SPERM WHALE -1
WELL COMPLETION REPORT

PERMIT Vic/P11
1982

Hudbay Oil (Australia) Ltd.

SPERM WHALE No.1

WELL COMPLETION REPORT

Authors: M.A. Battrick,
GEOLOGIST.

A. Eisenbarth,
SNR. DRILLING ENGINEER.

Supervised By: E.M.L. Tucker,
CHIEF GEOLOGIST.

Hudbay Oil (Australia) Ltd.

CONTENTS

1. WELL HISTORY

(Pages 1 - 5)

SPERM WHALE - 1.

1 WELL HISTORY

1.1 General Data

1.1.1 Name and Address of Operator

Hudbay Oil (Australia) Ltd.,
256 Adelaide Terrace,
PERTH W.A. 6000

1.1.2 Participants

Beach Petroleum N.L.,
32nd Floor,
360 Collins Street,
MELBOURNE VIC. 3000

Gas & Fuel Exploration N.L.,
151 Flinders Street,
MELBOURNE VIC. 3000

Hudbay Oil (Australia) Ltd.,
256 Adelaide Terrace,
PERTH W.A. 6000

1.1.3 Petroleum Title

Vic/P11, Victoria

1.1.4 District: Melbourne, 1:1,000,000 block No. 1781

SP 130, Line GB81-26 (proposed)

1.1.5 Location - Ref. Figure No. 1

Latitude : 38° 03' 25.86"S
Longitude : 148° 21' 51.64"E
AMG Co-ordinates:
N 5786947
E 619696
AMG Zone 55

Rotary Table (R.T.) - 9.45 metres above Mean Spring Low water. All depths for this report are referred to Rotary Table unless otherwise indicated.

1.1.6

Water Depth	-	54.5 metres
Total Depth	-	1417 metres
Spud Date	-	26th December, 1981
Rig Released	-	22nd January, 1982

1.1.7 Status

Plugged and Abandoned, Gas well.

1.2 Drilling Summary

The drillship "Petromar North Sea" was sailed from the Whale No 1 location and arrived at the Sperm Whale No 1 location at 0600 hours December 25th, 1981. Anchors were run and soaked, the vessel was positioned over the location, and the TGB was set on the seabed.

A 36" bottom hole assembly (BHA) was made up and run to spud the well at 0100 hours December 26th 1981. The 36" hole was drilled to 72m, the 36" BHA was pulled, a 26" BHA was run, and the hole was deepened to 208m. A 20" casing string complete with 20-3/4" wellhead, permanent guide base and 30" conductor pile was run and landed at 196m. The string was cemented in place with 855 sacks cement plus 2.5 percent prehydrated gel lead and 300 sacks cement plus 2 percent $CaCl_2$ tail slurry. The 20-3/4" stack was run and the casing was pressure tested to 500 psi. A test plug was run to pressure test the stack and the choke manifold.

A 17½" BHA was made up to drill out the 20" shoe plus 4m of new hole. A pressure integrity test to a 2.16 SG equivalent was conducted and the 17½" hole was drilled to 720m. Electric wireline logs were run over the 17½" open hole section. A string of 13-3/8" casing was run and cemented in place at 710m with 818 sacks cement plus 2.5 percent prehydrated gel lead and 202 sacks neat tail cement slurry. The 13-5/8" stack was skidded over the moonpool and hung off due to inclement weather. After the seas had calmed, the stack was landed and the casing was pressure tested to 2000 psi. The test plug was then run to pressure test the ram and annular preventors.

A 12¼" BHA was made up and run to drill out the shoe plus an additional 3m of new hole. A pressure integrity test was conducted to a 1.87 SG equivalent and then the drilling fluid was displaced to a Bara-carb brine system. The 12¼" hole was drilled to 1417m and then was conditioned for logging. Electric logs and RFT's were run and evaluated prior to plugging back the 12¼" hole.

Drill pipe was run to plug back the well to 925m. A string of 9-5/8" casing was run and landed at 919m. The casing was cemented in place with 396 sacks of neat cement. A 9-5/8" seal assembly was run and pressure tested to 2200 psi. The stack was pulled, the rams were changed out to 3½", the stack was rerun, and then was pressure tested. Excess cement was drilled out to 894m with an 8½" BHA.

Electric wireline was rigged up and a cement bond log was run. The interval 839 - 848m was then perforated for a DST. The first attempt at a DST was a misrun due to the inability to latch the surface pressure readout connector and sand plugging in the test tools. An 8½" bit and 9-5/8" scraper were run to condition the well prior to the attempt at DST #1A. This test was also a misrun due to failure of the PCT to operate. DST #1B was then run and was operationally successful, although flow was not sufficient to unload the diesel cushion. The well was then conditioned after an 8½" BHA had been run.

A bridge plug was set at 837m on electric wireline and pressure tested to 2200 psi. The interval 832 - 834m was perforated and preparations were made to conduct DST #2. DST #2 was completed with a final flowrate of dry gas of approximately 4 mmscf/d with H_2S at 200 ppm. The well was circulated free of hydrocarbons and plugged back to 830m with a wireline set bridge plug.

The interval 819 - 826m was perforated and DST #3 was conducted. This test flowed dry gas at 5.4 mmscf/d with H_2S at 200 ppm. A bridge plug was set at 817m on electric wireline and a cement plug was pumped and balanced over the interval 817 - 787m. A second cement plug was placed over the interval 165 - 100m. the 9-5/8" seal assembly was recovered, the stack was pulled and secured, and a cutting assemly was made up. The 9-5/8" casing was eventually cut at 78m after a few problems with the mechanical cutter. The 9-5/8" stub was retrieved and the 13-3/8" casing was then cut at 76m and retrieved. Attempts to recover the 20" stub and subsea equipment were unsuccessful and it was considered prudent to recover this equipment at a later date using diver placed explosives. The anchors were pulled and the rig was released at 0600 hours on January 22nd, 1982.

An attempt to remove the subsea wellhead by using divers to place an explosive charge was unsuccessful due to strong water currents and poor weather conditions. Hence, the rig was moved back to the Sperm Whale No 1 location for the wellhead recovery prior to departing the area for the Northwest coast of Australia. Four anchors were run out and the rig was positioned over the wellhead. An explosive charge was placed in the wellhead and lowered below the 30" conductor pile. The rig was moved off location, the charge was detonated, and the rig was repositioned over the wellhead. The 20" stub plus the subsea equipment was successfully recovered. The anchors were pulled and the rig departed for the Northwest Shelf at 2230 hours 19th February, 1982.

1.3 Geological Summary (Enclosure E1)

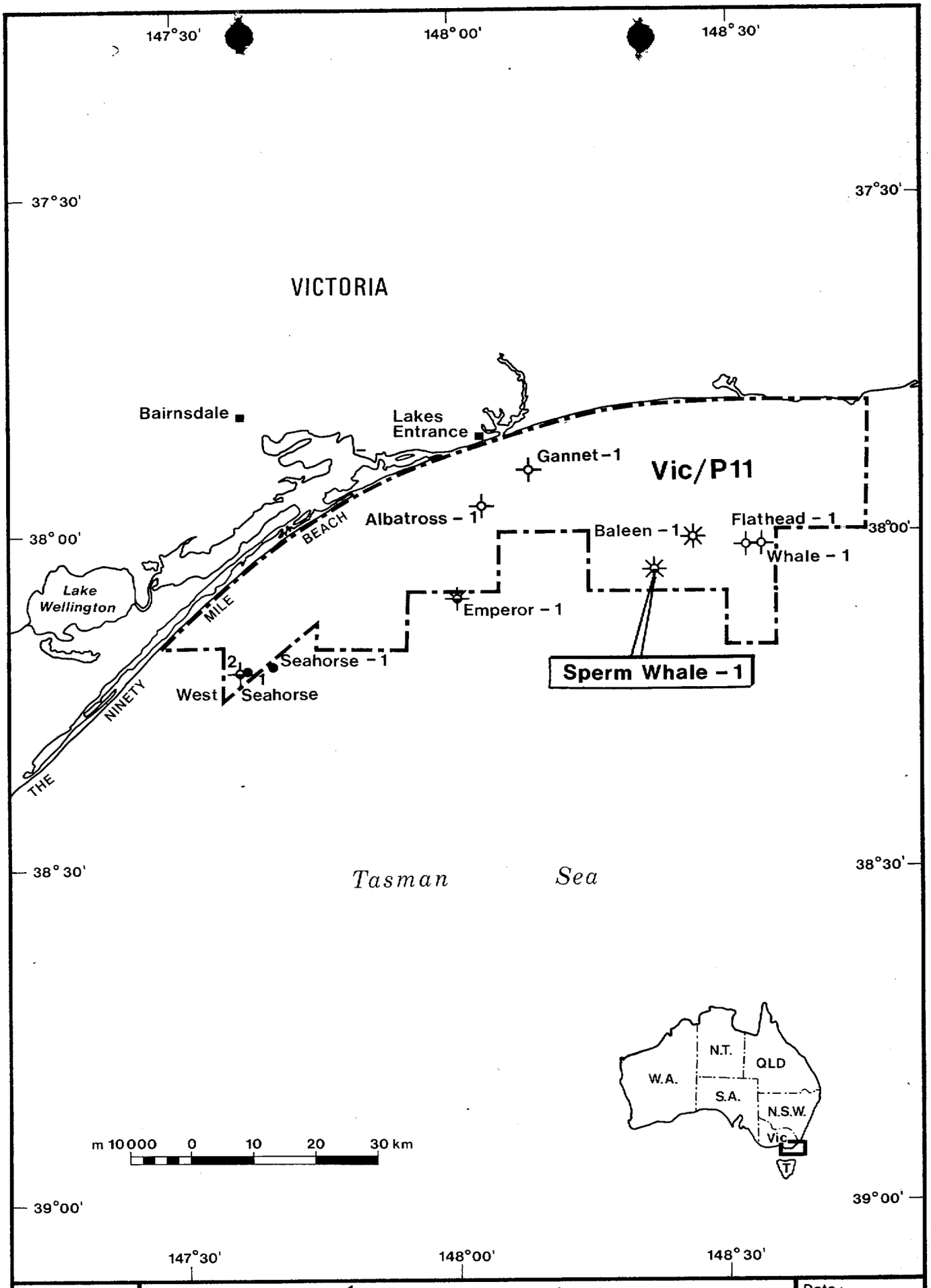
The Sperm Whale No.1 well was drilled into an asymmetric anticline, formed by arching into a major east-west, reverse fault, upthrown to the south. Closure was mapped at two horizons, designated "Top Latrobe" and "Top Strzelecki" (Figure 13). Formation sampling commenced after drilling out the 20 inch casing shoe, set at 196 metres.

The interval 196-805 metres consisted of skeletal calcarenites, calcisiltites and calcilutites, with marls and calcareous claystones predominantly below 400 metres. There was an overall decrease in grain size with depth and the formation became recrystallized in part below 720 metres. This interval ranged from Upper Eocene to Mid Pliocene in age. The underlying section, from 805-947 metres consisted of 142 metres of non-marine sandstones and claystones with minor siltstones and coals throughout. This section ranged in age from Palaeocene to Eocene with possible Upper Cretaceous affinities at the base. This interval represented the Latrobe Group.

There is a minor increase in acoustic impedence and gamma ray response, with a marked decrease in S.P. response and density below 947 metres. The sequence from 947 metres to T.D. at 1417 metres consisted dominantly of arenaceous claystones and argillaceous sandstones with minor interbeds of clean sandstone and claystone. Thin silicified bands occurred in the sequence and lithic fragments were noted throughout the more coarse lithologies. This interval is placed in the Lower Cretaceous period with Albian age affinities above 1253 metres.

Movable hydrocarbons were encountered within the upper section of the Latrobe Group, and the well flowed dry gas at rates of up to 5.4 MMcf/d during a DST over the interval 819-826 metres. Degraded oil was recovered during the RFT programme from a thin oil leg over the interval 831.5-833.5 metres.

The well bottomed in sediments of Lower Cretaceous age.



Scale:	Hudbay Oil (Australia) Ltd. LOCATION MAP **SPERM WHALE - 1**	Date: April 1982
Drawn by: H.O.A.L.		Drawing N°: A4-GP-486

Figure 1

2. DRILLING

(Pages 6-19)

2.0 DRILLING

2.1 Drilling General

2.1.1 Drilling Data Summary

Drilling Contractor:	Petromarine Drilling Aust. Pty Ltd Office Suite 1-5 1st Floor, Stratham House 49 Melville Parade SOUTH PERTH WA 6151
Drawworks:	National 1625 powered by two 752 GE Traction motors
Blow Out Preventor Equipment	Two stack system 20-3/4" x 2000 psi - Hydril MSP Cameron double gate Type U 13-5/8" x 5000 psi - Hydril GL Cameron triple gate Type U
Elevation:	RT to MSL - 9.45m Water Depth - 54.5m Datum - rotary table (63.95m above seabed)
Pumps:	Two National 12-P-160 Triplex driven by two GE 752 motors

2.1.2 General Well Data

Location:	Latitude 38° 03' 25.863" S Longitude 148° 21' 51.644" E
0430 hrs	December 25th 1981 - Rig released from Whale No 1
0600 hrs	December 25th 1981 - arrived at location
0100 hrs	December 26th 1981 - spudded
2100 hrs	January 6th 1982 - TD reached
0600 hrs	January 22nd 1982 - Rig released
Days to total depth - 12 days	
2100 hrs	February 17th 1982 - Return to location to recover SS equipment
2230 hrs	February 19th 1982 - Left location

Hole and Casing Details:

Hole Size	Depth	Shoe Depth	Casing
36"	72m	70m	30" Grade B 310#
26"	208m	196m	20" X52 94# Cameron CC connectors
17½"	720m	710m	13-3/8" K55 61# BTC
12¼"	1417m	919m	9-5/8" K55 40# BTC

2.2 Daily Operation Record

2.2.1 Daily Drilling Operation Summary

See attached Figure 2.

2.2.2 Bottom Hole Assembly Record

26 December 1981 RR Bit No 1	Bit-Bit Sub-6x8" Drill Collars, Cross Over, 55.2 metres.
27 December 1981 Bit RR No 2	Bit-Bit Sub-12x8" Drill Collars, Cross Over, 8 Joint Heavy Wt Drill Pipe, 108 metres.
29 December 1981 RR Bit No 3	Bit-Bit Sub-12x8" Drill Collars, Cross Over, 1 Joint Heavy Wt, Jars, 11 Joint Heavy Wt, 102.7 metres.
30 December 1981 Bit No 4	Bit-Bit Sub-12x8" Drill Collars, Cross Over, 1 Joint, Heavy Wt Jars, 11 Joint Heavy Wt, 102.7 metres.
1 January 1982 RR Bit No 3	Bit-Bit Sub-12x8" Drill Collars, Cross Over, 1 Joint Heavy Wt, Jars, 8 Joint Heavy Wt, 79.4 metres.
3 January 1982 Bit No 5	Bit Junk Sub-Bit Sub-15x8" Drill Collars, Cross Over, 1 Joint Heavy Wt, Jars, 11 Joint Heavy Wt, 135.4 metres.
4 January 1982 Bit No 6	Bit-Bit Sub-2x8" Drill Collars, 12¼" Stab, 1x8" Drill Collar, 12¼" Stab, 12x8" Drill Collars, Cross Over, 1 Joint Heavy Wt, Jars, 11 Joint Heavy Wt, 252.6 metres.
5 January 1982 Bit No 7	Bit-Bit Sub-2x8" Drill Collars, 12¼" Stab, 1x8" Drill Collars, 12¼" Stab, 12x8" Drill Collars, Cross Over, 1 Joint Heavy Wt, Jars, 11 Joint Heavy Wt, 252.6 metres.
6 January 1982	Bit-Bit Sub-2x8" Drill Collars, 12¼" Stab, 1x8" Drill Collars, Cross Over, 1 Joint Heavy Wt, Jars, 11 Joint Heavy Wt, 252.6 metres.

Hudbay Oil (Australia) Ltd.
Subsidiary of Hudson's Bay Oil and Gas Company Limited

DAILY DRILLING OPERATIONS SUMMARY

WELL SPERM WHALE NO 1

DATE	DEPTH	OPERATION
25/12/81	NIL	Last anchor pulled on Whale No 1 at 0430 hours 25 December 1981. Underway to Sperm Whale No 1, arrived on location at 0600 hours.
26/12/81	75m	Ran anchors and moved onto location, and set temporary guide base. Spudded in at 0100 hours 26 December 1981. Drilled 36" hole from 64m to 72m. Laid out 36" hole opener and ran in hole with 26" bit. Drilled 26" hole from 72m to 75m.
27/12/81	208m	Continued drilling 26" hole from 75m to 208m. Conditioned mud and hole to run 20" casing. Hung permanent guide base in Moonpool and ran 10 joints of 20" casing. Landed casing and permanent guide base in temporary guide base.
28/12/81	208m	Circulated casing prior to cementing and cemented casing with 1155 sacks of cement. (See cementing and casing report for full details.) Ran in hole with Bull Nose and tagged top of cement at 140m. Removed rig floor and rigged up to run 20-3/4" BOP. Waited on weather 4½ hours. Ran 20-3/4" BOP stack.
29/12/81	343m	Finished running 20-3/4" BOP stack. Tested choke kill and manifold to Hudbay specification. Ran in hole with bit no 3, 17½" and drilled out cement and shoe. Displaced sea water with gel/polymer mud, and drilled from 208m to 212m. Performed leak off test equivalent to 18 ppg. Drilled from 212m to 343m. Surveyed at 227m, 1°. Slipped drilling line while pulling out of hole.
30/12/81	669m	Pulled out of hole with bit no 3 and retrieved survey 1° at 343m. Ran in hole with bit no 4. Drilled 17½" hole from 343m to 669m. Note while drilling through Gumbo section worked kelly and circulated on each connection.
31/12/81	720m	Continued drilling 17½" hole 669m to 720m13-3/8" casing point. Tripped to condition hole to log, - tight hole from 650m to 690m. Ran in hole, no fill on bottom. Circulated and conditoned mud and hole to log. Pulled out of hole to log. Ran logs: Run #1 DIT, BHGS,GR. Run #2 FDC, GR, CAL. Run #3 CST #1.
1/1/82	720m Float Collar @ 697.9m	Finished log no 3 CST no 1. Made up 13-5/8" well head equipment. Ran in hole and washed and reamed through tight spot from 673m to 699m and from 705m to 720m. Circulated and made wiper trip. Pulled out of hole and ran 54 joints of 13-3/8" casing. Landed casing with shoe at 709.7m. Tested cement line. Circulated casing volume and started mixing and pumping cement.
2/1/82	720m Float Collar @ 697.9m	Mixed and pumped 1043 sacks of cement. (See casing and cement report for details.) Backed out and pulled running tool. Pulled 20-3/4" BOP and rigged to run 13-5/8" BOP. Worked on blue and yellow pod, prepared to jump divers to check on obstruction in wellhead. Cancelled dive due to gale warning. Waited on weather and mixed bara-carb brine mud.
3/1/82	723m	Finished waiting on weather. Jumped divers and cleared obstruction from wellhead. Ran 13-5/8" BOP. Tested casing and BOP. (See BOP report for details.) Ran wear bushing and installed divertor. Ran in hole with bit no 5. Tagged cement at 677m. Drilled cement float collar and shoe. worked junk sub. Drilled 12¼" hole from 720m to 723m. Circulated bottoms up and performed leak off test equivalent to 15.61 ppg.
4/1/82	848m	Finished performing leak off test. Circulated and displaced hole with bara-carb brine and cleaned active tanks. Drilled 12¼" hole from 723m to 848m. Circulated bottoms up prior to making connections to prevent plugging bit jets. Dropped survey and pulled out of hole to 13-3/8" casing shoe at 709m. Retrieved survey 1½°. Ran in hole. Hole free. Attempted to unplug jets with no success. Pulled out of hole with bit no 5 and recovered ½ lb junk from junk sub. Ran in hole with bit no 6 to 832m.
5/1/82	1055m	Washed and reamed through tight spot from 832m to 848m. Circulated bottoms up to condition mud. Drilled ahead from 848m to 946m. Circulated bottoms up, dropped survey and pulled out of hole to 13-3/8" shoe. Retrieved survey 1½°. Ran in hole. Worked pipe and attempted to unplug jets with no success. Pulled out of hole. Ran in hole with bit no 7 to 926m. Washed and reamed through tight hole, 3m of fill. Drilled ahead from 946m to 1055m.
6/1/82	1292m	Continued drilling ahead from 1055m to 1292m. Circulated bottoms up. Dropped survey and pulled out of hole for bit change,- survey ½°. Made up re-run bit no 6 and ran in hole.
7/1/82	1417m	Continued running in hole to 13-3/8" casing shoe, slipped 6.5m drill line and finished running in hole to 1199m. Washed and reamed from 1199m. Washed and reamed from 1199m to 1292m-1294m fill on bottom. Drilled ahead with Bit #6 from 1292m to 1417m (T.D.) circulated bottoms up, dropped survey. Pulled out of hole to 13-3/8" casing shoe, tight hole from 1312m to 1417m 9.1 tonne over pull.

Figure 2

Hudbay Oil (Australia) Ltd.
Subsidiary of Hudson's Bay Oil and Gas Company Limited

DAILY DRILLING OPERATIONS SUMMARY

WELL SPERM WHALE NO 1

DATE	DEPTH	OPERATION
7/1/82 Cont.	1417m	Prepared 9-5/8" shoe and float collar. Ran in hole to 1321m - tight spot. Checked pumps, unable to get correct pump pressure.
8/1/82	1417m	Reamed and washed from 1321m to 1417m - 3 metre fill. Circulated and conditioned mud and hole to log. Pulled out of hole to log (steel line measurement .75m greater - no correction). Rigged up Schlumberger and logged DLL-MSFL-GR - tool not working. Cut 61m Schlumberger line and spliced same. OK. Ran DLL-MSFL-GR. Run #2 - Ran BHCS-GR. Attempted to run FDC-CNL-GR-EPL-GR. Commenced Velocity survey.
9/1/82	1417m	Finished running velocity survey. Ran HDT log. Ran RFT No 1 to 842m and collected samples. Ran RFT No 2 to 852m and collected samples. Ran RFT No 3 to 812m and collected samples. Laid out Schlumberger tools and equipment. Made up RR Bit #5 and ran in hole.
10/1/82	1417m	Finished running in hole to 1417m - hole free circulated. Conditioned mud and hole. Pulled out of hole to complete logging programme. Rigged up Schlumberger to run RFT. Ran RFT #4 and collected samplesfrom 836m - 850m - 859m. Ran RFT #5 and collected samples from 829.5m - 828m. Ran CST No 1 from 1411m to 917m. Ran CST No 2 723m - 1411m. Rigged down Schlumberger and laid out 8" drill collars and stabilizers. Ran in hole with open end drill pipe.
11/1/82	Float Collar @ 894.5m	Finished running into hole with open end drill pipe. Circulated and conditioned mud. Set cement plug from 1080m to 930m, pulled back to 925m and reversed out, recovered 4 bbl cement contaminated mud. Circulated and conditioned mud. Pulled out of hole and pulled wear bushing. Rigged up and ran 72 joints 9-5/8" K55 40 lb casing and landed same, shoe @ 919m. Circulated casing volume. Tested cement line to 4000 psi. OK. Mixed and pumped 396 sacks cement (see cement report for details). Backed out running tool and displaced to sea water. Ran and set 9-5/8" seal assembly and attempted to test same with no success.
12/1/81	Float Collar @ 894.5m	Pulled 9-5/8" seal assembly, and ran in hole with open end drill pipe. Circulated and washed out well head. Ran new 9-5/8" seal assembly and tested same to 2200 psi. OK. Pulled BOP stack and changed top pipe rams to 3½" rams. Repaired leak in yellow pod, tested BOP to Hudbay specifications. Ran BOP stack, jumped divers to hook up TV guide line. Landed and latched BOP's.
13/1/82	894.5m	Ran in hole with test plug and tested lower rams to 2200 psi. OK. Ran and set wear bushing. Ran in hole with 8½" bit and casing scraper, tagged top of cement @ 883m, drilled out cement from 883m to 894m. Circulated and conditioned mud and pulled out of hole. Rigged up and ran perforating gun and perforated from 839m to 848m with 4 shot per foot. Rigged up and checked fluted hanger spacing. Made up DST #1 and ran in hole, unable to pass packer through well head. Pulled test tools out of hole, found packer rubbers dislodged.
14/1/82	894.5	Replaced packer rubbers. Ran in hole with DST #1 - Gator Hawked tubing to 9000 psi. Made up EZ tree function tested and landed same. Packer set at 832.8m. Rigged up surface equipment, and pressure tested separator lines to 600 psi and surface equipment lines to 3000 psi. Conducted DST #1, open for 1st flow 2025 hours. Moderate blow. Closed for 1st shut in 2032 hours. Open for 2nd flow 2100 hours no blow, well dead at 2109 hours, closed tool for final shut in at 0010 hours. Unseated packer, observed well, rigged down surface equipment and pulled DST #1 - collected samples.
15/1/82	894.5m	Laid down test tools. Ran in hole with 8½" bit and casing scraper to 838m. Made repairs to rig SCR system. Finished running in hole to 894m and circulated bottoms up. Pulled out of hole and laid out casing scraper. Made up and ran DST 1A - Gator Hawked tubing to 9000 psi, ran diesel cushion to surface. Ran EZ tree. Hooked up surface equipment and pressure tested surface lines.
16/1/82	894.5	Finished pressure testing surface lines and set packer @ 832.5m. Attempted to run SPRO, strand parted on monoconductor, repaired same and ran in hole with SPRO. Attempted to open PCT, no flow, SPRO indicated no opening. Reset packer, attempted to open PCT with same results. Increased annulus pressure to final shut off point with no flow, ruptured pump out sub and reversed out diesel cushion. Laid out surface equipment and pulled out of hole. Laid out test tools. Redressed HRT and made up test tools for DST 1B, and ran in hole with diesel cushion to EZ tree. Rigged up surface equipment and pressure tested surface lines
17/1/82	894.5	Set packer at 832.8m, ran and latched SPRO, opened PCT and flowed well. Well died without unloading diesel cushion. Ruptured pump out sub and reversed out tubing contents. Unseated packer, rigged down surface equipment and pulled out of hole. Ran in hole with 8½" bit and casing scraper to 890m, circulated and conditioned mud. Pulled out of hole and rigged up Schlumberger. Ran and set 9-5/8" bridge plug @ 837m, tested casing to 2200 psi. OK. Ran perforating gun,

Figure 2

Hudbay Oil (Australia) Ltd.
Subsidiary of Hudson's Bay Oil and Gas Company Limited

DAILY DRILLING OPERATIONS SUMMARY

WELL SPERM WHALE NO 1

DATE	DEPTH	OPERATION
17/1/82 Cont.	894.5m	and perforated from 832m - 834m with 4 shot per foot. Made up DST tools for test #2 and ran in hole with same, Gator Hawk Tested to 2500 psi. Ran diesel cushion to EZ tree.
18/1/82	830m	Made up EZ tree. Flow head and surface equipment, pressure tested surface lines. Set packer @ 815.2m, conducted DST #2, opened PCT with strong to medium blow, 0919 hours gas to surface, 0941 hours oil trace at surface, 1049 hours gas only, 1057 hours closed PCT for final build up. Ruptured pump out sub and reversed out tubing contents. Unseated packer and circulated out hydrocarbons, laid out surface equipment and pulled DST string. Made bit and casing scraper, run to 835m, circulated and conditioned mud. Pulled out of hole, rigged up Schlumberger and set 9-5/8" bridge plug @ 830m. Tested casing to 2200 psi. OK. Ran perforating guns and perforated 819m to 826m with 4 shot per foot. Rigged down Schlumberger tools. Made up DST #3 and ran into hole.
19/1/82	817m	Finished running into hole with DST #3 with diesel cushion to EZ tree. Made up EZ tree - flow head and surface equipment, pressure tested surface equipment and set packer at 803m. Conducted DST #3. Opened for 1st flow @ 1327 hours ¼" choke, final well head pressure 250 psi. At 1334 hours closed for 1st shut in, TSIP 1193.4 psi. At 1405 hours opened for 2nd flow, FWHP 855 psi on ½" choke. At 1545 hours closed for final shut in 1206.7 psi. Ruptured pump out subs and reversed out tubing contents. Unseated packer and circulated annulus free of hydrocarbons. Rigged down surface equipment and pulled out of hole laying down tubing. Collected samples and laid out test tools. Rigged up Schlumberger and set bridge plug @ 817m.
20/1/82	100m	Rigged down Schlumberger, ran in hole with open end drill pipe to 817m. Mixed and pumped 36 sacks cement plug from 817m to 787m. Pulled 3 stands and reversed out. Pulled out of hole to 165m, mixed and pumped 72 sacks cement, plug from 165m to 100m. Pulled 3 stands and reversed out. Pulled wear bushing, attempted to pull 9-5/8" seal assembly - no success. Made tool joints up dry, ran in hole and pulled seal assembly. Nippled down and pulled BOP stack. Made up 9-5/8" casing cutter - unable to stab into well head. Rigged up guide rope below marine swivel and stabbed into well head. Attempted to cut 9-5/8" casing, tool did not open. Repaired casing cutter, attempted to cut casing @ 78m, tool malfunction - lost all pump pressure. Pulled casing cutter out of hole.
21/1/82	100m	Ran into hole with 9-5/8" running tool and attempted to pull 9-5/8" casing - no success. Ran in hole with 9-5/8" casing cutter, tool still would not function. Laid out casing cutter and picked up new hydraulic casing cutter, cut off 9-5/8" casing and well head. Ran 13-3/8" casing cutter. Cut 13-3/8" casing at 76.4m, attempted to pull 13-3/8" casing - no success. Redressed 13-3/8" casing cutter and recut 13-3/8" casing @ 76.4m, attempted to pull same. Worked jars and attempted to circulate - no success. Pulled casing cutter, and ran in hole with 13-3/8" running tool and jars, attempted to jar casing loose - no success. Pulled running tool, redressed casing cutter - new cutter blades would not pass through well head. Redressed casing cutter with used blades and cut 13-3/8" casing @ 71.2m.
22/1/82	100m	Finished cutting 13-3/8" casing @ 71.2m, ran into hole with running tool and pulled 13-5/8" well head. Made up 20" casing cutter and cut casing @ 71m. Attempted to pull same with maximum over pull 181 tonnes and 3000 psi - no success. Jumped diver and secured pennant wire to permanent guide base for marker buoy. Pulled anchors and retrieved pigtail with divers, last anchor pulled and secured at 0600 hours 22/1/82. Underway to West Seahorse #2 location.
18/2/82	100m	At 1430 hours underway to Sperm Whale #1 to retrieve well head. Arrived on location at 2100 hours, 17/2/82. Set 4 anchors, attempted to position rig over well head - no success. Reset #3 anchor.
19/2/82	100m	Finished resetting #3 anchor, positioned rig over well head. Jumped divers to secure guide lines for TV camera. No 3 anchor dragging due to 40 knot wind and 4.3m seas, rig off location. Waited on weather.
20/2/82	100m	Finished waiting on weather. Jumped divers, placed charge in well head. Moved rig off location and blew wellhead. Re-positioned rig over location. Pulled 20" x 30" well head and permanent guide base. "J" into temporary guide base and pulled same. Pulled anchors and retrieved pigtails with divers. Loaded and secured workboats, pulled last anchor @ 2230 hours. Underway to WA-58P location @ 2230 hours 19/2/82.

Figure 2

13 January 1982	Bit-Casing Scraper-Bit Sub-12x6½" Drill Collars, Cross Over, 112.4 metres.
15 January 1982	Bit-Casing Scraper-Bit Sub-12x6½" Drill Collars, 3x4-3/4" Drill Collars, Cross Over, Tubing to Surface, 140.6 metres.

2.2.2 Bit Record

See 'Bit Record' attached as Figure 3.

2.2.4 Time Breakdown Survey

See 'Well Time Breakdown Analysis' as Figure 4.

2.2.5 Well History Chart

See 'Well History Chart' as Figure 5.

2.3 Casing Record

2.3.1 Casing Details

See 'Casing and Tubing Tallies' as Figures 6.

2.3.2 Cementation Details

See 'Casing Running Reports' as Figures 7.

2.4 Mud System

2.4.1 Mud Report Summary

36"/26" Hole Section

The 36"/26" hole section was drilled from 64m to 208m in 12.5 hours, 20" casing was then run and cemented at 195.5m. Mud cost for this section was $4,540.55

The well was spudded with a 26" bit and 36" hole opener and drilled from 64m to 72m; seawater was circulated with returns to the sea bed. After spotting 30 bbls of Gel Spud Mud, the bit and hole opener were pulled and laid down. A 26" bit was used to drill ahead, pumping seawater and spotting 20 bbls Gel Spud Mud prior to each connection. At 208m the hole was displaced with 360 bbls of Gel Spud Mud and a wiper trip made. A further 500 bbls of mud was pumped before pulling out and setting 20" casing at 195.5m.

Drawn by: A.Clark

Scale: N.T.S.

WELL NAME: SPERM WHALE NO 1 LOCATION: GIPPSLAND BASIN RT-SB/GL 64 m.

RIG: PETROMAR NORTH SEA CONTRACTOR: PETROMARINE DRILLING AUST. PTY LTD HOAL DRLG SPVSR. H SHIRE/B MCELHINNEY

SPUD DATE: 26 DECEMBER, 1981 COND. CSG: 208 m SURF. CSG: 720 m INTER. CSG: 919 m SEC. INTER. CSG: m

DATE AT TD: 6 JANUARY, 1982 PUMP NO 1: NATIONAL 12-P-160 PUMP NO 2: NATIONAL 12-P-160 PUMP POWER: 1600 HP

MUD TYPE: SW/Gel, Brine ~~Bara~~ Carb TOOL JTS: Size - 4½" Type - IF O.D. 6-3/8

DRILL COLLARS: No. - O.D. - 8" I.D. - 2-7/8" Length -

BIT NO.	SIZE	MAKE	TYPE	JETS	SERIAL NO.	DEPTH IN (M)	DEPTH OUT (M)	M/HR	WT (TONNES)	RPM	PUMP PR. (kPa)	PUMP VOL. (L/MIN)	T	B	G	Other	FORMATION/ REMARKS
IRR	36"	SEC	HO	3x24	7850	64	72	3.2	4.5	60	1380	1770	2	1	I		
	26"	HTC	OSC3AJ	3x24	RB267												
2	26"	HTC	OSC3AJ	3x18	LJ320	72	208	13.6	6.8	60	5860	1770	2	1	I		
3RR	17½"	HTC	OSC3AJ	3x15	RX789	208	343	15.8	6.8	70	10000	2450	3	4	I		
4	17½"	HTC	OSC3AJ	3x15	AZ033	343	720	15.1	13.6	80/100	14500	3130	2	5	I		
RR3	17½"	HTC	OSC3AJ	3x15	RX789		REAM AND CONDITION HOLE					3320	3	4	I		
5	12¼"	HTC	JD3	3x13	HX208	720	848	17	18.2	70	12000	1960	2	2	I		
6	12¼"	HTC	J33	3x12	084BG	848	946	15	18.2	80	12400	1660	2	1	I		
7	12¼"	HTC	JD4	3x15	FV265	946	1292	13	18.2	90	12600	1560	5	2	1/16		
RR5	12¼"	HTC	JD3	2x15 Blank	HX208	1292	1417	11.3	20.5	90	12400	1560	4	4	1/8		
8RR	8½"	HTC	XV	Open	57062		DRILLING OUT CEMENT										
RR8	8½"	HTC	XV	Open	57062		CASING SCRAPER RUN										

Hudbay Oil (Australia) Ltd.

