PACIFIC OIL & GAS PTY LIMITED

OWNEN NO. 1
EP 13, NORTHERN TERRITORY

WELL COMPLETION REPORT

AUTHOR: A G Kress
DATE: January, 1991

SUBMITTED BY: [Signature]
ACCEPTED BY: [Signature]

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CIS Canberra
Pacific Oil & Gas Pty Limited, Alice Springs
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CRAE Report No: 304056
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<td>PetNTcw3283</td>
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1. SUMMARY AND INTRODUCTION

Owen No.1, a stratigraphic well, was drilled as part of Pacific Oil & Gas Pty Limited's 1990 exploration programme within EP13, Georgina Basin, Northern Territory (Plans PETNTcw589, 3281). The well was positioned to the south-west of the "GM1 linear", a major lineament defined by gravity and magnetics, which is thought to represent a fundamental basement feature which influenced sedimentation in the early and middle Cambrian in the eastern part of the Georgina Basin.

The drilling location was selected after processing and interpretation of the 1989 "Georgina River" seismic survey with the hole sited at shot-point 3905 on seismic line 89-303. The drillsite is located approximately 10km SSW of the Tobermory homestead and 6km west of the Northern Territory - Queensland border. The nearest major centres are Alice Springs in the Northern Territory (566km by road) and Mt. Isa in Queensland (plan PETNTcw3281).

The well was unable to meet its proposed objectives, namely to determine the thickness and quality of reservoir facies in the Georgina and Thorntonia Limestones, due to drilling problems encountered at shallow depth. The well spudded in thin, red-brown soil directly overlying the late Cambrian to early Ordovician Ninmaroo Formation. Lithologies consisted mainly of sand and dolomite with lesser amounts of clay and siltstone. No hydrocarbon shows or gas were detected while drilling and visual porosity was generally nil to very poor, although some zones of good to excellent porosity/permeability were present as evidenced by the sandstone aquifer at around 50m depth, which produced good quality water at the rate of 3.5 litres/sec.

Owen No.1 was still within the Ninmaroo Formation when the drill string became stuck at a total drilled depth of 135.3m. All attempts to free the pipe and sidetrack the hole were unsuccessful and the decision was made to abandon Owen No.1 and skid the rig 25m NE and redrill the well as Owen No.2.

The well was plugged and abandoned on 12 September 1990 by setting two cement plugs and the rig released to Owen No.2 at 2100 hours.
Geological boundaries

- Solid line: Known
- Dotted line: Approximate boundary of Mesozoic cover
- Dash-dotted line: Inferred
- Dashed line: Inferred and concealed

- Squares: Towns
- Triangles: Homestead

Major road (sealed)
Major and minor roads (unsealed)

GEORGINA BASIN
Location and access roads

Pacific Oil & Gas Plan No. PetNTcw 589
### 2. WELL HISTORY

#### 2.1 General Data

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Details</th>
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<tr>
<td>Well Name</td>
<td>Owen No.1</td>
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<tr>
<td>CRAE Number</td>
<td>PD/RD 90 GB 15</td>
</tr>
<tr>
<td>Well Type</td>
<td>Deep Stratigraphic Test</td>
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<td>Interest Holders:</td>
<td>Pacific Oil &amp; Gas Pty Limited - 100%</td>
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<td>Permit</td>
<td>EP13 (Barry Plain), Northern Territory</td>
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<tr>
<td>Operator</td>
<td>Pacific Oil &amp; Gas Pty Limited</td>
</tr>
<tr>
<td></td>
<td>826 Whitehorse Road</td>
</tr>
<tr>
<td></td>
<td>BOX HILL, VICTORIA, 3128</td>
</tr>
<tr>
<td>Map References:</td>
<td>Tobermory (SF53-12) 1:250 000 Sheet</td>
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<td>Tobermory (6453) 1:100 000 Sheet</td>
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<td>Seismic Line</td>
<td>89-303, Shot Point 3905</td>
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<tr>
<td>Location:</td>
<td>Latitude: 22° 22' 8.12&quot; S</td>
</tr>
<tr>
<td></td>
<td>Longitude: 137° 56' 23.12&quot; E</td>
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<tr>
<td>AMG Co-Ordinates:</td>
<td>802 749.00 East</td>
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<tr>
<td></td>
<td>7523 371.34 North</td>
</tr>
<tr>
<td>Elevation:</td>
<td>Ground Level: 186.02m</td>
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<tr>
<td></td>
<td>Kelly Bushing: 191.66m</td>
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<td>Total Depth:</td>
<td>Driller: 135.29m</td>
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<td>Primary Objectives:</td>
<td>Thorntonia Limestone</td>
</tr>
<tr>
<td></td>
<td>Sun Hill Arkose Equivalent</td>
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<tr>
<td>Secondary Objectives:</td>
<td>Georgina Limestone</td>
</tr>
<tr>
<td>Status:</td>
<td>Plugged and Abandoned</td>
</tr>
<tr>
<td>Well Cost:</td>
<td>The combined costs for drilling Owen No.1 and Owen No.2 will be reported in the Well Completion Report for Owen No.2 (Kress, in prep).</td>
</tr>
</tbody>
</table>
2.2 **Drilling Data**

Date Drilling Commenced: 27 August 1990

Date Drilling Completed: 12 September 1990

Date Well Abandoned: 12 September 1990

Drilling Time to TD: 7 days

Total Rig Days: 17 days (393.5 hrs)

Contractors: Rockdrill Contractors Pty Limited
1 Jijaws Street
SUMNER PARK QLD 4074

Drilling Rig: Rockdrill Rig No.22

Rig Details: Bourne 5000
Complete specifications of Rockdrill Rig No.22 can be found in Appendix VI "Rig Specifications"
2.3 Drilling Summary

2.3.1 15" Hole Section

Owen 1 was spudded at 1130 hours on 27 August 1990. An 8½" pilot hole was hammer drilled to 23.23m and the hammer POOH. A 15" tricone bit was then picked up and the hole reamed to 13m where the bit became stuck due to the air compressor failing to lift cuttings from the large diameter hole. After working the stuck pipe for one hour it was necessary to repair the rig drawworks as the clutch was slipping. After repairs were completed the stuck pipe was again worked (up to 60 tonnes overpull - slowly easing off) and a stinger made up and run in to the cellar. Water was then circulated down to annulus to clear away any blockages. The pipe was freed and the bit POOH. The reamer was then rerun and the hole opened out to 15" to total depth. After repairing hydraulic hoses to the catworks and cellar pump, two joints of 9 5/8", 36#, K-55, 8 round casing were picked up and run in the hole. The conductor was landed at 23.23m and a 6bbl cement slurry mixed. An attempt was made to break circulation with a water spacer, however the hole caved in and circulation was not possible. The cement slurry was then dumped to the sump.

A large crater (approximately 1.5m wide x 2m deep) formed around the conductor due to the cave in. A second cement slurry of 6.5 bbls was mixed and pumped to the cellar (top fill cement job).

2.3.2 8½" Hole Section

A short length of riser was attached to the conductor pipe and the blooie line secured to the riser. The 8½" Drilquip T17 hammer and bit was then picked up and RIH. After blowing the hole clean, 3m of new hole was hammer drilled and the bit POOH to allow a cement plug to be set below the conductor pipe.

A 3bbl slurry of class "A" cement was then mixed and displaced to the hole. WOC for three hours before picking up the hammer bit once again and RIH. The top of cement was tagged at 18m and cement was hammer drilled to 26m. Drilling of 8½" hole then continued to 51m where the hammer became blocked and was POOH for cleaning. The hammer was then re-run but failed to function after tagging bottom. It was pulled to surface again, stripped down and cleaned and then function tested on surface (OK) before running back into the hole, RIH to 51m and displaced water from the hole with air. Hammer drilled to 60m where one hour was spent reaming 2m of hard fill on bottom (hole
caving-in). Hammer drilling proceeded to 97.65m with two hours spent reaming and circulating the hole. The pipe became stuck on a connection at 135.29m and 12 hours were spent working stuck pipe (one hour lost repairing a slipping clutch on the drawworks). A 40 bbl high-vis Rapidgyl pill was circulated through the hammer while working the pipe and up to 85 tonnes of overpull was exerted without success. Following further repairs to the drawworks, a decision was made to manually back-off the drillpipe from the BHA. The 3½" drillpipe (10 joints) was successfully backed out of the drillcollars leaving the top of the fish at 102.84m.

A fishing string was then run into the hole, consisting of:

1 x 7-7/8" Bowen Series 150 releasing and circulating overshot - dressed with a 4-3/4" basket grapple and a mill control packer
1 x 6½" Drill collar
1 x NL McCullough Bumper Sub/Safety Joint
4 x 6½" Drill Collars
1 x 6½" Bowen Type "Z" Oil Jars
5 x 6½" Drill Collars

Fill was encountered above the fish and the kelly was picked up to enable the string to be washed down with stiff foam to the top of the fish (5.12m of fill). The overshot was latched onto the fish and jarring operations commenced. Circulation was maintained for approximately 30 minutes after which it began to drop off. Up to 100 tonnes of overpull was exerted while working the pipe. An attempt was then made to release the fish at which time full rotation was regained, however there was still no circulation.

Approximately 2m was gained by backreaming and jarring but the pipe became stuck again. Jarring continued and several attempts were made to release the overshot from the fish to regain circulation. Circulation was finally regained at 1000 hours on the 31 August 1990 after exerting 2200 psi surface pressure. Circulating pressure dropped to around 250 psi after about 30 minutes. No fluid returns were seen at surface. Six hours were spent replacing the complete clutch assembly on the drawworks after which jarring continued and the string was worked while circulating in an attempt to regain rotation.

