *Cicatricosisp. pseudotripartitus* | | | | | | | X | |
| *Contignisporites cooksoniae* | RW | | | | | | | |
| *Corollina jardinae* | | cf. | | 0.7% | 0.7% | | | |
| *Corollina torosa* | X | 3.0% | 0.6% | | | | | 5.0% |
| *Cupressacites* sp. | | 14.3% | 32.7% | 13.4% | 7.6% | 1.0% | 0.7% | 0.7% |
| *Cyathidites* spp. large >40µm | X | 1.8% | | X | X | X | | 2.8% |
| *Cyathidites* spp. small <40µm | | 1.8% | 2.5% | 7.7% | 2.8% | 1.9% | 17.7% | 7.8% |
| *Cyathidites rafaeli* | | | | | | | X | |
| *Dictyophyllidites* spp. | | | | 0.7% | | X | | 1.4% |
| *Dictyotosporites complex* | | RW | | | | | | RW |
| *Dictyotosporites speciosus* | RW | RW | | | | | | RW |
| *Dilwynites granulatus* | X | 14.3% | 28.4% | 21.8% | 29.2% | 72.4% | 11.3% | 12.8% |
| *Dilwynites pusillus* † | | 20.8% | | 5.6% | 14.6% | 8.6% | 2.1% | 2.1% |
| *Foraminisporis dailyi* | | | X | | | | | X |
| *Gleicheniidites circinidites* | | 0.6% | | 2.1% | 0.7% | 1.0% | 1.4% | 0.7% |
| Gymnosperm pollen undiff. | | | | | 3.5% | | | 1.4% |
| *Herkosporites elliottii* | | | 0.6% | | 0.7% | | | 4.3% |
| *Interulobites intraverrucatus* | | | | | | | | X |
| *Klukisporites scaberis* | X | X | | | X | | | X |
| *Laevigatosporites ovatus* | | | 1.2% | 0.7% | X | | 2.8% | X |
| *Latrobosporites* sp. | | | | | | | | |
| *Leptolepidites verrucosus* | X | X | X | X | | | | X |
| *Marattisporites scabratus* | | | | 1.4% | | | | |
| *Microbaculatispora* spp. | | | | | | RW | | |
| *Microcachryidites antarcticus* | X | 4.2% | 6.2% | 4.2% | 6.9% | 3.8% | 5.0% | 4.3% |
| *Neoraistrickia truncata* | X | X | | | | | | X |
| *Osmundacidites wellmanii* | X | 1.2% | | 0.7% | 0.7% | | 2.1% | 0.7% |
| *Perotrilites jubatus* | | | X | | | 1.0% | | |
| *Perotrilites majus* | X | 0.6% | | | | 1.0% | | |
| *Phyllocladidites eunuchus* † | | | | 0.7% | | | | |
| *Phyllocladidites mawsonii* | | | | 1.4% | | | 0.7% | 2.8% |
| *Pilosisporites notensis* | | | | | | | | RW |
| *Plicatipollenites* spp. | | RW | RW | | RW | | | |
| *Podocarpidites* spp. | X | 21.4% | 7.4% | 22.5% | 18.8% | 2.9% | 46.1% | 35.5% |
| *Protohaploxypinus* spp. | | RW | | | | | | RW |
| *Reticulatisporites pudens* | RW | | | | | | | |
| *Retitriletes* spp. | X | 0.6% | 0.6% | 0.7% | X | X | | 2.1% |