BIT RECORD
SPERM WHALE-1

Date: March 1982

Drawing No: A4-DR-466

Figure 3

Author: A.I.
Drawn: A.Clark
Date: March 1982

WELL TIME BREAKDOWN ANALYSIS
SPERM WHALE-1

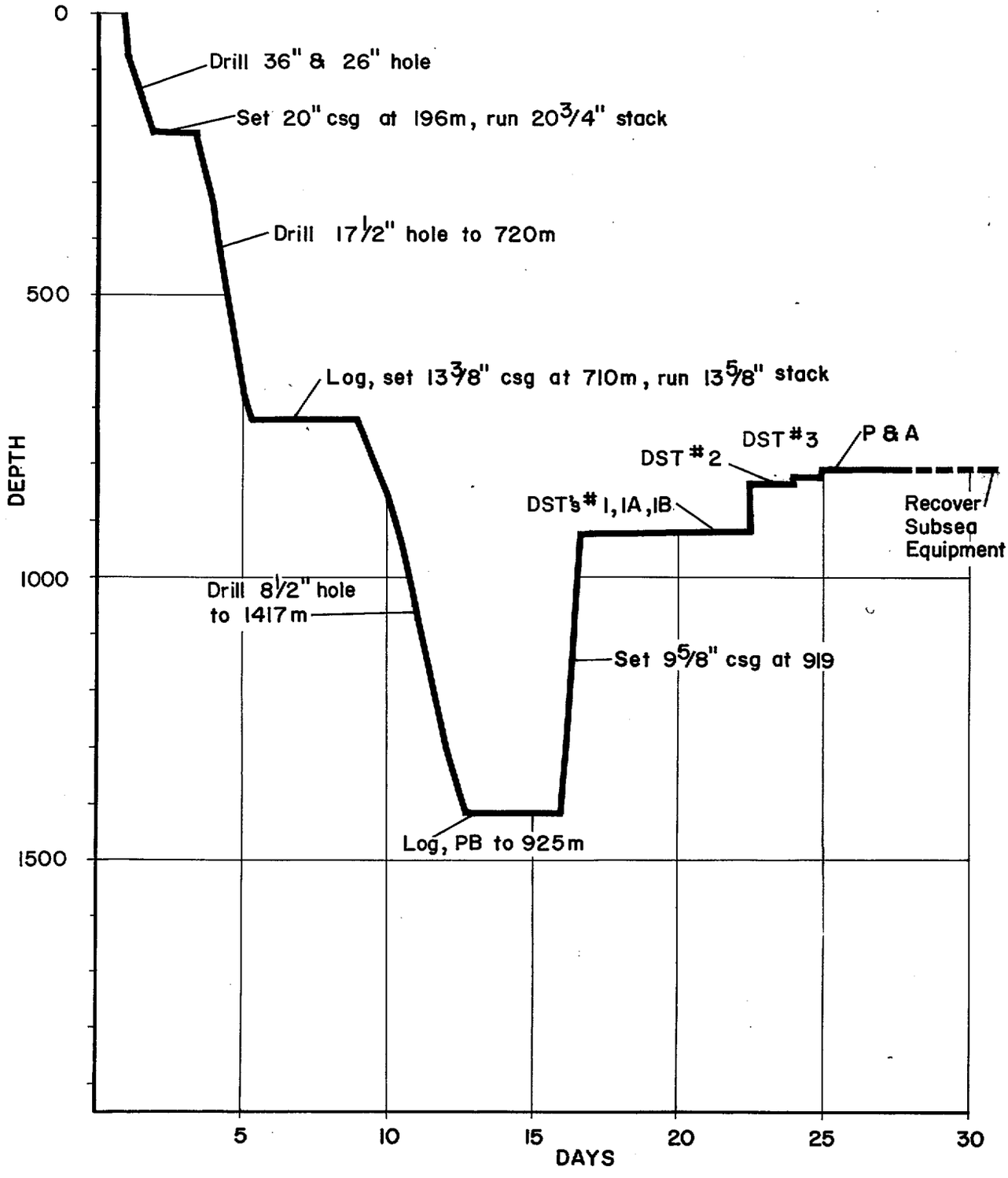
Hudbay Oil (Australia) Ltd.

TIME ANALYSIS (Hours)	Moving/ Anchoring	36"/26" Hole	17½" Hole	12¼"Hole	8½"Hole	6"Hole	Comp/Test	Total	%
DRILLING:									
Moving to/from Location	1½						6	7½	1.0
Anchor Handling	16½						33	49½	6.8
Drilling		12½	33½	53½				99½	13.7
Round Trips		4½	6½	20½				31½	4.3
Reaming, Cond. Hole, Cond. Trips		4½	11½	22				38	5.2
Running, Pulling and Cementing Casing		17½	17½	5			20½	60½	8.3
Running, Pulling Subsea Equipment		13	21½					34½	4.7
Testing Wellhead and BOP's		3½	6					9½	1.3
Plugging Back, Abandonment, Completion				9			76	85	11.7
Curing Lost Circulation									
Fishing and Washouts									
Well Control									
Surveys			1½	5				6½	0.9
Downtime: Weather		4½	10				14½	29	4.0
Mechanical Surface									
Mechanical Subsea									
Others									
EVALUATION:									
Circulating Samples				2				2	0.3
Hole Cond, Trips for Coring, Logging, Testing			8½	11				19½	2.7
Coring									
Electric Logging			13½	27½				41	5.6
Wireline Flow Testing				21½				21½	3.0
Drill Stem and Production Testing							185½	185½	25.5
Downtime: Logging				3½				3½	0.5
Flow Testing									
Others									
OTHERS			1½	2½				4	0.5
(Attempting to unplug jets, Repositioning rig)									
Total Time	18	60	131½	183			335½	728	
% Downtime		7.5	7.6	1.9				4.5	

Scale: N.T.S.
Drawing No: A4-DR-545

Figure 4

SPUD: 0100 hrs, 26/12/81
RR: 0600 hrs, 22/1/82
RETURN TO LOCATION TO
RECOVER SS EQUIP: 2100 hrs, 17/2/82
LEAVE LOCATION: 2230 hrs, 19/2/82



Author: K. Putnam	Hudbay Oil (Australia) Ltd.	Scale: N.T.S.
Drawn: A. Clark	SPERM WHALE-1	
Date: April 1982	WELL HISTORY CHART	Drawing No: A4-DR-497

Figure 5

UDBAY OIL (AUSTRALIA) LIMITED

Casing and Tubing Tally

(METRIC)

Well Name and No. SPERM WHALE NO 1 Date 27 DECEMBER 1982 Casing Size 20"

Weight 94 lb/ft Grade X52 Connection CIW 'CC' Joints Run 12 + WH

Joint No.	Length of (m) joint	Total in (m) Hole	Joint No.	Length of (m) Joint	Total in (m) Hole	Joint No.	Length of Joint	Total in Hole
	•							
	•		Carried Forward			Carried Forward		
01	12·55	Inc Shoe	41	•		81	•	
02	12·51		42	•		82	•	
03	12·51		43	•		83	•	
04	12·53		44	•		84	•	
05	12·52		45	•		85	•	
06	12·51		46	•		86	•	
07	12·52		47	•		87	•	
08	12·51		48	•		88	•	
09	12·52		49	•		89	•	
10	12·51		50	•		90	•	
Sub tot	125·19		Sub tot	•		Sub tot	•	
11	10·13	30" x 20" WH	51	•		91	•	
12	•		52	•		92	•	
13	•		53	•		93	•	
14	•		54	•		94	•	
15	•		55	•		95	•	
16	•		56	•		96	•	
17	•		57	•		97	•	
18	•		58	•		98	•	
19	•		59	•		99	•	
20	•		60	•		100	•	
Sub tot	•		Sub tot	•		Sub tot	•	
21	•		61	•				
22	•		62	•				
23	•		63	•				
24	•		64	•				
25	•		65	•				
26	•		66	•				
27	•		67	•				
28	•		68	•				
29	•		69	•				
30	•		70	•				
Sub tot	•		Sub tot	•				
31	•		71	•				
32	•		72	•				
33	•		73	•				
34	•		74	•				
35	•		75	•				
36	•		76	•				
37	•		77	•				
38	•		78	•				
39	•		79	•				
40	•		80	•				
Sub tot	•		Sub tot	•				

TALLY SUMMARY

Group No. Ending	Length (Forward)
10	125·19
20	10·13
30	•
40	•
50	•
60	•
70	•
80	•
90	•
100	•
TOTAL	135.22

Tally By

Checked By

REMARKS Rotary Table to top of 30" x 20" Wellhead Housing = 60.23m

(i.e. Seabed = 64m RT less top of W/H to seabed of 3.77m)

Length of 20" Casing String 135.32m

Depth of 20" Casing Shoe = 195.55m

Operator's Representative

Figure 6

UDBAY OIL (AUSTRALIA) LIMITED

Casing and Tubing Tally

(METRIC)

Well Name and No. SPERM WHALE NO 1 Date 30 DECEMBER 1981 Casing Size 13-3/8"

Weight _____ Grade _____ Connection _____ Joints Run _____

Joint No.	Length of (m) joint	Total in (m) Hole	Joint No.	Length of (m) Joint	Total in (m) Hole	Joint No.	Length of Joint	Total in Hole
	·							
01	11·84	Centralizer	Carried Forward			Carried Forward		
	0·4	Collar	41	11·81		81	·	
02	11·84	Centralizer	42	11·94		82	·	
03	11·93		43	12·08		83	·	
04	11·92	Centralizer	44	11·98		84	·	
05	11·91		45	12·02		85	·	
06	11·82		46	11·56		86	·	
07	11·28		47	12·09		87	·	
08	11·91		48	12·09		88	·	
09	12·04		49	11·96		89	·	
10	12·09		50	11·82		90	·	
Sub tot	119·61	Inc Shoe & Collar	Sub tot	119·35		Sub tot	·	
11	11·99		51	11·86		91	·	
12	11·96		52	12·08		92	·	
13	12·00		53	12·09		93	·	
14	11·87		54	11·95		94	·	
15	11·97		55	4·37	WH Hanger	95	·	
16	11·87		56	·		96	·	
17	12·08		57	·		97	·	
18	11·90		58	·		98	·	
19	11·81		59	·		99	·	
20	12·05		60	·		100	·	
Sub tot	119·50		Sub tot	52·35		Sub tot	·	
21	11·98		61	·				
22	11·98		62	·				
23	12·00		63	·				
24	11·82		64	·				
25	11·84		65	·				
26	12·00		66	·				
27	12·06		67	·				
28	12·08		68	·				
29	12·05		69	·				
30	11·94		70	·				
Sub tot	119·75		Sub tot	·				
31	11·95		71	·				
32	11·87		72	·				
33	12·09		73	·				
34	11·70		74	·				
35	11·90		75	·				
36	12·08		76	·				
37	11·88		77	·				
38	11·93		78	·				
39	12·07		79	·				
40	119·32		80	·				
Sub tot	·		Sub tot	·				

TALLY SUMMARY

Group No. Ending	Length (Forward)
10	119·61
20	119·50
30	119·75
40	119·32
50	119·35
60	52·35
70	·
80	·
90	·
100	·
TOTAL	649 88

Tally By _____

Checked By _____

REMARKS RT - Top of 13-5/8" WH = 59.89m
Shoe @ 709.77m BRT (TD 17½" OH = 720m)
Total of 63 joints on board
Therefore 9 left on deck on completion
Length 13-3/8" R/T = 0.44m

Operator's Representative J B McElhinney

Figure 6

[illegible]ODBAY OIL (AUSTRALIA) LIMITED

Casing and Tubing Tally

(METRIC)

Well Name and No. SPERM WHALE NO 1 Date 4 JANUARY 1982 Casing Size 9-5/8"

Weight 40 lb/ft Grade K 55 Connection BTC Joints Run

Joint No.	Length of (m) joint	Total in (m) Hole	Joint No.	Length of (m) Joint	Total in (m) Hole	Joint No.	Length of Joint	Total in Hole
FS	0.51							
01	11.76	Centralizer	Carried Forward			Carried Forward		
02	11.79		41	11.41		81	11.69	
FC	0.44		42	11.98		82	11.88	
03	11.90	Centralizer	43	11.87		83	11.86	
04	11.49		44	11.64		84	11.71	
05	11.89	Centralizer	45	12.08		85	12.08	
06	12.08		46	11.97		86	11.81	
07	11.76		47	11.81		87	11.08	
08	12.08	Centralizer	48	11.79		88	11.81	
09	11.73		49	11.79		89	11.78	
10	12.04	Centralizer	50	11.97		90	11.95	
Sub tot	119.41	Marker Jt	Sub tot	118.31		Sub tot	117.65	
11	12.08	796.55	51	11.87		91	11.80	
12	11.97		52	11.77		92	11.75	
13	11.73		53	11.85		93	12.06	
14	11.93		54	11.93		94	12.06	
15	11.77		55	11.85		95	11.92	
16	11.78		56	11.80		96	11.85	
17	11.78		57	11.66		97	12.09	
18	11.74		58	11.57		98	11.89	
19	11.74		59	11.84		99	11.80	
20	12.07		60	11.76		100	12.06	
Sub tot	118.59		Sub tot	117.90		Sub tot	119.28	
21	11.68		61	11.93				
22	11.94		62	11.79				
23	11.75		63	11.71				
24	11.86		64	11.96				
25	11.71		65	11.87				
26	11.64		66	11.87				
27	11.76		67	11.72				
28	11.69		68	11.70				
29	11.95		69	11.71				
30	11.70		70	11.62				
Sub tot	117.68		Sub tot	117.88				
31	11.80		71	11.81				
32	12.08		72	11.80	3.01 Pup Jt.			
33	11.86		73	11.86	0.33 Hanger			
34	12.08		74	11.70	64.04 L/S			
35	11.76		75	11.72				
36	11.99		76	12.02				
37	11.75		77	11.81				
38	11.67		78	11.98				
39	11.82		79	11.91				
40	11.82		80	11.81				
Sub tot	118.63		Sub tot	118.42				

TALLY SUMMARY

Group No. Ending	Length (Forward)
10	119.47
20	118.59
30	117.68
40	118.63
50	118.31
60	117.90
70	117.88
80	118.42
90	117.65
100	119.28
TOTAL	1065.91
Tally By	415.48
Checked By	1481.39

REMARKS TOTAL JOINTS - 135

Plus 4 Pup Joints A 3.56 - B 3.84 - C 3.01 - D 3.01

Operator's Representative

Figure 6

HUDBAY OIL (AUSTRALIA) LIMITED

Casing, Running Report

Well Name and No. SPERM WHALE NO. 1 Date 27 December 1981 Casing Size 20"

HOLE	Size	36"	26"			
	Depth (m)	72m	208m			
CASING	Size	30"	20"			
	Depth (m)	70.36m	195.55			

MUD: Type Spud Mud s.g. 1.04 Vis. 93 YP WL

Power Tong Torque Maximum C.I.W. 'CC' Con. ft/lbs. Minimum ft/lbs.

Fill up Points Ea. Jt

Calc. Displ. (m^3) DP and Casing 144.8 Pump Strokes By H.O.W.C.O.

250 psi Max 1100 psi

CASING INFORMATION		m	m
TD			208.00
OFF BOTTOM		12.45	
Shoe (make and type)	Landed at		195.55
Length Shoe		12.55	183.00
Total 10 Joints. Grade X52 wt. 94 lb/ft ID. 19.124 ins.		112.64	70.36
Landing Collar (make and type)			
Hanger or Suspension joint (make and type) C.I.W. 30"x20" W/H		10.13	60.23
Top Hanger or Suspension joint			
Landing String	Running Tool	.31	59.92
	Pup Jt & HWT DP	- 63.69	- 3.77
metres above R.T. at Zero Tide			3.77
Less tide of	No Correction		
metres up from R.T.			3.77

DETAILED CASING AND CEMENTING REPORT

Ran a total of 10 Jts and landed same top of 20" at 60.23m and shoe @ 195.55. Circulated total volume DP + casing 160 + bbls prior to cementing. Pressure tested cement line and valves to 2000 - no surface leaks visable. Pumped 10 bbl preflush. Mixed lead slurry with 330 sacks 'G' cement with 220 bbls fresh water with 2.5% gel, average slurry wt. 13 ppg.

Followed with tail mix and pumped 300 sacks class 'G' cement mixed with 37 bbls seawater with 2% $CaCl_2$, average slurry wt 15.6 ppg.

Started displacing at 0845 with seawater. Displaced 85 bbls, pressure increased immediately from 250 psi to 900 psi. Increased pressure to 1100 psi and pressure fell to 150 psi immediately. Continued displacing additional 15 bbls. Good cement returns at sea bed. Checked float shoe, not holding. Surged float - still would not hold. Stopped displacing 45 bbls short due to sudden pressure loss. W.O.C. 2½ hrs - holding OK. Ran in hole with bull nose to confirm top of cement. Tagged top of cement at 164m. A total of 101' cement left in casing.

Operators Representative H. SHIRE

Figure 7

HUDBAY OIL (AUSTRALIA) LIMITED

Casing, Running Report

Well Name and No. SPERM WHALE NO. 1 Date 2 January 1982 Casing Size 13-3/8"

HOLE	Size	36"	26"	17½"		
	Depth (m)	72m	208m	720m		
CASING	Size	30"	20"	13-3/8"		
	Depth (m)	70.36m	195.55m	709.77m		

MUD: Type SW/Gel/Poly s.g. 1.19 Vis. 43 YP 17 WL 19.6

Power Tong Torque Maximum 10,000 ft/lbs. Minimum 7,000 ft/lbs.

Fill up Points Every 5 Jts

Calc. Displ. (m^3) HWDP 1.7 bbl casing 318 bbls Pump Strokes Displaced with H.O.W.C.O. unit

250 psi Initial 550 psi Final

CASING INFORMATION	Lgth m	m B.R.T.
TD		720
OFF BOTTOM	10.23	709.77
Shoe (make and type) With Lamb float shoe Landed at		709.77
Length Shoe	0.60	709.17
1 Joints. Grade K55 wt. 61 lb/ft ID. 12.515 ins.	11.84	697.33
Landing Collar (make and type) With Lamb baffle collar	0.43	696.90
53 Jts 13-3/8" K55 61#/ft casing	632.64	64.26
Hanger or Suspension joint (make and type) CIW 13-5/8" WH for 20"x13-5/8" WH	4.37	
Top Hanger or Suspension joint Complete with landing Jt		59.89
Landing String Running Tool	0.44	59.45
7xJts HWDP	64.26	
metres above R.T. at Zero Tide		- 4.81
Less tide of No Correction		
metres up from R.T.		- 4.81

DETAILED CASING AND CEMENTING REPORT

a) Ran a total of 54 Jts of 13-3/8" casing. Thread locked 1st two connection, float shoe and baffle collar, and also Jt below WH landing Jt.
b) Ran centralizers on Jt 1, Jt 2 and Jt 4.
c) Broke circulation prior to running out of 20" shoe.
d) On landing took 20,000 lbs overpull to confirm latch into 20".

Cemented Casing as follows:-

a) Circulated Int. volume of casing + DP prior to cementing.
b) Cement Job - tested lines to 3000 psi.
Pumped 10 bbls CS2 spacer ahead.
Fill Slurry: Mixed and pumped 224 bbls of 2.5% pre-hyd gel + 0.75% CFR2 mixed water with 811 sacks of Class 'B' cement and 202 sacks Class 'G' cement at an average slurry Wt of 1.62 SG (13.5 ppg).
Tail Slurry: Mixed and pumped 37 bbls of D/W with 300 sacks Class 'B' cement neat an average slurry Wt of 1.89 SG (15.8 ppg).
Displacement: Did not drop dart and launch top wiper plug due to the potential of a leak on the cement head, caused by an inability to keep two coarse thread connections tight.
Pumped 5 bbls D/W behind followed with 315 bbls of active mud, via H.O.W.C.O unit. Returns and pressure increased throughout job.
No flow back on release of pressure.

Operators Representative B. McELHINNEY

Figure 7

HUDBAY OIL (AUSTRALIA) LIMITED

Casing, Running Report

Well Name and No. SPERM WHALE NO. 1 Date 10 January 1982 Casing Size 9-5/8"

HOLE	Size	36"	26"	17½"	12¼"	
	Depth (m)	72m	208m	720m	930m	
CASING	Size	30"	20"	13-3/8"	9-5/8"	
	Depth (m)	70.36	195.55	709.77	919.03	

MUD: Type Baracarb Brine s.g. 1.29 Vis. 118 YP 17 WL 10.7

Power Tong Torque Maximum 7000 ft/lbs. Minimum 4200 ft/lbs.

Fill up Points Each 2 Jt

Calc. Displ. (m^3) 209 Pump Strokes By H.O.W.C.O.

_____ psi _____ psi

CASING INFORMATION

TD		925.00
OFF BOTTOM	- 5.97	919.03
Shoe (make and type) Baker Float Shoe Landed at	- .51	918.52
Length Shoe		
2 Joints. Grade K55 wt. 40 lb/ft ID. 8.835 ins.	-23.55	894.97
Landing Collar (make and type) Baker Float Collar	- .44	894.53
70 Jt 9-5/8" K55 40# Casing	-827.57	66.96
Marker Jt	- 3.56	63.40
Pup Jt made up on Hanger	- 3.01	60.39
Hanger or Suspension joint (make and type) C.I.W.		
Top Hanger or Suspension joint 13-5/8 x 9-5/8 Casing Hanger	.33	60.06
Landing String 7 Jt HWT DP	- 1.4.06	- 4
metres above R.T. at Zero Tide		
Less tide of		
metres up from R.T.		4 meters

DETAILED CASING AND CEMENTING REPORT

Ran a total of 72 Jt K55 40# with shoe at 919.03 float collar at 894.53 and marker Jt at 796.55. Landed casing and circulated total volume of DP and Casing and pressure tested cement line to 4000 psi - OK. Pumped 20 bbls tight cement mixed with fresh water ahead. Mixed and pumped 396 sacks class 'B' cement mixed with 49 bbls freshwater + .75% CFR2. Displaced with 2 bbls mud. Dropped dart and shear plug with 3200 psi followed with 207 bbls mud. Plug did not seat. Pumped 4 more bbls mud. Plug did not pump. Released pressure - float holding OK. Bled back 1.5 bbl mud static.

NOTE: While cementing had trouble shifting cement to surge tank. Drilling Supt. has ordered valves and flanges to help prevent this problem again.

Operators Representative H. SHIRE

Figure 7

17½" Hole Section

The 17½" hole was drilled from 208m to 720m in 33.5 hours, at a mud cost of $7,416.30. The 13-3/8" casing was set at 709.8m. No major problems were encountered.

After some delay, due to bad weather, the 20" BOP and marine riser were run and latched. The BOP's were tested and then a 17½" bit was run in, tagging cement at 164m. Seawater was used while drilling out the cement and casing shoe. The seawater was then displaced with Seawater/Gel/Polymer mud, new hole drilled to 212m and a leak off test performed (equivalent to an SG of 2.16). Drilling was then resumed and continued down to 550m without any difficulties. Below 550m some problems were encountered with gumbo plugging the flowline and shaker possum belly; this involved some loss of mud over the bell nipple and from the possum belly while cleaning out the gumbo. To help minimize this gumbo problem the hole was circulated and reamed prior to each connection. TD for the 17½" hole phase was reached at 720m and after circulating bottoms up a wiper trip was made to the 20" casing shoe; tight hole was encountered from 650 - 690m and this section was reamed, there was no fill on bottom. After circulating to condition the hole and mud, the Schlumberger logs were run.

After logging, a 17½" bit was run and reamed tight spots from 673-699m and 705 - 720m. After circulating, a wiper trip was made, the hole was again circulated and conditioned, and then 13-3/8" casing was run and cemented at 709.8m.

The claystones and marls drilled were highly dispersible and this, combined with the high penetration rates, necessitated heavy dilution and treatments with Q-Broxin to maintain the rheological properties; Condet was also used. To help control weight and keep solids content as low as possible, the desilter was run continuously, the desander was also run when the other centrifugal pump was not required for the mixing hopper. Dextrid was used to reduce the water loss to about 15 ml/30 min by casing depth.

12¼" Hole Section

The 12¼" hole phase was drilled from 720m to 1417m in 51.5 hours. A low solids Baracarb-Brine mud was used to minimize formation damage in the objective zone, this resulted in a relatively high mud cost of $68,249.56. After running Schlumberger logs, 9-5/8" casing was set at 919m in preparation for testing the well.

Once again bad weather delayed the landing of the BOP stack, however, this time was utilized to mix the Baracarb-Brine for the 12¼" hole phase. After landing and testing the BOP's a 12¼" bit was run in and cement tagged at 677m. Seawater/ Gel/Polymer mud was circulated while drilling out the cement and shoe, and then making new hole to 723m; a leak off test was then conducted (equivalent to 1.87 SG). The hole was then displaced with Baracarb-Brine mud and the active tanks were dumped, cleaned and filled with the remaining Baracarb-Brine; due to lack of chemicals it was not possible to prepare enough mud to fill all of the active tanks. Drilling of 12¼" hole continued to 848m, circulating bottoms up before each connection to collect cuttings samples (drilling objective zone). After taking a survey at 848m the bit jets (3 x 13/32") were found to be plugged and a wet trip had to be made; approximately 90 bbls of mud was lost. Plugging of the bit jets (this time 3 x 12/32") occurred again while taking a survey at 946m; approximately 55 bbls of mud was lost this trip. For the remainder of the well, bits were run with 2 x 15/32" and the third jet blanked off; no further plugging occurred. When tripping at 1293m for a new bit, tight hole was encountered at 1199m and it was necessary to wash and ream back to 1293m; the old bit was graded 1/16" undergauge. Drilling continued to TD at 1417m, bottoms up was circulated and a wiper trip made to the 13-3/8" casing shoe. Overpull of 15 - 20,000 lbs occurred when pulling out and when running back in, it was necessary to wash and ream from 1321m back to TD. After circulating to condition the mud and hole, Schlumberger logs were run.

A conditioning trip was made reaming 1407 - 1414m with no fill, circulated, pulled out and continued running RFT's and CST's.

When logging was completed, a 12¼" bit was run to bottom and the hole circulated to ensure that the mud weight was consistent throughout the system. A balanced cement plug was then set from 1080 - 930m. Cement and contaminated mud was reversed out, then the hole was circulated and conditioned for casing. The 9-5/8" casing was run and cemented at 919m.

Baracarb-Brine was utilized to provide an inhibitive weighted fluid with a minimum solids content; an SG of 1.25 was obtained using KCl, $CaCl_2$ and $CaCO_3$ - the KCl and $CaCl_2$ also had an inhibiting affect on drilled clays. Due to a lack of sufficient KCl and $CaCl_2$ it was not possible to build enough mud volume to completely fill the active mud tanks, this meant that the available solids control equipment could not be utilized. Also the lack of materials meant that the concentration of KCl could only be maintained between 57.0 and 63.5 kg/m^3 and this may have limited the inhibitive quality of the mud. The lack of pit volume also affected the size of shale shaker screens used, until the polymers in the fluid had shear thinned it was not possible to use screens finer than 40 mesh as mud would be lost off the ends of the screens. By the time additional chemicals were received and extra volume could be built, the drill solids content had risen and the mud weight increased to 1.31 - 1.32 SG. Dilution, fitting finer shaker screens and running the desilter/mud cleaner enabled the weight to be controlled at 1.28 - 1.29 SG but no further reduction was possible without drastic dilution. Large additions of Dextrid were necessary to control the API filtrate less than 12 ml/30 mins. Rheological properties were maintained with additions of HEC and XC-Polymer. The increase in drill solids content appears to have had little affect.

Testing

Three drill stem tests were conducted, with perforations at 848 - 839m, 834 - 832m and 826 - 819m. Additional materials to maintain optimum rheology and mud weight were required during this phase, with testing being completed on January 18. The well was plugged and abandoned on January 19, 1982.

2.4.2 Mud Engineering

Mud engineering services and mud materials were supplied by Baroid Australia Pty Ltd. The engineers at the wellsite were: Dann Quinn, Alan Searle and Peter Ledden.

2.4.3 Mud Record

See attached Mud Properties form per Figure 8.

2.4.4 Materials Consumption and Costs

Materials	Unit	Cost Unit	Quantity	Cost
36" and 26" Hole - Interval 64-208m				
Gel	100 lb	15.50	275	4262.50
Caustic	23 kg	17.70	8	142.00
Lime	25 kg	6.75	13	87.75
Q-Broxin	25 kg	24.15	2	48.30
		TOTAL COST FOR 36"/26" HOLE		$4540.55
17½" Hole - Interval 208-720m				
Gel	100 lb	15.50	90	1395.00
Baradefoam	5 gal	98.00	3	294.00
Caustic	23 kg	17.75	40	710.00
Coat 888	50 kg	23.20	4	92.80
Condet	55 gal	395.00	3	1186.50
Dextrid	50 lb	51.60	35	1806.00
Q-Broxin	25 kg	24.15	80	1932.00
		TOTAL COST FOR 17½" HOLE		$7416.30

HUDBAY OIL (AUSTRALIA) LIMITED

Mud Properties

WELL SPERM WHALE NO. 1

MUD COMPANY: BAROID

1. Specific gravity
2. Viscosity (sec)
3. A.P.I. Water Loss (ml)
4. $CaCO_3$ ppb
5. A.P.I. Cake (millimetre)
6. Sand (%)
7. Chloride (ppm x 1000)
8. pH
9. Solids (%)
10. Plastic Viscosity (cp @ 50°C)
11. Yield Point (lb/100ft.^{2})
12. Gels (lb/100ft.^{2} 10 sec/10 min)
13. Total Hardness (epm)
14. Pf
15. $CaCl_2$ ppb
16. KCL ppb
17. Other salts ppb
18. Bentonite kg/m3

Date	Depth 0600 hrs (metres)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Dec 26	-	1.04	100+																
27	208	1.04	93																
28	227	1.09	41	NC			Tr	10	9.3	5	6	12	5/9	40	.1				43
29	482	1.14	56	20.6		3	Tr	13	9	7	10	15	3/5	44	.06				57
30	651	1.17	44	25.7		3	.1	15	9	8	8	16	5/7	44	.05				64
31	720	1.19	43	19.6		3	.1	15	8.5	10	10	17	9/15	56	.01				71
Jan 1				MIXING BRINE BARACARB SYSTEM															
2				MIXING BRINE BARACARB SYSTEM															
3	720	1.24	50	9.7	22.5	1	.75	158	9.3	10	15	22	3/5		.08	58.1	23	7.7	0
4	880	1.29	43	13.5	43	1	3	142	8.7	12	13	16	1/2		.02	51.8	20.9	11.8	14
5	1004	1.29	43	10.6	44.5	1	2.5	138	8.4	15	15	17	2/3		.01	41.2	22.3	19.4	20
6	1293	1.28	41	12.7	31.5	1.5	.3	120	8.6	16	12	14	1/3		.02	35.7	23.0	14.1	34
7	1417	1.31	50	9.6	31.5	1	.3	123	8.4	18	19	19	2/6		.01	42	22	10.2	43
8	1417	1.31	50	9.6	31.5	1	.3	123	8.4	18	19	19	2/6		.01	42	22	10.2	43
9	1417	1.32	52	10.4	33	1.5	.25	116.5	8.3	18	21	22	4/7		.01	42.2	18.3	9.1	46
10	919	1.32	52	17.4	36	3	3	111	8.5	19	24	20	3/13		.01	39.7	18.0	8.7	43
11	919	1.32	52	17.4	36	3	3	111	8.5	19	24	20	3/13		.01	39.7	18.0	8.7	43
12	919	1.32	52	12.6	33.5	2	1.5	111	9.7	18	19	21	3/7		.13	37.6	18.3	10.6	43
13	919	1.32	55	18.6	-	3	1.5	95	9.7	18	12	14	2/4		.16	-	-	-	36
14	919	1.32	50	12	32	2	2	111	9.5	15	13	16	2/5		.1	32.8	19.1	11.4	37
15	919	1.30	40	14.2	30.4	2	1.5	109	9	12	8	10	1/3		Tr	41.8	10.9	11	37
16	919	1.32	55	9.6	29.5	2	2.0	144	8	15	17	11	2/4		Tr	36.5	43.7	11	37
17	838	1.32	56	9.2	27	2	3	128	8.5	20	24	24	3/7		Tr	35.7	33.6	10.4	37
18	838	1.32	56	9.2	27	2	3	128	8.5	20	24	24	3/7		Tr	35.7	33.6	10.4	37

Figure 8

Materials	Unit	Cost Unit	Quantity	Cost
12¼" Hole - Interval 720-1417m				
Baracarb (C)	40 kg	8.93	370	3304.10
Baracarb (F)	25 kg	5.58	490	2734.20
Barade foam	5 gal	98.00	9	882.00
$CaCl_2$	25 kg	12.75	2170	27667.00
Dextrid	50 lb	51.60	85	4386.00
Mg O	25 kg	12.00	112	1344.00
KCl	50 kg	26.70	297	7929.00
KCl	83 kg	44.33	112	4964.96
XC-Polymer	50 kg	335.00	32	10720.00
HEC	25 kg	149.00	28	4172.00
Q-Broxin	25 kg	24.15	6	144.90
		TOTAL COST FOR 12¼" HOLE		$68249.56

Drill Stem Testing

$CaCl_2$	25 kg	12.75	264	3366.00
Baracarb (F)	25 kg	5.58	82	457.56
Baracarb (C)	40 kg	8.93	53	473.29
Dextrid	50 lb	51.60	3	154.80
XC-Polymer	50 lb	335.00	3	1005.00
KCl	50 kg	26.70	41	1094.70
KCl	83 kg	44.33	47	2083.51
HEC	25 kg	149.00	5	745.00
Mg O	25 kg	12.00	5	60.00
		TOTAL COST FOR TESTING PHASE		$9439.86

Materials	Unit	Cost Unit	Quantity	Cost
Consumption for 36", 26", 12¼" and Testing				
Gel	100 lb	15.50	365	5657.50
Baracarb (C)	40 kg	8.93	423	3777.39
Baracarb (F)	25 kg	5.58	572	3191.75
Baradefoam	5 gal	98.00	12	1176.00
$CaCl_2$	25 kg	12.75	2434	31033.55
Caustic	23 kg	17.75	48	852.00
Coat 888	50 lb	23.20	4	92.80
Condet	55 gal	395.50	3	1186.50
Dextrid	50 lb	51.60	123	6346.80
Lime	25 kg	6.75	13	87.75
Mg O	25 kg	12.00	117	1404.00
KCl	50 kg	26.70	338	9024.60
KCl	83 kg	44.33	159	7048.47
Q-Broxin	25 kg	24.15	88	2125.20
XC-Polymer	50 lb	335.00	35	11725.00
HEC	25 kg	149.00	33	4917.00
			TOTAL COST FOR DRILLING AND TESTING	$89646.26

2.4.5 Mud Equipment Description

1. Reserve mud storage tanks 4 x 500 bbls.
2. Active mud storage 400 bbls complete with 150 bbl settling tank and 85 bbl pill tank.
3. Brandt Dual Tandem shaker.
4. Demco Desander, 6 cone x 6 inch rated at 1050 gpm with Mission 6 inch x 8 inch centrifuged pump and 75 HP electric motor.
5. Demco Desilter, 12 cone x 4 inch rated at 1080 gpm with Ingersoll-Rand centrifuged pump and 75 HP electric motor.
6. Pioneer Mud Cleaner, 16 cone x 4 inch rated at 800 gpm with 75 psi head.

7. Degasser

8. Pit Volume Totalizer.

9. Mud Mixer, Lightning mixers 2 ea x 25 HP in active tanks, 4 ea x 25 HP in reserve tanks.

10. Pioneer Sidewinder Mud Mixing Hopper.

11. Mud Mixing Pumps, Ingersoll-Rand MIR 150 with 75 HP electric motors, two on active tank, two on reserve tanks.

12. Mud/Gas separator with vent to Crown block.

13. Swaco super adjustable choke 10,000 psi with control panel.

14. Trip tank - 25 bbls with high-low level switch activated motor for transfer pump to annulus.

2.5 Flow Testing

2.5.1 Flow Testing Summary

Three drillstem tests were run on this well and are summarized in detail in Appendix D1 which is attached to this report.

2.5.2 Flow Data

The flow data as reported by Flopetrol is attached as Appendix D2 to this report.

2.5.3 Pressure Data

The pressure data as reported by Dowell Schlumberger is attached as Appendix D3 to this report.

2.5.4 Interpretation and Analysis

The interpretation and analysis of the flow testing on this well is summarized below:

DST No. 1: Interval 839 - 848m RT

- Recovered 15 bbls of formation water and sand with no trace of oil.
- Preliminary field analysis of the formation water indicates a chloride content of 5500 ppm.
- Due to the suspected plugging of the PCT by sand, the test was rerun.

DST No. 1(a): Interval 839 - 848m RT

- Non conclusive test due to a failure of the PCT tool.

DST No. 1(b): Interval 839 - 848m RT

- Recovered 17 barrels of formation water and a trace of oil from the PCT chamber.
- Preliminary field analysis of formation water indicates a chloride content of 11500 ppm.
- Pressure data indicates a very high permeability formation.

2.5.4 Interpretation and Analysis (Continued)

DST No. 2: Interval 832 - 834m RT

- Recovered gas at rates up to 4 MMcf/D on a ½ inch choke at wellhead flowing pressure of 1005 psi.
- Due to the presence of up to 200 ppm H_2S, the test was shortened considerably.
- Approximately 500 ml of oil was recovered from the manifold.
- The Oil leg in this well is very thin and/or the gas coned down from the upper gas zone during this DST.
- The pressure data indicates a very high permeability formation.

DST No.3: Interval 819 - 826m RT

- Recovered dry gas at rates up to 5.4 MMcf/D on a ½ inch choke at a wellhead flowing pressure of 855 psig.
- The relatively small drawdown and rapid buildup both indicate a very high permeability formation with little or no skin damage.
- Due to the presence of up to 200 ppm H_2S, the test was shortened considerably.
- The produced gas was very dry and no liquids were recovered from the separator.

2.6 General Data

2.6.1 Positioning Report

See attached Positioning Report per Figure 9 and Appendix D4.

2.6.2 Downhole Surveys

Depth	Drift
85m	1^{o}
227m	1^{o}
343m	1^{o}
720m	$1\text{-}3/4^{o}$
848m	$1\frac{1}{2}^{o}$
946m	$1\frac{1}{2}^{o}$
1292m	$\frac{1}{2}^{o}$
1408m	1^{o}

2.6.3 Plug Back and Squeeze Cementation Record

The well was plugged back from 1417m to 925m on January 10th, 1982. Prior to running 9-5/8" casing and conducting DST's, open ended drill pipe was run to 1080m. A 344 sack cement plus was mixed to 15.8 ppg and was pumped and balanced. The DP was pulled to 925m, and the string was reversed clean.