All attempts to move the fish any further were unsuccessful and so several attempts to release the overshot were then made. Tong lines were attached to the rotary kelly bushing to try to
release the overshot with right hand rotation without success. An attempt was then made to release the string downhole at the safety joint, however this was also unsuccessful. At this point the main drive shaft to the mud pumps sheared while pumping with No.1 pump (300 psi circulating pressure). At 1130 hours on the 2 September 1990 the rig was put on standby to await the arrival of Schlumberger's back-off equipment from Roma, Queensland (25 hours lost).

The kelly was manually backed off from the saver-sub below the drill floor and racked back. A 4 3/4" pony collar and hollow stubbin was picked up and "welded" onto the 4 3/4" saver sub using Bakerlok. Schlumberger arrived on site at 2230 hours, 2 September, 1990 and checked all equipment before standing by for daylight.

Schlumberger rigged up and ran a CCL log followed by a free-point log and the string found to be free all the way down to the top of the fish. An attempt was made to pass through the overshot into the fish, however the tool would not pass through as the string was blocked by fine silt/sand. The back off tool was then run and three attempts were made to back off the string at the overshot. The first two were unsuccessful and the pipe came free close to the surface on the third shot (4 tonnes string weight). The drill collars were screwed back into the string and a 4th shot was made across the first tool joint at 92.15m. The back-off attempt was successful and the fishing string was POOH leaving the original fish plus the Bowen Overshot and 1 x 6½" drill collar still in the hole.

Open ended drill-pipe was then RIH and a cement plug set on top of the fish from 91m to 50m. The pipe was POH and the rig went on standby waiting for pump parts (93 hours lost). The new pump shaft arrived on site at 2200 hours on 7 September 1990 and 12 hours were spent repairing and testing the pumps.

Bit No.2, a Security S44F with two blank nozzles and 1 x 12 nozzle was then picked up and RIH. Cement was tagged at 52.74m and the hole jetted without rotation in an attempt to sidetrack the hole. Jetting (with surveys) continued to a depth of 70m. At this point drilling was resumed with 8 tonnes WOB and 25-30RPM. At 0700 hours on the 9 September the bit drilled onto the top of the fish at 92.15m. The bit was POOH and open ended drill pipe run back in to 90m. A second cement plug was set from 90 to 72m. After waiting on cement for 7½ hours, bit No.2 was rerun, the cement plug dressed to 80m and the hole circulated and
conditioned. The string was then POOH and the bit and subs broken down and layed out.

A whipstock was made up on the drill floor using a 3/8" steel rod as a shear pin. The whipstock dimensions were as follows:

<table>
<thead>
<tr>
<th>OD</th>
<th>8 3/8&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ramp Length</td>
<td>4.4m</td>
</tr>
<tr>
<td>Tail</td>
<td>1.0m (including chisel point)</td>
</tr>
<tr>
<td>Ramp angle</td>
<td>3½&quot; (approx)</td>
</tr>
</tbody>
</table>

The whipstock was run in hole but held up on a ledge at around 50m. An attempt was made to work the whipstock past the obstruction but the shear pin broke. The wedge was then bumped with the drill pipe but would not go down any further. A 3 bbl cement slurry was spotted around the wedge and the pipe POH. Waited on cement for 4½ hours before picking up a string of 4-3/4" drill collars and a 6" Security S33F tricone bit and RIH. No cement was tagged and the wedge was found at 52m. A 6" pilot hole was drilled with surveys to a depth of 56.57m, at which time the bit was pulled and replaced with bit No.4. Drilling of the 6" pilot hole continued to 64.75m where a sample was circulated up with stiff foam. Both deviation surveys and the rock sample suggested that the sidetrack attempt was successful.

The 6" bit was then POOH and an 8½" bit made up on a 6½" BHA and RIH. The 6" hole was then reamed to 8½" diameter to a depth of 66.8m. Two metres of fill were reamed out after taking a deviation survey and the string hung up on the whipstock. Drilled ahead to 67.5m and POOH to check the bit condition as it was torquing up. The bit was run back to bottom and drilling continued to a depth of 85.8m using stiff foam. After reaming tight hole for two hours (30 tonnes overpull), drilled ahead into the top of the fish once again. POOH laying down drill collars and prepared to abandon the well. Rigged up for cementing and RIH with open ended drill pipe. Set abandonment plug No.1 from 70 to 50m. POH and WOC for four hours. Ran back in hole and tagged TOC at 47.5m, pulled back to 40m. Set a surface cement plug. Rockdrill Rig 22 was released at 2100 hours on 12 September 1990.
2.3.3 Lost Time

A total of 316.75 hrs of time was "lost" during the drilling of Owen No.1, representing 80.5% of the total time spent drilling the well.

The following table lists the amount of lost time in various categories:

<table>
<thead>
<tr>
<th>OPERATION</th>
<th>TIME (Hours)</th>
</tr>
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<tbody>
<tr>
<td>Hole Problems -</td>
<td></td>
</tr>
<tr>
<td>Stuck pipe (surface)</td>
<td>3</td>
</tr>
<tr>
<td>Remedial plugs &amp; cementing</td>
<td>20</td>
</tr>
<tr>
<td>Working stuck pipe</td>
<td>12</td>
</tr>
<tr>
<td>Fishing/Jarring</td>
<td>33½</td>
</tr>
<tr>
<td>Side Tracking</td>
<td>75½</td>
</tr>
<tr>
<td>Standby</td>
<td></td>
</tr>
<tr>
<td>Wait on Schlumberger</td>
<td>42½</td>
</tr>
<tr>
<td>Wait on pump parts</td>
<td>94</td>
</tr>
<tr>
<td>Rig Repair</td>
<td>34½</td>
</tr>
<tr>
<td>Hammer blockages</td>
<td>2</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>316.75</strong></td>
</tr>
</tbody>
</table>

The high proportion of lost time reflects the difficulties experienced while air drilling the tophole, caused predominantly by large amounts of water being produced from an aquifer within the Ninmaroo Formation. This resulted in "tight hole" due to caving, leading to stuck pipe on several occasions (eventually necessitating fishing and sidetracking operations) and, ultimately, the abandonment of the well.

Rig repairs also contributed a major part of the lost time, in particular repairs to the drawworks' clutch and mud pumps. The remoteness of the drilling location resulted in long standby times while waiting on a replacement drive shaft for the mud pumps (94 hours lost) and while waiting for back-off equipment to arrive from Roma, Queensland (42½ hours lost).

2.3.4 Water Supply

Water for drilling purposes was obtained from a 60m deep water bore (RD90GB14, RN 15844) drilled on the eastern side of the drilling location prior to the arrival of Rig 22. The bore was located about 30m east of shot-point 3905 on seismic line.
89-303, and it's approximate co-ordinates are 802 780m East, 7 523 371m North. Water was struck at 48m. The flow rate was tested at 3.5 l/s (3330 gph) and standing water level was 38m. The Rw of the bore water was 3.03 ohm-m at 25°C (Classic Comlabs Report 009/486, Appendix II). Potable water for camp purposes was carted to the location from either Goatyard Bore (approx 8 km NNW of the drill pad) or the bore at Tobermory Homestead (10km NNE of Owen No.1).

2.3.5 Deviation Surveys

Deviation surveys were run using a Totco survey tool with 0-7' or 0-14' ranges. Surveys were programmed to be run at 100m intervals, however due to the need to sidetrack the hole, this was modified during drilling. Hole deviation is tabulated below:

<table>
<thead>
<tr>
<th>Hole</th>
<th>Depth (m)</th>
<th>Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Owen 1</td>
<td>90</td>
<td>2'</td>
</tr>
<tr>
<td>Owen 1 &quot;ST/1&quot;</td>
<td>56</td>
<td>1'</td>
</tr>
<tr>
<td></td>
<td>67</td>
<td>1½'</td>
</tr>
<tr>
<td></td>
<td>76</td>
<td>1¾'</td>
</tr>
<tr>
<td></td>
<td>85</td>
<td>2'</td>
</tr>
<tr>
<td>Owen 1 &quot;ST/2&quot;</td>
<td>56</td>
<td>1'</td>
</tr>
<tr>
<td></td>
<td>60</td>
<td>1½'</td>
</tr>
<tr>
<td></td>
<td>63</td>
<td>1'</td>
</tr>
<tr>
<td></td>
<td>66.8</td>
<td>½'</td>
</tr>
</tbody>
</table>

2.3.6 Completion Summary

Owen 1 was plugged and abandoned after technical difficulties prevented the hole from progressing around pipe stuck in the hole. Two abandonment plugs were set on the 12th of September 1990 and complete details can be found in Appendix V. Plug depths were as follows:

Plug No.1 70-47.5m
Plug No.2 40-Surface

2.3.7 Fishing Operations

Two fishing jobs were carried out: the first fishing attempt was mechanical, using an overshot to try to retrieve a stuck BHA; and the second attempt was made on wireline when the fishing assembly could not be unlatched from the original fish.

The drill string originally became stuck on connection during air drilling operations at 135.3m. The pipe was worked for 12 hours with up
to 85 tons overpull before the 3½" drill pipe was backed off the BHA, leaving the top of the fish at 102.84m.