**Table 4: Upper Cretaceous species abundances and occurrences in Deadman Hill–1 (cont.).**

| Sample Type: | Cutts | Core-1 | Core-1 | Cutts | Cutts | Core-2 | Core-2 | Core-2 |
|---|---|---|---|---|---|---|---|---|
| **Depth (metres):** | **564** | **566.1** | **568.4** | **795** | **826** | **827.25** | **831.8** | **836.4** |
| *Retitriletes eminulus* | | | | X | | | | X |
| *Retitriletes facetus* | RW | | | | | | | |
| *Retitriletes nodosus* | X | | | X | | | | X |
| *Rugulatisporites* spp. | | | | | | | | 0.7% |
| *Ruffordiaspora australiensis* | | | X | X | | X | | |
| *Stereisporites antiquisporites* | X | X | X | X | 2.1% | X | | 0.7% |
| *Trichotomosulcites subgranulatus* | X | 1.8% | 2.5% | 9.2% | 5.6% | X | 2.1% | 0.7% |
| Tricolp(or)ates spp. | | | | 0.7% | X | | 3.5% | |
| Trilete spores undiff. | X | 0.6% | 2.5% | 1.4% | 0.7% | X | | 7.0% |
| *Triporoletes reticulatus* | X | | | | | X | | |
| *Vitreisporites signatus* | X | | X | | | | | X |
| **Total Spores:** | 25.0% | 8.3% | 8.6% | 15.5% | 7.6% | 4.8% | 24.1% | 29.1% |
| **Total Gymnosperms:** | 75.0% | 91.7% | 91.4% | 83.8% | 92.4% | 95.2% | 72.3% | 70.9% |
| **Total Angiosperms:** | | | | 0.7% | | | 3.5% | |
| **Total Spore-Pollen count:** | 20 | 168 | 162 | 142 | 144 | 105 | 141 | 141 |
| **Total MP count:** | 1 | 16 | 2 | 9 | 5 | 2 | 10 | 10 |
| **Combined MP + SP Count:** | 21 | 184 | 164 | 151 | 149 | 107 | 151 | 151 |
| **MP% in SP + MP counts** | 4.8% | 8.7% | 1.2% | 6.0% | 3.4% | 1.9% | 6.6% | 6.6% |
| **Microplankton** | | | | | | | | |
| *Botryococcus braunii* | X | | | | | | X | X |
| *Circulisporites parvus* | | | | | | | C | |
| *Cleistosphaeridium* sp. | | | | | | | X | |
| *Luxadinium* sp. | | X | | | | | | |
| *Micrhystridium* sp. A | X | C | X | C | X | | | C |
| *Rimosicysta* spp. | X | C | X | C | C | X | | |
| *Rimosicysta aspera* | | X | | | | X | | |
| *Rimosicysta concava* | X | | | | | | | |
| *Rimosicysta eversa* | X | | | | X | | | |
| *Rimosicysta kipperii* | | X | X | X | | | | |
| *Schizosporis reticulatus* | | | | | | | | X |
| *Sigmopollis carbonis* | | X | | | | X | | X |
| *Sigmopollis hispidus* | | | | | | | X | |
| *Wuroia* spp. | | C | C | C | | | | |
| *Wuroia tubiformis* | X | X | X | X | X | X | | |
| *Wuroia unciformis* | | X | X | | | X | | |
| **Other Palynomorph** | | | | | | | | |
| Fungal fruiting bodies | | | X | | | | X | |
| Fungal spores & hyphae | X | 0.6% | 0.6% | 0.7% | 1.4% | | 18.0% | 1.4% |
| Reworked spore-pollen | | 1.7% | 0.6% | | | | | |
| **Total Others:** | | 4 | 2 | 1 | 2 | | 31 | 2 |
| **Combined SP + Others count:** | | 172 | 164 | 143 | 146 | 105 | 172 | 143 |
| **TOTAL SP + Others COUNT:** | 21 | 188 | 166 | 152 | 151 | 107 | 182 | 153 |

Abbreviations: X= Present; C = Common; RW = Reworked;
cf. = Compared with; † = Manuscript species