Proposed Location: 038° 03' 26.21" S — Latitude:

148° 21' 50.23" E — Longitude:

Actual Location: 038° 03' 25.863" S — Latitude:

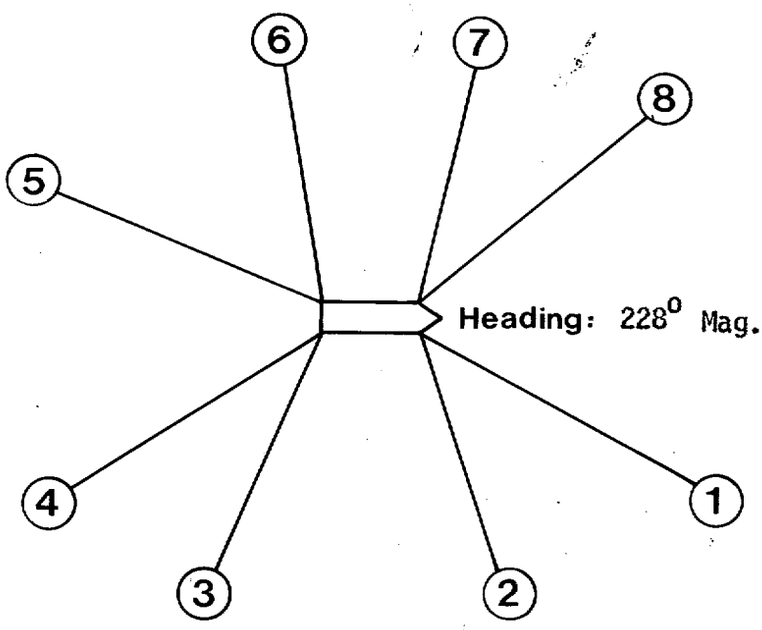
148° 21' 51.644" E — Longitude:

Distance and Bearing from Proposed to Actual: 36m @ 74° T.

Survey Method: Trisponder System

Checked By: JMR-4 Satellite observations

Anchor Pattern:



Remarks: No anchoring problems were experienced during deployment or recovery of the anchors and all anchors held securely during the drilling operations.

Author: A.Eisenbarth	Hudbay Oil (Australia) Ltd.	Date: May, 1982
Drawn by: H.O.A.L.	**POSITIONING** **SPERM WHALE - 1**	Drawing Nº A4-DR-517

Figure 9

2.6.4 Fishing Operations

None performed.

2.6.5 Side Tracked Hole

None performed.

2.7 Abandonment Report

Sperm Whale No 1 was abandoned on January 19th, 1982 although the subsea equipment was not recovered until February 19th, 1982. A wireline set bridge plug was set at 817m and pressure tested to 2000 psi.

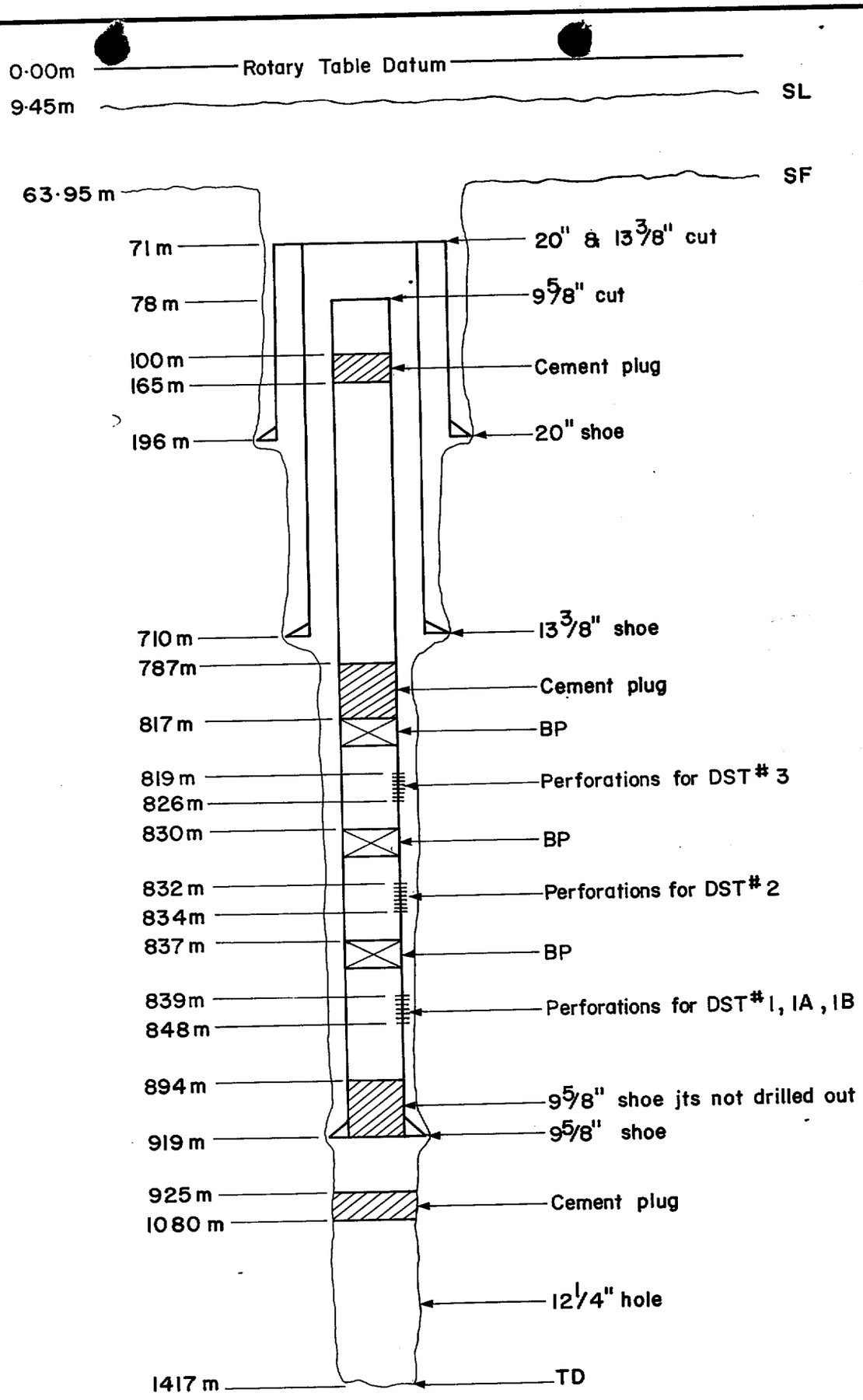
Open ended drillpipe was run to 817m and a 36 sack cement plus was mixed to 15.8 ppg pumped, and balanced over the interval 817 - 787m.

A second plug of 72 sacks was mixed to 15.8 ppg and placed over the interval 165 - 100m. The 9-5/8" seal assembly was recovered, and the 9-5/8" and 13-3/8" casing stub were mechanically cut and recovered; but the 20" casing, the 20-3/4" wellhead, and the permanent and temporary guide bases could not be worked free.

After West Seahorse No 2 was abandoned, the rig was moved back to the Sperm Whale location and an explosive charge was utilized to loosen the remaining subsea equipment. After the charge was detonated, the rig was repositioned over the well to recover the 20-3/4" WH, 20" casing stub, 30" conductor, permanent guide base, and the temporary guide base. See attached schematic for downhole plug placement, (Figure 10).

2.8 Recommendations for Future Drilling Programmes

Sperm Whale No 1 was reasonably successful from a drilling point of view and it probably would be difficult to substantially improve the performance using the same rig and equipment. There were no hole problems of any significance so it would appear as if the mud systems that were utilized are satisfactory.
The problems that were encountered were of a nature that is more or less out of the realm of control of the operator such as downtime due to weather, questionable DST tool servicing, and firmly cemented subsea equipment.



Author: K. Putnam	Hudbay Oil (Australia) Ltd.	Date: April 1982
Drawn by: A. Clark	**SPERM WHALE – 1** **AS ABANDONED**	Drawing № A4-DR-498

Figure 10

A4 210 x 297

APPENDIX D1

D.S.T. RESULTS

HUDBAY OIL (AUST) LTD

SPERM WHALE NO. 1

DST RESULTS

FEBRUARY 1982

SPERM WHALE NO. 1

SUMMARY OF DST NO. 1

Perforated Interval: 839 - 848m

Sequence of Events on 13/14.01.82

19:35	Set Packer at 832.84m
20:23	Open PCT for 7 minutes initial flow. Medium to strong blow at surface.
20:30	Close PCT for 28 minute initial shut-in.
20:58	Open PCT for final flow. Medium to strong blow at surface.
21:07	Blow abruptly decreased to zero - suspected tool plugging. Well almost dead. Attempt to run in SPRO unit but got stuck at 680m.
00:10	Close PCT tool
00:26	Unseat packer and pull string out of hole wet.

SPERM WHALE NO. 1 - DST NO. 1

SAMPLE RECOVERIES AND PRELIMINARY ANALYSIS

Sample	Cl^-	Comments
1. 120m		Gas cut mud - no oil or H_2S
2. 253m		Water diluted gas cut mud
3. 442m		Water diluted gas cut mud
4. 556m	9500	Water diluted gas cut mud - mainly water
5. 580m		Sand only - clear to white, occasionally frosted. Unconsolidated very fine to medium grained, dominantly fine, subangular to rounded, well sorted, no visible matrix on cement. Trace pale yellow - white fluorescence. Trace claystone, medium grey, firm - hard, as discrete chips.
6. 594m	7000	Mud coloured water
7. 725m	7000	Mud coloured water
8. 820m	5500	Sample from PCT chamber - no oil indication, small amount of gas (not measureable) Resistivity 0.65 at 68^oF Appears to be a representative sample of formation water.

Gas Analysis from top of liquid samples:

Sample No.	1	2
C_1	5130 ppm	7300 ppm
C_2	76	100
C_3	12	16
iC_4	Tr	Tr
nC_4	Tr	-
C_5	-	-

DST NO. 1

PRESSURE TRANSIENT ANALYSIS

DST No. 1 was run without a cushion. The bottomhole pressures for the test as measured by J1630 gauge at 840.5m are tabulated on the following page. The pressures during the initial 7 minute flow period built up rapidly to 1116 psig. Within four minutes of the initial shut-in, the pressure had essentially stabilized at 1230 psi. This rapid buildup is indicative of an extremely high permeability formation.

Upon opening the PCT for the final flow, the pressure dropped immediately to 1191 psi and then built up to 1232 psi within 8 minutes and eventually stabilized at 1234 psi after 194 minutes. The PCT tool is thought to have been plugged by sand 9 minutes into the second flow period. This was evidenced at the surface by a strong to medium blow which ceased abruptly. The pressure during the final flow period increased immediately from 1234 psi to 1238 psi and then remained unchanged.

A repeat formation tester run on this same zone resulted in a small quantity of oil recovery. Since DST No. 1 did not result in any oil recovery and since the tool was thought to have been plugged by sand, the decision was made to rerun the test.

SPERM WHALE NO. 1 - DST NO. 1

PRESSURE DATA FOR RECORDER : J 1630 at Depth : 840.5m RT

ΔT (mins)	PRESSURE (PSI)	LOG ((t+Dt)/Dt)	COMMENTS
	1581		Initial Hydrostatic
0	749		Initial Flow
2	861		
4	988		
7	1116		
0	1116		Initial Shut-in
2	1228	0.65	
4	1230	0.44	T = 7
6	1230	0.34	
8	1230	0.27	
10	1231	0.23	
15	1231	0.17	
20	1231	0.13	
28	1231	0.10	
0	1192		Final Flow
2	1213		
4	1226		
6	1230		
8	1232		
10	1232		
20	1233		
40	1233		
60	1233		
80	1234		
100	1234		
150	1234		
194	1234		
0	1234		Final Shut-in
2	1238	2.01	T = 201
4	1238	1.71	
6	1238	1.54	
8	1238	1.42	
10	1238	1.32	
14	1238	1.19	
	1573		Final Hydrostatic

SPERM WHALE NO. 1

SUMMARY OF DST NO. 1(a)

Perforated Interval: 839 - 848m RT

Sequence of Events on 15.01.82

06:10	Set Packer at 832.9m RT and run in diesel cushion to subsea test tree.
08:02	Latch SPRO - Initial pressure 1179 psig at 119.4°F.
08:08	Attempt to open SPRO - unsuccessful
08:28	Unseat packer
08:34	Reseat packer
08:45	Attempt to open SPRO, unsuccessful. Pressure up and bleed off test string. SPRO pressure remained unchanged indicating PCT closed.
09:18	Bleed off annulus and repressure to 2000 psi. Tool did not open.
09:31	Begin procedures to reverse out and rerun test.

SPERM WHALE NO. 1

SUMMARY OF DST NO. 1(b)

Perforated Interval: 839 - 848m RT. All pressures as measured by the J1630 recorder at 840.5m.

Sequence of Events on 16.01.82

06:53	Set Packer at 832.5m RT and run in diesel cushion to subsea test tree.
07:09	Open PCT tool - initial buildup to strong blow.
07:11	Open flow to burner through 7/16" choke. Switch flow to gauging tank.
07:13	Increase choke size to ½".
07:18	Wellhead flowing pressure 51 psig.
07:26	Wellhead flowing pressure 24 psig.
07:30	Wellhead flowing pressure 20 psig.
07:39	Wellhead flowing pressure 7 psig.
08:55	Bleed pressure from annulus to close PCT.
08:57	Begin to reverse out.

SPERM WHALE NO. 1 - DST NO. 1(b)

SAMPLE RECOVERIES AND PRELIMINARY ANALYSIS

Sample	Cl^-	Comments
1. 72m		Diesel, trace mud
2. 179m		Diesel, trace mud
3. 333m	36,000	Water, mud contaminated
4. 461m	36,000	Water, mud contaminated
5. 512m		Water, mud contaminated
6. 564m		Water, mud contaminated
7. 640m		Water, mud contaminated
8.		Mud after displacing drill string
9.	82,000	Mud after displacing drill string
10. 816m	11,500	
11. 820m	11,500	
12. 821m	11,500	PCT chamber - SG 1.018 About 50 cc of oil - water emulsion Obtained gas sample with following analysis: C_1 74,100 ppm C_2 400 C_3 150 iC_4 200 nC_4 200 C_5 -

COMMENTS

The last three samples appear to be representative of the formation fluid.

DST NO. 1(b)

PRESSURE TRANSIENT ANALYSIS

DST No. 1(b) was run with a full diesel cushion to minimize the pressure drawdown when the tool was initially opened. The test was also run with only one flowing period to minimize the possibility of sand settling in the drillpipe during the initial shut-in, thus plugging the PCT tool. The pressure built up to 1236 psig after 102 minutes and remained at that level even after the PCT tool was closed. The formation fluid did not flow to surface and the samples indicate that the formation contains essentially water. Some oil-water emulsion was however recovered from the PCT chamber, thus confirming the RFT recovery.

The bottomhole pressures for the test as measured by the J1630 gauge at 840.5m are tabulated on the following page. The rapid increase in pressure is indicative of a high permeability formation.

SPERM WHALE NO. 1 - DST NO. 1(b)

PRESSURE DATA FOR RECORDER : J 1630 at Depth : 840.5m RT

△ T (mins)	PRESSURE (PSI)	COMMENTS
	1535	Initial Hydrostatic
0	1034	Initial Flow
2	1203	
4	1221	
6	1219	
8	1213	
10	1213	
20	1214	
40	1219	
60	1222	
80	1225	
101	1225	
102	1236	
111	1236	
121	1236	
131	1236	
136	1236	
	1537	Final Hydrostatic

SPERM WHALE NO. 1

SUMMARY OF DST NO. 2

Perforated Interval: 832 - 834m RT

Sequence of Events on 17.01.82

08:32	Set packer at 815m RT and run in diesel cushion to subsea test tree.
09:09	Open PCT for initial flow period. Strong to medium blow and diesel flowback.
09:18	Gas to surface on ½" choke. Wellhead flowing pressure 640 psi.
09:25	Wellhead flowing pressure 750 psi. H_2S - 30 ppm. Gas and mud flow.
09:30	H_2S increasing to 100 ppm.
09:41	Reduce choke to ¼" as flare would not burn. Oil trace to surface - recovered about 500 ml. Wellhead flowing pressure 1080 psig. H_2S 150 ppm.
10:15	Wellhead flowing pressure 1065 psig. H_2S 150 ppm.
10:23	Sampled gas at choke manifold.
10:49	Increase choke size to ½". Wellhead flowing pressure 1005 psi. H_2S 200 ppm.
10:57	Close PCT for build-up.
12:06	Begin procedures to reverse out of hole.

DST NO. 2

PRESSURE TRANSIENT ANALYSIS AND INTERPRETATION

The bottomhole pressures for the test as measured by the J1630 recorder at 824m are tabulated on the following page.

A full diesel cushion was run to minimize the initial drawdown and possible sand production. During the initial flow period however, the SPRO unit indicated pressure fluctuations which were interpreted as sand plugging the tool. The decision was made to run a single flow period and shut-in. The initial flow lasted for 110 minutes and the final shut-in period was 84 minutes.

The zone of interest produced oil on the RFT but produced mainly gas on the DST. The resulting interpretation is that the oil leg is very thin and/or the gas coned down from the gas zone above. A small amount of oil was recovered from the choke manifold thus confirming the presence of oil in the zone. The cement bond log indicated a reasonably good cement bond over the zone.

The presence of up to 200 ppm H_2S resulted in the test being shortened considerably since some of the surface equipment was not rated for sour service. The gas flow rate did not stabilize and was not switched through the separator. The flow rate was however estimated to be 2-3 MMcf/D on a ¼" choke at a wellhead pressure of 1065 psi and a flowing bottomhole pressure of 1222 psi. A short 8 minute flow on a ½" choke resulted in 3-4 MMcf/D at a wellhead pressure of 1005 psi and a flowing bottomhole pressure of 1199 psi. After the well was shut-in, the pressure built up immediately to 1224 psi and stabilized at 1229 psi after 84 minutes. The pressure data indicates an extremely high permeability formation.

SPERM WHALE NO. 1 - DST NO. 2

PRESSURE DATA FOR RECORDER : J 1630 at Depth : 824m RT

ΔT (mins)	PRESSURE (PSI)	LOG ((t+Dt)/Dt)	COMMENTS
	1538		Initial Hydrostatic
0	1146		Initial Flow
5	1209		
10	1193		
20	1171		
30	1155		
40	1222		
50	1222		
70	1222		
90	1222		
110	1199		
0	1199		Start Shut-in
1	1224	2.05	T = 100
2	1224	1.75	
3	1224	1.58	
5	1224	1.36	
10	1224	1.08	
20	1225	0.81	
40	1226	0.57	
60	1226	0.45	
84	1229	0.36	
	1538		Final Hydrostatic

SPERM WHALE NO. 1

SUMMARY OF DST NO. 3

Perforated Interval: 819 - 826m RT

Sequence of Events on 18.01.82

13:04	Set packer at 803.6m and run in diesel cushion to top of subsea test tree.
13:27	Open PCT on ¼" choke - strong surface blow.
13:28	Diesel flow to surface.
13:29	Wellhead flowing pressure 250 psig.
13:31	Choke plugging - increase to ½".
13:34	Close PCT for initial buildup.
14:05	Open PCT for second flow period - gas at surface.
14:07	Wellhead flowing pressure 760 psig - trace H_2S.
14:11	Mud to surface.
14:25	Wellhead flowing pressure 840 psig - gas and trace mud.
14:40	H_2S 200 ppm.
14:50	Switch flow through separator. Calculated flow rate 5.4 MMcf/D at flowing wellhead pressure of 855 psig and temperature of 25°C. Gas gravity = 0.605, no liquids from separator.
15:45	Close PCT for final shut-in.
18:13	Begin procedures to reverse out of hole.

DST NO. 3

PRESSURE TRANSIENT ANALYSIS AND INTERPRETATION

The bottomhole pressures for the test as recorded by the J1630 recorder are tabulated on the following page.

This zone produced dry gas with a gravity of 0.60. The gas flow was switched through the separator during the second flow period and no liquids were observed. The well produced gas at rates up to 5.4 MMcf/D on a ½ inch choke at a wellhead pressure of 855 psig and a flowing bottomhole pressure of 1219 psig. The well built up immediately after the second shut-in to 1233 psig. The relatively small (14 psi) drawdown and rapid (less than 2 minutes) buildup both indicate an extremely high permeability formation. The DST had to be shortened due to the presence of up to 200 ppm H_2S in the gas.

SPERM WHALE NO. 1 - DST NO. 3

PRESSURE DATA FOR RECORDER : J 1630 at Depth : 813m RT

ΔT (mins)	PRESSURE (PSI)	LOG ((t+Dt)/Dt)	COMMENTS
	1522		Initial Hydrostatic
0	1152		Initial Flow
2	1217		
4	1217		
7	1217		
0	1217		Start Shut-in
2	1223	0.65	T = 7
4	1223	0.44	
6	1223	0.34	
8	1223	0.27	
10	1223	0.23	
15	1223	0.17	
20	1223	0.13	
31	1223	0.09	
0	1183		Final Flow
10	1218		
20	1218		
40	1219		
60	1219		
80	1219		
101	1219		
0	1219		Start Shut-in
2	1233	1.74	T = 108
4	1233	1.45	
6	1233	1.28	
8	1233	1.16	
10	1233	1.07	
20	1233	0.81	
40	1233	0.57	
60	1233	0.45	
80	1233	0.37	
100	1233	0.32	
150	1233	0.24	
180	1233	0.20	
	1497		Final Hydrostatic

WELL TESTING

APPENDIX D2

REPORT NO.

10018200182

FLOPETROL

DIVISION : NTD

BASE : PERTH - AUSTRALIA.

REPORT N° : 100182200182

Well Testing Report

Client : HUDBAY OIL (AUSTRALIA) LTD.

Field : WILDCAT Well : SPERM WHALE NO. 1

Zone : Date : FROM 10.01.82 TO 20.01.82

N°: DOP 100

INDEX

Flopetrol chief operator
Name : M. LEFRANCOIS

Client representative
Name : B. McERLHINNY

- TEST PROCEDURE -

D.S.T. tests were carried out on Sperm Whale # 1. from January 10th to January 20th, 1982, using DOWELL P.C.T. tool together with posi-test packer.

A S.P.R.O. Gauge was used during those tests for a pressure and temperature survey.

D.S.T. 1 January, 13th, 1982

PERFORATION DEPTH	:	839 - 848 M.
DEPTH OF PACKER	:	832.84 M.
S.P.R.O. GAUGE DEPTH	:	817.99 M.

A) First opening of downhole tool duration: 7min.
Observation of Flow through a ¼" Ø hose at choke manifold.

B) First shut-in.
Duration: 30 min.

C) Second opening.
During this period the S.P.R.O. Gauge which could not have been run in before the first opening due to a Wireline cable failure was run in but got stuck at 680M before reaching the latching depth.
At the same time we were unable to get any flow at surface. Then the testing string was probably plugged the S.P.R.O. Gauge was pulled out of hole.

D) Shut in, packer unset, testing string pulled out of hole.

END OF D.S.T. NO. 1

- TEST PROCEDURE -

D.S.T. 1A January, 15th, 1982

PERFORATION DEPTH: 839 - 848 M.
DEPTH OF PACKER: 832 M.
DIESEL CUSHION HEIGHT: 800 M.

A) After the Packer was set and the S.P.R.O. Gauge latched on the well was opened up for a 12 min duration. No indication of blow at choke manifold.

B) First shut-in. Duration: 2min.
No indication of build up at S.P.R.O. Computer.

C) Second opening of P.C.T. Tool.
Duration: 10 min.
No indication of blow.

D) Second shut-in.
During this period the packer was unset then reset.

E) Third attempt to open the P.C.T. Tool. No flow.

F) After 29 min observation, annulus pressure bled off and P.C.T. tool closed.

G) Fourth attempt to open the P.C.T. Tool. No Flow.
11 min observation.
No indication on S.P.R.O. Computer.

H) Final shut-in, packer unset, testing string pulled out of hole.

Non conclusive test due to a possible failure of the P.C.T. Tool.

END OF D.S.T. NO. 1A

- TEST PROCEDURE -

D.S.T. NO. 1B January 16th, 1982

PERFORATION DEPTH: 839 - 848 M.
PACKER DEPTH: 832 M.
DIESEL CUSHION HEIGHT: 800 M.

A) After the packer was set and the S.P.R.O. Gauge latched on, the well was opened up for a unique flow period at first on 7/16" Ø choke, then ½" Ø.
Duration: 99 min.

B) Shut-in, observation of build up of downhole pressure, packer unset, testing string pulled out of hole.
Duration of shut in : 48 min.

END OF D.S.T. 1B

D.S.T. NO. 2 January 17th, 1982

PERFORATION DEPTH: 832 - 834 M.
PACKER DEPTH: 815 M.
SPRO GAUGE DEPTH: 800.1 M.
DIESEL CUSHION HEIGHT: 790 M.

A) After the packer was set and the S.P.R.O. Gauge latched on, the well was opened up for a unique flow period, on at first ½" Ø choke, then ¼" Ø and at last ½" Ø.
2 samples were taken upstream the choke manifold during this period on ¼" Ø in 20 litres GERZAT bottles.
Flow period duration: 110 min.
Presence of H2S in flowing gas was detected.

B) Shut-in, observation of downhole pressure build-up, packer unset, testing string pulled out of hole.
Duration of shut-in period: 85 min.

END OF D.S.T. 2

- TEST PROCEDURE -

D.S.T. 3 January 18th, 1982

PERFORATION DEPTH: 819 - 926 M.
PACKER DEPTH: 803.56 M.
S.P.R.O. GAUGE DEPTH: 788.7 M.
DIESEL CUSHION HEIGHT: 780 M.

A) Initial Flow period.

After the packer was set and the S.P.R.O. gauge latched on, the well was opened up for an initial flow period on ¼" Ø choke, then ½" Ø choke.
Duration: 7 min.

B) Initial Shut-In.

Duration: 31 min.

C) Final flow period through ½" Ø choke.

Duration: 31 min.

Flow rate measurements and sample (1 x 20 Litres GERZAT bottle) taken at separator outlet.

Presence of H2S in flowing gas during both flow periods.

D) Final Shut-in.
Duration: Approximately 200 min.

Observation and recording of downhole pressure build up.

The packer was then unset and the testing string pulled out of hole.

END OF D.S.T. 3.

END OF THE SERIES.

FLOPETROL

Base : PERTH

Client : HUDBAY OIL

Field : WILDCAT

Well : SPERM WHALE # 1

Section : 2

Page : 01

Report N° : 10018220018 2

- MAIN RESULTS -

D.S.T. NO. 1

Tested interval : _____ Perforations : 839 - 848 M

OPERATION	DURATION	BOTTOM HOLE PRESSURE	WELL HEAD PRESSURE	OIL PROD. RATE	GAS PROD. RATE	G.O.R
Units	MIN	PSIG	PSIG	BOPD	MMSCFD	
INITIAL FLOW ON ¼" HOSE	7		STRONG BLOW	WEAKENING VERY QUICKLY 0	0	
INITIAL SHUT IN	30		0			
FINAL FLOW ON ½" Ø FIXED CHOKE	180		0	TUBING STRING PLUGGED BY SAND UP TO 680M. 0	0	
FINAL SHUT IN	25		0	SHORTENED DUE TO INCONCLUSIVE TEST		

Depth of bottom hole measurements : _____ Reference : _____

Temperature : _____ at : _____ depth

Separator gas gravity (air : 1) at choke size : _____

STO gravity at choke size : _____

BSW : _____ Water cut : _____

REMARKS AND OTHER OPERATIONS

N°: DOP 103

FLOPETROL

Base : PERTH

Client : HUDBAY OIL

Field : WILDCAT

Well : SPERM WHALE # 1.

Section : 2

Page : 02

Report N° : 10018220018 2

- MAIN RESULTS -

D.S.T. NO. 1A

Tested interval: _____ Perforations : 839 - 848 M

OPERATION	DURATION	BOTTOM HOLE PRESSURE	WELL HEAD PRESSURE	OIL PROD. RATE	GAS PROD. RATE	G.O.R
Units	MIN	PSIG	PSIG	BOPD	MMSCFD	
INITIAL FLOW ON ¼" Ø CHOKE	12		0 NO FLOW	0	0	
INITIAL SHUT IN	2		0			
SECOND FLOW	10		0	NO FLOW		
SECOND SHUT-IN.	23		0			
THIRD FLOW	29		0	NO FLOW		
THIRD SHUT-IN	2		0			
FINAL FLOW	11		0	NO FLOW		
FINAL SHUT-IN	60		0			

Depth of bottom hole measurements : 817.99 M Reference : RT.

Temperature : _____ at : _____ depth

Separator gas gravity (air : 1) at choke size : _____

STO gravity at choke size : _____

BSW : _____ Water cut : _____

REMARKS AND OTHER OPERATIONS

INCONCLUSIVE TEST DUE TO FAILURE ON P.C.T. TOOL OPENING.

BOTTOM HOLE PRESSURE WAS RECORDED SEE DOWELL COMPUTER REPORT.

N°: DOP 103

FLOPETROL

Base : PERTH

Client : HUDBAY OIL

Field : WILDCAT

Well : SPERM WHALE # 1

Section : 2

Page : 03

Report N° : 100182200182

- MAIN RESULTS -

D.S.T. 1B

Tested interval : _____ Perforations : 839 - 848 M

OPERATION	DURATION	BOTTOM HOLE PRESSURE	WELL HEAD PRESSURE	OIL PROD. RATE	GAS PROD. RATE	G.O.R
Units	MIN	PSIG	PSIG	BOPD	MMSCFD	
INITIAL FLOW ON ¼" HOSE	2		STRONG BLOW			
INITIAL FLOW SWITCHED TO 7/16" Ø CHOKE	1		130	DIESEL CUSHION COMES TO SURFACE		
INITIAL FLOW SWITCHED TO ½" Ø CHOKE	96		0	DIESEL CUSHION NOT COMPLETELY RECOVERED.		
FINAL FLOW	48		0			

Depth of bottom hole measurements : 818 M Reference : RT

Temperature : _____ at : _____ depth

Separator gas gravity (air : 1) at choke size : _____

STO gravity at choke size : _____

BSW : _____ Water cut : _____

REMARKS AND OTHER OPERATIONS

BOTTOM HOLE PRESSURE RECORDED ON DOWELL COMPUTER REPORT.

N°: DOP 103

MAIN RESULTS

D.S.T. NO. 2

Tested interval: _____ Perforations : 832 - 834 M

OPERATION	DURATION	BOTTOM HOLE PRESSURE	WELL HEAD PRESSURE	OIL PROD. RATE	GAS PROD. RATE	G.O.R
Units	MIN	PSIG	PSIG	BOPD	MMSCFD	
INITIAL FLOW ON ½" Ø CHOKE	31		850	DIESEL THEN GAS TO SURFACE.		
INITIAL FLOW SWITCHED ON ¼" Ø CHOKE	69		1065	0	2 to 3 * (2 SAMPLES WERE TAKEN)	
INITIAL FLOW SWITCHED ON ½" Ø CHOKE	10		1005	SMALL AMOUNT OF OIL TO SURFACE	3 TO 4	
FINAL SHUT-IN	85		0			

* ASSUMING CRITICAL CONDITIONS EXIST AND FLOW OF DRY GAS.

* ESTIMATED WITHOUT ANY CALCULATION FROM SEPARATOR GAS METER.

Depth of bottom hole measurements : 800.1 M Reference : RT

Temperature : _____ at : _____ depth

Choke Manifold
~~Separator~~ gas gravity (air : 1) at choke size : 0.612 AT ¼" Ø CHOKE

STO gravity at choke size : _____

BSW : _____ Water cut : _____

REMARKS AND OTHER OPERATIONS

D.S.T. SHORTENED BECAUSE OF HIGH PERCENTAGE OF H2S IN FLOWING GAS (UP TO 200 PPM).

2 GAS SAMPLES TAKEN FROM CHOKE MANIFOLD.

BOTTOM HOLE PRESSURE FROM DOWELL COMPUTER REPORT.

N°: DOP 103

FLOPETROL

Base : PERTH

Client : HUDBAY OIL

Field : WILDCAT

Well : SPERM WHALE # 1

Section : 2

Page : 05

Report N° : 1001822001 32

- MAIN RESULTS -

D.S.T. NO 3.

Tested interval: _____ Perforations : 819 - 826 M

OPERATION	DURATION	BOTTOM HOLE PRESSURE	WELL HEAD PRESSURE	OIL PROD. RATE	GAS PROD. RATE	G.O.R
Units	MIN	PSIG	PSIG	BOPD	MMSCFD	
INITIAL FLOW ON ½" Ø CHOKE	4		260	DIESEL	CUSHION COMES TO SURFACE.	
INITIAL FLOW ON ½" Ø CHOKE	3		390	DIESEL CUSHION COMES TO SURFACE.		
INITIAL SHUT IN	31		20	GAS COMING TO SURFACE.		
FINAL FLOW ON ½" Ø CHOKE	100		855	0	5.4	
FINAL SHUT IN	APPROX. 200		0	-	-	

Depth of bottom hole measurements : 788.7 Reference : RT

Temperature : _____ at : _____ depth

Separator gas gravity (air : 1) at choke size : 0.605 ½" Ø CHOKE

STO gravity at choke size : _____

BSW : _____ Water cut : _____

REMARKS AND OTHER OPERATIONS

HIGH PERCENTAGE OF H2S IN FLOWING GAS (200 PPM)
GAS SAMPLE TAKEN AT SEPARATOR OUTLET.
BOTTOM HOLE PRESSURE FROM DOWELL COMPUTER REPORT.

N°: DOP 103

- OPERATING AND MEASURING CONDITIONS -

A - TYPE OF GAUGE -

BOTTOM HOLE :
Pressure : SPRO GAUGE 10000 PSIG
Temperature : SPRO GAUGE 200°F.

WELL HEAD :
Pressure : FOXBORO 5000 PSI / D.W.T. 5000 PSI (CLOCK FAILURE ON FOXBORO)
Temperature : THERM. 10°C / 110°C

SEPARATOR :
Pressure : BARTON STAT: 1000 PSIG / DIFF. 200" WATER
Temperature : THERM. 10°C / 110°C

B - PRODUCTION RATE CONDITIONS AND SOURCES -

OIL PRODUCTION RATE
- ☐ Tank
- ☐ Meter
- ☐ Dump
- ☐ Floco
- ☐ Rotron
- ☐ _____

Reference conditions :
- ☐ Separator
- ☐ Atmospheric pressure 60°F

Shrinkage measurement :
- ☐ With tank
- ☐ With shrinkage tester

GAS PRODUCTION RATE
- ☒ Orifice meter
- ☐ _____

Standard conditions :
60°F 14.73 PSIA

WATER PRODUCTION RATE
- ☐ Tank
- ☐ Meter
- ☐ _____

C - WELL DATA -

WELL STATE DURING SURVEY :

Well producing through : tubing / ~~drill pipe~~ / ~~casing~~
Main casing size 9 5/8" set at 834 M Total well depth 1417 M
Tubing size 3½" set at DST 1 Packer RTTS set at 832.84 M
DST 2 815.0 M
Perforations :

DST 1	- Zone _____	From	839	to	848 M	From DST 3	to 803.56 M
DST 2	- Zone _____	From	832	to	834 M	From _____	to _____
DST 3	-	From	819	to	826 M		

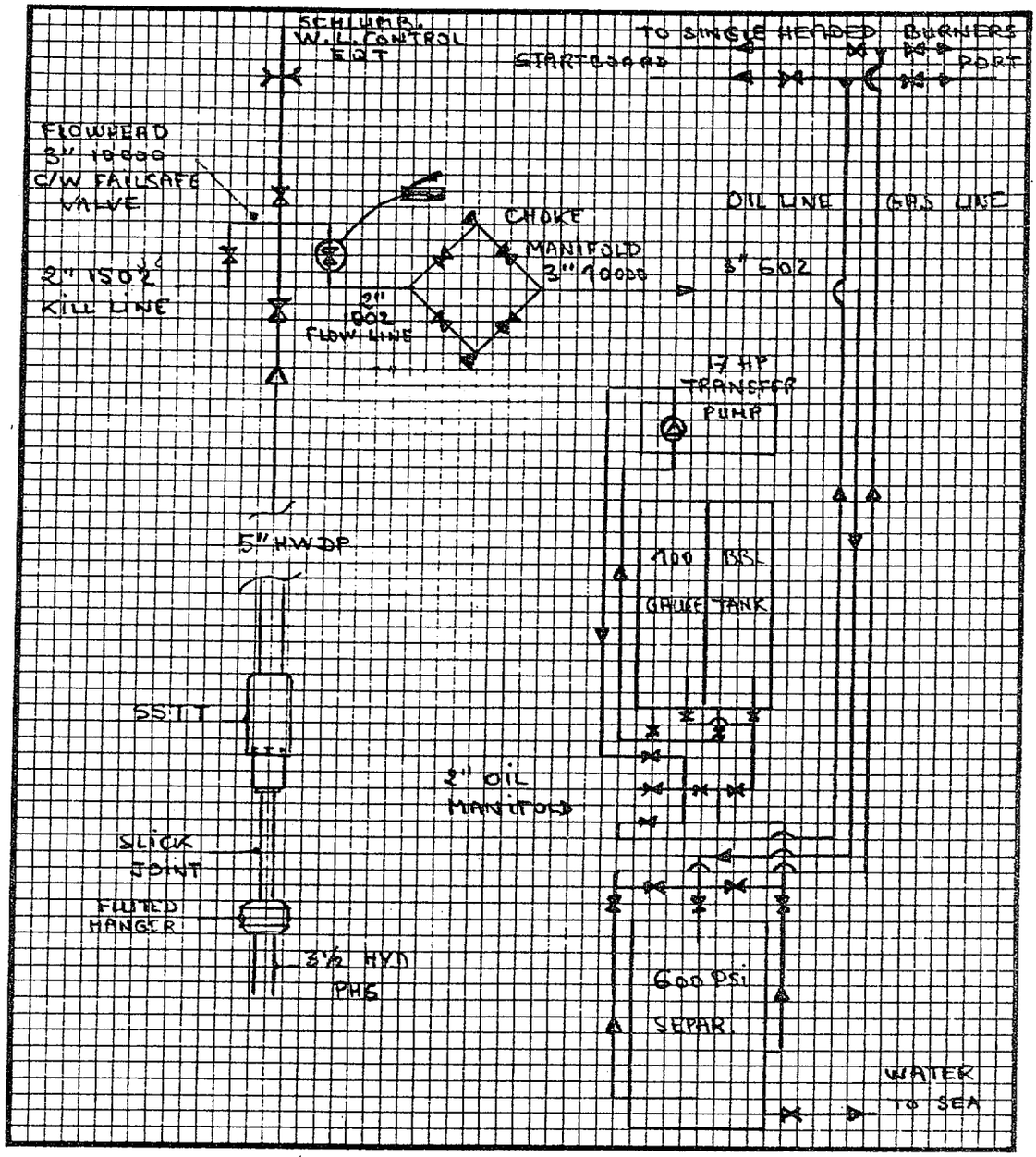
WELL STATE BEFORE TEST : EXPLORATION TEST.