Details of the subsequent fishing operations follow:

1. Total Depth: 135.29m  
   Date: 29/8/90  
   Top of fish: 102.84m  
   Fish Details:
   
   Drilquip T17 hammer with Austec Flat-face  
   Hammer bit 1.60m  
   Bit Sub ?  
   1 joint 6½" OD DC 9.00m  
   1 X/O sub (6½"-4 3/4") 0.63m  
   1 joint 4 3/4" OD DC 9.02m
   
   TOTAL 20.25m+  
   Method Used: Bowen Series 150 releasing overshoot.  
   Successful: No (Fishing assembly could not be released from fish).

2. Total Depth: 135.29m  
   Date: 3/9/90  
   Top of fish: 102.58m (original fish) "Surface" (fishing string)  
   Fish Details: As before  
   Method Used: Schlumberger SEACO back-off tool.  
   Successful: Partly. Recovered most of fishing assembly but left overshoot and 1 joint of drill collars down hole. Equipment left down hole consisted of:
   
   Drilquip T17 hammer & bit  
   Bit Sub  
   1 joint 6½" DC  
   1 X/O sub  
   1 joint 4 3/4" DC  
   1 Bowen 7 7/8" Series 150 Overshot  
   1 joint 6½" DC

The top of the fish was now at approximately 91.9m. Details of the fish can be found in Appendix V (Casing and Completion Summary), together with a schematic of all equipment left downhole (plan PETNTcw3279).
2.3.8 Sidetracked Hole

Two attempts were made to sidetrack the hole around the fish which had been left in the hole after the failed fishing attempts (see sections 2.3.2 and 2.3.7 for details). Neither attempt was successful and the hole was plugged and abandoned due to technical difficulties.

Sidetrack attempt no.1 commenced at 1145 hrs on the 8/9/90. An 8½" bit was run in with two blank jets and one 12/32" jet and jetting and spudding with no rotation was used to try to kick off a previously set cement plug. Jetting and spudding continued from 52.7m to 70m after which drilling resumed, however the bit followed the original hole and eventually tagged the top of the fish.

After setting another cement plug and dressing it to 80m, a whipstock was run in hole at 0445 hrs, 10/9/90. The whipstock hung up at 50m on a ledge and could not be forced past the obstruction. The second sidetrack attempt was made at this depth using a 6" bit to drill a pilot hole. The pilot hole was drilled to 64.75m and deviation surveys and rock chip samples suggested that the sidetrack attempt was successful. An 8½" hole was then drilled after reaming out the 6" pilot hole, however the original hole was intersected once again with a similar result to the first sidetrack attempt.

2.3.9 Plug Back Operations

Several plugs were run during the course of drilling and sidetracking operations at Owen 1.

Plug No.1

| Interval:       | 26.2 - 18m |
| Date set:       | 28/8/90    |
| Reason for plug:| To support base of 9 5/8" conductor. |
| Cement:         | 12 sxs Class "A" with 3% w/w Soda Ash. |
| Slurry weight:  | 15.6 ppg   |
| Slurry volume:  | 3 bbls     |
| Setting method: | Balanced cement plug. |
| Tagged:         | Yes        |
Plug No.2

Interval: 91 - 50m
Date Set: 4/9/90
Reason for plug: To allow hole to be sidetracked.
Cement: 60 sxs Class "A" with 7.5 bbls borewater (25% excess over hole volume).
Slurry weight: 15.6 ppg
Slurry volume: 11.5 bbls
Setting method: Balanced cement plug
Tagged: Yes (52.7m)

Plug No.3

Interval: 90 - 65m
Date Set: 9/9/90
Reason for plug: To allow sidetracking using a whipstock set on top of plug.
Cement: 36 sxs Class "A" with 4.3 bbls water.
Slurry weight: 15.6 ppg
Slurry volume: 6.6 bbls
Setting method: Balanced cement plug.
Tagged: Yes (74.2m). Dressed to 80m.

Plug No.4

Date set: 10/9/90
Reason for plug: To cement whipstock in place before sidetracking.
Cement: 15 sxs Class "A" with 1.8 bbls borewater.
Slurry Weight: 15.6 ppg
Slurry volume: 3 bbls
Setting method: Balanced cement plug
Tagged: No - plug dropped away (?lost circulation).

2.4

FORMATION EVALUATION

2.4.1 Mudlogging

Mudlogging services were provided by Halliburton GEODATA. Instruments monitored pit level, rate of penetration (ROP), depth and both chromatographic and total mud gas. A hydrogen sulphide (H2S) gas detector was also in operation at all times during the drilling operation.

No gas detectors were operational between surface and 23.2m (surface conductor depth) and zero gas was recorded between 23.2m and 135.3m (TD).
Chip samples were caught, washed and described at 3m intervals between surface and 135.3m, however fast penetration rates while air hammering necessitated the interval caught to be varied occasionally to 6m and rarely 9m. All cutting samples were examined under ultraviolet (UV) light for the presence of hydrocarbons. Cuttings descriptions are given in Appendix I.

ROP, mud gas and lithology are summarised graphically on the 1:500 scale mudlog (Halliburton GEODATA Masterlog, Enclosure I). Splits of the cuttings have been retained for:

(a) Pacific Oil & Gas Pty Limited
(b) Northern Territory Department of Mines.

2.4.2 Calcimetry

The proportion of calcite and dolomite in each cuttings sample was determined using a calcimeter. Calcimetry results are summarised graphically on the 1:500 scale mudlog (Enclosure I) and at 1:1000 scale on plan PETNTcw3278.

2.4.3 Testing and Coring

No DST’s were run
No cores were cut

2.4.4 Electric Logging

No wireline formation evaluation logs were run in Owen No.1. Schlumberger SEACO logging truck 8394 was used during back-off operations. Services were:

- CCL 101.3m - Surface
- SIT 9 levels from 18 m to 96.5m
- Back-off 3 shots at 101.3m ((no success))
  Successfully backed off at 91.9m

The field log is included as Enclosure II. No downhole temperature information was obtained.

2.4.5 Elemental Analysis

A representative portion of each cuttings sample collected from Owen No.1 was obtained by splitting. A total of 36 splits of the cuttings samples (approx. 50g weight each) were sent to Australian Laboratory Services Pty Limited (ALS)
in Brisbane for analysis of 15 different elements by the ICP technique. Elements assayed were Cu, Pb, Zn, As, Ag, Sb, S, Ba, Ti, V, Al, P, Co, Ni and Fe. Results of these analyses are tabulated in Appendix III.
3. GEOLOGY

3.1 Objectives

Pacific Oil & Gas Pty Limited’s Owen No.1 well was a stratigraphic test, drilled as part of the Company’s 1990 Georgina Basin exploration programme in EP13, Barry Plain, Northern Territory (plans PETNTcw589, 3281). The well’s location was selected after processing and interpretation of the 1989 Georgina River seismic survey. It was positioned to the south-west of the “GM1” linear, a fundamental basement feature, which is thought to have controlled sedimentation in the early and middle Cambrian. A thickening of the sedimentary sequence to the south-west of the structure was evident on seismic and the well was drilled to test the development and quality of reservoir facies in the Thorntonia Limestone and basal Cambrian clastics (Sun Hill Arkose equivalent). Secondary objectives were possible sandstone or shoal carbonate reservoirs within the Georgina Limestone (Arthur Creek Formation). The well was also designed to provide information on the thickness, quality and maturity level of any source rocks within the Georgina Limestone (Kress, 1990).

3.2 Results of Drilling

Owen No.1 was unable to meet its objectives due to serious hole problems suffered while drilling the 8½” hole section. Air drilling operations were hampered by high flow rates of water from a shallow aquifer, making it difficult to unload the annulus and also to dispose of the water at surface, as the sump and turkey’s nest were filled to capacity in a very short time. These drilling problems were exacerbated by the presence in the borehole of water active clays, as the large amounts of water produced caused instability in the more clay-rich sections of the top hole, resulting in cave-ins and wash-outs. The drill string became stuck at a total depth of 135.3m and subsequent fishing and sidetracking operations all proved unsuccessful. The well was eventually plugged and abandoned and the rig skidded approximately 25m NE to drill Owen No.2 on the 14th September 1990.

A brief stratigraphic summary follows based on wellsite lithologic descriptions (Appendix I) and calcimetry results (Plan PETNTcw3278). A more detailed stratigraphy will be given in the Well Completion Report for Owen No.2 (Kress, in prep).

Reference to the TOBERMORY 1:250 000 mapsheet and explanatory notes (K G Smith, 1965) indicated that
**KEY TO CALCIMETRY**

- **LIMESTONE**
- **DOLOMITE**
- **ACID INSOLUBLES**

**LATE CAMBRIAN TO EARLY ORDOVICIAN**

**NINMAROO FM.**

- **DEPTH (m,KB)**
  - 10
  - 20
  - 30
  - 40
  - 50
  - 60
  - 70
  - 80
  - 90
  - 100

- **CALCIMETRY (%)**
  - **GROUND LEVEL 5.66m**
  - **TOTAL DEPTH 135.3m**

- **LITHOLOGIC DESCRIPTIONS**
  - Moderate reddish-brown, very argillaceous silty to very fine sandy:
    - **SOIL.**
  - White to very light grey, silty to very fine sandy **CLAYSTONE**, non-calcareous to slightly dolomitic.
  - Dark yellowish-brown, very silty, dispersive **CLAY**.
  - Yellowish-grey to yellowish-brown, very fine to fine grained **SAND**, with occasional medium to coarse grains.
    - Minor **SILTSTONE** and **DOLOMITE**.
  - Pale to dark yellowish-orange, very fine crystalline **DOLOMITE**
    - recrystallised, sucrosic, no visible porosity.
  - Thinely interbedded light to medium bluish-grey, microcrystalline to very fine crystalline silty **DOLOMITE** and very fine to fine **SAND**.
    - Minor to dark yellowish-orange limonitic **SILTSTONE**.
  - **SAND** with minor **DOLOMITE** and **SILTSTONE**, as above.
  - Pale to moderate yellowish-orange, very fine grained calcareous **SAND**.
the well should have intersected a thin sequence of Tertiary AUSTRAL DOWNS LIMESTONE (Ta) at surface, instead the well spudded in reddish-brown sandy argillaceous soil (Qa) overlying NINMAROO FORMATION (Late Cambrian to early Ordovician) and was still within the Ninmaroo formation at total depth (see Appendix I). The only evidence for the existence of the Austral Downs Limestone at the Owen locality is the presence of a surface scree of granule to pebble sized nodules of chalcedony and silicified limestone.