# Appendix 3
# Core Descriptions

# LAKES OIL N.L.

## DEADMAN HILL No.1

## WELLSITE CORE DESCRIPTIONS

### CORE No.1

DEADMANS HILL No.1 CORE No.1 CUT 565.0 - 574.0m
RECOVERED 566.0 to 569.7m (3.7m) (41% recovery).
From drill rate correlation, the missing section of the core has been assessed to be 1 meter of core (presumably silty claystone) from the top lost due to pump problems and pump pressure build-ups, with the remaining loss of 4.3m (presumably friable very fine to fine gained sandstone) from the base of the core.
LITHOLOGY:
566.0 - 569.0m
SILTY CLAYSTONE: medium grey to occasionally medium dark grey, slightly to very silty, occasionally very finely arenaceous with quartz and partially altered feldspar sand grains, trace to common black coaly specks, trace to occasionally common micromica, firm, non fissile.
No apparent sedimentary structure, bedding at 0 degrees, rare slickensides.
569.0 - 569.7m
SANDSTONE: very light grey to occasionally light brown grey, very fine to rarely coarse, dominantly very fine to fine, angular to subrounded, dominantly subangular, poor to moderate sorting, common to abundant white argillaceous matrix, quartzose with abundant partially altered feldspar grains, trace to occasionally common grey lithics, trace fine black coaly detritus, friable, fair visual porosity, no oil fluorescence.
Thin band at top (4 cm) of coarser sandstone. No apparent sedimentary structure, bedding at 0 degrees.
DRILL RATES (min/m): 565-566 (11.0), 566-567 (29.0), 567-568 (29.0), 568-569 (23.0), 569-570 (2.0), 570-571 (1.0), 571-572 (3.0), 572-573 (3.0), 573-574 (1.0).
No ditch gas was detected whilst coring. No oil fluorescence was observed in the core.
SAMPLES TAKEN FOR ANAYSIS:
2 plugs were taken from the core for porosity/permeability/grain density analysis (569.22m , 569.55m) and were sent to Core Laboratories in Perth.
2 sections of core were taken for palynological analysis (566.1m , 568.4m) and were to sent to Dr. A. Partridge in Perth.

### CORE No.2

CORE No.2 827.0 to 839.0m. Cut 12m. Rec 9.0m. (75%).
Note: missing section of core although deleted from bottom of the cored interval, is believed to be missing from several intervals throughout the core length. The core shows many rotational surfaces.

827.0 to 828.35 m.
Massive Claystone (100%).
CLAYSTONE: very dark grey, very silty, very carbonaceous, trace micromica, firm, non fissile. Occasional slickensided surfaces, no visible bedding or sedimentary structure.

828.35 to 832.5m.
Sandstone (50%) with finely interbedded interlaminated and grading to Claystone (50%).
SANDSTONE: light to medium grey, very fine to medium, occasional to common clay clasts to 4mm, angular to subrounded, dominantly subangular, poorly sorted, weak silica cement, composed of altered feldspars, grey green claystone clasts, minor quartz grains, trace to abundant black coaly detritus, friable to moderately hard, very poor visual porosity, no oil fluorescence.
CLAYSTONE: very dark grey, very silty, very carbonaceous, trace micromica, firm, non fissile, grading to
CLAYSTONE: light to medium grey to grey brown, moderately to very silty, common to abundant black coaly detritus, occasionally very arenaceous with altered feldspar grains, trace micromica, firm, non fissile.
Bedding 0-5 degrees, common diffused bedding (dewatering?), common sedimentary bedding.

832.5 to 834.1m.
Massive Sandstone (100%)

SANDSTONE: light grey, occasionally light greenish grey, very fine to rarely medium, dominantly fine, angular to subrounded, dominantly subangular, moderately sorted, weak silica cement, nil to strong calcareous cement, common off white argillaceous matrix, composed of altered feldspar grains with common quartz and green grey black lithics, trace orange red lithics, trace brown and clear mica flakes, common to abundant black coaly detritus, friable to moderately hard, very poor visual porosity, no oil fluorescence.
Bedding 0-5 degrees, common diffused bedding (dewatering?).

834.1 to 836.0m.
Sandstone (50%) interbedded, interlaminated and grading to Claystone (50%).
SANDSTONE: light grey to slightly greenish grey, very fine to fine, dominantly fine, angular to subrounded, dominantly subangular, moderately to well sorted, weak silica and calcareous cements, common to abundant white argillaceous matrix, occasionally abundant light to medium grey argillaceous matrix, composed of feldspar grains with common quartz and grey green black lithics, trace red orange lithics, trace clear and brown mica flakes, abundant black coaly detritus, friable to moderately hard, very poor visual porosity, no oil fluorescence. CLAYSTONE: light to medium grey to grey brown, moderately to very silty, common to abundant black coaly detritus, occasionally very arenaceous with altered feldspar grains, trace micromica, firm, non fissile, grading to CLAYSTONE: very dark grey, very silty, very carbonaceous, trace to common micromica, firm, non fissile.
Bedding 0-8 degrees, common diffused bedding (dewatering?), common sedimentary bedding.