- ☐ Well closed since _____
- ☐ Well flowing since _____ Producing zone _____
  Choke size _____

N° : DOP 104

FLOPETROL	Client : HUDBAY OIL	Section : 4
Base : PERTH	Field : WILDCAT Well : SPERM WHALE # 1	Page : 01 Report N° : 10018220018

- SURFACE EQUIPMENT LAYOUT -

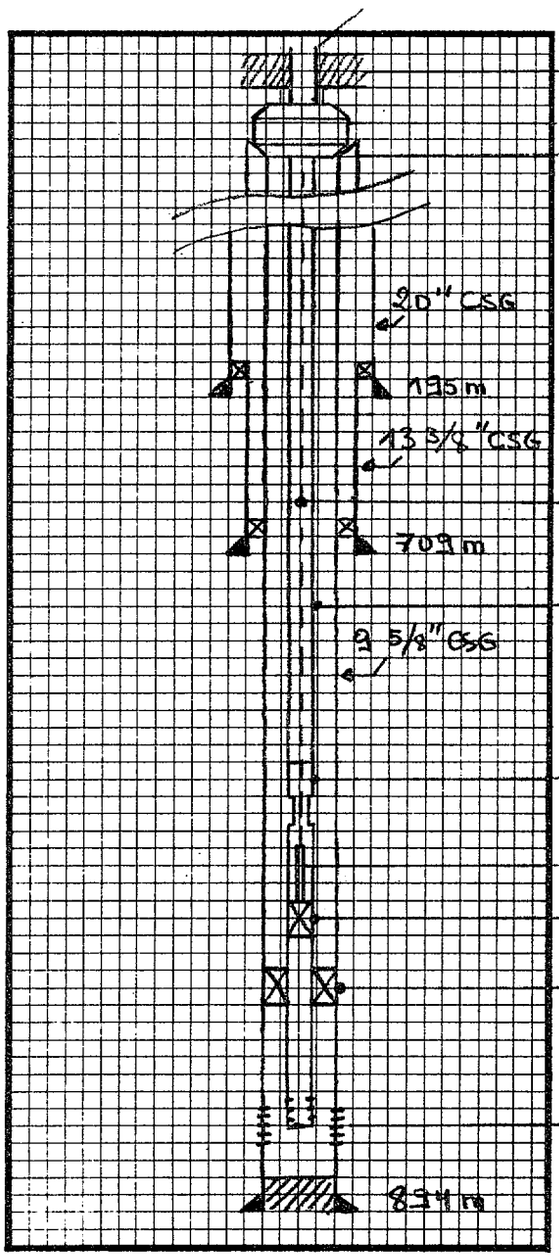


REMARKS :

N° : DOP 105

FLOPETROL	Client : HUDBAY OIL	Section : 5
Base : PERTH	Field : WILDCAT	Page : 01
	Well : SPERM WHALE # 1	Report N° : 1001822001 32

- WELL COMPLETION DATA -



3" RAMS

FLUTED SSTT HANGER
9 5/8 WEAR BUSHINGS

SCHLUMBERGER WIRELINE

3½ TUBING PH 6

2 X 5' SLIP JOINTS

S.P.R.O. GAUGE

P.C.T. VALVE.

PACKER

PERFORATIONS

REMARKS :

N° : DOP 106

FLOPETROL

Base : PERTH

Client : HUDBAY OIL

Field : WILDCAT

Well : SPERM WHALE NO. 1

Section : 6

Page : 01

Report N° : 10018220018 2

- SEQUENCE OF EVENTS -

DATE	TIME	OPERATION
10.01.82		FLOPETROL CREW ARRIVES ON BOARD.
		PETROMAR NORTH SEA - CHECKING ON INVENTORY AND PERMANENT
		EQUIPMENT.
11.01.82		PREPARATION OF E.Z. TREE, SEPARATOR AND MISCELLANEOUS EQUIP.
12.01.82		RIG UP BURNERS.
13.01.82	01.30	DUMMY RUN E.Z. TREE - MAKE UP E.Z TREE. AND FLOWHEAD.
	08.00	START RUNNING IN TESTING STRING FOR D.S.T. NO. 1
		PREPARATION OF OIL SAMPLING BOTTLES.
	15.15	PICK UP E.Z. TREE ON MAIN DECK.
	16.15	R.I.H. E.Z. TREE.
	17.15	PICK UP FLOWHEAD ON MAIN DECK.
	17.30	RIG UP FLOW HEAD AND SURFACE EQUIPMENT.
	18.30	RIG UP SCHLUMBERGER W.L. EQUIPMENT.
		FAIL ON CABLE. RIG DOWN W.L. EQUIPMENT.
	19.00	PRESSURE TEST FLOWHEAD AND SURFACE EQUIPMENT. 600 PSI UP TO
		SEPARATOR.
		3,000 PSI ON DOWNSTREAM AND UPSTREAM C/M VALVES.
		INCONCLUSIVE.
	19.35	SET PACKER AT 832.84 M.
	19.40	PRESSURE TEST AGAIN - O.K.
	20.23	OPEN P.C.T. ON ¼" BUBBLE HOSE (ANNULUS PRESSURE 1400 PSI).
	20.30	1ST SHUT IN (BLEED OFF ANNULUS PRESSURE).
	21.00	2ND OPENING OF P.C.T. ON ½" Ø FIXED CHOKE
	21.08	CLOSE C/M - FLOW THROUGH BUBBLE HOSE.
	21.10	START RIG UP SCHLUMBERGER W.L. EQUIPMENT.
	21.30	START RUNNING IN S.P.R.O. LATCH
	21.45	S.P.R.O. LATCH STUCK AT 680 M (TUBING PLUGGED.
	22.30	P.O.O.H. S.P.R.O. LATCH /RIG DOWN W.L.EQUIPMENT.

N°: DOP 107

SEQUENCE OF EVENTS (Continuation)

DATE	TIME	OPERATION
13.01.82	24.00	FINAL SHUT IN.
14.01.82	00.25	UNSET PACKER.
	00.45	RIG DOWN FLOWHEAD AND SURFACE EQUIPMENT.
	01.15	START P.O.O.H. TESTING STRING.
	01.45	E.Z. TREE AT SURFACE.
	05.00	TESTING STRING OUT OF HOLE.
		END OF D.S.T. NO. 1
	18.30	START RUNNING IN TESTING STRING FOR D.S.T. 1A.
15.01.82	02.30	PICK UP E.Z. TREE ON MAIN DECK.
	03.00	R.I.H. E.Z. TREE.
	03.30	PICK UP FLOWHEAD ON MAIN DECK.
	03.45	RIG UP FLOWHEAD AND SURFACE EQUIPMENT.
	04.15	RIG UP SCHLUMBERGER W.L. EQUIPMENT.
	05.25	PRESSURE TEST SURFACE EQUIPMENT. (600 & 3000 PSI)
	05.46	SET PACKER AT 832 M.
	06.30	R.I.H. S.P.R.O. LATCH - FAIL ON CABLE.
	08.01	S.P.R.O. LATCHED.
	08.10	OPEN P.C.T. ON ¼" Ø ADJ. CHOKE (ANNULUS PRESSURE 1400 PSI)
		NO FLOW.
	08.14	SHUT IN P.C.T. TOOL (BLEED OFF ANNULUS PRESSURE).
	08.16	SECOND ATTEMPT TO OPEN P.C.T.
	08.26	BLEED OFF ANNULUS PRESSURE.
	08.29	UNLATCH S.P.R.O. GAUGE.
	08.31	UNSET PACKER.
	08.34	RESET PACKER.
	08.36	RELATCH S.P.R.O. GAUGE.
	08.49	THIRD ATTEMPT TO OPEN P.C.T.
	09.04	PRESSURE UP TUBING.
		PRESSURE AT CHOKE MANIFOLD 840 PSI.

_ SEQUENCE OF EVENTS _(Continuation)

DATE	TIME	OPERATION
15.01.82	09.10	PRESSURE AT CHOKE MANIFOLD 650 PSI.
	09.14	BLEED OFF PRESSURE IN TUBING.
	09.18	BLEED OFF ANNULUS PRESSURE.
	09.20	FOURTH ATTEMPT TO OPEN P.C.T.
	09.28	PRESSURE UP ANNULUS TO 2000 PSI.
	09.31	BLEED OFF ANNULUS PRESSURE.
	09.34	START REVERSE CIRCULATION TO GAUGE TANK.
	09.44	STOP REVERSE.
	09.46	P.O.O.H. S.P.R.O. LATCH.
	09.55	RIG DOWN WIRELINE EQUIPMENT.
	10.32	UNSET PACKER.
	11.15	RIG DOWN FLOWHEAD - SURFACE EQUIPMENT.
	11.45	P.O.O.H. TESTING STRING.
	12.30	E.Z. TREE AT SURFACE.
	13.00	BURN DIESEL CUSHION COLLECTED IN GAUGE TANK.
	13.40	FINISH BURNING.
	16.00	TESTING STRING OUT OF HOLE.
		END OF D.S.T. 1A.
15.01.82	18.00	START RUNNING IN TESTING STRING FOR D.S.T. 1B.
16.01.82	01.00	PICK UP E.Z. TREE ON MAIN DECK.
	01.30	R.I.H. E.Z. TREE.
	02.00	PICK UP FLOWHEAD ON MAIN DECK.
	02.45	RIG UP FLOWHEAD AND SURFACE EQUIPMENT.
	04.00	PRESSURE TEST 600 PSI TO SEPARATOR.
	04.15	RIG UP SCHLUMBERGER W.L. EQUIPMENT.
	05.00	PRESSURE TEST 3000 PSI - FAIL ON OPERATING FAIL SAFE VALVE
		ON FLOW HEAD.

_ SEQUENCE OF EVENTS _(Continuation)

DATE	TIME	OPERATION
16.01.82	06.00	PRESSURE TEST AT 3000 PSI O.K.
	06.53	SET PACKER AT 832 M.
	06.57	R.I.H. S.P.R.O. LATCH.
	07.09	S.P.R.O. LATCHED.
	07.11	OPEN P.C.T. (1400 PSI ON ANNULUS PRESSURE) ON ¼" Ø
		BUBBLE HOSE.
	07.13	FLOW DIESEL CUSHION THROUGH 7/16" ADJ. CHOKE.
	07.14	SWITCH FLOW THROUGH ½" Ø ADJ. CHOKE.
	08.50	CLOSE IN (BLEED OFF ANNULUS PRESSURE).
	08.57	REVERSE OUT TO GAUGE TANK.
	09.20	UNLATCH S.P.R.O. GAUGE - P.O.O.H. S.P.R.O. LATCH.
	09.38	UNSET PACKER.
	09.40	RIG DOWN W.L. EQUIPMENT.
	10.15	RIG DOWN SURFACE EQUIPMENT.
	10.35	P.O.O.H. TESTING STRING.
	11.15	E.Z. TREE AT SURFACE.
	11.45	BURN REMAINING DIESEL CUSHION RECOVERED FROM REVERSE.
	12.00	FINISH BURNING.
	14.30	TESTING STRIN OUT OF HOLE.
		END OF D.S.T. 1B.
	23.00	START RUNNING IN TESTING STRING FOR D.S.T. 2.
17.01.82	05.45	PICK UP E.Z. TREE ON MAIN DECK.
	06.10	R.I.H. E.Z. TREE.
	06.30	PICK UP FLOWHEAD ON MAIN DECK.
	06.45	RIG UP FLOWHEAD AND SURFACE EQUIPMENT.
	07.15	RIG UP SCHLUMBERGER W.L. EQUIPMENT.
	07.40	PRESSURE TEST SURFACE EQUIPMENT (600 & 3000 PSI).
	08.25	END OF PRESSURE TEST.
	08.32	SET PACKER AT 815 M.
	08.35	R.I.H. S.P.R.O. LATCH.

SEQUENCE OF EVENTS (Continuation)

DATE	TIME	OPERATION
17.01.82	09.08	S.P.R.O. LATCHED.
	09.10	OPEN P.C.T. (1400 PSI ON ANNULUS PRESSURE) ON ½" Ø FIXED
		CHOKE.
	09.11	DIESEL TO SURFACE.
	09.13	START BURNING DIESEL.
	09.17	GAS TO SURFACE - H2S DETECTED.
	09.41	SWITCH FLOW THROUGH ¼" Ø ADJ. CHOKE.
	10.08	TAKE MUD SAMPLES AT C.M.
	10.23	START 1ST GAS SAMPLING AT C.M.
	10.27	FINISH GAS SAMPLING.
	10.35	START 2ND GAS SAMPLING AT C.M.
	10.40	FINISH GAS SAMPLING.
	10.49	SWITCH FLOW THROUGH ½" Ø FIXED CHOKE.
	10.50	TRACE OF OIL AT SURFACE.
	10.59	SHUT IN (BLEED OFF ANNULUS PRESSURE).
	12.02	REVERSE OUT TO TANK.
	12.10	UNLATCH S.P.R.O. - P.O.O.H. S.P.R.O. GAUGE.
	12.24	UNSET PACKER.
	12.26	START CIRCULATING.
	14.20	FLUSH LINES.
	14.25	RIG DOWN W.L. EQUIPMENT / SURFACE EQUIPMENT.
	14.45	P.O.O.H. TESTING STRING.
	15.30	E.Z. TREE AT SURFACE.
	19.00	TESTING STRING OUT OF HOLE.
		END OF D.S.T. NO. 2
	22.00	START ON TRANSFERRING P.C.T. SAMPLE (D.S.T. 2) INTO 628 CC
		OIL BOTTLES.
18.01.82	04.00	START RUNNING IN FOOTING STRING FOR D.S.T. 3
	10.30	PICK UP E.Z. TREE ON MAIN DECK.
	10.45	R.I.H. E.Z. TREE.

FLOPETROL

Section : 6

Page : 06

Report N°: 100182200182

SEQUENCE OF EVENTS (Continuation)

DATE	TIME	OPERATION
18.01.82	11.00	PICK UP FLOWHEAD ON MAIN DECK.
	11.15	RIG UP FLOWHEAD AND SURFACE EQUIPMENT.
	11.55	RIG UP SCHLUMBERGER WIRELINE EQUIPMENT.
	12.40	PRESSURE TEST SURFACE EQUIPMENT 600 & 3000 PSI.
	13.00	FINISH PRESSURE TESTING.
	13.06	SET PACKER AT 803.56 M.
	13.10	R.I.H. S.P.R.O. LATCH.
	13.25	S.P.R.O. LATCHED.
	13.26	OPEN WELL ON ¼" Ø ADJ. CHOKE (1400 PSI ON ANNULUS
		PRESSURE).
	13.27	DIESEL TO SURFACE / START BURNING.
	13.30	SWITCH FLOW THROUGH ½" Ø ADJ. CHOKE.
	13.33	1ST RUN IN (BLEED OFF ANNULUS PRESSURE).
	13.38	GAS TO SURFACE / STRAIGHT TO STARBOARD BURNER.
	14.04	2ND OPENING ON ½" ØFIXED CHOKE.
	14.13	H2S DETECTED.
	14.50	SWITCH FLOW THROUGH SEPARATOR.
	15.15	LOWER 2.5" ORIFICE PLATE - START READING FOR GAS FLOW RATE
		MEASUREMENT.
	15.43	START TAKING 1 GAS SAMPLE AT SEPARATOR.
	15.44	LAST SHUT IN.
	15.45	FINISH SAMPLING.
	15.46	BY PASS SEPARATOR.
	18.15	START REVERSE CIRCULATING.
	19.45	UNLATCH S.P.R.O. - P.O.O.H. S.P.R.O. GAUGE.
	20.05	UNSET PACKER.
	20.08	START CIRCULATING.
	21.30	RIG DOWN WIRELINE EQUIPMENT / SURFACE EQUIPMENT.
	22.15	P.O.O.H. TESTING STRING.
	23.00	E.Z. TREE AT SURFACE.

N°. DOP 108

_ SEQUENCE OF EVENTS _(Continuation)

DATE	TIME	OPERATION
18.01.82	23.00	END OF D.S.T. 3.
		BREAK E.Z. TREE ON RIG FLOOR FOR PACKING UP.
	24.00	FINISH P.C.T. SAMPLE (D.S.T. 2) TRANSFER.
19.01.82	05.00	FINISH PACKING UP TO E.Z. TREE END FLOWHEAD.
	06.00	START ON TRANSFERRING RFT SAMPLE. INTO OIL SAMPLING
		BOTTLES.
	08.00	FINISH TRANSFER.
	10.00	2 CREW MEMBERS LEAVE THE RIG.
	16.00	FINISH PACKING UP.
20.01.82	07.07	LEAVE THE RIG.
		END OF JOB.

No.: DOP 109

FLOPETROL

Base : PERTH

Client : HUDBAY OIL

Field : WILDCAT

Well : SPERM WHALE # 1

- WELL TESTING DATA SHEET -

Section : 7

Page : 01

Report N° : 10018220018 2

DATE - TIME		PRESSURE AND TEMPERATURE MEASUREMENTS							PROD. RATES AND FLUID PROPERTIES					GOR			
		BOTTOM HOLE		WELL HEAD			SEPARATOR		OIL OR CONDENSATE			GAS					
Time	Cumul	Temp.	Pressure	Tg. temp. °C	Tg. press. PSIG	Cg. press. PSIG	Temp.	Press.	Rate	Gravity	BSW	Rate	Gravity Air = 1				Units
			D S.T. 1 - JANUARY 13TH, 1982														
19.35			SET PACKER			0											
20.23			OPEN WELL ON ¼" BUBBLE HOSE - STRONG BLOW.														
20.25			VERY WEAK BLOW			1400											
20.25					0	1400											
20.30			FIRST SHUT IN														
20.30					0	0											
21.00			SECOND OPENING ON ½" Ø FIXED CHOKE														
21.00					0	1400											
21.08			OPEN ONLY ON ¼" BUBBLE HOSE											BOTTOM HOLE PRESSURE /			
21.10					0	1400								TEMPERATURE NOT RECORDED BY			
22.30			TUBING APPEARS TO BE PLUGGED											S.P.R.O. GAUGE DUE TO			
24.00			CLOSE IN		0	0								IMPOSSIBLE LATCHING.			
00.25			UNSET PACKER	/		END OF D.S.T. 1								SEE OTHER RECORDERS (DOWELL).			

LIQUID FLOW RATE MEASURING CONDITIONS :

TESTED INTERVAL : 839 - 848 M

DEPTH REFERENCE : RT

DEPTH OF B.H. MEASUREMENTS :

No.: DOP 110

FLOPETROL _WELL TESTING DATA SHEET_(Continuation)

Page : 02
Report N°: 100182200182

Section : 7

DATE - TIME		PRESSURE AND TEMPERATURE MEASUREMENTS							PROD. RATES AND FLUID PROPERTIES					GOR			
		BOTTOM HOLE		WELL HEAD			SEPARATOR		OIL OR CONDENSATE			GAS					
Time	Cumul	Temp.	Pressure	Tg. temp	Tg. press.	Cg. press.	Temp.	Press.	Rate	Gravity	BSW	Rate	Gravity				
HR MIN					PSIG	PSIG							Air=1				Units
			D.S.T. NO. 1A JANUARY 15TH 1982						(SAME TESTED INTERVAL AS D.S.T. NO.1)								
05.46			SET PACKER														
08.10			OPEN WELL ON ¼" Ø ADJ. CHOKE - NO INDICATION ON FLOW														
08.10					0	1400											
08.14			SHUT IN WELL														
					0	0											
08.16			SECOND ATTEMPT TO OPEN - NO FLOW														
					0	1400											
08.26			SHUT IN - BLEED OFF ANNULUS PRESSURE														
					0	0											
08.31			UNSET PACKER														
08.34			RESET PACKER														
08.49			THIRD ATTEMPT TO OPEN - NO INDICATION OF FLOW.														
08.49					0	1400											
09.04			PRESSURE UP TUBING STRING.														
					840	1400											
09.10					650	1400											

No.: DOP 110

FLOPETROL _WELL TESTING DATA SHEET_(Continuation)

Page : 03
Report N°: 100182200182

Section : 7

DATE - TIME		PRESSURE AND TEMPERATURE MEASUREMENTS							PROD. RATES AND FLUID PROPERTIES					GOR			
		BOTTOM HOLE		WELL HEAD			SEPARATOR		OIL OR CONDENSATE			GAS					
Time HR MIN	Cumul	Temp.	Pressure	Tg. temp	Tg. press. PSIG	Cg. press. PSIG	Temp.	Press.	Rate	Gravity	BSW	Rate	Gravity Air=1				Units
09.14			BLEED OFF PRESSURE IN T.B.G.														
					0	1400											
09.18			BLEED OFF ANNULUS PRESSURE														
					0	0											
09.20			FOURTH ATTEMPT TO OPEN - NO INDICATION OF FLOW														
					0	1400											
09.28			PRESSURE UP - ANNULUS PRESSURE														
					0	2000											
09.31			BLEED OFF ANNULUS PRESSURE														
					0	0											
10.32			UNSET PACKER														
			END OF D.S.T. NO. 1A														
			* BOTTOM HOLE PRESSURE WAS RECORDED BY DOWELL S.P.R.O. COMPUTER.														

No.: DOP 110

FLOPETROL _WELL TESTING DATA SHEET_(Continuation)

Page : 04
Report N°: 100182200182

Section : 7

DATE - TIME		PRESSURE AND TEMPERATURE MEASUREMENTS							PROD. RATES AND FLUID PROPERTIES					GOR
		BOTTOM HOLE		WELL HEAD			SEPARATOR		OIL OR CONDENSATE			GAS		
Time	Cumul	Temp.	Pressure	Tg. temp	Tg. press.	Cg. press.	Temp.	Press.	Rate	Gravity	BSW	Rate	Gravity	
				°C	PSIG	PSIG							Air=1	Units
			D.S.T. NO. 1B - JANUARY 16TH 1982 (SAME TESTED INTERVAL AS D.S.T. NO. 1)											
06.53			SET PACKER											
07.11			OPEN WELL ON ½" Ø BUBBLE HOSE - STRONG BLOW.											
					0	1400								
07.13			SWITCH FLOW THROUGH 7/16" Ø ADJ. CHOKE - DIESEL CUSHION TO SURFACE.											
				16	130	1400								
07.14			CHANGE CHOKE Ø TO ½" Ø ADJ.											
07.15				22	65	1400								
07.20				23	35	1400								
07.25				23	27	1400								
07.30				23	22	1400								
07.35				23	11	1400								
07.40				23	6	1400								
07.45				23	4	1400								
07.50				23	4	1400								
07.55				23	4	1400								
08.00				23	3	1400								

No.: DOP 110

FLOPETROL _WELL TESTING DATA SHEET_(Continuation)

Page : 05
Report N° 100182200182

Section : 7

DATE - TIME		PRESSURE AND TEMPERATURE MEASUREMENTS							PROD. RATES AND FLUID PROPERTIES					GOR			
		BOTTOM HOLE		WELL HEAD			SEPARATOR		OIL OR CONDENSATE			GAS					
Time	Cumul	Temp.	Pressure	Tg. temp	Tg. press.	Cg. press.	Temp.	Press.	Rate	Gravity	BSW	Rate	Gravity				
				°C	PSIG	PSIG							Air=1				Units
08.15				23	3	1400	STILL DIESEL CUSHION										
08.30				23	0	1400											
08.45				23	0	1400											
08.50			SHUT IN BY BLEEDING OFF ANNULUS PRESSURE														
				23	0	0											
09.38			UNSET PACKER.														
			END OF D.S.T. NO. 1B														
			* BOTTOM HOLE PRESSURE RECORDED BY DOWELL COMPUTER.														

No.: DOP 110

FLOPETROL _WELL TESTING DATA SHEET_(Continuation)

Page : 06
Report N°: 10018220018

Section : 7

DATE - TIME		PRESSURE AND TEMPERATURE MEASUREMENTS							PROD. RATES AND FLUID PROPERTIES					GOR			
		BOTTOM HOLE		WELL HEAD			SEPARATOR		OIL OR CONDENSATE			GAS					
Time	Cumul	Temp.	Pressure	Tg. temp °C	Tg. press. PSIG	Cg. press. PSIG	Temp.	Press.	Rate	Gravity	BSW	Rate	Gravity Air=1				Units
			D.S.T. NO. 2 - JANUARY 17TH 1982 (TESTED INTERVAL 832 - 834 M).														
08.32			SET PACKER														
09.10			OPEN WELL ON ½" Ø FIXED CHOKE - STRONG BLOW.														
				26	140	1400											
09.11			DIESEL CUSHION TO SURFACE.														
				26	280	1400											
09.12				26	310	1400											
09.13				26	400	1400											
09.14				25	450	1400											
09.15				25	550	1400											
09.16				25	680	1400											
09.17				25	690	1400											
09.18				25	640	1400	-	GAS	TO SURFACE.								
09.19				25	570	1400											
09.20				25	660	1400											
09.25				25	750	1400											
09.27				25	750	1400		H2S	30 PPM.								

No.: DOP 110

FLOPETROL – WELL TESTING DATA SHEET – (Continuation)

Page : 07
Report N°: 100182200182
Section : 7

DATE – TIME		PRESSURE AND TEMPERATURE MEASUREMENTS						PROD. RATES AND FLUID PROPERTIES					GOR
		BOTTOM HOLE		WELL HEAD			SEPARATOR	OIL OR CONDENSATE			GAS		
Time	Cumul	Temp.	Pressure	Tg. temp °C	Tg. press. PSIG	Cg. press. PSIG	Temp.	Press.	Rate	Gravity	BSW	Rate MMSCFD	Gravity Air=1	
														Units
09.30				25	750	1400								
09.35				25	850	1400			H2S 100 PPM					
09.41			CHANGE CHOKE TO ¼" Ø ADJ.						H2S 20 PPM					
09.41				26	1080	1400								
09.45				28	1075	1400								
09.50				28	1070	1400			H2S 200 PPM					
09.55				28	1060	1400								
10.00				27	1060	1400			H2S 175 PPM					
10.05				27	1065	1400								
10.08			MUD SAMPLES TAKEN AT CHOKE MANIFOLD.						H2S 200 PPM					
10.15				27	1069	1400								
10.23			1ST GAS SAMPLING AT CHOKE MANIFOLD.											
				27	1065	1400								
10.35			2ND GAS SAMPLING AT CHOKE MANIFOLD									.612		
				27	1065	1400								
10.49			CHANGE CHOKE TO ½" Ø FIXED.									ESTIMATED 2 TO 3	.612	
10.50				27	1010	1400								

No.: DOP 110

FLOPETROL — _WELL TESTING DATA SHEET_(Continuation)

Page : 08
Report N°: 100182200182

Section : 7

DATE - TIME		PRESSURE AND TEMPERATURE MEASUREMENTS							PROD. RATES AND FLUID PROPERTIES					GOR			
		BOTTOM HOLE		WELL HEAD			SEPARATOR		OIL OR CONDENSATE			GAS					
Time	Cumul	Temp.	Pressure	Tg. temp °C	Tg. press. PSIG	Cg. press. PSIG	Temp.	Press.	Rate	Gravity	BSW	Rate MMSCFD	Gravity Air=1				Units
10.50			TRACE OF OIL AT SURFACE														
10.57				27	1005	1400			H2S 200 PPM			ESTIMATED 3 TO 4					
10.59			SHUT IN BY BLEEDING OFF ANNULUS PRESSURE														
				27	1005	0											
11.01				27	340	0											
12.24			UNSET PACKER.														
			END OF D.S.T. NO. 2														
			*BOTTOM PRESSURE RECORDED BY DOWELL COMPUTER.														

No.: DOP 110

FLOPETROL _WELL TESTING DATA SHEET_(Continuation)

Page : 09
Report N°: 10018220018

Section : 7

DATE - TIME		PRESSURE AND TEMPERATURE MEASUREMENTS							PROD. RATES AND FLUID PROPERTIES					GOR			
		BOTTOM HOLE		WELL HEAD			SEPARATOR		OIL OR CONDENSATE			GAS					
Time	Cumul	Temp.	Pressure	Tg. temp °C	Tg. press. PSIG	Cg. press. PSIG	Temp.	Press.	Rate	Gravity	BSW	Rate	Gravity Air=1				Units
			D.S.T. NO. 3 JANUARY 18TH 1982 (TESTED INTERVAL 819 - 826 M)														
13.06			SET PACKER														
13.26			OPEN WELL DOWNHOLE - FLOW THROUGH ¼"Ø ADJ. CHOKE														
				24	100	1400			STRONG BLOW AT BUBBLE HOSE								
13.27			DIESEL CUSHION TO SURFACE - STRONG FLOW.														
				24	130	1400											
13.28				24	250	1400											
13.29				24	260	1400											
13.30			CHANGE CHOKE TO ½" Ø ADJ.														
13.30				24	250	1400											
13.31				24	320	1400											
13.32				24	390	1400											
13.33			1ST SHUT IN														
				24	390	0											
13.38				24	310	0			GAS TO SURFACE.								
13.39				24	260	0											
13.40				24	200	0											

No.: DOP 110

FLOPETROL — WELL TESTING DATA SHEET (Continuation)

Page : 10
Report N° 100182200182

Section : 7

DATE - TIME		PRESSURE AND TEMPERATURE MEASUREMENTS							PROD. RATES AND FLUID PROPERTIES					GOR
		BOTTOM HOLE		WELL HEAD			SEPARATOR		OIL OR CONDENSATE			GAS		
Time	Cumul	Temp.	Pressure	Tg. temp	Tg. press.	Cg. press.	Temp.	Press.	Rate	Gravity	BSW	Rate	Gravity	
				°C	PSIG	PSIG							Air=1	Units
13.41				24	140	0								
13.42				24	100	0								
13.45				24	20	0								
13.50				24	0	0								
14.04			FINAL FLOW - THROUGH ½" Ø FIXED CHOKE.											
14.05				25	300	1400								
14.06				25	650	1400								
14.07				25	900	1400								
14.08				25	930	1400								
14.09				25	900	1400								
14.10				25	890	1400								
14.13				25	870	1400			H2S 19 PPM					
14.15				25	880	1400								
14.30				25	810	1400								
14.35				25	800	1400			H2S 200 PPM					
14.45				25	820	1400								
14.50			SWITCH FLOW THROUGH SEPARATOR											

No.: DOP 110

FLOPETROL — WELL TESTING DATA SHEET (Continuation)

Page : 11
Report N°: 100182201082

Section : 7

DATE - TIME		PRESSURE AND TEMPERATURE MEASUREMENTS							PROD. RATES AND FLUID PROPERTIES					GOR			
		BOTTOM HOLE		WELL HEAD			SEPARATOR		OIL OR CONDENSATE			GAS					
Time	Cumul	Temp.	Pressure	Tg. temp °C	Tg. press. PSIG	Cg. press. PSIG	Temp. °C	Press. PSIG	Rate	Gravity	BSW	Rate MMSCFD	Gravity Air=1				Units
14.50				25	820	1400									H2S 200 PPM		
14.55				25	830	1400											
15.00				25	832	1400	15	130					.605				
15.15			LOWER ORIFICE PLATE Ø 2.5"														
15.15				25	845	1400	8	135				5.2	.605				
15.30				25	855	1400	8	135				5.4	.605		H2S	200 PPM	
15.43			GAS SAMPLING AT SEPARATOR														
				25	855	1400	8	135					.605				
15.45				25	855	1400	8	138				5.4	.605				
15.45			FINAL SHUT IN														
				25	855	0	8	138					.605				
15.46			BY PASS SEPARATOR														
15.40				25	350	0											
20.05			UNSET PACKER														
			END OF D.S.T. NO. 3						* BOTTOM PRESSURE RECORDED BY DOWELL COMPUTER.								

FLOPETROL

DIVISION : N.T.D.

BASE : PERTH

REPORT N°:

Well Testing Report
Annexes

Client : HUDBAY OIL (AUSTRALIA) LTD.

Field : WILDCAT Well : SPERM WHALE NO. 1

Zone : Date : FROM 10.01.82 TO 20.01.82

N°: DOP 111

INDEX of ANNEXES

- LIQUID PRODUCTION RATE MEASUREMENT -

2.1 - MEASUREMENT WITH TANK -

$$V_o = V \times K \times (1 - BSW)$$

V_o : Net oil volume at 60°F and atmospheric pressure.
V : Gross oil volume measured by tank gauging.
K : Volume correction factor to be applied between the tank temperature during gauging and 60°F.
BSW : Basic sediments and water.

2.2 - MEASUREMENT WITH METER -

a) Shrinkage factor is measured by shrinkage tester.

$$V_o = V_S \times f \times (1 - Shr) \times K \times (1 - BSW)$$

V_o : Net oil volume at 60°F and atmospheric pressure.
V_S : Gross oil volume measured by meter under separator conditions.
f : Meter correction factor = $\frac{\text{Volume measured in tank}}{\text{Volume measured by meter}}$
Shr : Percentage of oil volume reduction between separator and tank conditions, reported to oil volume at separator conditions.
K : Volume correction factor to be applied between the final temperature during shrinkage measurement and 60°F.
BSW : Basic sediments and water.

b) Shrinkage factor is measured with tank.

$$V_o = V_S \times (1 - Shr') \times K \times (1 - BSW)$$

V_o, V_S, K and BSW : Same meaning as in a).
$(1 - Shr')$: Shrinkage factor including meter correction factor.

No.: DOP 120

FLOPETROL

Base : PERTH

Client : HUDBAY OIL

Field : WILDCAT

Well : SPERM WHALE NO. 1

- OIL PRODUCTION RATE -

- MEASUREMENT WITH TANK -

Section : ANNEX 2.1

Page : 01

Report N° : 10018220018

DATE - TIME		Gauge	TANK VOLUME		STO GRAVITY			K	BSW	Net volume of STO V_o	Net STO product. rate	Cumulative production	
Time	Interval	graduation	Volume V	Temp.	Gravity	Temp.	Grav. 60°F						
		CM	BBL						%		/day		Units
		D.S.T. 1 B. JANUARY 16TH, 1982											
		RECOVERY OF DIESEL CUSHION											
07.11		OPEN WELL ON ¼" Ø BUBBLE HOSE.											
07.13		DIESEL CUSHION TO SURFACE - FLOW THROUGH 7/16" Ø ADJ. CHOKE.											
07.14		CHOKE Ø ½" ADJ.											
07.14		0											
08.50		SHUT IN											
08.50		56	14.8										

TESTED INTERVAL :

PERFORATIONS :

GAS PRODUCTION RATE MEASUREMENT by orifice meter

Reference is made to the rules and coefficients given in AGA gas measurement Comittee Report No.3 for orifice metering.

a) EQUATIONS

$$Q = C \sqrt{hw \times Pf}$$

Q : Production rate at reference conditions.
C : Orifice flow coefficient.
hw: Differential pressure in inches of water.
Pf : Flowing pressure in psia.

$$C = Fu \times Fb \times Fg \times Y \times Ftf \times Fpv$$

Fu : Unit conversion factor in desired reference conditions.
Fb : Basic orifice factor (Q in Cu.ft / hour).
Fg : Specific gravity factor.
Y : Expension factor
Ftf : Flowing temperature factor.
Fpv: Supercompressibility factor (estimated).

Remarks

Fm: Manometer factor is equal one since only bellows type meters are used.
Fr : Reynolds factor is considered to be one.

TABLE OF Fu FACTOR

UNITS	REFERENCE CONDITIONS			
	60°F 14.73 psia	0°C 760mmHg*	15°C 760mmHg *	15°C 750mmHg *
Cu.ft / hour	1	0.9483	1.0004	1.0137
Cu.ft / day	24	22.760	24.009	24.329
m^3 / hour	0.02832	0.02685	0.02833	0.02870
m^3 / day	0.6796	0.6445	0.6799	0.6889

* Mercury at 32°F

b) METER DATA

Meter type : DANIEL ORIFICE
Flow recorder type : BARTON
Flange taps – Pf taken down stream
ID of meter tube : 4.026"

c) SPECIFIC GRAVITY SOURCE

Sampling point : SEPARATOR OUTLET
Gravitometer type : KIMRAY

d) SUPERCOMPRESSIBILITY FACTOR Fpv

All coefficients are taken from AGA NX 19 manual for natural gas free of air, CO_2 and H_2S . More accurate values could only be determined by laboratory measurement.