Immediately underlying the soil horizon, with a gradational contact, is a thick bed of moderate yellowish-brown to light olive-brown, soft, silty, hygoclastic clay. The Ninmaroo Formation at this locality appears to contain a relatively high proportion of terrigenous sediment. Radke (1980,1981) divided the Ninmaroo Formation into six lithofacies. His terrigenous lithofacies (Vt) consists of thin bedded very fine to fine sandstones and calcareous siltstones, while the crystalline dolostone facies (VId) consists of dolostone (lacking primary textures) and minor sandstone. Bradley No.1, drilled 36km NE of the Owen locality, in ATP380P, Queensland, intersected 136m of highly weathered and altered Ninmaroo Formation equivalent to lithofacies Vt and VId of Radke (Kress, 1989). The sequence at Owen No.1 appears similar to that at Bradley, however it is slightly more clastic and less weathered. Deposition of the Ninmaroo Formation is thought to have taken place in a broad, shallow epicontinental sea, under normal marine, increasingly saline and evaporitic conditions (Radke, 1980).

Between 11m and 24m, the lithology is a massive, white to very light grey, silty to very fine sandy claystone which is locally micaceous and may be very thinly interlaminated with yellowish-brown clay in part. The uppermost portion of this interval (from 11 to 14m) contains a minor amount of "breccia" consisting of fine clasts of white to very light grey limestone in a mottled moderate reddish-orange to moderate orange-pink matrix. Although largely non-calcareous, the clay may represent a very weathered carbonate unit as rare to trace amounts of microvugular porosity are evident in cuttings. Some black manganese "crusts" are also evident. Between 24 to 36m, the white claystone grades back into dark yellowish-brown, soft, silty, dispersive clay once again. Trace amounts of ?anhydrite and fine to medium quartz sand are also present.
Thin to thick bedded sand with thin interbeds of siltstone and minor clay occur between 36m and 67m and minor amounts of dolomite appear below 50m. The sand is predominantly unconsolidated, is pale yellowish-brown to yellowish-grey in colour, and consists of very fine to fine grained quartz grains which are sub-angular to rounded and moderately sorted. Medium to coarse, well rounded and frosted quartz grains are present in part (possibly the bimodal sandstone of Radke, 1980) and the sand is locally very slightly calcareous and silica cemented. When cemented, the sandstone has very poor to poor visible porosity, however the aquifer sand below 50m has good porosity and permeability as evidenced by the high water output (3.51/sec). The siltstone is moderate brown to dark yellowish-brown, moderately hard and non-calcareous and grades into silty claystone in part. The thin dolomite horizon at 53 to 55m consists of dark yellowish-brown to buff recrystallised microcrystalline dolomite which is locally sandy (grades to dolomitic cemented sandstone in part) with common manganese staining and no visible porosity.

A major change from clastic sediments to massive dolomite takes place at around 67m (Plan PETNTcw3278). This thick bedded unit occurs to a depth of 81m and consists of pale to dark yellowish-orange, microcrystalline to very fine crystalline, recrystallised dolomite with a generally sucrosic texture. It is hard and dense with no visible intercrystalline porosity in general, although some very poor microvugular porosity occurs in part and there is probably some fracture porosity present as well (evidenced by the presence of medium to coarse crystalline euhehedral dolomite rhombs which are either fracture or vug fill).

Below 81m, the Ninmaroo Formation consists of thinly to thickly interbedded dolomite and sand/sandstone with minor siltstone. The dolomite and sand are present in sub-equal amounts in cuttings samples to a depth of around 92m, below which sand begins to predominate. The dolomite is light to medium bluish-grey in colour, microcrystalline to very fine crystalline and argillaceous to silty. It is locally glauconitic and contains very thin interlaminations of pinkish-red sandstone in part. The sand is predominantly unconsolidated quartz, fine grained and poorly to moderately sorted. Cemented sandstone is slightly more common than in the upper portion of the hole, with the main cements being silica and dolomite, and more rarely, limonite. The siltstone is dark yellowish-orange in general, however it occasionally becomes mottled red and reddish-orange-pink. It is limonitic and sandy in part.
21.

From 92m to total depth (135.3m), the lithology is essentially sand with occasional thin to thick dolomite stringers and minor siltstone. The dolomite is essentially as above, light bluish-grey in colour, recrystallised and very glauconitic in part, with some pyrite. Porosity is nil to very poor intercrystalline. The sand is pale to moderate yellowish-orange, very fine to fine grained quartz. Once again it is sometimes silica or dolomite cemented and porosity is poor to moderate. Trace amounts of pale greenish-grey, firm, dispersive claystone appear below 104m.

No hydrocarbon shows (fluorescence, staining or bleeds) were observed in any cuttings sample over the entire Ninmaroo Formation and there was no gas detected while drilling. The sandstone interval at around 50m depth was water productive (see Appendix II).
KEYWORDS AND LOCATION

Petroleum, Palaeozoic, carbonate, sandstone, sediments, facies marine shallow, lineament, assays drill, drill percussion, drill rotary, drill stratigraphic, geochem water, stratigraphy, well data, well logs, drilling methods, porosity.

Owen 1, PD/RD90GB15, RD90GB14, EP13NT "Barry Plain", Tobermory SF53-12, Tobermory 6453, Georgina Basin, Northern Territory.
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APPENDIX I

LITHOLOGICAL DESCRIPTIONS
APPENDIX I - LITHOLOGICAL DESCRIPTIONS

This appendix contains detailed descriptions of all cuttings samples collected from Owen No.1.

Samples were caught and described at 3m intervals between surface and total depth of 135.3m, however high penetration rates while air drilling occasionally necessitated the sample interval to be extended to 6m and in exceptional cases 9m.

Lithology is summarised graphically on the 1:500 scale Halliburton Mudlog (Enclosure I).

All depths in this appendix are uncorrected driller's depths and are relative to the Kelly bushing (K.B). All rock colours are based on the Munsell Colour Chart system.

Reference

Geological Society of America, 1984:

"Rock colour chart" prepared by the Rock Colour Chart Committee.
Surface Cover (Cainozoic)
From 5m to 11m
Thickness: 6m

5 - 8m Soil (100%): Moderate red-brown, very argillaceous, silty to very fine sandy, quartz well sorted, sub-rounded, sub-spherical, transparent grains, occasional medium to coarse quartz grains, trace gypsum, calcareous, dispersive, trace red iron-stained grains, very rare carbonaceous specks.

8 - 11m Soil (30%): As above.

Claystone (70%): Predominantly moderate yellowish-brown, minor light olive brown, soft, sticky, hygroclastic (dispersive), non-calcareous, silty, trace carbonaceous streaks in part, ?interlaminated thinly with soil in part.

Note: The soil horizon is capped by scattered granule to pebble sized chalcedony and silicified limestone, generally purplish in colour and probably representing a scree of Austral Downs Limestone.

NINMAROO FORMATION (Cambro-Ordovician)
From 11m to 135.3m (TD)
Thickness: 124.3+m

11-14m Dolomite (100%): White, very light grey, recrystallised, crypto/micro-crystalline, with common well rounded, transparent, very fine quartz grains, rare moderate reddish-orange to moderate orange-pink mottles (cement of dolomitic claystone with angular, medium to coarse sand-sized clasts of white and very light grey limestone), soft to firm, occasionally moderately hard, rarely light greenish-grey in part, trace black manganese dendrites, minor dark yellowish-brown limonite stain in part, nil to very poor visible porosity.
14-17m **Claystone (100%)**: White, very light grey, as above, ?slightly dolomitic in part, firm, occasionally moderately hard, very fine sandy in part, rare vuggy porosity in part.

17-20m **Claystone (100%)**: White, very light grey, very silty to very fine grained sandy, grades to very fine grained argillaceous sandstone in part (quartz well sorted, well rounded, sub-spherical to spherical, translucent and transparent grains, poor to moderate visible porosity), firm to moderately hard, non-calcareous, trace mica flakes, locally with black ?Manganese "crusts" and "particles", possibly some fossil fragments in part, generally no visible porosity, locally trace to very rare microvugular porosity (connected in part).

20-23m **Sandstone (100%)**: White, very light grey, very fine to fine grained, very argillaceous matrix, grades to coarse siltstone in part, quartz moderately sorted, sub-angular to rounded, elongate to sub-spherical, transparent and translucent grains, non-calcareous to very slightly calcareous in part, friable to slightly firm, micaceous, trace black lithics, very poor (to ?moderate) visible intergranular porosity.

23-26m **Claystone (70%)**: Dark yellowish-brown, soft to firm, non-calcareous, silty to very fine quartz sandy in part.

**Siltstone (20%)**: White, very light grey, with occasional mottles of moderate red, non-calcareous, thinly laminated with claystone in part, grades from sandstone above (20-23m).