# Appendix 4:
# Sample Analysis

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Core Lab
PETROLEUM SERVICES

CORE LABORATORIES
AUSTRALIA PTY LTD

447-449 Belmont Ave, Kewdale, Perth WA 6105
Tel : (61 8) 9353 3944 Fax : (61 8) 9353 1369
Email: corelab@corelab.com.au

# *A Routine Analysis Study Of Selected Samples From Well : DEADMAN HILL #1*

## *Australia*

Prepared for
**LAKES OIL N.L.**

July 2002

File: PRP-02029

Rock Properties
Core Laboratories Australia Pty. Ltd.
Perth
Australia

914410 078

Core Lab
PETROLEUM SERVICES

**CORE LABORATORIES AUSTRALIA PTY LTD**

20th July, 2002

**Lakes Oil NL**
PO Box 300
Collins St West
MELBOURNE VIC 8007

**Attention : Mr. J. Mulready**

Subject : Routine Core Analysis
Well : Deadman Hill #1
File : PRP-02029

Dear Sir,

Presented herein is the final report of a routine core analysis study conducted on selected plug samples from the above well that arrived at our Perth laboratory at the end of May and the beginning of June, 2002.

We appreciate the opportunity to present this service to you. Please contact us should you require any further information or assistance.

Yours sincerely,
**Core Laboratories Australia Pty Ltd**

James Brown
Senior Core Analyst

ABN 67 065 540 838
PO Box 785 Cloverdale, 6985 Western Australia Tel : (61 8) 9353 3944 Fax : (61 8) 9353 1369 Email: corelab@corelab.com.au

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# INTRODUCTION

Core Laboratories Australia Pty Ltd (Core Lab) conducted a routine core analysis study on seven plug samples taken from the well Deadman Hill #1 on behalf of Lakes Oil NL (Lakes Oil). Services performed and presented in the report include:

- Permeability, porosity and grain density measurements

# LABORATORY PROCEDURES

## Sample Preparation

Seven horizontal, 1.5" diameter plugs were received and logged in. The samples were trimmed, then dried in a convection oven for 24 hours at 90° C. prior to analysis.

## Grain Volume and Grain Density

The weight, diameter and length of all samples were measured before they were processed through the Ultrapore™ porosimeter to determine grain volume. As a standard quality control measure, a calibration check plug was run after the samples. Grain density data was then calculated from grain volume and sample weight data.

## Permeability and Porosity

Permeability and pore volume measurements were made on all samples at ambient pressure in the CMS™300 automated core measurement system. A standard check plug was run after the samples.

Klinkenberg permeability (Kinf) values are obtained directly from the CMS-300, since it operates by unsteady-state principles. Porosity data was obtained by combining pore volumes from the CMS-300 data with grain volumes from the Ultrapore porosimeter.

Plug sample porosity, permeability and grain density data are tabulated on page 2.

914410 080

# POROSITY, PERMEABILITY AND GRAIN DENSITY
## (Ambient)

| SAMPLE NUMBER | DEPTH (m) | 800psig NOB PRESSURE | | | GRAIN DENSITY (g/cc) | COMMENTS |
|---|---|---|---|---|---|---|
| | | PERMEABILITY | | POROSITY (%) | | |
| | | Kinf (md) | Kair (md) | | | |
| | | **Core 1** | | | | |
| 1 | 569.22 | 4.06 | 5.51 | 28.4 | 2.64 | |
| 2 | 569.55 | 3.06 | 4.25 | 28.4 | 2.65 | |
| | | **Core 2** | | | | |
| 3 | 827.40 | 0.538 | 0.591 | 18.5 | 2.61 | |
| 4 | 829.60 | 0.020 | 0.035 | 9.7 | 2.69 | |
| 5 | 830.30 | 0.021 | 0.054 | 19.6 | 2.68 | |
| 6 | 833.00 | 0.015 | 0.026 | 9.7 | 2.70 | |
| 7 | 833.75 | 0.013 | 0.026 | 12.2 | 2.70 | |