No. DOP 125

FLOPETROL

Base : PERTH

Client : HUDBAY OIL

Field : WILDCAT

Well : SPERM WHALE # 1

- GAS PRODUCT. RATE MEASUREMENT -

Section : ANNEX 3

Page : 02

Report N : 100182200182

DATE - TIME		Flowing	P_f	h_w	$\sqrt{h_w \times P_f}$	Orifice	Gas	F_b	F_g	Y	F_{tf}	F_{pv}	C	Gas production	Cumulative
Time	Interval	Temp.	absolute			diameter	gravity							rate : Q	Production
		°C	psia	"of wat.		Inches	(air=1)							MMSCFD	
			D.S.T. NO. 3 JANUARY 18TH 1982 (TESTED INTERVAL 819 - 826 M)												
13.26			OPEN WELL												
13.33			1ST SHUT IN												
13.38			GAS TO SURFACE												
14.04			FINAL FLOW - CHOKE Ø ½" Ø FIXED.												
14.50			SWITCH FLOW TO SEPARATOR												
15.15			LOWER 2.5 Ø ORIFICE PLATE												
15.15		8	150	35	119.37	2.5	.605	1387.2	1.2856	1	1.0137	1.013	43951.6	5.2	
15.30		8	150	100	122.47	2.5	.605	1387.2	1.2856	1	1.0137	1.013	43951.6	5.4	
15.44		8	153	100	123.69	2.5	.605	1387.2	1.2856	1	1.0137	1.014	43995.0	5.4	
15.45			FINAL SHUT IN												
15.46			BY PASS SEPARATOR.												

F_u = 24

Recorder ranges : P_f = 1000 PSI

h_w = 200" W Temp. =

TESTED INTERVAL : 819 826 M

PERFORATIONS :

FLOPETROL

Base : PERTH

Client : HUDBAY OIL

Field : WILDCAT

Well : SPERM WHALE

Section : ANNEX 42

Page : 01

Report N° : 1001822001 32

- SURFACE SAMPLING -

Date of sampling : 17.01.82 Service order : _____ Sampling No. : 1

Sample nature : GAS Sampling point : CHOKE MANIFOLD INLET

A - RESERVOIR AND WELL CHARACTERISTICS -

Producing zone : D.S.T. 2 Perforations : 832 834 M Sampling interval : _____

Depth origin : 1417 M Tubing Dia. : 3½" Casing Dia. : 9 5/8

Surface elevation : _____ Shoe : _____ Shoe : 894 M

Bottom hole static conditions	Initial pressure :	at depth :	date :
	Latest pressure measured :	at depth :	date :
	Temperature :	at depth :	date :

B - MEASUREMENT AND SAMPLING CONDITIONS -

Time at which sample was taken : 10.23 Time elapsed since stabilisation : _____

Bottom hole dynamic conditions	Choke size : since :	Well head pressure :	Well head temp. :
	Bottom hole pressure :	at depth :	date :
	Bottom hole temp. :	at depth :	date :

Flow measurement of sampled gas - Gravity (air : 1) : .612 Factor Fpv = $\frac{1}{\sqrt{Z}}$: _____

Values used for calculations :

Separator	Pressure : PSIG Temp. : °F	Rates - Gas : SCFD Oil (separator cond.) : BOPD [B] [C]	GOR : _____ (separator cond.)
Stock tank	Atmosphere : mmHg - °F Tank temperature : °F	Oil at 60 °F : BOPD [A] [B] [C] [a] [b]	

BSW : _____ % WLR : _____ %

Transfering fluid : _____ Transfer duration : _____

Final conditions of the shipping bottle :

Pressure : 1065 PSIG Temp : 27°C

C - IDENTIFICATION OF THE SAMPLE -

Shipping bottle No. : A 4974 sent on : 20.01.82 by : HUDBAY Shipping order No. : _____

Addressee : PERTH

Coupled with	LIQUID		GAS	
Bottom hole samples No.	TRANSFER FROM PCT D.S.T. 2	TRANSFER FROM EQT.		
Surface samples No.	A 7387 15089/5 230-97	9024-25 15089/17 2226 -115	A 4926 A 12042	

Measurement conditions.

[A] - Tank. [B] - Meter. [C] - Dump.

[a] - Corrected with shrinkage tester. [b] - Corrected with tank.

D - REMARKS -

Visa Chief Operator

No. : DOP 127

FLOPETROL

Base : PERTH

Client : HUDBAY OIL

Field : WILDCAT

Well : SPERM WHALE

Section : ANNEX 4.2

Page : 02

Report N° : 10018220082

- SURFACE SAMPLING -

Date of sampling : 17.01.82 Service order : _____ Sampling No. : 2

Sample nature : GAS Sampling point : CHOKE MANIFOLD INLET

A - RESERVOIR AND WELL CHARACTERISTICS -

Producing zone : DST NO. 2 Perforations : 832 - 834 Sampling interval : _____

Depth origin : 1417 M Tubing Dia. : 3½" Casing Dia. : 9 5/8"

Surface elevation : _____ Shoe : _____ Shoe : 894 M

Bottom hole static conditions	Initial pressure :	at depth :	date :
	Latest pressure measured :	at depth :	date :
	Temperature :	at depth :	date :

B - MEASUREMENT AND SAMPLING CONDITIONS -

Time at which sample was taken : 10.35 Time elapsed since stabilisation : _____

Bottom hole dynamic conditions	Choke size : since :	Well head pressure :	Well head temp. :
	Bottom hole pressure :	at depth :	date :
	Bottom hole temp. :	at depth :	date :

Flow measurement of sampled gas - Gravity (air : 1) : .612 Factor Fpv = $\frac{1}{\sqrt{Z}}$: _____

Values used for calculations :

Separator	Pressure : PSIG Temp. : °F	Rates - Gas : SCFD Oil (separator cond.) : BOPD [B] [C]	GOR : (separator cond.)
Stock tank	Atmosphere : mmHg - °F Tank temperature : °F	Oil at 60 °F : BOPD [A] [B] [C] [a] [b]	

BSW : % WLR : %

Transfering fluid : Transfer duration :

Final conditions of the shipping bottle :

Pressure : 1065 PSIG Temp : 27°C

C - IDENTIFICATION OF THE SAMPLE -

Shipping bottle No. : A 4926 sent on : 20.01.82 by : HUDBAY Shipping order No. : _____

Addressee : PERTH

Coupled with	LIQUID	GAS
Bottom hole samples No.	SEE PAGE 01 ANNEX 4.2.	
Surface samples No.		

Measurement conditions.

[A] - Tank. [B] - Meter. [C] - Dump.

[a] - Corrected with shrinkage tester. [b] - Corrected with tank.

D - REMARKS -

Visa Chief Operator

No. : DOP 127

FLOPETROL

Base : PERTH

Client : HUDBAY OIL

Field : WILDCAT

Well : SPERM WHALE #1

Section: ANNEX 4.2

Page : 03

Report N°: 1001822001 32

- SURFACE SAMPLING -

Date of sampling : 18.01.82 Service order : _____ Sampling No. : 1

Sample nature : GAS Sampling point : SEPARATOR OUTLET

A - RESERVOIR AND WELL CHARACTERISTICS -

Producing zone : D.S.T. NO. 3 Perforations : 819 - 826 Sampling interval : _____

Depth origin : 1417 M Tubing Dia. : 3½" Casing Dia. : 9 5/8

Surface elevation : _____ Shoe : _____ Shoe : 894 M

Bottom hole static conditions

Initial pressure : _____ at depth : _____ date : _____

Latest pressure measured : _____ at depth : _____ date : _____

Temperature : _____ at depth : _____ date : _____

B - MEASUREMENT AND SAMPLING CONDITIONS -

Time at which sample was taken : 15.43 Time elapsed since stabilisation : _____

Bottom hole dynamic conditions

Choke size : _____ since : _____ Well head pressure : _____ Well head temp. : _____

Bottom hole pressure : _____ at depth : _____ date : _____

Bottom hole temp. : _____ at depth : _____ date : _____

Flow measurement of sampled gas - Gravity (air : 1) : .605 Factor Fpv = $\frac{1}{\sqrt{Z}}$: _____

Values used for calculations :

Separator

Pressure : 135 PSIG Temp. : 77 °F

Rates - Gas : 5.4 MM SCFD

Oil (separator cond.) : _____ BOPD [B] [C]

GOR : _____ (separator cond.)

Stock tank

Atmosphere : _____ mmHg - _____ °F

Tank temperature : _____ °F

Oil at 60 °F : _____ BOPD [A] [B] [C] [a] [b]

BSW : _____ % WLR : _____ %

Transfering fluid : _____

Transfer duration : _____

Final conditions of the shipping bottle :

Pressure : 135 PSIG Temp : _____

C - IDENTIFICATION OF THE SAMPLE -

Shipping bottle No. : A12042 sent on : 20.01.82 by : HUDBAY Shipping order No. : _____

Addressee : ~~PERTH~~

Coupled with	LIQUID	GAS
Bottom hole samples No.	SEE PAGE 01 ANNEX 4.2	
Surface samples No.		

Measurement conditions.

[A] - Tank. [B] - Meter. [C] - Dump.

[a] - Corrected with shrinkage tester. [b] - Corrected with tank.

D - REMARKS -

Visa Chief Operator

No. : DOP 127

FLOPETROL

Base : PERTH

Client : HUDBAY OIL

Field : WILDCAT

Well : SPERM WHALE # 1

Section: ANNEX 42

Page : 04

Report N°: 100182200.82

- SURFACE SAMPLING -

TRANSFER

P.C.T. TRANSFER

Date of ~~sampling~~ : 17+18.01.82 Service order : _____ Sampling No.: _____

Sample nature : _____ Sampling point : _____

A - RESERVOIR AND WELL CHARACTERISTICS -

Producing zone : D.S.T. # 2 Perforations : 832 834 M Sampling interval : _____

Depth origin : 1417 M Tubing Dia. : 3½" Casing Dia. : 9 5/8 894M

Surface elevation : _____ Shoe : _____ Shoe : _____

Bottom hole static conditions	Initial pressure :	at depth :	date :
	Latest pressure measured :	at depth :	date :
	Temperature :	at depth :	date :

B - MEASUREMENT AND SAMPLING CONDITIONS -

Time at which sample was taken : _____ Time elapsed since stabilisation : _____

Bottom hole dynamic conditions	Choke size :	since :	Well head pressure :	Well head temp. :
	Bottom hole pressure :	at depth :		date :
	Bottom hole temp. :	at depth :		date :

Flow measurement of sampled gas - Gravity (air: 1) : _____ Factor Fpv = $\frac{1}{\sqrt{Z}}$: _____

Values used for calculations :

Separator	Pressure : _____ PSIG Temp. : _____ °F	Rates - Gas : _____ SCFD Oil (separator cond.) : _____ BOPD [B] [C]	GOR : _____ (separator cond.)
Stock tank	Atmosphere : _____ mmHg - _____ °F Tank temperature : _____ °F	Oil at 60 °F : _____ BOPD [A] [B] [C] [a] [b]	

BSW : _____ % WLR : _____ %

Transfering fluid : _____

Transfer duration : 4 HOURS

Final conditions of the shipping bottle :

Pressure : 880 PSIG Temp : _____

TRANSFERRING PRESSURE 900 PSIG

INITIAL PCT PRESSURE 880 PSIG

C - IDENTIFICATION OF THE SAMPLE -

~~Shipping bottle No~~ : _____ sent on : 20.01.82 by : HUDBAY Shipping order No. : _____

Addressee : _____

Coupled with	LIQUID		GAS	
	BOTTLE NO			
Bottom hole samples No.	A 7387	GAS CAP 30 cc		
	15089/5	GAS CAP 60 cc		
	230-97	GAS CAP 60 cc		
Surface samples No.				

Measurement conditions.

[A] - Tank. [B] - Meter. [C] - Dump.

[a] - Corrected with shrinkage tester. [b] - Corrected with tank.

D - REMARKS -

TRANSFER BY MERCURY DISPLACEMENT ALL SAMPLES NOT TOTALLY RECOVERED AS ASSUMED 1500 cc PCT CAPACITY SEEMS TO HAVE BEEN UNDERESTIMATED.

Visa Chief Operator

No.: DOP 127

FLOPETROL

Base : PERTH

Client : HUDBAY OIL

Field : WILDCAT

Well : SPERM WHALE NO. 1

Section : ANNEX 42

Page : 05

Report N° : 100182200182

- SURFACE SAMPLING -

TRANSFER RFT TRANSFER

Date of ~~sampling~~ : 19.01.82 Service order : _____ Sampling No. : _____

Sample nature : _____ Sampling point : _____

A - RESERVOIR AND WELL CHARACTERISTICS -

Producing zone : _____ Perforations : _____ Sampling interval : _____

Depth origin : 1417M Tubing Dia. : _____ Casing Dia. : _____

Surface elevation : _____ Shoe : _____ Shoe : _____

Bottom hole static conditions	Initial pressure : _____	at depth : _____	date : _____
	Latest pressure measured : _____	at depth : _____	date : _____
	Temperature : _____	at depth : _____	date : _____

B - MEASUREMENT AND SAMPLING CONDITIONS -

Time at which sample was taken : _____ Time elapsed since stabilisation : _____

Bottom hole dynamic conditions	Choke size : _____ since : _____	Well head pressure : _____	Well head temp. : _____
	Bottom hole pressure : _____	at depth : _____	date : _____
	Bottom hole temp. : _____	at depth : _____	date : _____

Flow measurement of sampled gas - Gravity (air : 1) : _____ Factor Fpv = $\frac{1}{\sqrt{Z}}$: _____

Values used for calculations :

Separator	Pressure : _____ PSIG Temp. : _____ °F	Rates - Gas : _____ SCFD Oil (separator cond.) : _____ BOPD [B] [C]	GOR : _____ (separator cond.)
Stock tank	Atmosphere : _____ mmHg - _____ °F Tank temperature : _____ °F	Oil at 60 °F : _____ BOPD [A] [B] [C] [a] [b]	

BSW : _____ % WLR : _____ %

Transfering fluid : _____ Transfer duration : 2 HOURS

Final conditions of the shipping bottle :

Pressure : _____ Temp : _____

C - IDENTIFICATION OF THE SAMPLE -

~~Shipping bottle~~ _____ sent on : 20.01.82 by : HUDBAY Shipping order No. : _____

Addressee : PERTH

Coupled with	LIQUID	GAS
Bottom hole samples No.	BOTTLE NO.	
	9024-25 40 cc GAS CAP	
Surface samples No.	15083/17 65 cc GAS CAP	
	22226/115 65 cc GAS CAP	

Measurement conditions,

[A] - Tank. [B] - Meter. [C] - Dump.

[a] - Corrected with shrinkage tester. [b] - Corrected with tank.

D - REMARKS -

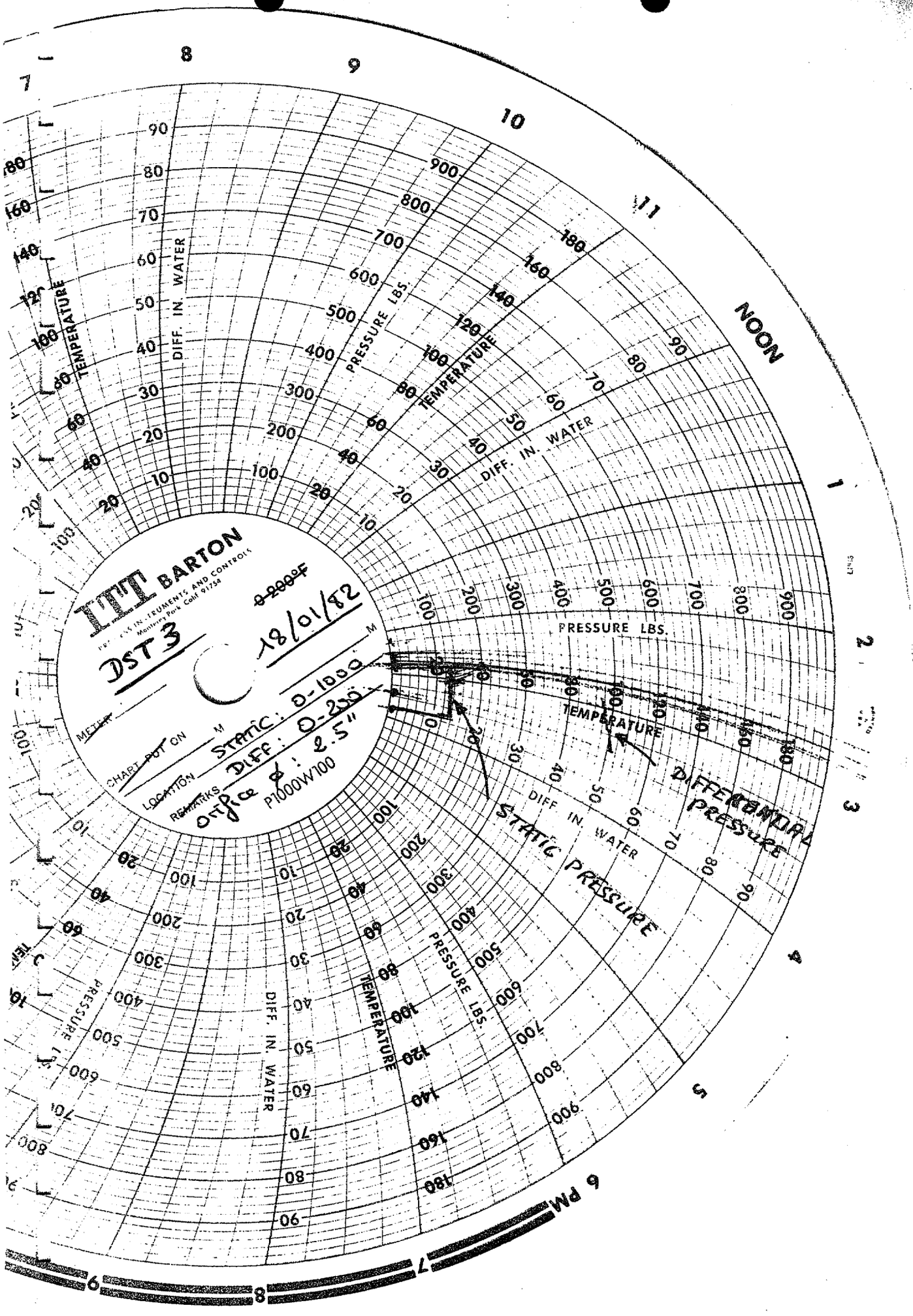
TRANSFER BY MERCURY DISPLACEMENT

TRANSFERRING PRESSURE 2000 PSIG

INITIAL RFT PRESSURE 1000 PSIG

Visa Chief Operator

No. : DOP 127


ITT BARTON
INSTRUMENTS AND CONTROLS
Monterey Park Calif 91754
0-200°F
DST 3
18/01/82
METER
CHART PUT ON
M
LOCATION
REMARKS
STATIC: 0-1000
DIFF: 0-250
Orifice # : 2.5"
P1000W100
NOON
PRESSURE LBS.
TEMPERATURE
DIFF. IN. WATER
DIFFERENTIAL PRESSURE
STATIC PRESSURE
6 PM

APPENDIX D3 DOWELL - SCHLUMBERGER

TECHNICAL REPORTS

DOWELL Schlumberger

PRESSURE LOG*

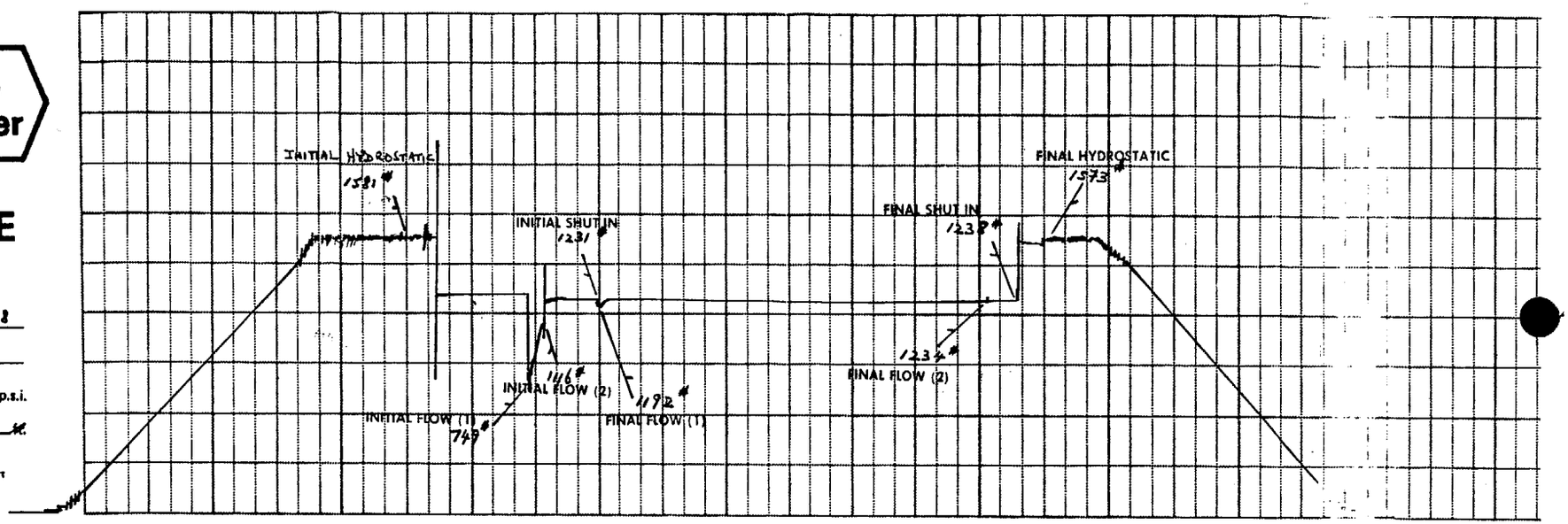
Field Report No. F82008

Instrument: Number J1630

Capacity 2800 p.s.i.

Depth 840.52M ft.

*a continuous tracing of the original chart



DOWELL Schlumberger

PRESSURE LOG*

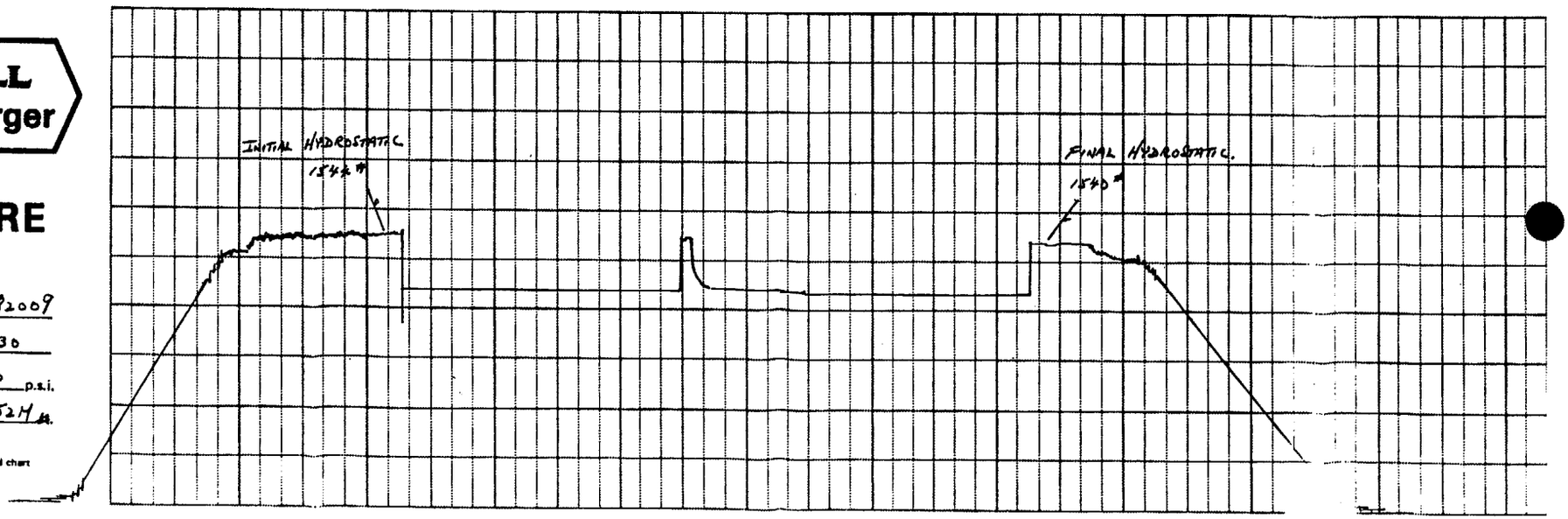
Field Report No. F82009

Instrument: Number J1630

Capacity 2800 p.s.i.

Depth 840.52M ft.

*a continuous tracing of the original chart



DOWELL
Schlumberger

PRESSURE LOG*

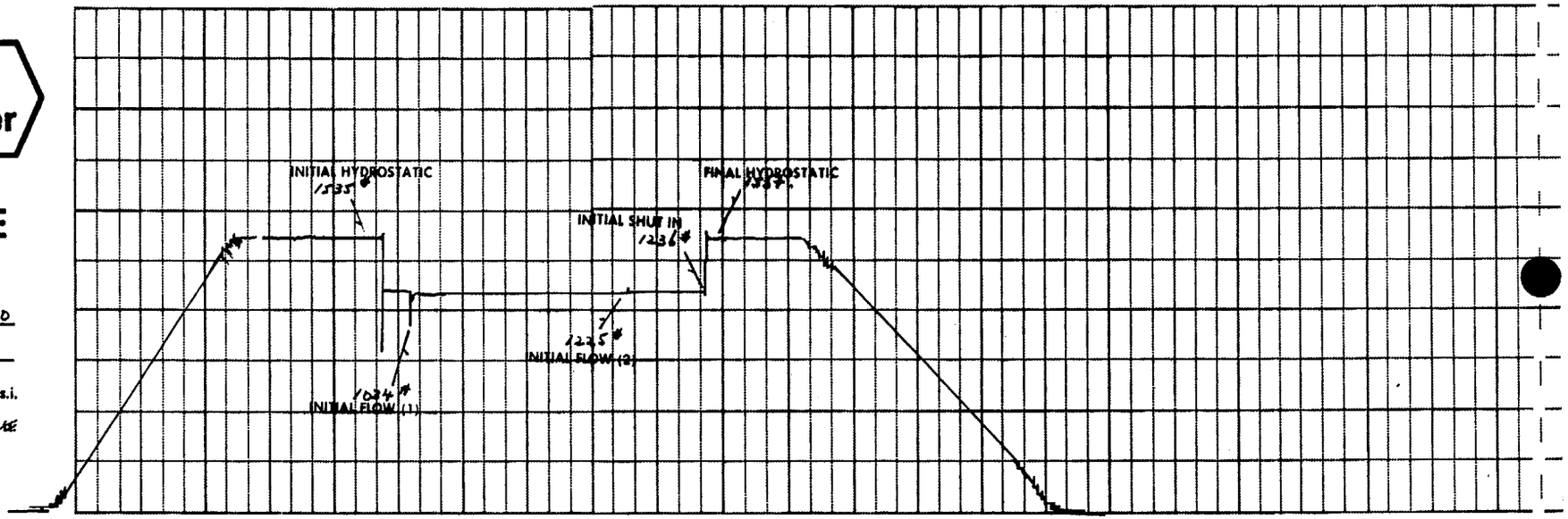
Field Report No. F82010

Instrument: Number J1630

Capacity 2800 p.s.i.

Depth 840.52M KB

*a continuous tracing of the original chart



DOWELL
Schlumberger

PRESSURE LOG*

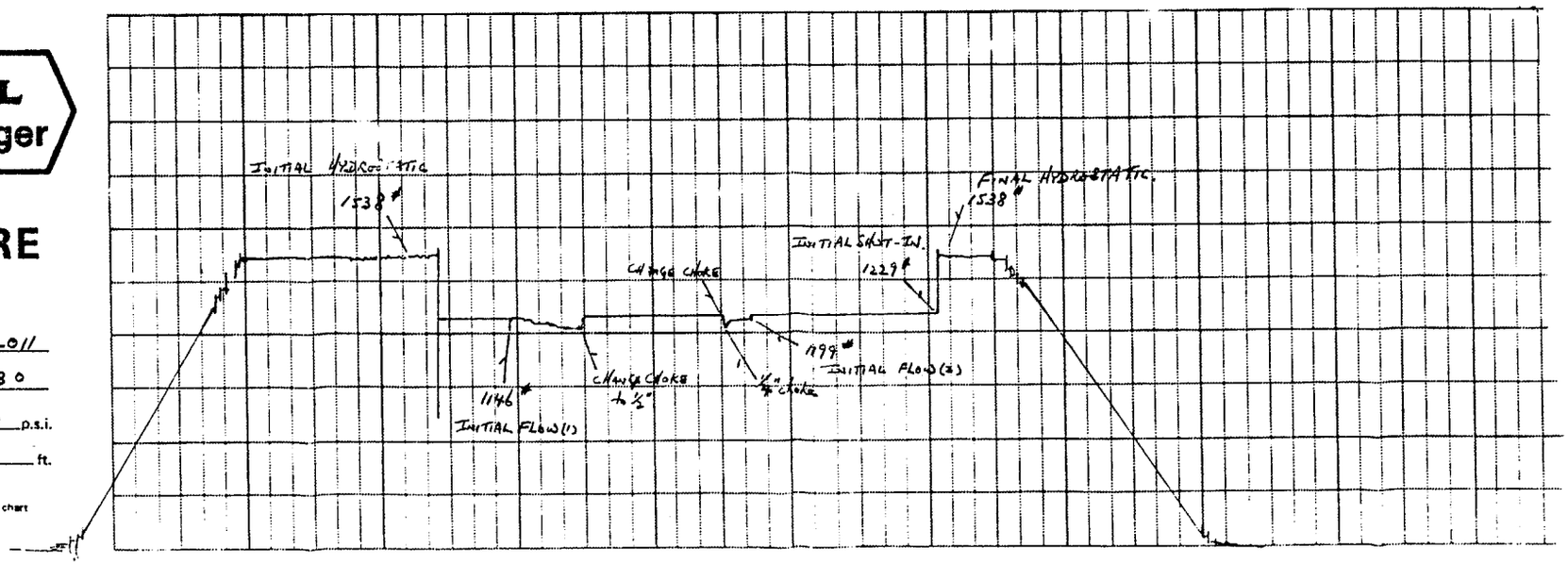
Field Report No. F82011

Instrument: Number J1630

Capacity 2800 p.s.i.

Depth _____ ft.

*a continuous tracing of the original chart



DOWELL
Schlumberger

PRESSURE LOG*

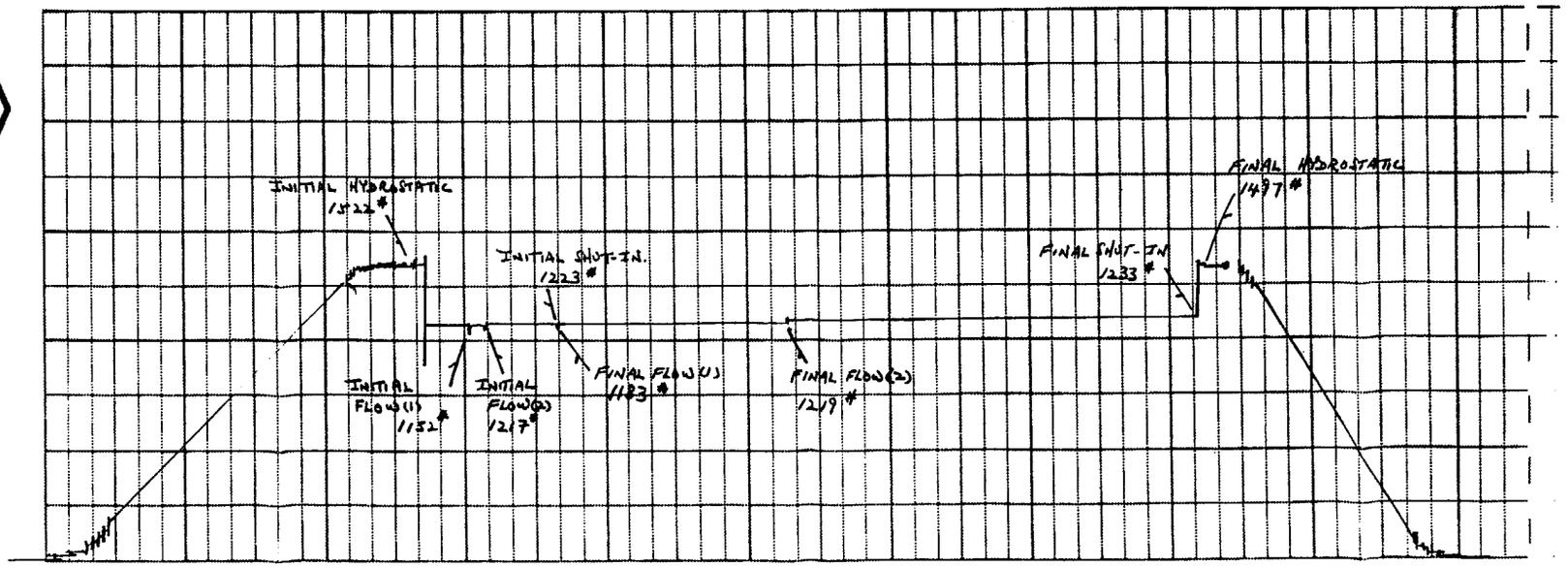
Field Report No. F82012

Instrument: Number J1630

Capacity 2800 p.s.i.

Depth 813.04M

*a continuous tracing of the original chart



REPORT N° F 82008

JOB N° _____

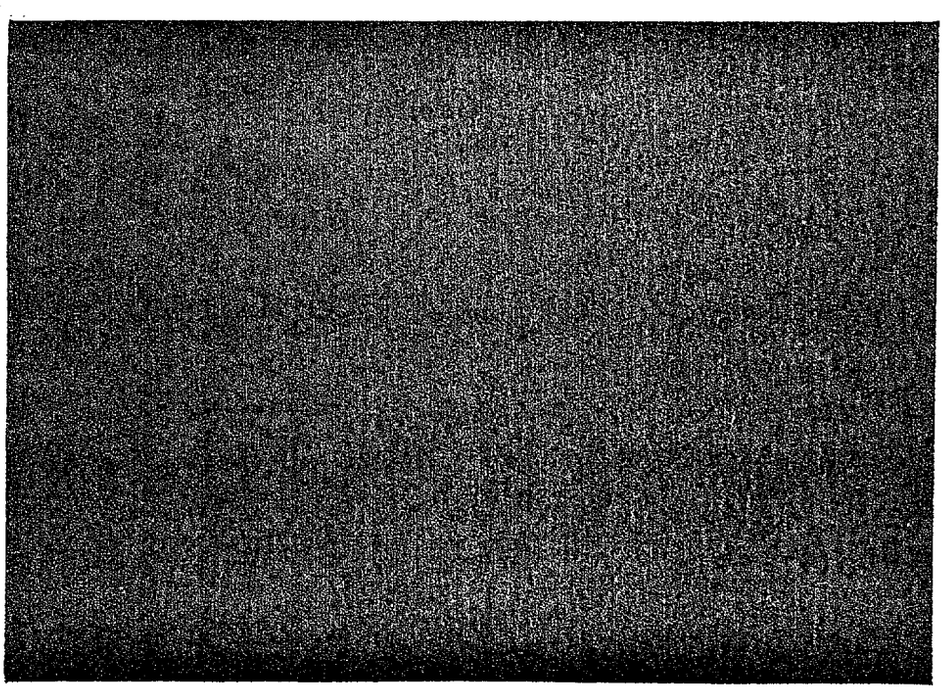
INVOICE/SIR. _____

DATE FEBRUARY 2, 1982

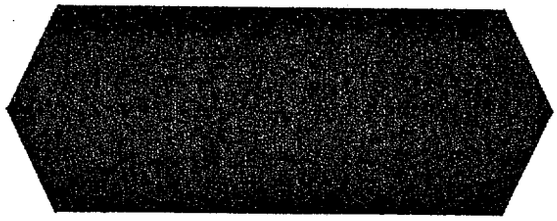
TECHNICAL REPORT

COMPANY HUDBAY OIL WELL SPERM WHALE 1 FIELD GIPPSLAND BASIN

TEST N° 1 COUNTRY AUSTRALIA



REPORT N° F 82008



CONFIRMATION OF REPORT DISTRIBUTION

TO HUDBAY OIL

WELL SPERM WHALE 1 FIELD GIPPSLAND BASIN TEST N° 1

COUNTRY AUSTRALIA DATE FEBRUARY 2, 1982

Dowell Schlumberger has been requested to furnish the following companies with Technical Reports. This distribution of Technical Reports will be used for :

☐ All tests on this well,

☐ This one test only,

unless otherwise notified.