**Sand (5%)**: Common unconsolidated quartz grains, (fine) to medium grained, transparent, frosted, moderately sorted,
3.

Sub-rounded, elongate to sub-spherical.

**Sandstone (5%)**: White, transparent, very fine grained, poorly to moderately sorted, sub-rounded to rounded, sub-elongate to sub-spherical, moderately hard to hard, well cemented, very calcareous (cement), nil (to poor) visible porosity, no shows.

**Calcite (Rare)**: Transparent, soft, coarse crystalline aggregates (acicular crystals).

**26-32m Cement (10%)**: Contamination.

**Claystone (90%)**: White to light yellowish-brown, yellowish-brown, very soft to soft, silty, non-calcareous.

**Calcite (Trace)**: Translucent, very calcareous, possibly ?cement or some sort ?fracture fill.

**32-35m Cement (Trace)**: As above.

**Claystone (90%)**: Dark yellowish-brown, very soft, dispersive, very silty (grades to argillaceous siltstone), non-calcareous, becoming very fine grained sandy in part.

**Claystone (10%)**: White, soft, non-calcareous, non-silty.

**35-41m Cement (Rare)**: As above.

**Sand (90%)**: White, translucent, very pale yellowish-orange to yellowish-grey, (very fine) to fine grained, very well sorted, elongate to sub-spherical, sub-angular to rounded, "clean", possibly some argillaceous matrix in part, non-calcareous, weak silica cement in part (frangible), poor (to moderate) visible porosity.

**Claystone (10%)**: Dark yellowish-brown, very soft, as above.
41-44m  **Sand (70%)**: Yellowish-grey, pale yellowish-brown, very fine to fine grained, unconsolidated quartz, translucent quartz, rounded, sub-spherical to spherical, occasional medium grains (well rounded, spherical), (poorly) to moderately sorted, rarely cemented (silica cement), very firm to moderately hard, non-calcareous, occasionally with argillaceous matrix in part, poor visible porosity, no shows.

**Siltstone (20%)**: Yellowish-brown, soft, very argillaceous, grades to silty claystone, as above.

**Clay (10%)**: Yellowish-brown to dark yellowish-brown, soft to slightly firm, non-calcareous, blocky, becoming sub-fissile in part.

44-50m  **Sand (80%)**: As above, with occasional medium (to coarse) quartz grains, predominantly unconsolidated with more common silica cemented sandstone (10-20%), very slightly calcareous in part, hard when cemented, medium to coarse quartz grains are well rounded, elongate to spherical, frosted, trace black lithic grains (?Mn), very poor visible porosity, no shows.

**Siltstone (10%)**: Moderate brown, dark yellowish-brown, moderately hard, argillaceous, blocky, non-calcareous, abundant black material (?Mn coating).

**Clay (10%)**: Dark yellowish-orange, soft, non-calcareous, sticky, dispersive, hygroclastic in part.

50-59m  **Sand (90%)**: Predominantly unconsolidated quartz grains, yellowish-grey, very fine to fine grained, well sorted, translucent and transparent grains, sub-angular to sub-rounded,
5.

elongate to sub-spherical, locally cemented with silica and/or dolomite, argillaceous matrix in part, moderately hard to hard when cemented, abundant Mn "crusts" and blebs in part, very poor visible porosity, appears to be very faintly laminated in part (even/parallel, very thin, mm-scale).

**Dolomite (10%)**: Dark yellowish-brown, buff, dark yellowish-orange, microcrystalline (recrystallised), moderately hard to hard, no original texture visible, locally becoming very fine grained quartz sandy (grades to dolomite cemented sandstone), locally abundant spots and blebs of black ?Mn, argillaceous in part, no visible porosity, no shows.

**Siltstone (Tr-5%)**: Brown, as above.

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59-62m

**Siltstone (10%)**: As above.

**Sand (80%)**: As above, predominantly unconsolidated, occasional medium to coarse grains, 2% black lithic grains (Mn).

**Dolomite (10%)**: White, very light grey, microcrystalline to very fine crystalline, sucrosic texture, calcareous dolarenite, moderately hard, poor (to moderate) visible intercrystalline porosity when sucrosic, otherwise tight. Minor dark yellowish-brown dolomite, as above.

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62-68m

**Siltstone (10%)**: Moderate to dark brown, dark yellowish-orange, argillaceous, firm, blocky, non-calcareous, very fine sandy in part.

**Sandstone (20%)**: Pale yellowish-orange, translucent, very fine to fine grained quartz, well sorted, sub-angular to sub-rounded, sub-spherical, weak silica
6. cement, friable to moderately hard, non-calcareous, trace feldspar and black lithic grains (?Mn), rare argillaceous matrix, poor to moderate visible porosity, no shows.

**Dolomite (70%)**: White, translucent, fine to very fine crystalline, sucrosic texture, recrystallised, calcareous dolarenite, moderately hard to hard, generally "clean", very rare black lithic specks in part, occasionally becoming pale yellowish-brown in colour and slightly argillaceous, non-fossiliferous, nil to very poor visible intercrystalline porosity.

68-71m  **Sand (10%)**: Abundant unconsolidated grains, transparent and translucent, very fine to fine grained, well sorted, sub-spherical, sub-rounded to rounded, occasional silica cemented sandstone, occasional medium to coarse quartz grains.

**Siltstone (Tr-5%)**: As above, possibly cavings (?)  **Dolomite (90%)**: White, translucent, dark yellowish-orange in part, very fine crystalline, sucrosic texture, microcrystalline in part, recrystallised, moderately hard, calcareous dolarenite, occasionally very hard and dense when finer crystalline, euhedral dolomite rhombs in part, non-fossiliferous, generally very poor to poor porosity, locally with moderate visible intercrystalline porosity, minor very poor microvug porosity (vugs <<1mm, unconnected).

71-74m  **Dolomite (90%)**: As above, minor white "rock flour" - white, soft.  **Sandstone (Trace)**: As above.
7.

Siltstone (10%): As above, possibly cavings.

74-77m

Dolomite (100%): Pale to dark yellowish-orange, white to very light grey in part, generally very fine crystalline with sucrosic texture, recrystallised, occasional medium to coarse crystalline euhedral rhombic crystals (?fracture or void fill), nil visible porosity.

Claystone (Trace): Greenish-grey, soft to firm, blocky to sub-fissile, very slightly calcareous, slightly crypto-fissile.

Siltstone (Trace): As above, ?cavings.

Sandstone (Trace): As above, ?cavings.

77-80m

Dolomite (100%): As above, nil visible porosity, no shows.

Siltstone (Trace-5%): As above.

Sand (Trace): As above.

80-83m

Dolomite (55%): As above, no shows.

Siltstone (25%): Two types; (1) dark yellowish-orange, moderate to dark brown, argillaceous, firm and friable to moderately hard, non-calcareous, very fine sandy in part; minor (2) light to medium blue-grey, very hard, argillaceous, very dolomitic (grades to silty dolomite - microcrystalline to very fine crystalline, sucrosic texture in part, tight, nil porosity).

Sand (20%): As above, with minor sandstone containing abundant Mn grains.

Claystone (Trace): Light greenish-grey, as above.

83-86m

Sand (50%): Predominantly unconsolidated, as above; minor cemented sandstone, moderately hard, silica cement, minor dolomitic cement, poor visible porosity.
8.

**Dolomite (40%)**: Two types; 10% (1) light to medium blue-grey, very fine crystalline, sucrosic texture, calcareous dolarenite, moderately hard to hard, non-fossiliferous, common very fine lithic grains, very thinly interlaminated with pinkish-red sandstone in part, poor (to moderate) visible intercrystalline porosity; (2) as above, no shows.

**Siltstone (10%)**: As above.

**Claystone (Trace)**: Light greenish-grey, soft, sticky, sub-fissile, non-calcareous, as above.

**Calcite (Trace)**: Transparent, coarse crystalline, ?fracture fill.

86-89m

**Sandstone (40%)**: Predominantly unconsolidated quartz grains, very fine to fine grained, occasional medium to coarse grains, as above, no shows.

**Dolomite (20%)**: White, yellowish-orange, sucrosic texture in part, as above, nil to very poor visible porosity.

**Siltstone (20%)**: Moderate brown, dark yellowish-orange, non-calcareous, as above.

**Limestone (20%)**: Light to medium blue-grey, calcarenetic, grades to silty argillaceous dolomite in part (as for 83-86m), non-laminated. Minor calcite.

89-92m

**Sand (40%)**: Predominantly unconsolidated, quartz transparent and translucent, fine, occasionally medium grained, poorly (to moderately) sorted, sub-angular to rounded, elongate to sub-spherical, as above. Minor cemented sandstone, friable (weak silica cement), very poor visible porosity.
9.

**Siltstone (20%)**: Dark yellowish-orange, limonitic, as above, becoming very fine sandstone in part, argillaceous matrix, very poor visible porosity, no shows.

**Dolomite (40%)**: Two types; (1) light to medium blue-grey, as above, trace glauconite, possibly some sulphide mineral dispersed in matrix in part; sub-equal (2) predominantly white, yellowish-orange in part, fine to medium crystalline, recrystallised, sucrosic texture, microcrystalline in part, moderately hard to hard, nil to very poor visible porosity, no shows.

98-101m **Sand (50%)**: As above, minor medium to coarse quartz grains.