# Appendix 5
# Well Site Survey

KLUGE JACKSON CONSULTANTS PTY. LTD.
A.C.N. 004 778 947
SURVEYORS, ENGINEERS AND ESTATE PLANNERS

Office: Sale
Our Ref: 02191-01

DIRECTORS:
H. Peter Kluge
John Jackson

914410 082

September 10th, 2002

Mr. J. Mulready,
Lakes Oil N.L.
Level 11, 500 Collins St,
Melbourne, Vic., 3000

Dear Sir,

RE: AMG and AHD Survey of Wells at Boundary Creek-1, Deadman Hill-1 and Protea-1.

We have now completed the above survey and enclose our results.

The table of results shows the co-ordinates to the centre of the sign of the well head.

The levels are as indicated on sketch attached – Levels to the top of cap could not be taken at Boundary Creek and Protea as they were covered at time of survey.

Our AMG co-ordinates have been obtained from co-ordinated marks PM 18, PM 27 (Longford) and 3GI Radio Mast. The AMG co-ordinates are unadjusted using Topcon Total Station and should be of an accuracy of ± 10cm. Latitude and Longitude have been obtained by converting AMG co-ordinates to latitude and longitude.

The AHD levels were obtained from PM 33 and are correct to ± 0.05 cm.

If you have any queries in the matter please contact the writer.

We thank you for your instructions and enclose our account.

Yours faithfully,
KLUGE JACKSON CONSULTANTS PTY., LTD.,

PETER KLUGE.
enc.

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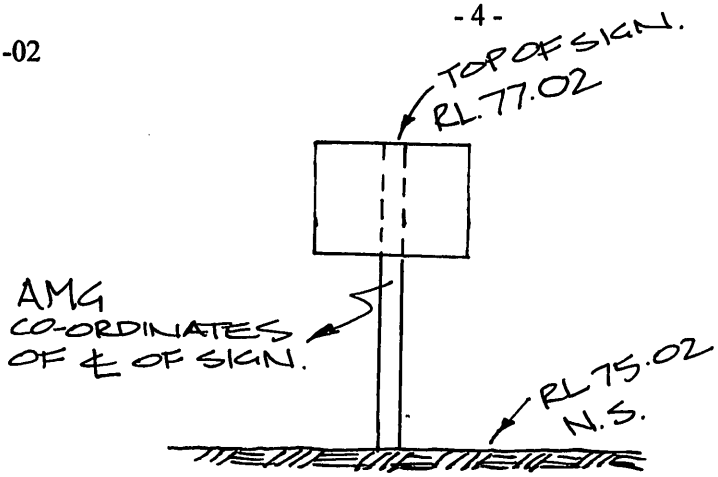
KLUGE JACKSON CONSULTANTS PTY. LTD.
A.C.N. 004 778 947
SURVEYORS, ENGINEERS AND ESTATE PLANNERS