_____ TECHNICAL REPORT (S)

_____ TECHNICAL REPORT (S)

_____ TECHNICAL REPORT (S)

_____ TECHNICAL REPORT (S)

_____ TECHNICAL REPORT (S)

_____ TECHNICAL REPORT (S)

Dowell Schlumberger

Cables: "Bigorange"
Telex: Orange RS 23005
Telephone: 2351022
2351287

FEBRUARY 2, 1982

REPORT NO : F 82008

GENTLEMEN,

The enclosed test appears to be a good drill stem test during which the tools did function properly.

A review of the test datas indicate high permeability.

FRANCIS SOO
RESERVOIR EVALUATION DEPARTMENT

FS/rs

REPORT N° F 82008

RECORDER N° : J 1629 CAPACITY : 2800 PSI DEPTH : 827.11 M

OPENING : INSIDE TEMPERATURES : 130 DEG F

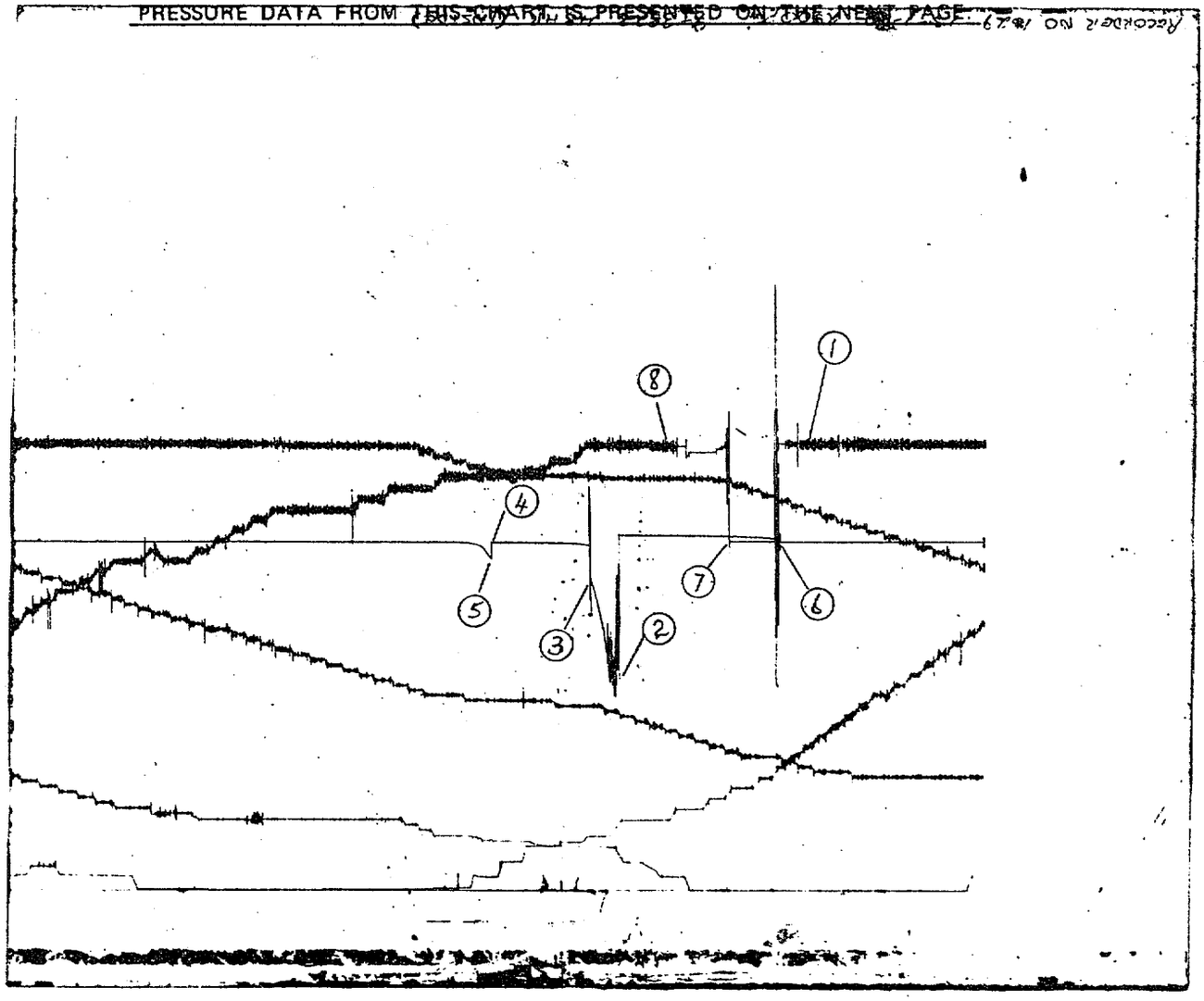
CLOCK N° : 9-3823 CAP: 48 HRS CLOCK TRAVEL : 0.020905 in/min

CALIBRATION DATA AT M = 556.84032

A = - 1.28894

PRESSURE (PSI) = DEFLECTION (INS) X M ± A

PRESSURE DATA FROM THIS CHART IS PRESENTED ON THE NEXT PAGE



REPORT N° F 82008

PRESSURE DATA FOR RECORDER : J 1629

DESCRIPTION	LABEL POINT	PRESSURE (PSI)	TIME GIVEN	TIME COMPUTED
INITIAL HYDROSTATIC	1	1519		
INITIAL FLOW (1)	2	731		
INITIAL FLOW (2)	3	1056	7	8
INITIAL SHUT-IN	4	1189	28	28
SECOND FLOW (1)				
SECOND FLOW (2)				
SECOND SHUT-IN				
THIRD FLOW (1)				
THIRD FLOW (2)				
THIRD SHUT-IN				
FINAL FLOW (1)	5	1133	0	0
FINAL FLOW (2)	6	1188	192	193
FINAL SHUT-IN	7	1190	16	15
FINAL HYDROSTATIC	8	1516		

REMARK :

REPORT Nº F 82008

RECORDER Nº : J 1630 CAPACITY : 2800 PSI DEPTH : 840.52 M

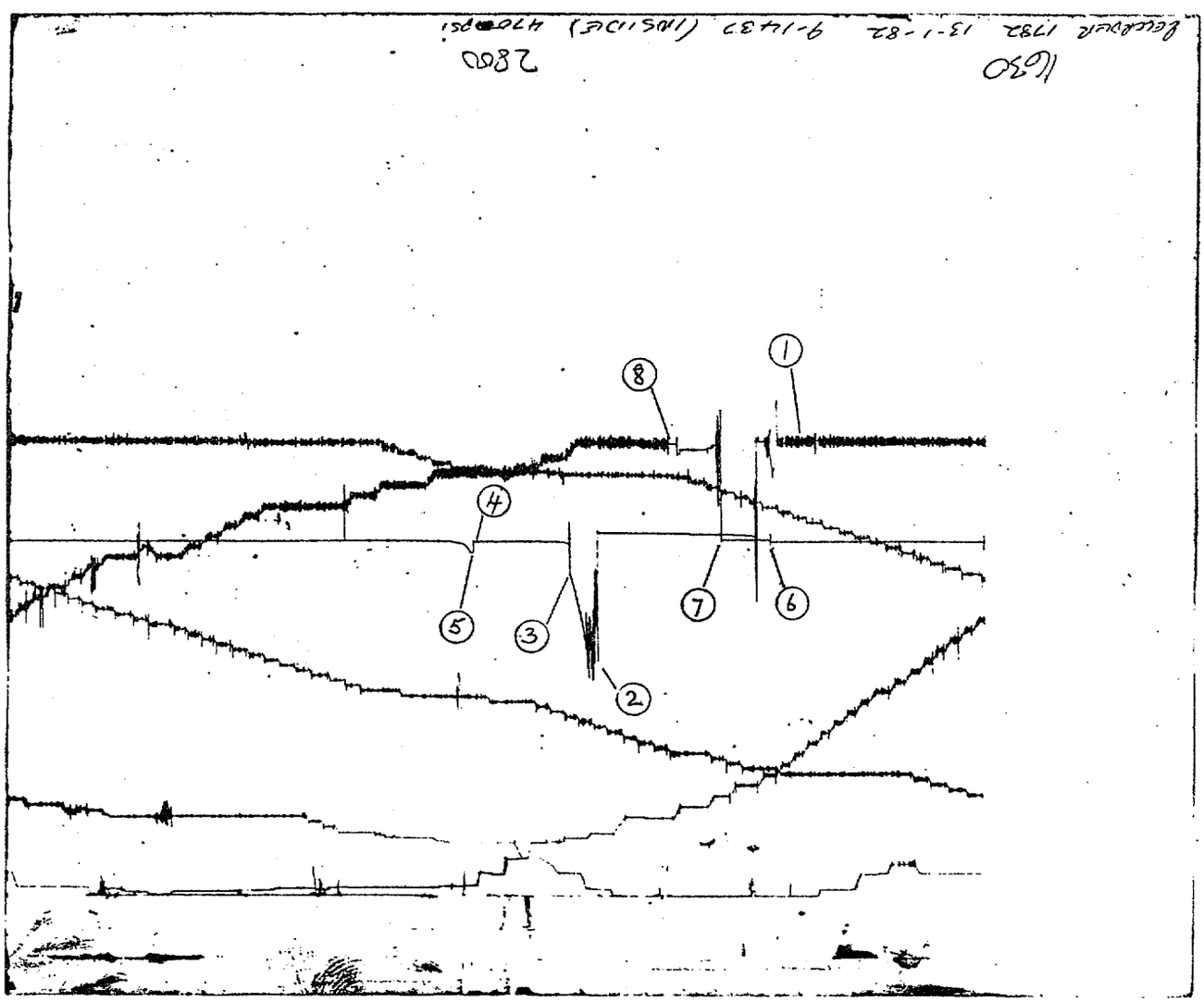
OPENING : OUTSIDE TEMPERATURES : 130 DEG F

CLOCK Nº : 9-1437 CAP: 48 HRS CLOCK TRAVEL : 0.020778 in/min

CALIBRATION DATA AT M = 564.5074
A = 5.357018

PRESSURE (PSI) = DEFLECTION (INS) X M ± A

PRESSURE DATA FROM THIS CHART IS PRESENTED ON THE NEXT PAGE.



PRESSURE DATA FOR RECORDER : J 1630

DESCRIPTION	LABEL POINT	PRESSURE (PSI)	TIME GIVEN	TIME COMPUTED
INITIAL HYDROSTATIC	1	1581		
INITIAL FLOW (1)	2	749		
INITIAL FLOW (2)	3	1116	7	7
INITIAL SHUT-IN	4	1231	28	28
SECOND FLOW (1)				
SECOND FLOW (2)				
SECOND SHUT-IN				
THIRD FLOW (1)				
THIRD FLOW (2)				
THIRD SHUT-IN				
FINAL FLOW (1)	5	1192	0	0
FINAL FLOW (2)	6	1234	192	194
FINAL SHUT-IN	7	1238	16	14
FINAL HYDROSTATIC	8	1573		

REMARK :

PRESSURE DATA FOR RECORDER : J 1630

LABEL POINT	ΔT (mins)	PRESSURE (PSI)	$\frac{T + \Delta T}{\Delta T}$	LOG	Pw − Pf (PSI)	COMMENTS
1		1581				INITIAL HYDROSTATIC
2	0	749				INITIAL FLOW (1)
	2	861				
	4	988				
3	7	1116				
3	0	1116				INITIAL FLOW (2)
	2	1228	4.50	0.65	112	START SHUT-IN
	4	1230	2.75	0.44	114	T = 7
	6	1230	2.17	0.34	114	
	8	1230	1.88	0.27	114	
	10	1231	1.70	0.23	114	
	15	1231	1.47	0.17	114	
	20	1231	1.35	0.13	114	
4	28	1231	1.25	0.10	114	INITIAL SHUT-IN
5	0	1192				FINAL FLOW (1)
	2	1213				
	4	1226				
	6	1230				
	8	1232				
	10	1232				
	20	1233				
	40	1233				
	60	1233				
	80	1234				
	100	1234				
	150	1234				
6	194	1234				FINAL FLOW (2)
6	0	1234				START SHUT-IN
	2	1238	101.50	2.01	4	T = 201
	4	1238	51.25	1.71	4	
	6	1238	34.50	1.54	4	
	8	1238	26.13	1.42	4	
	10	1238	21.10	1.32	4	
7	14	1238	15.36	1.19	4	FINAL SHUT-IN
8		1573				FINAL HYDROSTATIC

DOWELL Schlumberger

Formation Testing Field Report

Report No. F 82008

WELL IDENTIFICATION

Company : HUDBAY OIL Well No : SPERM WHALE 1 Test No. : 1

Field : GIPPSLAND BASIN Location : OFFSHORE BAIRNSDALE Country : AUSTRALIA

Tested Interval : From 839 M XX to 848 M XX

Co-ordinates : -

Type Test : Open Hole ☐ Casing ☒ Conventional ☒ Straddle ☐ Land rig ☐ Jack-up ☐ Floater ☒

Valve : MFE ☐ PCT ☒ SPRO ☒ Other : with Packer ☒ Retainer ☐

HOLE DATA

Geologic Level : UPPER CRETACIOUS Description : -

Net Productive Interval : 8 M XX Estimated Porosity : 25.30 %

Total Depth : 894.53 M XX Depths measured from : RTKB Elevation : 9.35 M XX.

Open Hole Size : - in. - Rat Hole Size : - in., from - ft.

Casing Size : 9-5/8 in. 40 lbs/ft. Liner Size : - in., - lbs/ft. from - ft

Before test : Caliper Yes ☐ No ☒ Scraper Yes ☐ No ☒ Circulation Yes ☒ for 2 hrs; No ☐

MUD DATA

Mud Type : BARACARB BRINE Weight : 1.32 SG

Viscosity : 50 Water Loss 12 cc Mud Resistivity - at - °F

Filtrate Resistivity : - at - °F ; Chloride ppm : 111,000

INSTRUMENT AND CHART DATA

Recorder No.		J 1629	J 1630	J 1782	
Capacity (psig)		2800	2800	4700	
Depth		827.11	840.52	842.32	
Inside/Outside		INSIDE	OUTSIDE	INSIDE	
Above/Below valve		BELOW	BELOW	BELOW	
Clock No.		9-3823	9-1437	9-3813	
Capacity (hrs.)		48 HRS	48 HRS	48 HRS	
Temperature		130 DEG F	130 DEG F	130 DEG F	
Initial Hydrostatic Pressure		1524	1577		
Pre-flow	(1) Start Pressure	776	806		
	(2) Finish Pressure	1055	1113		
Initial Shut-in Pressure		1192	1231		
Second Flow	(1) Start Pressure	1136	1192		
	(2) Finish Pressure	1189	1228		
Second Shut-in Pressure		-	-		
Final Flow	(1) Start Pressure	-	-		
	(2) Finish Pressure	-	-		
Final Shut-in Pressure		1200	1234		
Final Hydrostatic Pressure		1513	1565		

UNREADABLE

OPERATIONS SUMMARY

Left Station at 10 : 55 on 9.1.82 On Location at 13 : 00 on 10.1.82

Started Operations at 02 : 30 on 13.1.82 Finished Operations at - : - on -

Off Location at : on Return Station at : on Mileage

Comments : FIRST TEST OF SERIES. THREE ZONES TO TEST TOOLS AND TUBING PLUGGED WITH SAND FORMATION FLUID STOPPED APPROXIMATELY 100M FROM SURFACE. SAND WAS FOUND IN THE TUBING 100M ABOVE TOOLS. STRING PLUGGED IN THE SECOND FLOW PERIOD LATCH FOR SPRO COULD NOT BE ATTACHED DUE TO SAND IN THE TUBING. DID NOT REVERSE OUT SO SAMPLE COULD BE TAKEN FROM THE STRING.
TOOLS IN HOLE 06.30 13/1 TO 0800 14/1

Station : AUS SIR No. : 61979 Date : 14.1.82

Customer Purchase Order Tester J PARTRIDGE Customer Representative R MC KENNY

DOWELL Schlumberger **Surface Data**

Report No. F 82008

Customer : HUDBAY **Well No :** SPERM WHALE 1 **Test No.** 1

TEST SEQUENCE AND FLOW RATE DATA

Description and Flow Rates	Date	Time hrs	Time mins	Pressure psig	Surface Choke
Packer Depth : 832.84 M XX Set at :	13.1.82	19	37	–	–
Opened Tool : (Annulus pressure 1400 psi)	"	20	23	–	–
MODERATE TO STRONG BLOW UPON TOOL OPENING					
SHUT-IN TOOL	13.1.82	20	30	0	–
OPENED TOOL 1400 ANN PRESSURE	"	20	58		–
MODERATE TO STRONG BLOW AGAIN					
BUT REDUCE RAPIDLY TO A MINIMAL BLOW					
AT 21.07. TOOLS AND TUBING PLUGGED DUE TO SAND					
COMING FROM THE FORMATION					
CLOSED TOOL	14.1.82	00	10	0	–
UNSET PACKER AND PULLED LOOSE	"	00	26	0	–
Reverse Circulation Started (Pump pressure psig)	NONE				
Reverse Circulation Finished					
Pulled Packer Loose/Pulled Out of Retainer	14.1.82	00	26	0	–

Cushion Type : NONE Amount bbls ; Length ft ; Pressure psi Bottom Choke 1"

RECOVERY DATA

	Recovery Description	Feet	Bbls	% Oil	% Water	% Other
1	WATER AND SOLIDS I.E. SAND					
2	NO TRACES OF HYDROCARBONS					
3						
4						
5						
6						

	Oil-API Gravity	Gas Gravity	G.O.R.	Resistivity	Chlorides
1	° at °F			at °F	ppm
2	° at °F			at °F	ppm
3	° at °F			at °F	ppm
4	° at °F			at °F	ppm
5	° at °F			at °F	ppm
6	° at °F			at °F	ppm

Comments : THE AMOUNT OF SAND RECOVERED INDICATES THAT THE FORMATION HAS AN EXTREMELY HIGH OR ALMOST INFINITE PERMEABILITY.

DOWELL Schlumberger

Equipment Data

Report No. F 82008

Customer : HUDBAY OIL **Well No. :** SPERM WHALE 1 **Test No. :** 1

SAMPLE CHAMBER RECOVERY DATA

Sampler Drained
On Location [X]
Elsewhere [ ]
Name : _____
Address : _____

Recovery
Gas NONE cu ft.
Oil NONE c.c.
Water 300 c.c.
Mud NONE c.c.
_____ °API ____ °F

Resistivity Chlorides (ppm)
Water _____ at _____ °F _____
Mud _____ at _____ °F _____
Mud Filtrate _____ at _____ °F _____
Pit Mud _____ at _____ °F _____
Pit Mud Filtrate _____ at _____ °F _____

Gas/Oil Ratio _____ cu ft./bbl Sample Chamber Pressure NEGLIGIBLE psi.

EQUIPMENT SEQUENCE

Components (including D.P. and D.C.)	Type	O.D. (in)	I.D. (in)	Length	Depth
BULL NOSE		4¾	2¼	0.25	844.37
RECORDER CARRIER J 1782	JOTCO	4-7/8	1½	1.80	844.12
RECORDER CARRIER J 1630	"	"	"	1.80	842.32
PERF. ANCHOR	"	4¾	2¼	6.10	840.52
X/O 3½ EUE BOX x 3½ FH PIN		"	2-5/16	0.63	834.42
9-5/8 POSITEST PACKER	JOTCO	9-5/8	3	0.95	832.84
		40		0.66	
X/O 3½ FH BOX x 3½ EUE PIN		4¾	2-5/16	0.32	832.18
SAFETY JOINT	BOWEN	4-5/8	2-7/16	0.60	831.86
TR 63 HYDRAULIC JAR	JOTCO	4-7/8	1½	2.35	831.26
RECORDER CARRIER J 1629	"	"	"	1.80	828.91
MFE/HRT	"	5	1-3/8	2.90	827.11
PCT	"	4¾	1	4.66	824.41
SPRO CONVERSION	"	"	2¼	2.69	819.55
X/O 4" IF BOX x 3½" FH PIN		6	2-7/8	0.32	816.86
1 STD 6½ D.C.		6½	2-7/8	27.11	816.54
2 PUMP OUT SUBS	JOTCO	6½	2¾	0.71	789.43
2 STDS 6½ D.C.		6½	2-7/8	54.48	788.72
X/O 3½ IF BOX x 4" IF PIN		6½	2-11/16	0.96	734.26
2 SLIP JOINTS	JOTCO	5	2.25	15.84	733.98
1 STD 4¾ D.C.		4¾		28.29	717.44
X/O 3½ PH6 BOX x 3½ IF PIN				0.21	709.15
3½ PH 6 TUBING 12.9 LB/FT				628.36	688.94
X/O SUB 4½ ACME PIN x 3½ PH 6 PIN				0.20	60.58
FLUTTED HANGER	FLOPETROL			0.27	60.38
SLKK JOINT	"			1.80	60.11
E-Z TREE	"			2.44	58.31
SAVER SUB	"			0.25	55.87
X/O 4½ IF BOX x 4½ ACME PIN				0.33	55.62
5" H.W. DP		5	5	61.05	55.29
X/O 6½ ACME PIN x 4½ IF PIN				0.32	- 5.76
FLOW HEAD					- 6.08
Total ~~DRILL PIPE~~ TUBING				628.36	
Total Drill Collar				109.88	

Comments : _____

Dowell Schlumberger

Formation Evaluation Data

To be completed by Customer Representative

Report No. F 82008

Customer : HUDBAY OIL **Well No. :** SPERM WHALE 1 **Test No. :** 1

Tested Interval	Sand-stone	Lime-stone	Chalk	Clay	Shale	Other (please specify)
Major Mineral Species						
Minor Mineral Species						
Stringers or Lenses						

Is the tested interval : Open Hole : ☐ I.D. ____ in

In Casing : ☐ O.D. ____ in. Wt : ____ lb./ft. I.D. ____ in.

Open Hole Interval : (Total Depth) _____ (Foot of Casing) _____

Perforated Intervals : _____ _____ _____

_____ _____ _____ _____

In the tested interval how many productive zones do logs show :

1 ☐ 2 ☐ 3 ☐ more ☐

What is the average porosity of the interval ? ☐ %

Is the interval homogeneous ? Yes ☐ No ☐

Is formation consolidation : Good ☐ Mod ☐ Low ☐

What is the clay content : % or High ☐ Mod ☐ Low ☐

Is the formation fractured Heavily ☐ Mod ☐ Little ☐

In this interval, is there expected near the wellbore :

Geological fault ? Yes ☐ No ☐

Interval thickness change ? Yes ☐ No ☐

Fluid phase contact ? Yes ☐ No ☐

—If yes :— Oil-Water ☐ Gas-Water ☐ Oil-Gas ☐

During drilling of the interval, was there :

Lost circulation ? Yes ☐ No ☐

Sand production ? Yes ☐ No ☐

Other (please specify) _____

Before testing was there a :

Scraper run ? Yes ☐ No ☐

Caliper run ? Yes ☐ No ☐

Mud circulation to bottom ? Yes ☐ No ☐

—If yes :— for how long ☐ If no, how long since ☐

Additional Comments : _____

Customer Representative : _____

SYMBOLS USED

ΔT – INCREMENT OF TIME (MINUTES)

$\frac{T + \Delta T}{\Delta T}$ – DIMENSIONLESS TIME CONSTANT USED FOR THE HORNER PLOT

ΔT IS THE INCREMENT OF SHUT-IN TIME (MINUTES)

T IS TOTAL FLOW TIME PRECEDING SHUT-IN (MINUTES)

LOG – LOGARITHM TO BASE 10 OF $\frac{T + \Delta T}{\Delta T}$

Pw – Pf – PRESSURE BUILD-UP ABOVE FINAL FLOWING PRESSURE PRECEDING THE BUILD UP WHICH IS USED FOR THE MCKINLEY PLOT.

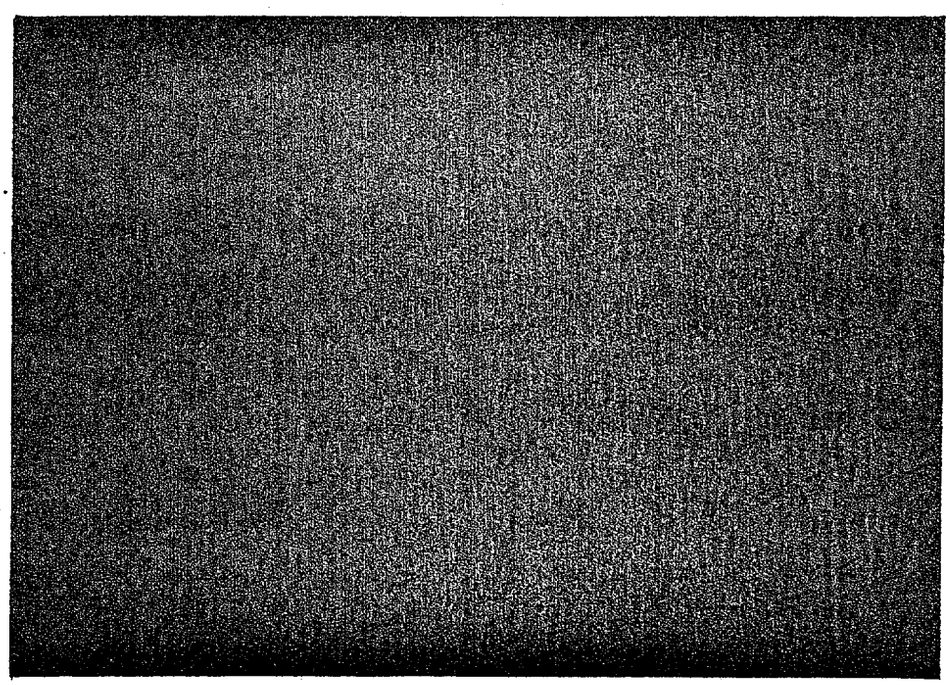
REPORT N° F 82009

JOB N°

INVOICE/SIR.

DATE FEBRUARY 2, 1982

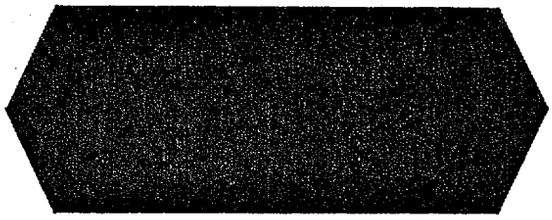
TECHNICAL REPORT



COMPANY HUDBAY OIL WELL SPERM WHALE 1 FIELD GIPPSLAND BASIN

TEST N° 1A COUNTRY AUSTRALIA

REPORT N° F 82009



CONFIRMATION OF REPORT DISTRIBUTION

TO HUDBAY OIL

WELL SPERM WHALE 1 FIELD GIPPSLAND BASIN TEST N° 1A

COUNTRY AUSTRALIA DATE FEBRUARY 2, 1982

Dowell Schlumberger has been requested to furnish the following companies with Technical Reports. This distribution of Technical Reports will be used for :

☐ All tests on this well,

☐ This one test only,

unless otherwise notified.

_____ TECHNICAL REPORT (S)

_____ TECHNICAL REPORT (S)

_____ TECHNICAL REPORT (S)

_____ TECHNICAL REPORT (S)

_____ TECHNICAL REPORT (S)

_____ TECHNICAL REPORT (S)

Dowell Schlumberger

Cables: "Bigorange"
Telex: Orange RS 23005
Telephone: 2351022
2351287

FEBRUARY 2, 1982

REPORT NO : F 82009

GENTLEMEN,

Because of Mechanical problem (Tool was plugged), no reservoir parameters could be calculated on this test.

FRANCIS SOO
RESERVOIR EVALUATION DEPARTMENT

fs/rs

REPORT N° F 82009

RECORDER N° : J 1758 CAPACITY : 4700 PSI DEPTH : 842.32 M

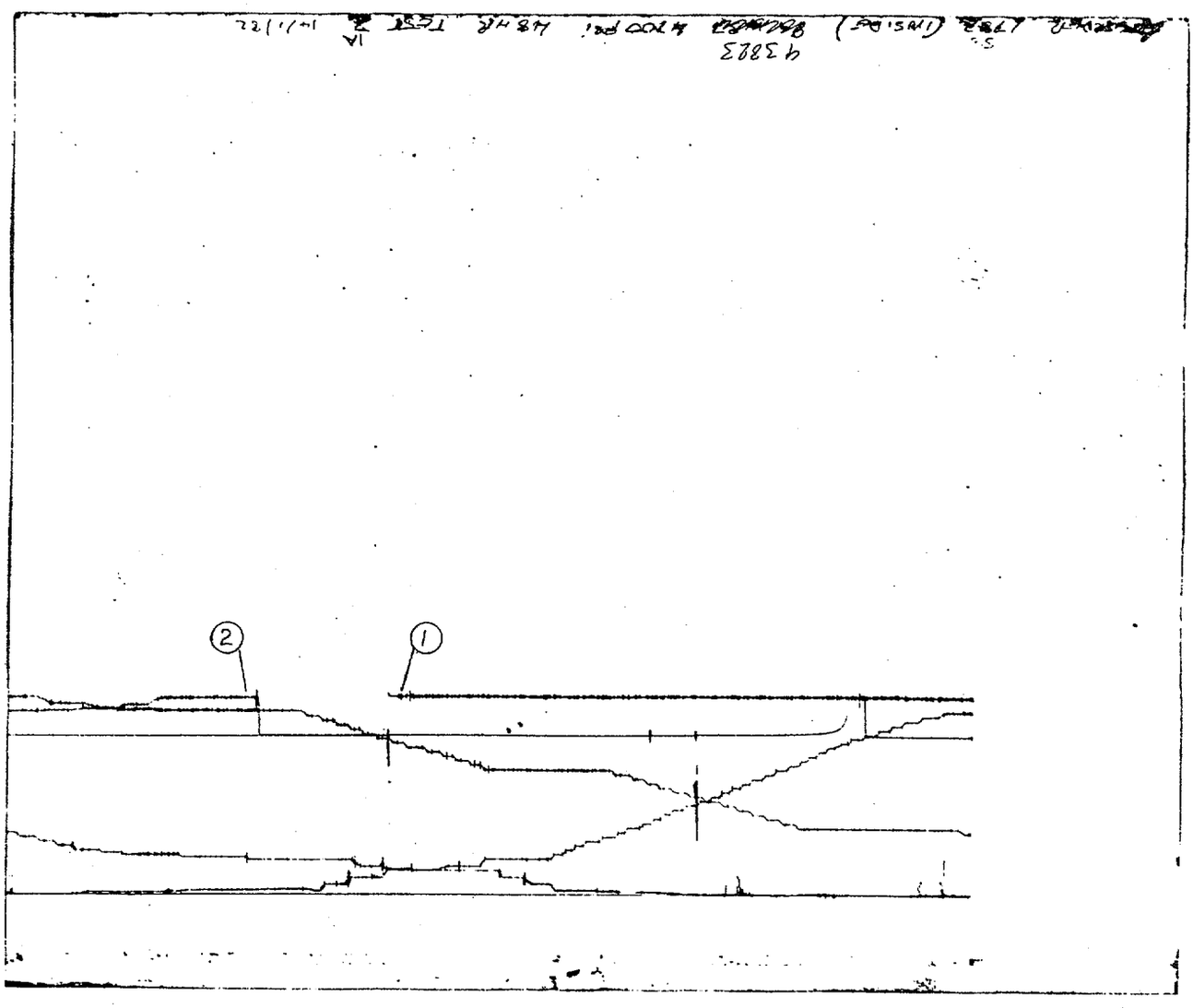
OPENING : INSIDE TEMPERATURES : 130 DEG F

CLOCK N° : 9-3823 CAP: 48 HRS CLOCK TRAVEL :

CALIBRATION DATA AT M = 1270.0054
A = - 9.654845

PRESSURE (PSI) = DEFLECTION (INS) X M ± A

PRESSURE DATA FROM THIS CHART IS PRESENTED ON THE NEXT PAGE.



REPORT N° F 82009

[redacted]

PRESSURE DATA FOR RECORDER : J 1758

DESCRIPTION	LABEL POINT	PRESSURE (PSI)	TIME GIVEN	TIME COMPUTED
INITIAL HYDROSTATIC	1	1528		
INITIAL FLOW (1)				
INITIAL FLOW (2)				
INITIAL SHUT-IN				
SECOND FLOW (1)				
SECOND FLOW (2)				
SECOND SHUT-IN				
THIRD FLOW (1)				
THIRD FLOW (2)				
THIRD SHUT-IN				
FINAL FLOW (1)				
FINAL FLOW (2)				
FINAL SHUT-IN				
FINAL HYDROSTATIC	2	1530		

REMARK : TEST UNRELIABLE AS TOOL WAS PLUGGED.

REPORT N° F 82009

RECORDER N° : J 1629 CAPACITY : 2800 PSI DEPTH : 827.11 M

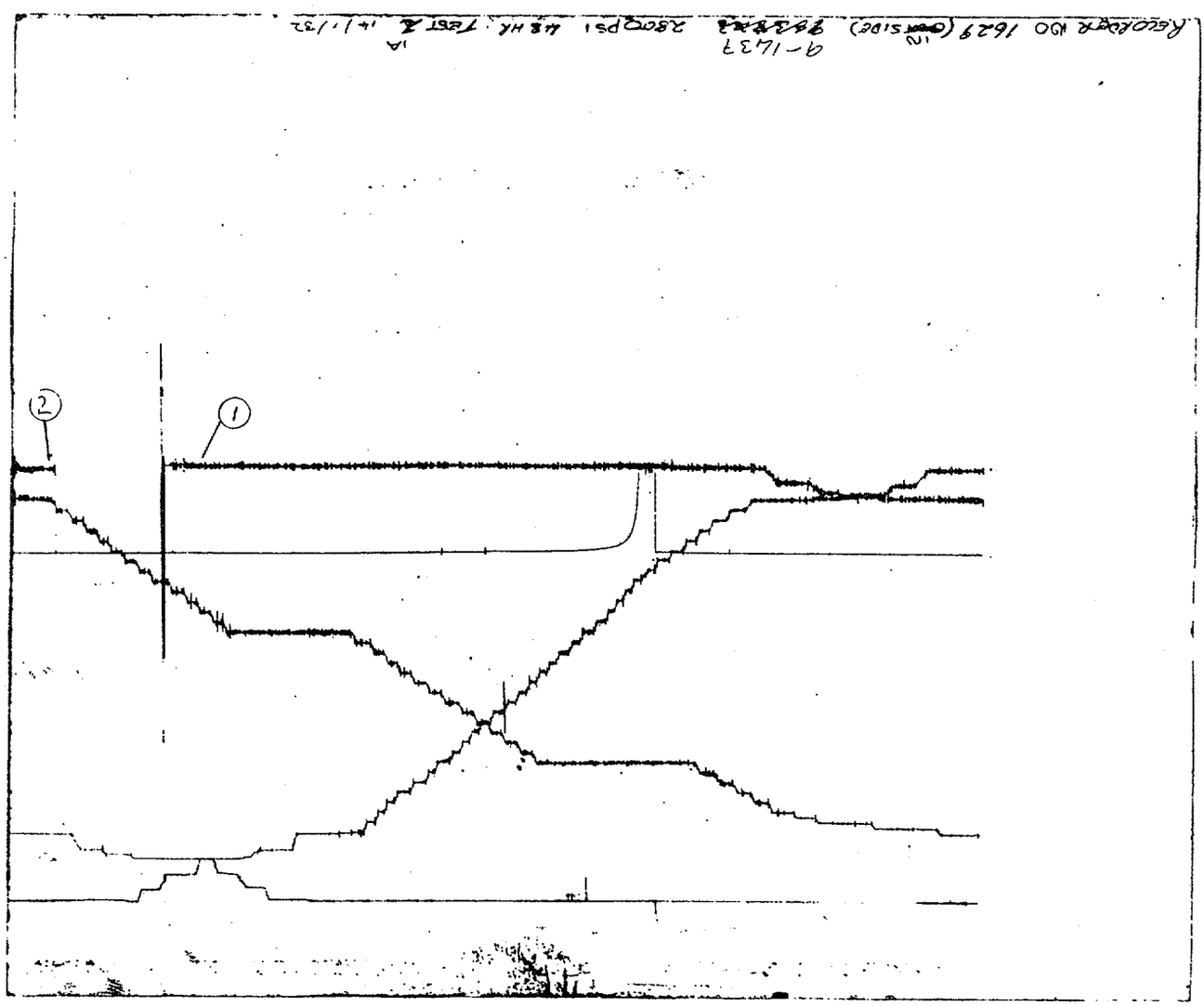
OPENING : INSIDE TEMPERATURES : 130 DEG F

CLOCK N° : 9-1437 CAP: 48 HRS CLOCK TRAVEL :

CALIBRATION DATA AT M = 556.84032
A = - 1.28894

PRESSURE (PSI) = DEFLECTION (INS) X M ± A

PRESSURE DATA FROM THIS CHART IS PRESENTED ON THE NEXT PAGE.



REPORT N° F 82009

PRESSURE DATA FOR RECORDER : J 1629

DESCRIPTION	LABEL POINT	PRESSURE (PSI)	TIME GIVEN	TIME COMPUTED
INITIAL HYDROSTATIC	1	1489		
INITIAL FLOW (1)				
INITIAL FLOW (2)				
INITIAL SHUT-IN				
SECOND FLOW (1)				
SECOND FLOW (2)				
SECOND SHUT-IN				
THIRD FLOW (1)				
THIRD FLOW (2)				
THIRD SHUT-IN				
FINAL FLOW (1)				
FINAL FLOW (2)				
FINAL SHUT-IN				
FINAL HYDROSTATIC	2	1473		

REMARK : TEST UNRELIABLE AS TOOL WAS PLUGGED.