**Dolomite (30%)**: Light bluish-grey, as above, no shows.

**Siltstone (20%)**: Dark yellowish-orange, moderate brown, limonitic and very fine sandy, as above.

101-104m **Dolomite (50%)**: Light to medium bluish-grey, fine to medium crystalline, recrystallised, sucrosic texture, dolarenite, hard, brittle, calcareous in part, trace very fine dark green glauconite, trace pyrite and sulphide mineral grains, trace lithics (red), occasionally with very thin, even laminations in part, no visible intercrystalline porosity, no shows.

**Siltstone (30%)**: Dark yellowish-orange, limonitic, sandy in part, as above. Locally moderate to dark brown, occasionally pinkish-red (iron-stained), common Mn in part (aggregates of black ?psilomelane).

**Sandstone (20%)**: White, very light grey, very fine to fine grained, very rare medium to coarse quartz grains, silica cemented, moderately hard, very slightly
10.

calcareous in part, minor
limonite matrix in part
(grades to siltstone),
m moderate visible porosity in
part; no shows; common loose
quartz grains, as above.

104-107m  Sand (40%):
As above, minor cemented
sandstone.
Dolomite (30%):
As above, locally becoming
very glauconitic, occasionally
abundant pyrite (scattered
"specks" to fine aggregates).
Siltstone (30%):
As above, slightly more
argillaceous, becoming
dispersive in part
(hygroclastic).
Claystone (trace):
Light greenish-grey, firm,
blocky to fissile, non-
calcareous, dispersive
(swelling clay - hygroclastic
to hygrofissile).
Calcite (trace):
As above.

107-110m  Sand (70%):
Pale to moderate yellowish-
orange, unconsolidated quartz,
very fine to fine grained,
rare medium grains, very well
sorted, as above, calcareous
(?cement in part).
Dolomite (20%):
As above, occasionally white
to very light grey, tight, no
show.
Siltstone (10%):
As above, argillaceous.

110-113m  Sandstone (50%):
As above, silica cemented,
limonitic in part, very rare
pyrite, poor visible porosity,
no show. Rare unconsolidated
quartz.
Dolomite (30%):
Light to medium bluish-grey,
white in part, as above,
 sucrosic texture, nil to very
poor visible intercrystalline
porosity, no show. Occasional
coarse crystalline dolomite
rhombs (translucent, white),
corroded in part.
Siltstone (20%): As above, limonitic, sandy, with Mn coatings in part.

Gypsum (Trace-5%): Transparent, soft, coarse crystalline, tabular crystals, non-calcareous, possibly fracture fill.

113-116m

Sandstone (60%): As above, argillaceous matrix in part, no show.

Dolomite (20%): As above, becoming coarse crystalline in part, large blocks of dolomite cemented by finer dolomite, no show. Common "loose" medium to coarse dolomite rhombs.

Siltstone (20%): As above, sandy - grades to very fine grained limonitic sandstone.

Claystone (Trace): As above.

Gypsum (Trace): As above.

116-119m

Dolomite (50%): Predominantly yellowish-grey and white, minor bluish-grey, medium to coarse crystalline dolomite rhombs, nil visible porosity, no shows.

Sandstone (40%): Predominantly unconsolidated quartz grains, as above, occasional medium to coarse grained quartz.

Siltstone (10%): As above.

Claystone (trace): Light greenish-grey, hygrofissile, as above.

119-122m

Sand (70%): As above.

Siltstone (20%): As above.

Dolomite (10%): As above, with rare pinkish-red (iron-stained) dolomite in part, occasional aggregates of medium crystalline dolomite rhombs.
122-128m **Sand (70%)**: Unconsolidated quartz grains, as for 131-134m (see below), poor inferred porosity, no show.

**Siltstone (20%)**: Dark yellowish-orange, moderate brown, limonitic, soft to firm, argillaceous, with scattered very fine quartz grains in part, trace to common greyish-black earthy pyrolusite “clasts” and coatings, nil visible porosity.

**Dolomite (10%)**: 2 types: (1) light to moderate bluish-grey, as above; Minor (2) white, fine to medium crystalline, recrystallised, euhedral crystals in part, no visible porosity.

128-131m **Sand (80%)**: As above.

**Siltstone (10%)**: As above.

**Dolomite (10%)**: Moderate bluish-grey, fine crystalline, sucrosic texture, very hard, dense, trace pyrite aggregates, dense, nil visible porosity.

131-135.3m **Sand (100%)**: Pale to moderate yellowish-orange, unconsolidated quartz grains, very fine to fine grained, very well sorted, translucent and transparent grains, sub-angular to sub-rounded, elongate to sub-spherical quartz, rare silica cemented aggregates, calcareous (possibly calcite cemented in part), 20-30% limonite stained grains, occasional pinkish-red iron-stained grains, trace black lithics (?Mn), trace ?feldspar, poor inferred porosity, no show.

**Total Depth 135.3m**
APPENDIX II

WATER ANALYSES

(Amdel Core Services)
APPENDIX II

Two samples of water were obtained from water bore RD90GB14 and sent to AMDEL Core Services in Adelaide for standard water analysis and determination of potability. Sample #2826050 was taken at a depth of 51m during drilling and may be slightly contaminated by drilling fluids. Sample #2826051 was taken at a depth of 60m while the bore was on test and is probably more representative of the formation fluid.

The attached report (Amdel Core Services 009/486) summarises the analytical results.
30th August 1990

CRA Exploration Pty Ltd
PO Box 38
ALICE SPRINGS NT 0871

Attention: Tony Kress

REPORT: 009/486

CLIENT REFERENCE: DPO G7081

MATERIAL: Water

LOCALITY: Water Bore RD90GB14

WORK REQUIRED: Water Analysis

Please direct technical enquiries regarding this work to the signatory below under whose supervision the work was carried out.

[Signature]

BRIAN L WATSON
Laboratory Supervisor
on behalf of Amdel Core Services Pty Ltd

Amdel Core Services Pty Limited shall not be liable or responsible for any loss, cost, damages or expenses incurred by the client, or any other person or company, resulting from any information or interpretation given in this report. In no case shall Amdel Core Services Pty Ltd be responsible for consequential damages including, but not limited to, lost profits, damages for failure to meet deadlines and lost production arising from this report.

Please Reply To:
P.O. Box 109 Eastwood SA 5063 Australia
Telephone: 61-8-372 2834 Facsimile: 61-8-372 2861

Amdel Core Services Pty Ltd
(Incorporated in South Australia)
# Water Analysis Report

**Job No.** OAD2620  **Method** WAT 2 Page W1

## Sample ID.
2826050. WATER BORE RD90GB14 DEPTH 51M

### Chemical Composition (mg/L)

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### Anions

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<tr>
<td>Carbonate (CO3)</td>
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<tr>
<td>Bi-Carbonate (HCO3)</td>
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<td>Sulphate (SO4)</td>
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### Chloride (Cl)

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### Nitrate (NO3)

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### Derived Data (mg/L)

- **Total Dissolved Solids**
  - A. Based on E.C. 2124
  - B. Calculated (HCO3=CO3) 2215

- **Total Hardness** 898
- **Carbonate Hardness** 238
- **Non-Carbonater Hardness** 660
- **Total Alkalinity** (Each as CaCO3) 238

### Totals and Balance

- **Cations (me/L)** 39.3 Diff= 1.62
- **Anions (me/L)** 37.7 Sum = 76.92

**ION BALANCE** (Diff*100/Sum) = 2.10%

**Sodium / Total Cation Ratio** 53.2%

### Remarks

**IMBALANCE UNKNOWN** ALL RESULTS CHECKED AND VERIFIED.

### Note:

- mg/L = Milligrams per litre
- me/L = MilliEqvls per litre

---

**Name:** MR R. EAST  
**Address:** AMDEL CORE SERVICES  
FLEMINGTON STREET  
FREWSVILLE S.A

**Date Collected:** 11-8-90  
**Date Received:** 15-8-90  
**Collected by:** CLIENT
WATER POTABILITY


THE NON POTABLE WATERS ARE: # 282 6050

The sample does not conform to W.H.O. (1971) for the following parameters.

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<tr>
<th>ANALYTE</th>
<th>WHO (1971) LIMIT</th>
<th>SAMPLE</th>
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<tr>
<td>Magnesium</td>
<td>&lt; 30 if SO₄ &gt; 250</td>
<td>129 mg/L</td>
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<tr>
<td>Total Dissolved Salts</td>
<td>1500 mg/L</td>
<td>2215 mg/L</td>
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<tr>
<td>Total Hardness (as CaCO₃)</td>
<td>500 mg/L max</td>
<td>898 mg/L</td>
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<tr>
<td>Sulphate</td>
<td>400 mg/L max</td>
<td>434 mg/L</td>
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PLEASE NOTE: THE SAMPLES HAVE ONLY BEEN EXAMINED FOR THE ABOVE INORGANIC CONSTITUENTS. WE CANNOT COMMENT ON POTABILITY WITH RESPECT TO OTHER PARAMETERS e.g. Bacteria
Water Analysis Report

Sample ID: SAMPLE 2826051
Job No. OAD2712
Method WAT 2 Page W1

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<td>(micro -S/cm at 25°C)</td>
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<td>Resistivity Ohm.M at 25°C</td>
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Note: mg/L = Milligrams per litre; me/L = MilliEqvs.per litre

Name: Ms R. TAMKE
Address: AMDEL CORE, SERVICES
         FLEMINGTON STREET
         FREMVILLE

Date Collected
Date Received 22-8-90
Collected by CLIENT
WATER POTABILITY


THE NON POTABLE WATERS ARE: 2826051

The sample does not conform to W.H.O. (1971) for the following parameters.