914410 083

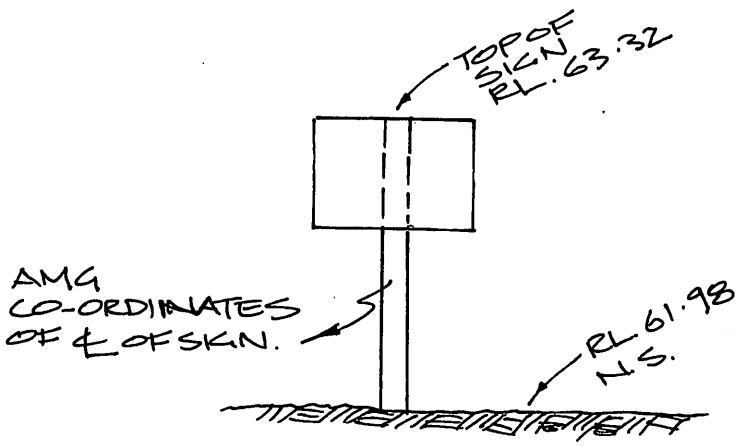


Office: Sale
Our Ref: 02191-02

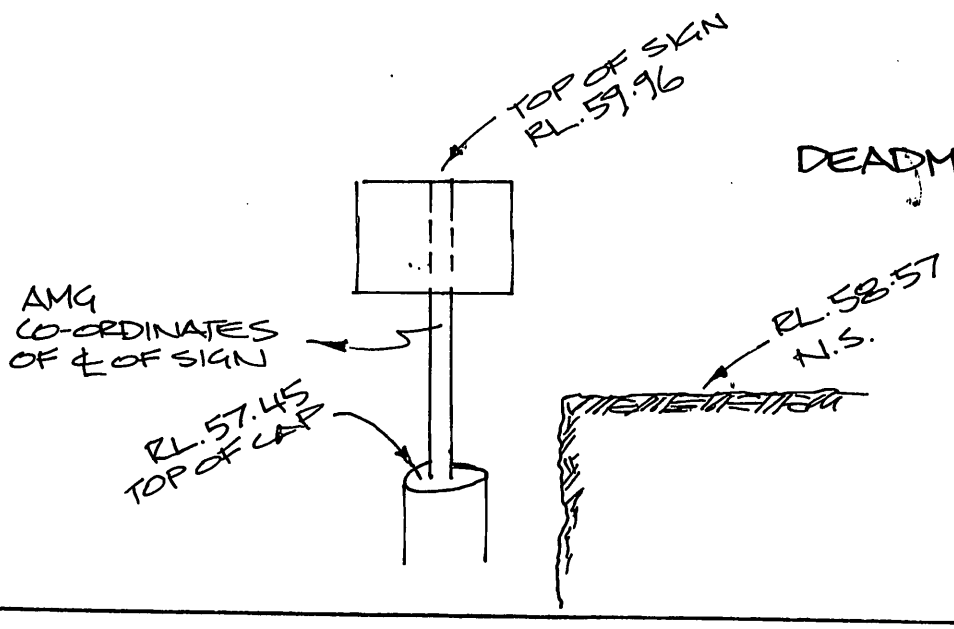
DIRECTORS:
H. Peter Kluge
John Jackson




BOUNDARY CREEK 1-A




PROTEA - 1




DEADMANS HILL

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45 Macalister Street,
SALE, Vic 3850
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Facsimile (03) 5144 6591

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DIRECTORS:
H. Peter Kluge
John Jackson

September 10th, 2002

# TABLE OF SURVEY RESULTS

## Deadman Hill - 1

| | |
|---|---|
| **AHD Level of Top of Cap** | 57.45 |
| **AHD Level of Top of Sign** | 59.96 |
| **AMG Co-ordinate of Centre of sign.** | Easting 515 827.27<br>Northing 5 772 244.60 |
| **Latitude** | S 38°11'50.90" |
| **Longitude** | E 147°10'50.72" |
| **Approximate AHD surface Level at Bore** | 58.57 |

The AMG coordinates shown above are for Zone 55.

Coordinates are in AGD 66.

.../4

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PE914411

This is an enclosure indicator page.
The enclosure PE914411 is enclosed within the container PE914410 at this location in this document.

The enclosure PE914411 has the following characteristics:

| | |
|---|---|
| ITEM_BARCODE | = PE914411 |
| CONTAINER_BARCODE | = PE914410 |
| NAME | = Deadman Hill-1 Lithology Log |
| BASIN | = GIPPSLAND |
| OFFSHORE? | = Y |
| DATA_TYPE | = WELL |
| DATA_SUB_TYPE | = WELL_LOG |
| DESCRIPTION | = Deadman Hill-1 Lithology Strip Log, Scale 1:500 m, Part 1 of 4, Enclosure of Well Completion Report |
| REMARKS | = |
| DATE_WRITTEN | = |
| DATE_PROCESSED | = |
| DATE_RECEIVED | = 25-APR-2003 |
| RECEIVED_FROM | = Lakes Oil NL |
| WELL_NAME | = Deadman Hill-1 |
| CONTRACTOR | = |
| AUTHOR | = |
| ORIGINATOR | = Lakes Oil NL |
| TOP_DEPTH | = 0 |
| BOTTOM_DEPTH | = 200 |
| ROW_CREATED_BY | = DN07_SW |

(Inserted by DNRE - Vic Govt Mines Dept)

PE914413

This is an enclosure indicator page.
The enclosure PE914413 is enclosed within the container PE914410 at this location in this document.