REPORT N°F 82009

RECORDER N° : J 1630 CAPACITY : 2800 PSI DEPTH : 840.52 M

OPENING : OUTSIDE TEMPERATURES : 130 DEG F

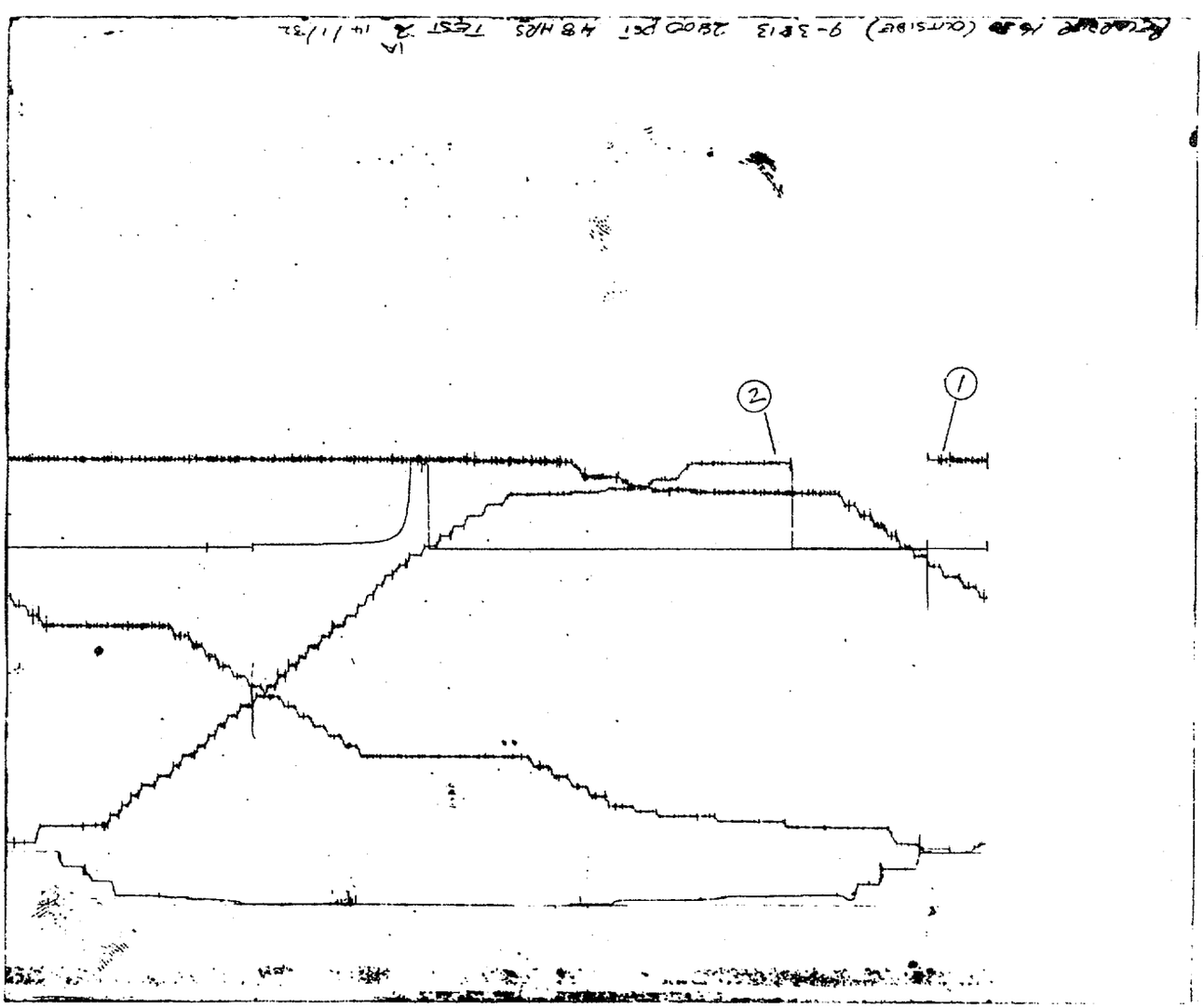
CLOCK N° : 9-3813 CAP: 48 HRS CLOCK TRAVEL :

CALIBRATION DATA AT M = 564.5074

A = - 5.357018

PRESSURE (PSI) = DEFLECTION (INS) X M ± A

PRESSURE DATA FROM THIS CHART IS PRESENTED ON THE NEXT PAGE.



[redacted]

REPORT N° F 82009

PRESSURE DATA FOR RECORDER : J 1630

DESCRIPTION	LABEL POINT	PRESSURE (PSI)	TIME GIVEN	TIME COMPUTED
INITIAL HYDROSTATIC	1	1544		
INITIAL FLOW (1)				
INITIAL FLOW (2)				
INITIAL SHUT-IN				
SECOND FLOW (1)				
SECOND FLOW (2)				
SECOND SHUT-IN				
THIRD FLOW (1)				
THIRD FLOW (2)				
THIRD SHUT-IN				
FINAL FLOW (1)				
FINAL FLOW (2)				
FINAL SHUT-IN				
FINAL HYDROSTATIC	2	1540		

REMARK : TEST UNRELIABLE AS TOOL WAS PLUGGED.

DOWELL Schlumberger

Formation Testing Field Report

Report No. F 82009

WELL IDENTIFICATION

Company : HUDBAY OIL Well No : SPERM WHALE 1 Test No. : 1A
Field : GIPPSLAND BASIN Location : OFFSHORE BAIRNSDALE Country : AUSTRALIA
Tested Interval : From 839 M KB to 848 M KB
Co-ordinates : -
Type Test : Open Hole ☐ Casing ; ☒ Conventional ☒ Straddle ; ☐ Land rig ☐ Jack-up ☐ Floater ☒
Valve : MFE ☐ PCT ☒ SPRO ☒ Other : with Packer ☒ Retainer ☐

HOLE DATA

Geologic Level : UPPER CRETACIOUS Description : -
Net Productive Interval : 8 M fKX Estimated Porosity : 25 - 30 %
Total Depth : 894.53 M KB Depths measured from : RTKB Elevation : 9.35 M KB.
Open Hole Size : - in. - Rat Hole Size : - in., from - ft.
Casing Size : 9-5/8 in. 40 lbs/ft. Liner Size : - in., - lbs/ft. from - ft
Before test : Caliper Yes ☐ No ☒ Scraper Yes ☐ No ☒ Circulation Yes ☒ for 2 hrs; No ☐

MUD DATA

Mud Type : BARACARB BRINE Weight : 1.32 SG
Viscosity : 50 Water Loss 12 cc Mud Resistivity - at - °F
Filtrate Resistivity : - at - °F ; Chloride ppm : 111,000

INSTRUMENT AND CHART DATA

Recorder No.		J 1629	J 1630	J 1758	
Capacity (psig)		2800	2800	4700	
Depth		827.11	840.52	842.32	
Inside/Outside		INSIDE	OUTSIDE	INSIDE	
Above/Below valve		BELOW	BELOW	BELOW	
Clock No.		9-1437	9-3813	9-3823	
Capacity (hrs.)		48 HRS	48 HRS	48 HRS	
Temperature		130 DEG F	130 DEG F	130 DEG F	
Initial Hydrostatic Pressure					
Pre-flow	(1) Start Pressure				
	(2) Finish Pressure				
Initial Shut-in Pressure					
Second Flow	(1) Start Pressure				
	(2) Finish Pressure				
Second Shut-in Pressure					
Final Flow	(1) Start Pressure				
	(2) Finish Pressure				
Final Shut-in Pressure					
Final Hydrostatic Pressure					

OPERATIONS SUMMARY

Left Station at 10 : 55 on 9.1.82 On Location at 13 : 00 on 10.1.82
Started Operations at : on Finished Operations at : on
Off Location at : on Return Station at : on Mileage

Comments : SAME ZONE TESTED MAIN. DIESEL CUSHION RUN TO SURFACE. CHARTS INDICATE HRT METERED CLOSED BUT PCT DID NOT OPEN WHEN ANNULUS WAS PRESSURED UP. THERE WAS NO INDICATION OF THE TOOL OPENING ON THE SPRO COMPUTER OR AT THE BUBBLE BUCKET.

** FURTHER INVESTIGATION FOUND THAT PCT DID FUNCTION PROPERLY BUT PLUGGED SAMPLE CHAMBER MADE FLOW IMPOSSIBLE.

Station : AUS SIR No. : 61616 Date : JANUARY 15, 1982
Customer Tester J PARTRIDGE Customer B MC ELHINNY
Purchase Order Representative

DOWELL Schlumberger **Surface Data**

Report No. F 82009

Customer : HUDBAY OIL **Well No :** SPERM WHALE 1 **Test No.** 1A

TEST SEQUENCE AND FLOW RATE DATA

Description and Flow Rates	Date	Time hrs	Time mins	Pressure psig	Surface Choke
Packer Depth : 832.84 M ~~KX~~ Set at :	15.1.82	06	10	–	–
Opened Tool : (Annulus pressure psi)					
PRESSURED UP TO 1600 PSI TOOL DID NOT OPEN BLED OFF	"	08	18		–
PRESSURE. PICKED UP STRIJG TO OPEN HRT. RESET PACKER	"	08	34	–	–
PRESSURED UP ANNULUS 1600 PSI	"	08	45		–
TRIED TO PUMP DOWN D.P TO SEE IF STRING WAS	"	09	04	–	–
PLUGGED – HELD PRESSURE : TOOL CLOSED					
INCREASED ANNULUS PRESSURE 1800 PSI	"	09	20		–
INCREASED ANNULUS PRESSURE 2000 PSI	"	09	29		–
BLED OFF ANNULUS PRESSURE					
Reverse Circulation Started (Pump pressure 1500 psig)	15.1.82	09	33		–
Reverse Circulation Finished	"	09	50	–	–
Pulled Packer Loose/Pulled Out of Retainer	"	11	25	–	–

Cushion Type : DIESEL Amount – bbls ; Length TO SURFACE ft ; Pressure – psi Bottom Choke 1"

RECOVERY DATA

	Recovery Description	Feet	Bbls	% Oil	% Water	% Other
1	NONE					
2						
3						
4						
5						
6						

	Oil-API Gravity	Gas Gravity	G.O.R.	Resistivity	Chlorides
1	° at °F			at °F	ppm
2	° at °F			at °F	ppm
3	° at °F			at °F	ppm
4	° at °F			at °F	ppm
5	° at °F			at °F	ppm
6	° at °F			at °F	ppm

Comments :

Report No. F 82009

Customer: HUDBAY OIL **Well No.:** SPERM WHALE 1 **Test No.:** 1A

SAMPLE CHAMBER RECOVERY DATA

Sampler Drained
On Location [X]
Elsewhere [ ]
Name: _____
Address: _____

Recovery		Resistivity	Chlorides (ppm)
Gas –	cu ft.	Water _____	at _____ °F _____
Oil –	c.c.	Mud _____	at _____ °F _____
Water 1000	c.c.	Mud Filtrate _____	at _____ °F _____
Mud _____	c.c.	Pit Mud _____	at _____ °F _____
_____ °API ____	°F	Pit Mud Filtrate _____	at _____ °F _____

Gas/Oil Ratio – cu ft./bbl Sample Chamber Pressure 50 psi.

EQUIPMENT SEQUENCE

Components (including D.P. and D.C.)	Type	O.D. (in)	I.D. (in)	Length	Depth
BULL NOSE		4¾	2¼	0.25	844.37
RECORDER CARRIER J 1758	JOTCO	4-7/8	1½	1.80	844.12
RECORDER CARRIER J 1630	"	4-7/8	1½	1.80	842.32
PERF ANCHOR	"	4¾	2¼	6.10	840.52
X/O 3½ EUE BOX x 3½ FH PIN (1)		"	2-5/16	0.63	834.42
9-5/8 POSITEST PACKER	JOTCO	9-5/8	3	0.95	832.84
		40		0.66	
X/O 3½ FH BOX x 3½ EUE PIN (2)		4¾	2-5/16	0.32	832.18
SAFETY JOINT	BOWEN	4-5/8	2-7/16	0.60	831.86
TR 63 HYDRAULIC JARS	JOTCO	4-7/8	1½	2.35	831.26
RECORDER CARRIER J 1629	"	"	"	1.80	828.41
MFE/HRT	"	5	1-3/8	2.90	827.11
PCT	"	4¾	1	4.66	824.21
SPRO CONVERSION	"	"	2¼	2.69	819.55
X/O 4 IF BOX /3½ FH PIN (3)		6	2-7/8	0.32	816.86
1 STD 6½ DC		6½	"	27.11	816.54
2 PUMP OUT SUBS	JOTCO	6-1/8	2¾	0.71	789.43
2 STDS 6½ DC		6½	2-7/8	54.48	788.72
X/O 3½ IF BOX x 4 IF PIN (4)		6¼	2-11/16	0.96	734.26
2 SLIP JOINTS	JOTCO	5	2¼	15.84	733.98
1 STD 4¾ DC		4¾		28.29	717.44
X/O 3½ PHG BOX / 3½ IF PIN				0.21	689.15
3½ PHG TUBING 12.9 LB/FT				628.36	688.94
X/O 4½ ACME P/ 3½ PHG BOX				0.20	60.58
FLUTED HANGER	FLOPETROL			0.27	60.38
SLICK JOINT	"			1.80	60.11
E-2 TREE	"			2.44	58.31
SAVER SUB	"			0.25	55.87
X/O 4½ ACME P/ 4½ IF B				0.33	55.62
5 H.W.D.P		5		61.05	55.29
X/O 6½ ACME PIN/ 4½ IF PIN				0.32	– 5.76
FLOW HEAD					– 6.08
TOTAL TUBING				628.36	
Total Drill Pipe				61.05	
Total Drill Collar				109.88	

Comments: _____

DOWELL Schlumberger

Formation Evaluation Data

To be completed by Customer Representative

Report No. F 82009

Customer : HUDBAY OIL **Well No. :** SPERM WHALE 1 **Test No. :** 1A

Tested Interval	Sand-stone	Lime-stone	Chalk	Clay	Shale	Other (please specify)
Major Mineral Species						
Minor Mineral Species						
Stringers or Lenses						

Is the tested interval : Open Hole : ☐ I.D. ☐ in

In Casing : ☐ O.D. ☐ in. Wt : ☐ lb. ft. I.D. ☐ in.

Open Hole Interval : (Total Depth) _____ (Foot of Casing) _____

Perforated Intervals : _____ _____ _____

_____ _____ _____

In the tested interval how many productive zones do logs show :

1 ☐ 2 ☐ 3 ☐ more ☐

What is the average porosity of the interval ? ☐ %

Is the interval homogeneous ? Yes ☐ No ☐

Is formation consolidation : Good ☐ Mod ☐ Low ☐

What is the clay content : % or High ☐ Mod ☐ Low ☐

Is the formation fractured Heavily ☐ Mod ☐ Little ☐

In this interval, is there expected near the wellbore :

Geological fault ? Yes ☐ No ☐

Interval thickness change ? Yes ☐ No ☐

Fluid phase contact ? Yes ☐ No ☐

—If yes :— Oil-Water ☐ Gas-Water ☐ Oil-Gas ☐

During drilling of the interval, was there :

Lost circulation ? Yes ☐ No ☐

Sand production ? Yes ☐ No ☐

Other (please specify) _____

Before testing was there a :

Scraper run ? Yes ☐ No ☐

Caliper run ? Yes ☐ No ☐

Mud circulation to bottom ? Yes ☐ No ☐

—If yes :— for how long ☐ If no, how long since ☐

Additional Comments : _____

Customer Representative : _____

SYMBOLS USED

ΔT – INCREMENT OF TIME (MINUTES)

$\frac{T + \Delta T}{\Delta T}$ – DIMENSIONLESS TIME CONSTANT USED FOR THE HORNER PLOT

ΔT IS THE INCREMENT OF SHUT-IN TIME (MINUTES)

T IS TOTAL FLOW TIME PRECEDING SHUT-IN (MINUTES)

LOG – LOGARITHM TO BASE 10 OF $\frac{T + \Delta T}{\Delta T}$

Pw – Pf – PRESSURE BUILD-UP ABOVE FINAL FLOWING PRESSURE PRECEDING THE BUILD UP WHICH IS USED FOR THE MCKINLEY PLOT.

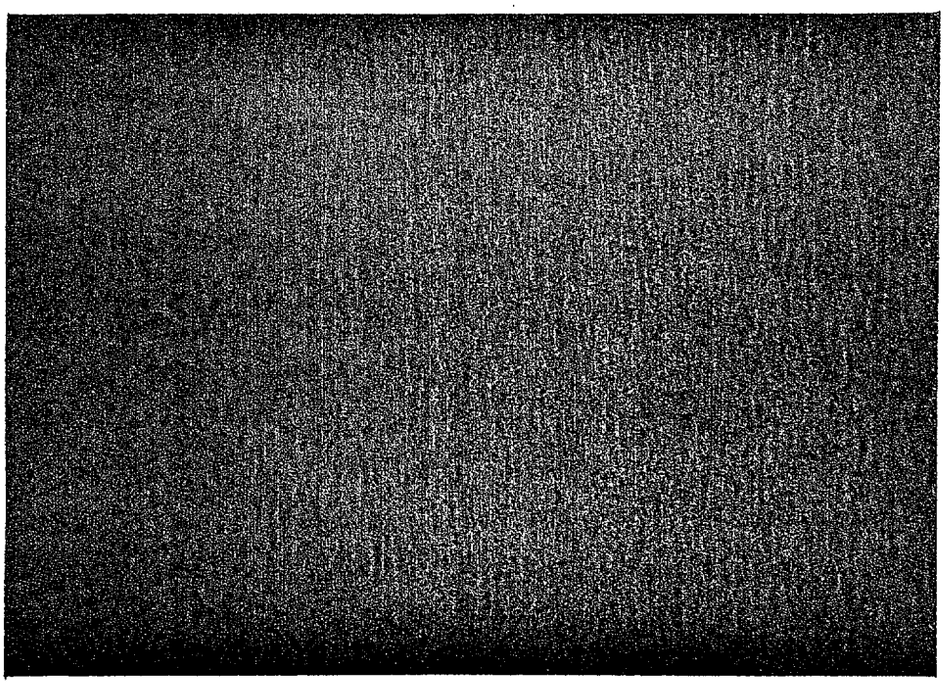
REPORT N° F 82010

JOB N° _____

INVOICE/SIR. _____

DATE FEBRUARY 3, 1982

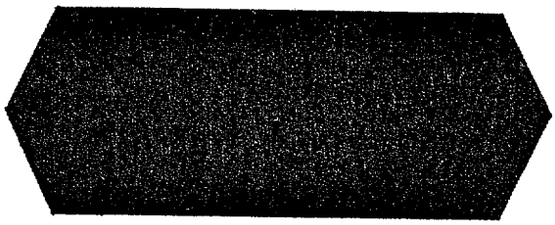
TECHNICAL REPORT



COMPANY HUDBAY OIL WELL SPERM WHALE 1 FIELD GIPPSLAND BASIN

TEST N° 1B COUNTRY AUSTRALIA

REPORT N° F 82010



CONFIRMATION OF REPORT DISTRIBUTION

TO HUDBAY OIL

WELL SPERM WHALE 1 FIELD GIPPSLAND BASIN TEST N° 1B

COUNTRY AUSTRALIA DATE FEBRUARY 3, 1982

Dowell Schlumberger has been requested to furnish the following companies with Technical Reports. This distribution of Technical Reports will be used for :

☐ All tests on this well,

☐ This one test only,

unless otherwise notified.

_____ TECHNICAL REPORT (S)	_____ TECHNICAL REPORT (S)
_____ TECHNICAL REPORT (S)	_____ TECHNICAL REPORT (S)
_____ TECHNICAL REPORT (S)	_____ TECHNICAL REPORT (S)

Dowell Schlumberger

Cables: "Bigorange"
Telex: Orange RS 23005
Telephone: 2351022
2351287

FEBRUARY 3, 1982

REPORT NO : F 82010

GENTLEMEN,

In the enclosed test, the tools did function properly.

A review of the test datas indicate good permeability. Test indicate that this is essentially a water zone.

FRANCIS SOO
RESERVOIR EVALUATION DEPARTMENT

FS/rs

REPORT N° F 82010

RECORDER N° : J 1758 CAPACITY : 4700 PSI DEPTH : 842.32 M

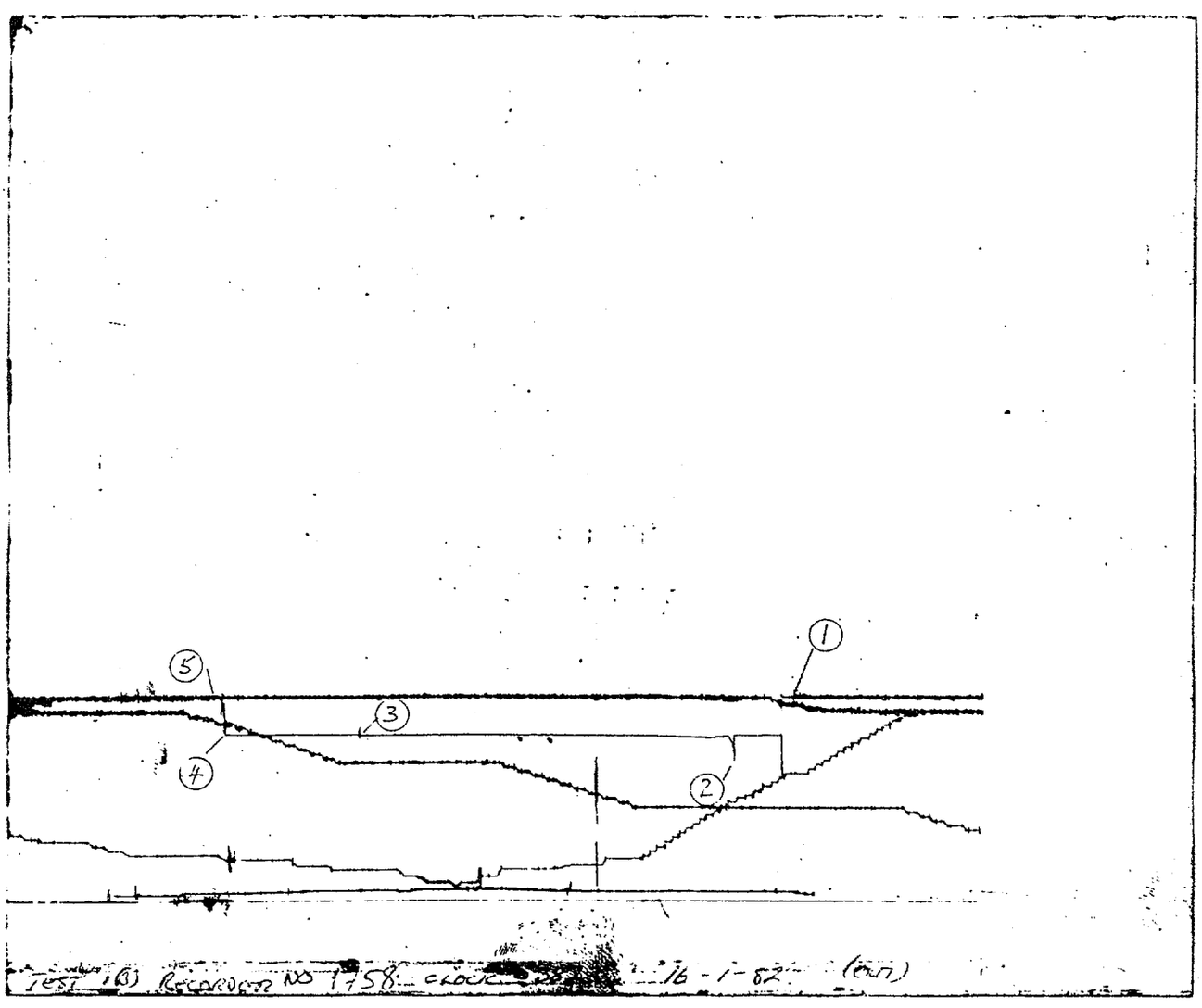
OPENING : INSIDE TEMPERATURES : 130 DEG F

CLOCK N° : 9-3823 CAP: 48 HRS CLOCK TRAVEL : 0.022074 in/min

CALIBRATION DATA AT M = 1270.0054
A = - 9.654845

PRESSURE (PSI) = DEFLECTION (INS) X M ± A

PRESSURE DATA FROM THIS CHART IS PRESENTED ON THE NEXT PAGE.



[redacted]

REPORT N° F 82010

PRESSURE DATA FOR RECORDER : J 1758

DESCRIPTION	LABEL POINT	PRESSURE (PSI)	TIME GIVEN	TIME COMPUTED
INITIAL HYDROSTATIC	1	1569		
INITIAL FLOW (1)	2	1102		
INITIAL FLOW (2)	3	1269	106	100
INITIAL SHUT-IN	4	1271	30	36
SECOND FLOW (1)				
SECOND FLOW (2)				
SECOND SHUT-IN				
THIRD FLOW (1)				
THIRD FLOW (2)				
THIRD SHUT-IN				
FINAL FLOW (1)				
FINAL FLOW (2)				
FINAL SHUT-IN				
FINAL HYDROSTATIC	5	1572		

REMARK :

REPORT N° F 82010

RECORDER N° : J 1629 CAPACITY : 2800 PSI DEPTH : 827.11 M

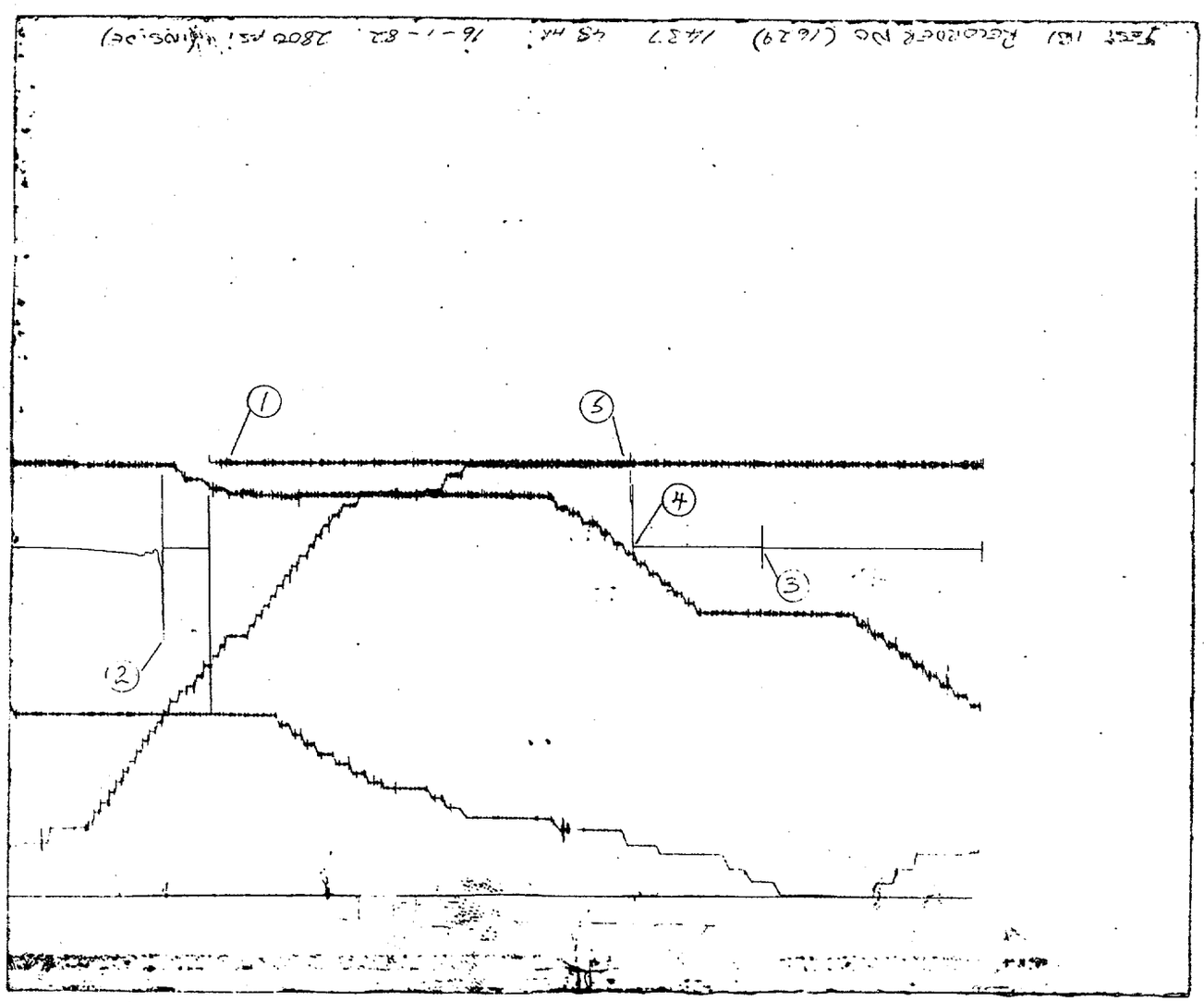
OPENING : INSIDE TEMPERATURES : 130 DEG F

CLOCK N° : 9-1437 CAP: 48 HRS CLOCK TRAVEL : 0.021941 in/min

CALIBRATION DATA AT M = 556.84032
A = - 1.28894

PRESSURE (PSI) = DEFLECTION (INS) X M ± A

PRESSURE DATA FROM THIS CHART IS PRESENTED ON THE NEXT PAGE.



REPORT N° F 82010

PRESSURE DATA FOR RECORDER : J 1629

DESCRIPTION	LABEL POINT	PRESSURE (PSI)	TIME GIVEN	TIME COMPUTED
INITIAL HYDROSTATIC	1	1479		
INITIAL FLOW (1)	2	879		
INITIAL FLOW (2)	3	1188	106	101
INITIAL SHUT-IN	4	1189	30	35
SECOND FLOW (1)				
SECOND FLOW (2)				
SECOND SHUT-IN				
THIRD FLOW (1)				
THIRD FLOW (2)				
THIRD SHUT-IN				
FINAL FLOW (1)				
FINAL FLOW (2)				
FINAL SHUT-IN				
FINAL HYDROSTATIC	5	1475		

REMARK :

REPORT N° F 82010

RECORDER N° : J 1630 CAPACITY : 2800 PSI DEPTH : 840.52 M

OPENING : OUTSIDE TEMPERATURES : 130 DEG F

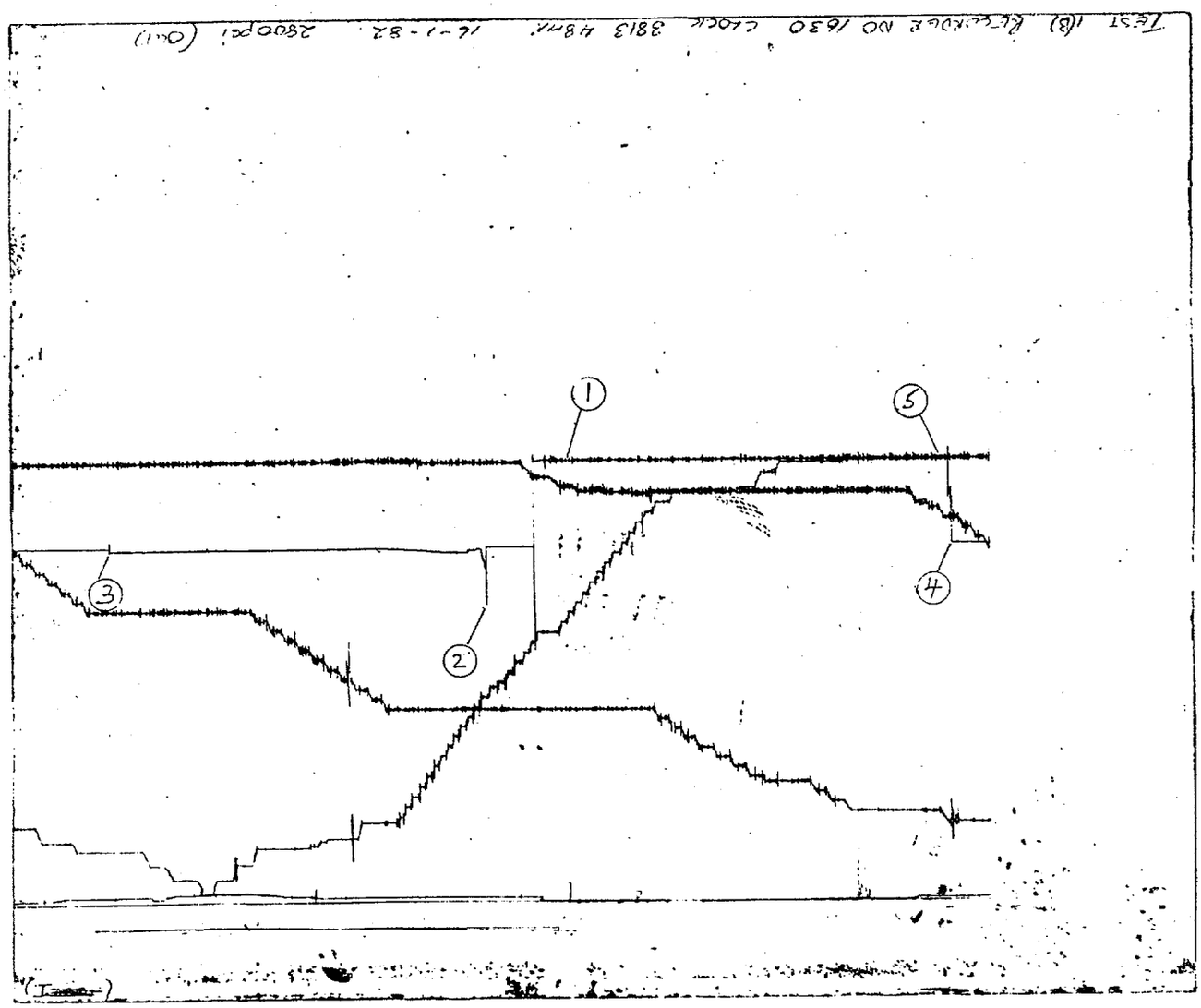
CLOCK N° : 9-3823 CAP: 48 HRS CLOCK TRAVEL : 0.02214 in/min

CALIBRATION DATA AT M = 564.5074

A = – 5.357018

PRESSURE (PSI) = DEFLECTION (INS) X M ± A

PRESSURE DATA FROM THIS CHART IS PRESENTED ON THE NEXT PAGE.



REPORT N° F 82010

PRESSURE DATA FOR RECORDER : J 1630

DESCRIPTION	LABEL POINT	PRESSURE (PSI)	TIME GIVEN	TIME COMPUTED
INITIAL HYDROSTATIC	1	1535		
INITIAL FLOW (1)	2	1034		
INITIAL FLOW (2)	3	1225	106	101
INITIAL SHUT-IN	4	1236	30	35
SECOND FLOW (1)				
SECOND FLOW (2)				
SECOND SHUT-IN				
THIRD FLOW (1)				
THIRD FLOW (2)				
THIRD SHUT-IN				
FINAL FLOW (1)				
FINAL FLOW (2)				
FINAL SHUT-IN				
FINAL HYDROSTATIC	5	1537		

REMARK :

REPORT N° F 82010

PRESSURE DATA FOR RECORDER : J 1630

LABEL POINT	ΔT (mins)	PRESSURE (PSI)	$\frac{T + \Delta T}{\Delta T}$	LOG	Pw – Pf (PSI)	COMMENTS
1		1535				INITIAL HYDROSTATIC
2	0	1034				INITIAL FLOW (1)
	2	1203				
	4	1221				
	6	1219				
	8	1213				
	10	1213				
	20	1214				
	40	1219				
	60	1222				
	80	1225				INITIAL FLOW (2)
3	101	1225				START SHUT-IN
3	0	1225				T = 101
	1	1236	102.00	2.01	11	
	2	1236	51.50	1.71	11	
	3	1236	34.67	1.54	11	
	4	1236	26.25	1.42	11	
	5	1236	21.20	1.33	11	
	10	1236	11.10	1.05	11	
	20	1236	6.05	0.78	11	
	30	1236	4.37	0.64	11	
4	35	1236	3.89	0.59	11	INITIAL SHUT-IN
5		1537				FINAL HYDROSTATIC

DOWELL Schlumberger

Formation Testing Field Report

Report No. F 82010

WELL IDENTIFICATION

Company : HUDBAY OIL Well No : SPERM WHALE 1 Test No. : 1B
Field : GIPPSLAND BASIN Location : OFFSHORE-VICTORIA Country : AUSTRALIA
Tested Interval : From 839 M ~~KK~~ to 848 M ~~KK~~
Co-ordinates : -
Type Test : Open Hole ☐ Casing ; ☒ Conventional ☒ Straddle ; ☐ Land rig ☐ Jack-up ☐ Floater ☒
Valve : MFE ☐ PCT ☒ SPRO ☒ Other : with Packer ☒ Retainer ☐

HOLE DATA

Geologic Level : UPPER CRETATIOUS Description : -
Net Productive Interval : 8 M ~~KK~~ Estimated Porosity : 25 - 30 %
Total Depth : 894.53 M ~~KK~~ Depths measured from : RTKB Elevation : 9.35 M ~~KK~~
Open Hole Size : - in. - Rat Hole Size : - in., from - ft.
Casing Size : 9-5/8 in. 40 lbs/ft. Liner Size : - in., - lbs/ft. from - ft
Before test : Caliper Yes ☐ No ☒ Scraper Yes ☒ No ☐ Circulation Yes ☒ for 2 hrs; No ☐

MUD DATA

Mud Type : BARACARB BRINE Weight : 1.32 S G
Viscosity : 50 Water Loss 12 cc Mud Resistivity - at - °F
Filtrate Resistivity : - at - °F ; Chloride ppm : 111,000

INSTRUMENT AND CHART DATA

Recorder No.		J 1629	J 1630	J 1758	
Capacity (psig)		2800	2800	4700	
Depth		827.11	840.52	842.32	
Inside/Outside		INSIDE	OUTSIDE	INSIDE	
Above/Below valve		BELOW	BELOW	BELOW	
Clock No.		9-1437	9-3813	9-3823	
Capacity (hrs.)		48 HRS	48 HRS	48 HRS	
Temperature		130 DEG F	130 DEG F	130 DEG F	
Initial Hydrostatic Pressure		1485	1536	1538	
Pre-flow	(1) Start Pressure	865	1026	1025	
	(2) Finish Pressure	1198	1225	1222	
Initial Shut-in Pressure		1205	1241	1246	
Second Flow	(1) Start Pressure				
	(2) Finish Pressure				
Second Shut-in Pressure					
Final Flow	(1) Start Pressure				
	(2) Finish Pressure				
Final Shut-in Pressure					
Final Hydrostatic Pressure		1485	1536	1540	

OPERATIONS SUMMARY

Left Station at 10 : 55 on 9.1.82 On Location at 13 : 00 on 10.1.82
Started Operations at : on Finished Operations at : on
Off Location at : on Return Station at : on Mileage

Comments : SAME ZONE TESTED AGAIN TOOLS FUNCTIONED PROPERLY
ONLY HAD PREFLOW AND 1 SHUT-IN
FAIRLY TYPICAL WATER ZONE WITH A STRONG BLOW DECREASING TO NOTHING
WHEN TOOL WAS OPENED.