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<th>ANALYTE</th>
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<td>Sulphate</td>
<td>400 mg/l</td>
<td>418 mg/L</td>
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<td>Chloride</td>
<td>600 mg/L</td>
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<tr>
<td>Hardness (as CaCO₃)</td>
<td>500 mg/L</td>
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PLEASE NOTE: THE SAMPLES HAVE ONLY BEEN EXAMINED FOR THE ABOVE INORGANIC CONSTITUENTS. WE CANNOT COMMENT ON POTABILITY WITH RESPECT TO OTHER PARAMETERS e.g. Bacteria
APPENDIX III

INORGANIC GEOCHEMISTRY

(Australian Laboratory Services Pty Limited)
APPENDIX III - INORGANIC GEOCHEMISTRY

A total of 36 samples, covering the interval from surface to total depth, were sent to ALS in Brisbane for analysis of 15 different elements. Sample details are given in the "Sample Catalogue" (Appendix VII) and the results tabulated in the attached report.
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<th>Pb ppm</th>
<th>Zn ppm</th>
<th>As ppm</th>
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Detection Limit: 5 5 5 1 1

Comments: Ca, Ba and Ti values will be inconclusive by this method. ICS87 is recommended.
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Detection Limit:
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- Pb: 5 ppm
- Zn: 5 ppm
- As: 1 ppm
- Ag: 1 ppm

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Comments:

Signed:
## Laboratory Report

**Client:** CRA EXPLORATION PTY LTD  
**Address:** P.O. BOX 38  
**Contact:** MR. T. WRESS  
**Order No.:** DPO 67099  
**Sample Type:** CORE

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**Signed:** [Signature]

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**Address:** PO BOX 25  
**Location:** ALICE SPRINGS  
**Contact:** Mr. T. Kress  
**Order No.:** DPO 67099  
**Sample Type:** CORE  
**Stafford:**  
**Date Completed:** 20/11/90

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FORMALS QA/QC
APPENDIX IV

DRILLING RECORD
APPENDIX IV

DRILLING RECORD

This appendix contains a complete summary of drilling details for Owen No.1 well, including bit and drilling fluid data, as well as a time-depth curve (Plan PETNTcww3277).

(a) Bit details

A total of five (5) bits were used during the drilling of Owen No.1, two for the original hole and three for sidetracking operations (see Table IV-1). Drilling time from IADC reports was 11 hours giving an average ROP of 5.1 minutes/metre (11.7 metres/hour).

(b) Drilling Fluids Programme

A downhole hammer technique was proposed to drill both the 15” and 8½” hole sections using either air or stiff foam as the preferred drilling fluid (Kress, 1990).

Air was used for the 15” hole section, however because of the large hole size, cuttings were not effectively cleared from the annulus and the bit became stuck at 13m. It was eventually freed and drilling continued to conductor setting depth. Further hole problems were then encountered when circulating a water spacer ahead of the casing cement slurry, as the unstable surface clays collapsed and prevented circulation. This was remedied by a top fill cement job followed by setting a cement plug in the rathole below the conductor.

Hammer drilling with air was then used for the 8½” hole section. Large amounts of water were produced from a sandstone aquifer within the Nimmaroo Formation at around 50m depth. High water input hampered the air drilling operation causing cave-ins and eventually resulting in the string becoming stuck.

Water was initially used as drilling fluid during the two unsuccessful sidetracking attempts, however due to lost circulation problems (?losing to aquifer), air/stiff foam was used to clean the hole of cuttings.
COMPANY: PACIFIC OIL & GAS PTY LIMITED
WELL: OWEN No.1
RIG: ROCKDRIL RIG 22
DATE SPUNDED: 27/8/90
DATE COMPLETED: 12/9/90

APPENDIX IV

Pacific Oil & Gas Pty Limited
NORTHERN TERRITORY
EP13

OWEN NO.1
ACTUAL TIME-DEPTH CURVE

No. OF DAYS

MAIN HOLE | "ST/1" | "ST/2"

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20

REF.
SCALE 1:1000
DRAWING
AUTHOR A.G.Kress
DATE December, 1990
PLAN No PetNTow3277
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APPENDIX V

CASING AND COMPLETION SUMMARY

Full details of all casing strings run and the abandonment programme for Owen No.1 are included in this appendix. All depths are below kelly bushing (K.B.)
(a) Casing Summary

Only a surface conductor string was run during the drilling of Owen No.1. Shoe depth, hole sizes and cement tops are shown graphically in the "Hole Profile" section of the accompanying Abandonment Schematic (Plan PETNTcw3274). Casing details are summarised as follows:

Surface Conductor

Date Run: 28/08/90
Type: Nippon Steel, 36ppf, K-55, 8-round casing
Size: 9 5/8"
No. of joints: 2
Set at: 23.23m
Cement:
  Initial slurry: Volume 6.5bbls
  Weight 15.6ppg
  Type Class 'A'
  neat
  (Top fill cement job after hole caved in around conductor).
  Bottom Slurry: Volume 3bbls
  Weight 15.6ppg
  Type Class 'A'
  with 3% w/w Soda Ash
  (Cement plug set in rathole below conductor shoe).

(b) Completion Summary

Owen No.1 stratigraphic well was plugged and abandoned at a total depth of 135.3m on the 12/9/90 after all attempts to recover a lost fish or sidetrack the hole proved futile.

The well was abandoned in accordance with Northern Territory Government regulations and the abandonment programme consisted of setting two cement plugs. The accompanying "Abandonment Schematic" shows details of the abandonment programme.

Plug No.1

Depth: 70-40m
Date Run: 12/9/90
Cement:
  No. of Sacks: 30
  Slurry weight: 15.6ppg
  Slurry volume: 6bbls
Method: Balanced cement plug
Tested: Yes. Top tagged at 47.5m

Plug No.2

Depth: 40 - Surface
Date Run: 12/9/90
Cement:
  No. of sacks: 50
  Slurry weight: 15.6 ppg
  Slurry volume: 10 bbls
Method: Balanced cement plug

After setting the surface cement plug a witness post was attached to the casing stub and the cellar infilled with soil.
TOP OF EQUIPMENT LEFT IN HOLE APPROX. 91.9m KB

8½" OPEN HOLE

102.58m

9.38m

9.00m

9.02m

0.63m

? ?

1 X O/SUB (6½" - 4½")

9.00m

1 X 6½" "SPIRAL GROOVED" RANGE 2 DRILL COLLAR

1 X 4½" RANGE 2 DRILL COLLAR

1 X 7½" BOWEN SERIES 150 CIRCULATING AND RELEASING OVERSHOT DRESSED WITH 4½" BASKET GRAPPLE & MILL CONTROL Packer

1 X 6½" "SPIRAL GROOVED" RANGE 2 DRILL COLLAR

1 X 6½" "SPIRAL GROOVED" RANGE 2 DRILL COLLAR

1 X O/SUB

1 X DRILQUIP T17 HAMMER FITTED WITH 6½" AUSTEC FLAT FACE HAMMER BIT

APPENDIX V

T.D. 135.29m KB

APPROX 123.43m
ABANDONMENT DATE: 12-9-90

**PLUG No.2** 40 - Surface 50 axs 'A' cement 15.6ppg. Collar infilled with soil. Witness post attached to casing stub.

**PLUG No.1** 70 - 47.5m 30 axs 'A' cement 15.6ppg. Tagged

FOR DETAILS OF EQUIPMENT LEFT IN HOLE SEE PLAN PETNTcw 3279

NOTE: KB to GL 5.66m

APPENDIX V

Pacific Oil & Gas Pty Limited

NORTHERN TERRITORY

EP 13

**OWEN NO.1**

ABANDONMENT SCHEMATIC

REF. 1:1000

DRAFTING Hammond Carto

AUTHOR A.G.Kress

REPORT

DATE December, 1990 PLAN No PetNTcw 3274
APPENDIX VI

RIG SPECIFICATIONS

Full details of the specifications of Rockdrill Rig 22 and its associated equipment, used during the drilling of Owen No.1 Stratigraphic Well are given on the following pages.
APPENDIX VI - RIG 22 SPECIFICATIONS

1. DRAWWORKS

COOPER double drum type drawworks, model 42" x 10" - 38" x 8", mechanically driven through powershift transmission - 350 HP.

- Main Wireline 1"
- Sandline Drum Wire 7/16"
- Pressurised Circulating Brake (Water Cooled)
- Paramac 122 "Hydromatic" Auxiliary Brake

2. POWER SYSTEM

Two (2) DETROIT-GM 8V92TA engines water cooled diesel, rated 410 BHP at 1800 RPM

Engines are fitted with flame proofing as follows:
- Exhaust system diverted to off side, with spark arresters
- Exhaust water spray
- Ingersoll-Rand Air Starter
- Flame proof alternator

3. COMPOUND CASE

Twin engines input, twin output, (drawwork/rotary and mud pumps) Hy Lo chain running on heat treated sprockets, pressure fed lubrication to bearing and chain, 700 HP rating.

4. TRANSMISSION

ALLISON model CLT 5961 six speed automatic transmission with torque convertor, air shift control.

5. ROTARY TABLE

COOPER 17½" opening rotary table. Static rated capacity 300 tons. Rotation speed up to 350 RPM.

6. MAST

Rockdrill model MT 10815-300 cantilever self-standing type mast, designed and manufactured in accordance with API specification No. 4E, for drilling and servicing structures and Australian Standards 1250, 1554, and 1163. Designed to break down into 1800kg packages for easy transportation and raised by drawwork power.