The enclosure PE914413 has the following characteristics:

| | |
|---|---|
| ITEM_BARCODE | = PE914413 |
| CONTAINER_BARCODE | = PE914410 |
| NAME | = Deadman Hill-1 Lithology Log |
| BASIN | = GIPPSLAND |
| OFFSHORE? | = Y |
| DATA_TYPE | = WELL |
| DATA_SUB_TYPE | = WELL_LOG |
| DESCRIPTION | = Deadman Hill-1 Lithology Strip Log, Scale 1:500 m, Part 3 of 4, Enclosure of Well Completion Report |
| REMARKS | = |
| DATE_WRITTEN | = |
| DATE_PROCESSED | = |
| DATE_RECEIVED | = 25-APR-2003 |
| RECEIVED_FROM | = Lakes Oil NL |
| WELL_NAME | = Deadman Hill-1 |
| CONTRACTOR | = |
| AUTHOR | = |
| ORIGINATOR | = Lakes Oil NL |
| TOP_DEPTH | = 440 |
| BOTTOM_DEPTH | = 600 |
| ROW_CREATED_BY | = DN07_SW |

(Inserted by DNRE - Vic Govt Mines Dept)

PE914412

This is an enclosure indicator page.
The enclosure PE914412 is enclosed within the container PE914410 at this location in this document.

The enclosure PE914412 has the following characteristics:

| | |
|---|---|
| ITEM_BARCODE | = PE914412 |
| CONTAINER_BARCODE | = PE914410 |
| NAME | = Deadman Hill-1 Lithology Log |
| BASIN | = GIPPSLAND |
| OFFSHORE? | = Y |
| DATA_TYPE | = WELL |
| DATA_SUB_TYPE | = WELL_LOG |
| DESCRIPTION | = Deadman Hill-1 Lithology Strip Log, Scale 1:500 m, Part 2 of 4, Enclosure of Well Completion Report |
| REMARKS | = |
| DATE_WRITTEN | = |
| DATE_PROCESSED | = |
| DATE_RECEIVED | = 25-APR-2003 |
| RECEIVED_FROM | = Lakes Oil NL |
| WELL_NAME | = Deadman Hill-1 |
| CONTRACTOR | = |
| AUTHOR | = |
| ORIGINATOR | = Lakes Oil NL |
| TOP_DEPTH | = 200 |
| BOTTOM_DEPTH | = 450 |
| ROW_CREATED_BY | = DN07_SW |

(Inserted by DNRE - Vic Govt Mines Dept)

PE914414

This is an enclosure indicator page.
The enclosure PE914414 is enclosed within the container PE914410 at this location in this document.

The enclosure PE914414 has the following characteristics:

| | |
|---|---|
| ITEM_BARCODE | = PE914414 |
| CONTAINER_BARCODE | = PE914410 |
| NAME | = Deadman Hill-1 Lithology Log |
| BASIN | = GIPPSLAND |
| OFFSHORE? | = Y |
| DATA_TYPE | = WELL |
| DATA_SUB_TYPE | = WELL_LOG |
| DESCRIPTION | = Deadman Hill-1 Lithology Strip Log, Scale 1:500 m, Part 4 of 4, Enclosure of Well Completion Report |
| REMARKS | = |
| DATE_WRITTEN | = |
| DATE_PROCESSED | = |
| DATE_RECEIVED | = 25-APR-2003 |
| RECEIVED_FROM | = Lakes Oil NL |
| WELL_NAME | = Deadman Hill-1 |
| CONTRACTOR | = |
| AUTHOR | = |
| ORIGINATOR | = Lakes Oil NL |
| TOP_DEPTH | = 580 |
| BOTTOM_DEPTH | = 840 |
| ROW_CREATED_BY | = DN07_SW |

(Inserted by DNRE - Vic Govt Mines Dept)