- Clear Working Height 108ft (32.94m)
- Static Hool Load 220,001bs (100 tons).
- Gross Nominal Capacity 300,001bs (136 tons).
- Max. Wind Load (No Set Back) 115 M.P.H.
- Max. Wind Load (With Rated Set Back) 100 M.P.H.
7. CROWN

Fabricating from plate suitable for 8 line string up, consisting of:
- Two (2) 24" Diameter Fast Line Sheaves, Grooved 1".
- Three (3) 28" Diameter Cluster Sheaves, Grooved 1".
- Two (2) 14" Diameter Sheaves, Grooved 5/16" For Wire Line.

8. BACKING BOARD

Adjustable racking board with capacity to accommodate 200 stand of 3¼" DP.

9. SUBSTRUCTURE

Swing up type substructure with 14ft (4.27m) clear working height under rotary table.
- Setback Load Capacity 220 000lbs (100 tons).
- Floor Length 20ft (6.10m)
- Floor Width 15ft (4.5m).

10. MUD PUMPS SYSTEM

Two (2) Triplex mud pumps driven from engine compound.
- One (1) Triplex Piston Pump, Make OPI, Model 350 DG, Rated 350 HP.
- One (1) Triplex Plunger Pump, Make OPI, Model 500 AWS Rated 500 HP.

Each pump is driven from idler shaft through SPC series v-belts with ratio to suit and controlled by twin disc PO 318 friction clutch operated from derrick floor.

11. TOP HEAD DRIVE

One (1) Bourne Top Head Drive unit. Model hydraulically driven by 2 Dension M7 motors. Rated 350HP, 2 Speed gearbox offers 0-600 RPM. 4" IF R/H connection. Driven by Detroit 6V92 TA hydraulic power pack incorporating 1 x Denison P14 closed loop pump. All necessary hose - fittings- control panel - inside derrick rails etc. needed to convert rig to top head drive.

12. CATLINE WINCH

Hydraulic catline winch planetary gear type, mounted on Derrick Leg. Wireline ½".

Hydraulic control valve at V-door opening.

13. HYDRAULIC CATWORKS

Hydraulic make-up and break out catworks at rig floor with controls located at driller console -
- Max. Pull for Make-up 10 0001b
- Max. Pull for Breakout 20 0001b

14. AIR SYSTEM

Two 12 CFM compressors driven by engines crankshaft. One 50 CFM compressor driven by flame proof 3 phase electric motor.

15. TRAVELLING BLOCK

McKissick Model 663 Travelling Block with incorporated hook - 100 Ton Capacity, four (4) Sheaves 1" rope.

16. MUD SWIVEL

OILWELL PC-100 6-5/8" API Reg. L.H. thread/pin
Ballerini 35 ton 4½" API Reg. L.H. thread/pin

17. MUD SYSTEM

Four (4) mud tanks, 17 cubic meters each complete with:

- Suction Manifold 6"
- Eight (8) Mud Mixing Guns
- Four (4) Electric Mud Agitators
- One (1) Brandt 8 Cones Desilter, model SE 8
- One (1) Brandt Double Shale Shaker
- One (1) Centrifugal "Gasmaster" Degasser
- Two (2) Mixing and Servicing Centrifugal Pumps - Type Mission 4 x 5 - Driven by Electrical Motor.
- Discharge Manifold 3"-5000 PSI
- Rotary Hose 3" x 50ft, 5000 PSI
- Two (2) Vibrator Hose 3" x 8ft Mounted on Each Pump

18 MISCELLANEOUS

- One (1) Water Storage Tank, 17 Cubic Metre capacity, Complete with Electric Centrifugal Pump.
- Three (3) Fuel Storage Tank Approximately 34 Cubic Metres
- One (1) Complete Explosion Proof Lighting System.
- One (1) Warehouse Barrack.
- One (1) Workshop Barrack.
- One (1) Dog House
- Set of Wooden Mattings
- Pipe Racks
- Fire Extinguishers.

19 BOP EQUIPMENT

- One (1) Shaffer Spherical BOP, Flanged Bottom 9"-5000 PSI
- Two (2) Single Ram, Type Shaffer, Flanged Top and Bottom 9" 5000 PSI Outlets Complete with:
  - Blind Rams
  - 3-½" Rams
  - 4-½" Rams
- 5" Rams
- 7" Rams
- One (1) Koomey Accumulator Unit for BOP Control Type MA0800-115BB Complete with Control Manifold and Remote Panel.
- Drill Adapter Spool Flanged Top 9"-5000 PSI W.P. With two Outlets, 2-1/16" - 5000 PSI and 3-1/18" - 5000 PSI.
- One (1) Choke Manifold 3" - 5000 PSI Complete with Two (2) Adjustable Chokes.
- One (1) Choke Line 3" - 5000 PSI to Connect Choke Manifold to the Drilling Adapter Spool.
- Two (2) 2" x 6000 PSI Chiksan for Kill Line
- Three (3) 3" x 6000 PSI Chiksan for Choke Line.
- One (1) Wellhead 5000 PSI to suit 7", 5" and 4" casing, plus all accessories.
- One (1) HCR Valve.

20 SURFACE EQUIPMENT

- One (1) Set Made up of Two (2) BJ type "C" Pipe and Casing Tongs to catch 3½", 4-3/4", 4½", 6½", 9-5/8" sized tubulars.
- One (1) Drilco Hexagonal Kelly 4½".
- One (1) Drilco Hexagonal Kelly 3½"
- One (1) Hydril Upper Kelly Cock.
- One (1) Hydril Lower Kelly Cock.
- Two (2) Safety Clamp for DC
- Two (2) BJ Took Pusher Links 1-3/4" x 60
- Two (2) BJ Tool Pusher Links 2½" x 72
- Necessary Cup Testers for 5", 9-5/8" and 7" Casings
- One (1) Gray Float Valve.
- One (1) Circulating Head for 5" Casing.
- One (1) Circulating Head for 9 5/8" Casing
- One (1) Circulating Head for 7" Casing
- One (1) Bowen Type "Z" 011 Jar OD 6½" - 46 NC
- One (1) Bowen Type "Z" 011 Jar OD 4 3/4" - 38 NC
- Three (3) Bowen Fishing Magnet 10", 7" and 5" OD
- One (1) Baash Ross Type "E" Autoloc Safety Joint OD 6½" - 46 NC
- One (1) Baash Ross Type "E" Autoloc Safety Joint OD 4 3/4" - 38 NC
- One (1) Circulating Head 3½" IF Conn. Complete with Halliburton Low Torque Valve.
- One (1) Bowen Series 150 Overshot 7-7/8" SH
- One (1) Bowen Series 150 Overshot 5-5/8" SH
- One (1) Extension Sub for 7-7/8" Overshot
- Three (3) Bowen Reverse Circulating Junk Baskets Sizes 5-3/4", 7-7/8", 11"
- One (1) Bowen Junk Sub 6-5/8" OD
- One (1) NL McCullough 4-3/4" OD Bumper Sub & Safety Joint.
21 TUBULAR EQUIPMENT

- 2250m CHD 101 + heaviweight pipe CHD 101
- DC 4-3/4" x 2-5/16", 3½" Conn.
- DC 6¾" x 2-13/16", 46" NC Conn
- 2250m of 3½" DP, Grade E, 13.3 lbs/ft, IF
- Christensen Core Barrel 4-3/4" x 2-5/8" x 30' Complete
  with Necessary Handling Equipment
- Set of Necessary Rotary Subs to Run Contractor Equipment
- One (1) Near Bit Stabiliser for 8½" Hole
- Three (3) String Stabiliser for 8½" Hole.
- One (1) Near Bit Stabiliser for 6" Hole
- Three (3) String Stabiliser for 6" Hole
- One (1) String Stabiliser for 12¾" Hole.
- Three (3) Security Roller Reamers 12¾" - 8½" - 6".

22 CONTROL EQUIPMENT

- One (1) Flame Proof Stoke Counter.
- One (1) Martin Decker Weight Indicator Metric System
  Complete with National Type "G:" Anchor System.
- One (1) Toto DRilling Recorder with 3 Pen Recording
  Penetration-Weight and Pump Pressure.
- One (1) Toto Pitometer with High Low Alarm Assy.
  Installed on the mud Tanks and 24hr Chart Recorder.
- One (1) Toto Operating Unit Complete with Double
  recording Unit 0-7 Degrees, 0-14 Degrees.
- One (1) Toto Flow Indicator
- One (1) Toto Drillmaster Automatic Driller.

23 TRANSPORTATION EQUIPMENT

- Two (2) Toyota Land Cruisers (Tray Body)
- One (1) 4 x 4 Mobile Crane 12 Tons.
- One (1) 6 x 6 Prime Mover Winch Truck.
- One (1) 94ID Caterpillar Track Type Loader - 6 Ton fork
  attachment mounted on front- Palfinger PK 12000
  Hydraulic Crane Rear Mounted.

24 CAMP FACILITIES

One fully equipped and airconditioned camp comprising
the following:

4 12m x 2m 5 man bunkhouse
1 10.8m x 3m washcar/laundry
1 12m x 3m recreation/store
1 TV and video
1 12m x 3m kitchen/dinner
1 4.8m x 3m ablution
1 pressure pump with one 1000 gallons water tank
1 distribution board and wiring.

25 AIR PACKAGE

One (1) skid mounted Ingersoll-Rand air compressor,
model XPH 1150 rated 1150 cfm at 400 psi, complete with
Drilquip T17 downhole hammer and bits.
APPENDIX VII

SAMPLE CATALOGUE

This Appendix contains a listing of all samples and analyses for Owen No.1
### ANALYSIS

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### SAMPLE CATALOGUE OWEN 1 WATER BORE

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