Station : AUS SIR No. : 62005 Date : 16.1.82
Customer Purchase Order Tester J PARTRIDGE Customer Representative B MC ELHINNEY

DOWELL Schlumberger

Surface Data

Report No. F 82010

Customer : HUDBAY OIL **Well No :** SPERM WHALE 1 **Test No.** 1B

TEST SEQUENCE AND FLOW RATE DATA

Description and Flow Rates	Date	Time hrs	Time mins	Pressure psig	Surface Choke
Packer Depth : 832.84 ft. Set at :	16.1.82	06	53	–	–
Opened Tool : (Annulus pressure 1400 psi)	"	07	09	100	7/16"
STARTED WEAK BUT QUICKLY INCREASED TO A STRONG		07	30	17	½"
BLOW.					
BLOW EVENTUALLY DECREASED TO NOTHING		07	51	4	½"
		08	00	3	½"
CLOSED TOOL		08	55	–	–
Reverse Circulation Started (Pump pressure 600 psig)	16.1.82	08	57	–	–
Reverse Circulation Finished	"	09	20		
Pulled Packer Loose/Pulled Out of Retainer	"	09	25	–	–

Cushion Type : DIESEL Amount TO SURFACE bbls ; Length ft ; Pressure psi Bottom Choke 1"

RECOVERY DATA

	Recovery Description	Feet	Bbls	% Oil	% Water	% Other
1	WATER		17			
2						
3						
4						
5						
6						

	Oil-API Gravity	Gas Gravity	G.O.R.	Resistivity	Chlorides
1	° at °F			at °F	ppm
2	° at °F			at °F	ppm
3	° at °F			at °F	ppm
4	° at °F			at °F	ppm
5	° at °F			at °F	ppm
6	° at °F			at °F	ppm

Comments :

DOWELL Schlumberger

Equipment Data

Report No. F 82010

Customer: HUDBAY OIL **Well No.:** SPERM WHALE 1 **Test No.:** 1B

SAMPLE CHAMBER RECOVERY DATA

Sampler Drained
On Location [X]
Elsewhere [ ]
Name : _____
Address : _____

Recovery		Resistivity	Chlorides (ppm)
Gas _____	cu ft.	Water _____ at _____	°F _____
Oil _____	c.c.	Mud _____ at _____	°F _____
Water 500	c.c.	Mud Filtrate _____ at _____	°F _____
Mud _____	c.c.	Pit Mud _____ at _____	°F _____
_____ °API	_____ °F	Pit Mud Filtrate _____ at _____	°F _____

Gas/Oil Ratio _____ cu ft./bbl Sample Chamber Pressure 120 psi.

EQUIPMENT SEQUENCE

Components (including D.P. and D.C.)	Type	O.D. (in)	I.D. (in)	Length	Depth
BULL NOSE		4¾	2¼	0.25	844.37
RECORDER CARRIER J 1758	JOTCO	4-7/8	1½	1.80	844.12
RECORDER CARRIER J 1630	"	"	"	1.80	842.32
PERF ANCHOR	"	4¾	2¼	6.10	840.32
X/O 3½ EUE BOX x 3½ FH PIN (1)		"	2-5/16	0.63	834.42
9-5/8 POSITEST PACKER	JOTCO	9-5/8	3	0.95	832.84
		40		0.66	
X/O 3½ EUE PIN x 3½ FH BOX (2)		4¾	2-5/16	0.32	832.18
SAFETY JOINT	BOWEN	4-5/8	2-7/16	0.60	831.86
TR 63 HYDRAULIC JARS	JOTCO	4-7/8	1½	2.35	831.26
RECORDER CARRIER J 1629	JOTCO	4-7/8	1½	1.80	838.91
MFE HRT	"	5	1-3/8	2.90	827.11
PCT	"	4¾	1	4.66	824.21
SPRO CONVERSION	"	"	2¼	2.69	819.55
X/O 4 IF BOX / 3½ FH PIN (3)		6	2-7/8	0.32	816.86
3 STDS 6½ D.C.		6½	2-7/8	81.59	816.54
X/O 4 IF PIN / 3½ IF BOX (4)		6½	2-11/16	0.96	734.95
2 SLIP JOINTS	JOTCO	5	2¼	15.84	733.99
1 STD 4¾ D.C.		4¾		28.29	718.15
1 PUMP OUT SUB	JOTCO	"		0.36	689.86
X/O 3½ PHG BOX / 3½ IF PIN				0.21	689.50
3½ PHG TUBING 12.9 LB/FT	12.9LB/FT			628.36	689.29
X/O 4½ ACME PIN / 3½ PHG BOX				0.20	60.93
FLUTED HANGER	FLOPETROL			0.27	60.73
SLICK JOINT	"			1.80	60.46
E-Z TREE	"			2.44	58.66
SAVER SUB	"			0.25	56.22
X/O 4½ ACME P / 4½ IF BOX				0.33	55.97
5" HWDP	5			61.05	55.64
X/O 6½ ACME PIN / 4½ IF PIN				6.32	- 5.41
FLOW HEAD	FLOPETROL				- 5.73
TOTAL TUBING				628.36	
Total Drill Pipe				61.05	
Total Drill Collar				109.88	

Comments : _____

DOWELL Schlumberger

Formation Evaluation Data

To be completed by Customer Representative

Report No. F 82010

Customer : HUDBAY OIL **Well No. :** SPERM WHALE 1 **Test No. :** 1B

Tested Interval	Sand-stone	Lime-stone	Chalk	Clay	Shale	Other (please specify)
Major Mineral Species						
Minor Mineral Species						
Stringers or Lenses						

Is the tested interval : Open Hole : ☐ I.D. ____ in

In Casing : ☐ O.D. ____ in. Wt : ____ lb. ft. I.D. ____ in.

Open Hole Interval : (Total Depth) _____ (Foot of Casing) _____

Perforated Intervals : _____ _____ _____ _____

_____ _____ _____ _____

In the tested interval how many productive zones do logs show :

1 ☐ 2 ☐ 3 ☐ more ☐

What is the average porosity of the interval ? ☐ %

Is the interval homogeneous ? Yes ☐ No ☐

Is formation consolidation : Good ☐ Mod ☐ Low ☐

What is the clay content : % or High ☐ Mod ☐ Low ☐

Is the formation fractured Heavily ☐ Mod ☐ Little ☐

In this interval, is there expected near the wellbore :

Geological fault ? Yes ☐ No ☐

Interval thickness change ? Yes ☐ No ☐

Fluid phase contact ? Yes ☐ No ☐

—If yes :— Oil-Water ☐ Gas-Water ☐ Oil-Gas ☐

During drilling of the interval, was there :

Lost circulation ? Yes ☐ No ☐

Sand production ? Yes ☐ No ☐

Other (please specify) _____

Before testing was there a :

Scraper run ? Yes ☐ No ☐

Caliper run ? Yes ☐ No ☐

Mud circulation to bottom ? Yes ☐ No ☐

—If yes :— for how long ☐ If no, how long since ☐

Additional Comments : _____

Customer Representative : _____

SYMBOLS USED

ΔT – INCREMENT OF TIME (MINUTES)

$\frac{T + \Delta T}{\Delta T}$ – DIMENSIONLESS TIME CONSTANT USED FOR THE HORNER PLOT

ΔT IS THE INCREMENT OF SHUT-IN TIME (MINUTES)

T IS TOTAL FLOW TIME PRECEDING SHUT-IN (MINUTES)

LOG – LOGARITHM TO BASE 10 OF $\frac{T + \Delta T}{\Delta T}$

Pw – Pf – PRESSURE BUILD-UP ABOVE FINAL FLOWING PRESSURE PRECEDING THE BUILD UP WHICH IS USED FOR THE MCKINLEY PLOT.

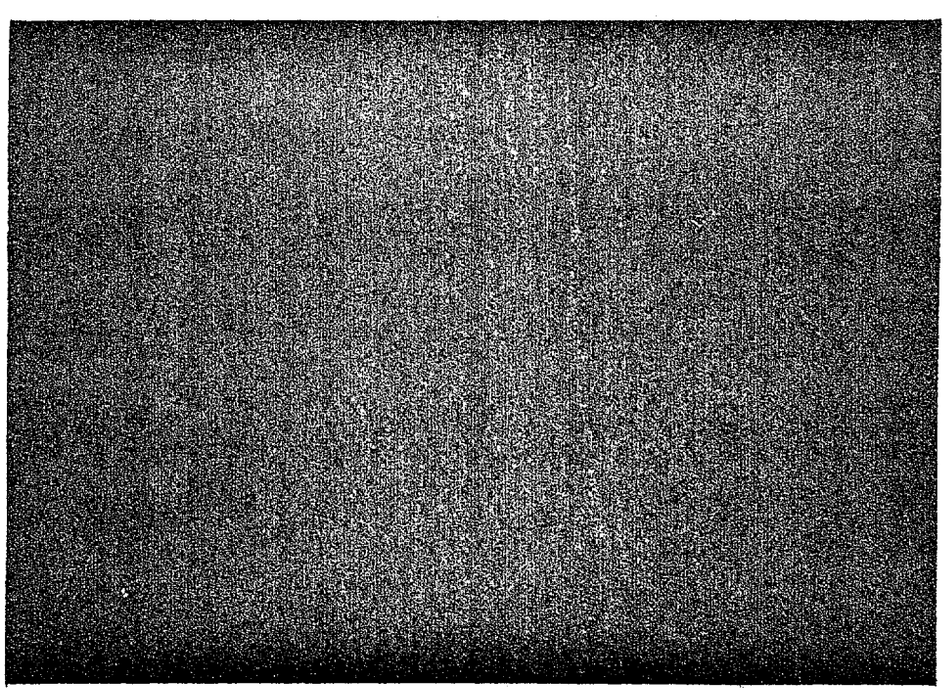
REPORT N° F 82011

JOB N°

INVOICE/SIR.

DATE FEBRUARY 5, 1982

TECHNICAL REPORT



COMPANY HUDBAY OIL

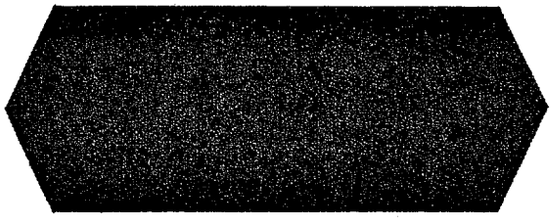
WELL SPERM WHALE 1

FIELD GIPPSLAND BASIN

COUNTRY AUSTRALIA

TEST N° 2

REPORT N° F 82011



CONFIRMATION OF REPORT DISTRIBUTION

TO HUDBAY OIL

WELL SPERM WHALE 1 FIELD GIPPSLAND BASIN TEST N° 2

COUNTRY AUSTRALIA DATE FEBRUARY 5, 1982

Dowell Schlumberger has been requested to furnish the following companies with Technical Reports. This distribution of Technical Reports will be used for :

☐ All tests on this well,

☐ This one test only,

unless otherwise notified.

_____ TECHNICAL REPORT (S)

_____ TECHNICAL REPORT (S)

_____ TECHNICAL REPORT (S)

_____ TECHNICAL REPORT (S)

_____ TECHNICAL REPORT (S)

_____ TECHNICAL REPORT (S)

Dowell Schlumberger

Cables: "Bigorange"
Telex: Orange RS 23005
Telephone: 2351022
2351287

FEBRUARY 5, 1982

REPORT NO : F 82011

GENTLEMEN,

The enclosed test appears to be a good drill stem test during which the tool did function properly.

It is essentially a gas zone.

A review of the test datas indicate high permeability.

FRANCIS SOO
RESERVOIR EVALUATION DEPARTMENT

FS/rs

REPORT N° F 82011

RECORDER N° : J 1782 CAPACITY : 4700 PSI DEPTH :

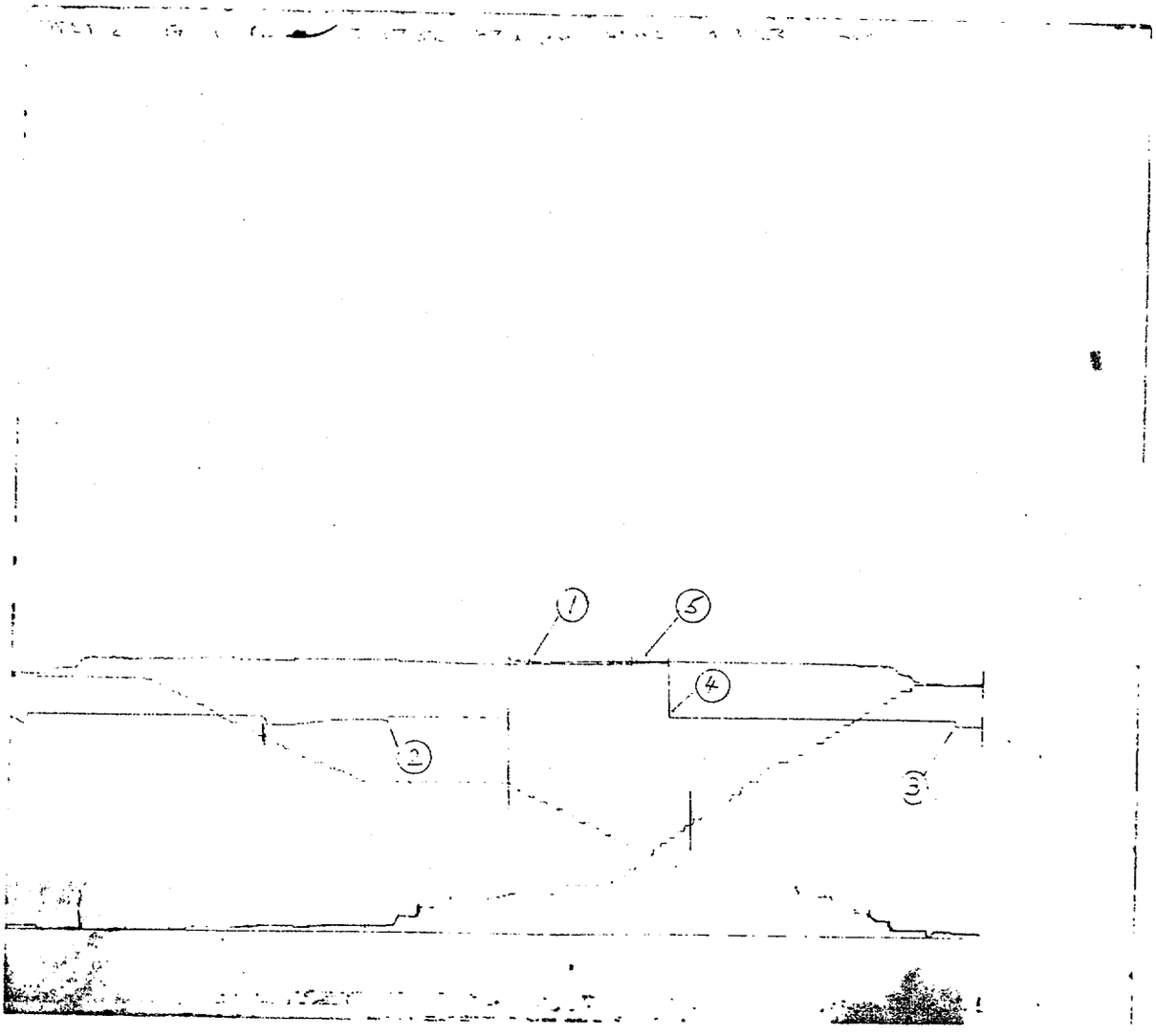
OPENING : OUTSIDE TEMPERATURES :

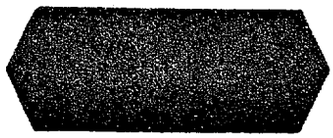
CLOCK N° : 9-3823 CAP: 48 HRS CLOCK TRAVEL : 0.021273 in/min

CALIBRATION DATA AT M = 936.001
A = 1.10

PRESSURE (PSI) = DEFLECTION (INS) X M ± A

PRESSURE DATA FROM THIS CHART IS PRESENTED ON THE NEXT PAGE.





REPORT N° F 82011

PRESSURE DATA FOR RECORDER : J 1782

DESCRIPTION	LABEL POINT	PRESSURE (PSI)	TIME GIVEN	TIME COMPUTED
INITIAL HYDROSTATIC	1	1516		
INITIAL FLOW (1)	2	1163		
INITIAL FLOW (2)	3	1171	110	110
INITIAL SHUT-IN	4	1202	84	84
SECOND FLOW (1)				
SECOND FLOW (2)				
SECOND SHUT-IN				
THIRD FLOW (1)				
THIRD FLOW (2)				
THIRD SHUT-IN				
FINAL FLOW (1)				
FINAL FLOW (2)				
FINAL SHUT-IN				
FINAL HYDROSTATIC	5	1514		

REMARK :

REPORT N° F 82011

RECORDER N° : J 1629 CAPACITY : 2800 PSI DEPTH :

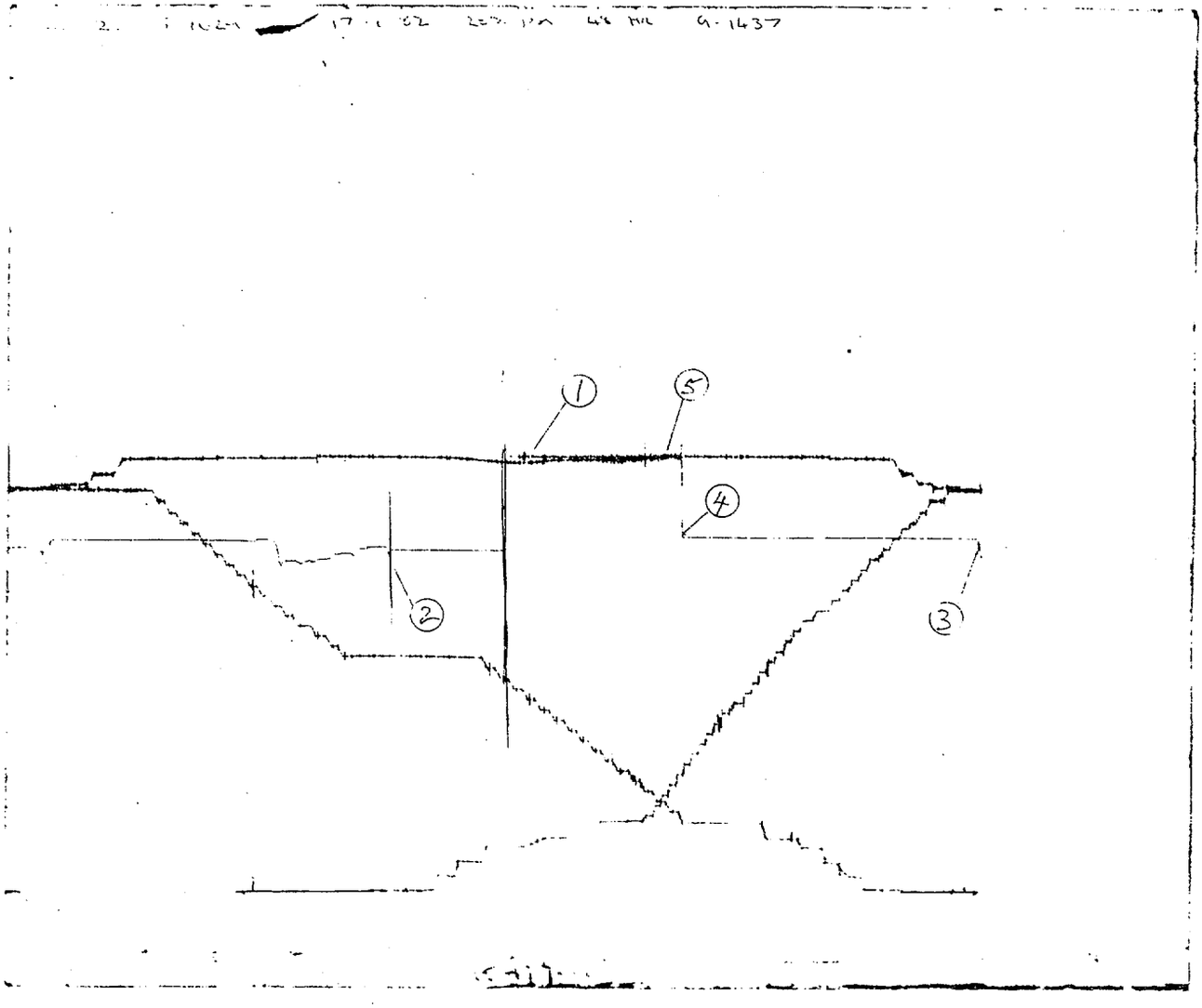
OPENING : INSIDE TEMPERATURES : 126 DEG F

CLOCK N° : 9-1436 CAP: 48 HRS CLOCK TRAVEL : 0.020778 in/min

CALIBRATION DATA AT M = 557.0221
A = - 1.1097

PRESSURE (PSI) = DEFLECTION (INS) X M ± A

PRESSURE DATA FROM THIS CHART IS PRESENTED ON THE NEXT PAGE.



REPORT N° F 82011

PRESSURE DATA FOR RECORDER : J 1629

DESCRIPTION	LABEL POINT	PRESSURE (PSI)	TIME GIVEN	TIME COMPUTED
INITIAL HYDROSTATIC	1	1474		
INITIAL FLOW (1)	2	1113		
INITIAL FLOW (2)	3	1170	110	109
INITIAL SHUT-IN	4	1196	84	85
SECOND FLOW (1)				
SECOND FLOW (2)				
SECOND SHUT-IN				
THIRD FLOW (1)				
THIRD FLOW (2)				
THIRD SHUT-IN				
FINAL FLOW (1)				
FINAL FLOW (2)				
FINAL SHUT-IN				
FINAL HYDROSTATIC	5	1474		

REMARK :

REPORT N° F 82011

RECORDER N° : J 1630 CAPACITY :2800 PSI DEPTH

OPENING : OUTSIDE TEMPERATURES : 126 DEG F

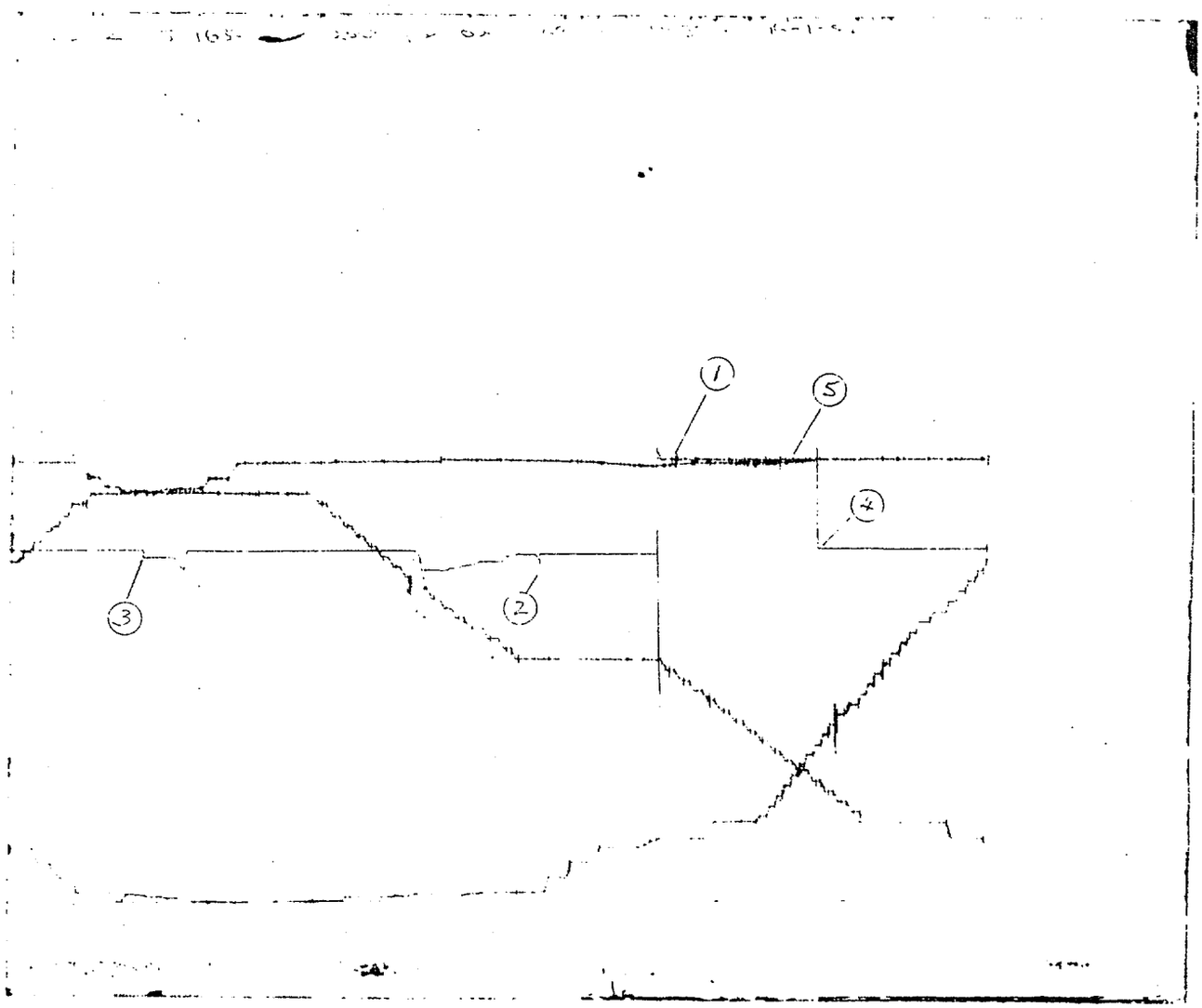
CLOCK N° : 9-3813 CAP:48 HRS CLOCK TRAVEL : 0.021258 in/min

CALIBRATION DATA AT M = 564.96988

A = 5.357018

PRESSURE (PSI) = DEFLECTION (INS) X M ± A

PRESSURE DATA FROM THIS CHART IS PRESENTED ON THE NEXT PAGE.



REPORT N° F 82011

PRESSURE DATA FOR RECORDER : J 1630

DESCRIPTION	LABEL POINT	PRESSURE (PSI)	TIME GIVEN	TIME COMPUTED
INITIAL HYDROSTATIC	1	1538		
INITIAL FLOW (1)	2	1146		
INITIAL FLOW (2)	3	1199	110	110
INITIAL SHUT-IN	4	1229	84	84
SECOND FLOW (1)				
SECOND FLOW (2)				
SECOND SHUT-IN				
THIRD FLOW (1)				
THIRD FLOW (2)				
THIRD SHUT-IN				
FINAL FLOW (1)				
FINAL FLOW (2)				
FINAL SHUT-IN				
FINAL HYDROSTATIC	5	1538		

REMARK :

REPORT N° F 82011

PRESSURE DATA FOR RECORDER : J 1630

LABEL POINT	ΔT (mins)	PRESSURE (PSI)	$\frac{T + \Delta T}{\Delta T}$	LOG	Pw − Pf (PSI)	COMMENTS
1		1538				INITIAL HYDROSTATIC
2	0	1146				INITIAL FLOW (1)
	5	1209				
	10	1193				
	20	1171				
	30	1155				
	40	1222				
	50	1222				
	70	1222				
	90	1222				
3	110	1199				INITIAL FLOW (2)
3	0	1199				START SHUT-IN
	1	1224	111.00	2.05	25	T = 110
	2	1224	56.00	1.75	25	
	3	1224	37.67	1.58	25	
	5	1224	23.00	1.36	25	
	10	1224	12.00	1.08	25	
	20	1225	6.50	0.81	26	
	40	1226	3.75	0.57	27	
	60	1226	2.83	0.45	27	
4	84	1229	2.31	0.36	30	INITIAL SHUT-IN
5		1538				FINAL HYDROSTATIC

DOWELL Schlumberger

Formation Testing Field Report

Report No. F 32011

WELL IDENTIFICATION

Company : HUDBAY OIL Well No : SPERM WHALE 1 Test No. : 2
Field : GIPPSLAND BASIN Location : OFFSHORE- VICTORIA Country : AUSTRALIA
Tested Interval : From 832 M ~~Ft~~ to 834 M ~~Ft~~.
Co-ordinates :
Type Test : Open Hole ☐ Casing ; ☒ Conventional ☒ Straddle ; ☐ Land rig ☐ Jack-up ☐ Floater ☒
Valve : MFE ☐ PCT ☒ SPRO ☐ Other : with Packer ☒ Retainer ☒

HOLE DATA

Geologic Level : UPPER CRETATIOUS Description : -
Net Productive Interval : 8 M ~~Ft~~ Estimated Porosity : 25 - 30 %
Total Depth : ft. Depths measured from : RTKB Elevation : 9.35 M ~~Ft~~
Open Hole Size : in. Rat Hole Size : in., from ft.
Casing Size : 9-5/8 in. 40 lbs/ft. Liner Size : in., lbs/ft. from ft
Before test : Caliper Yes ☐ No ☐ Scraper Yes ☒ No ☐ Circulation Yes ☒ for hrs; No ☐

MUD DATA

Mud Type : BARACARB BRINE Weight : 1.32 S G
Viscosity : 50 Water Loss 12 cc Mud Resistivity at °F
Filtrate Resistivity : at °F ; Chloride ppm : 111,000

INSTRUMENT AND CHART DATA

Recorder No.		J 1629	J 1630	J 1782	
Capacity (psig)		2800	2800	4700	
Depth					
Inside/Outside		INSIDE	OUTSIDE	OUTSIDE	
Above/Below valve		BELOW	BELOW	BELOW	
Clock No.		9-1437	9-3813	9-3823	
Capacity (hrs.)		48 HRS	48 HRS	48 HRS	
Temperature		126 DEG F	126 DEG F	126 DEG F	
Initial Hydrostatic Pressure		1488	1532	1539	
Pre-flow	(1) Start Pressure	899	1136	1154	
	(2) Finish Pressure	1172	1194	1187	
Initial Shut-in Pressure		1208	1222	1220	
Second Flow	(1) Start Pressure				
	(2) Finish Pressure				
Second Shut-in Pressure					
Final Flow	(1) Start Pressure				
	(2) Finish Pressure				
Final Shut-in Pressure					
Final Hydrostatic Pressure		1488	1529	1535	

OPERATIONS SUMMARY

Left Station at 10 : 55 on 9.1.82 On Location at 13 : 00 on 10.1.82
Started Operations at : on Finished Operations at : on
Off Location at : on Return Station at : on Mileage

Comments : TOOLS FUNCTIONED PROPERLY. H_2S DETECTED. 200 PPM HIGH PRESSURE GAS WELL. SLIGHT AMOUNT OF OIL PRESENT.

Station : AUS SIR No. : 61978 Date : 17.1.82
Customer Purchase Order Tester P O'LOUGHLIN Customer Representative B MC ELHINNY

DOWELL Schlumberger **Surface Data**

Report No. F 82011

Customer: HUDBAY OIL **Well No:** SPERM WHALE 1 **Test No.** 2

TEST SEQUENCE AND FLOW RATE DATA

Description and Flow Rates	Date	Time hrs	Time mins	Pressure psig	Surface Choke
Packer Depth: 815 M HX Set at:	17.1.82	08	30	–	–
Opened Tool: (Annulus pressure 1400 psi)	"	09	09	140	½"
STARTED WITH A STRONG BLOW	"	09	14	400	½
	"	09	18	670	½
PRESSURE BUILDING UP	"	09	32	820	½
CHANGED TO ¼" CHOKE	"	09	41	1080	¼
	"	09	50	1120	¼
CHANGED TO ½" CHOKE	"	10	46	850	½
CHANGED TO ¼" CHOKE	"	10	56	1080	¼
H_2S DETECTED 200 PPM – SOME OIL + IN VERY SMALL AMOUNTS	"	10	58	1080	¼
SHUT IN	"	10	59		
RUPTURE DISC BLEW AT 1800 PSI PUMP PRESSURE					
Reverse Circulation Started (Pump pressure 600 psig)	17.1.82	12	06		
Reverse Circulation Finished	"	12	20		
Pulled Packer Loose/Pulled Out of Retainer	"	12	23		

Cushion Type: DIESEL Amount TO SURFACE bbls; Length ft; Pressure psi Bottom Choke 1"

RECOVERY DATA

	Recovery Description	Feet	Bbls	% Oil	% Water	% Other
1						
2						
3						
4						
5						
6						

	Oil-API Gravity	Gas Gravity	G.O.R.	Resistivity	Chlorides
1	° at °F			at °F	ppm
2	° at °F			at °F	ppm
3	° at °F			at °F	ppm
4	° at °F			at °F	ppm
5	° at °F			at °F	ppm
6	° at °F			at °F	ppm

Comments:

DOWELL Schlumberger

Equipment Data

Report No. F 82011

Customer: HUDBAY OIL | Well No.: SPERM WHALE 1 | Test No.: 2

SAMPLE CHAMBER RECOVERY DATA

	Recovery	Resistivity / Chlorides (ppm)
Sampler Drained	Gas _____ cu ft.	Water _____ at _____ °F _____
On Location [X] BY FLOPETROL	Oil _____ c.c.	Mud _____ at _____ °F _____
Elsewhere [ ]	Water _____ c.c.	Mud Filtrate _____ at _____ °F _____
Name: _____	Mud _____ c.c.	Pit Mud _____ at _____ °F _____
Address: _____	_____ °API ____ °F	Pit Mud Filtrate _____ at _____ °F _____

Gas/Oil Ratio _____ cu ft./bbl Sample Chamber Pressure _____ psi.

EQUIPMENT SEQUENCE

Components (including D.P. and D.C.)	Type	O.D. (in)	I.D. (in)	Length	Depth
BULL NOSE		4¾	2¼	0.25	826.53
RECORDER CARRIER J 1782	JOTCO	4-7/8	1½	1.80	826.28
RECORDER CARRIER J 1630	"	"	1½	1.80	824.48
PERF ANCHOR	"	4¾	2¼	6.10	822.68
X/O 3½ EUE BOX x 3½ FH PIN (1)	-	"	2-5/16	0.63	816.58
9-5/8 POSITEST PACKER	JOTCO	9-5/8	3	0.95	813.00
		40LB/FT		0.66	
X/O 3½ EUE PIN x 3½ FH BOX (2)	-	4¾	2-5/16	0.32	814.34
SAFETY JOINT	BOWEN	4-5/8	2-7/16	0.60	814.02
TR 63 HYDRAULIC JAR	JOTCO	4-7/8	1½	2.35	813.42
RECORDER CARRIER	JOTCO	"	"	1.80	811.07
MFE/HRT	"	5	1-3/8	2.90	809.27
PCT	"	4¾	1	4.66	806.37
SPRO CONVERSION	"	"	2¼	2.69	801.71
X/O 4" IF BOX / 3½ FH PIN (3)	-	6	2-7/8	0.32	799.02
3 STDS 6½ D.C.		6½	"	81.59	798.70
X/O 4" IF PIN / 3½ IF BOX (4)		6½	2-11/16	0.96	717.11
2 SLIP JOINTS	JOTCO	5	2½	15.84	716.15
1 STD 4¾ D.C.		4¾		28.29	700.31
2 PUMP OUT SUB	JOTCO	"		0.36	672.02
X/O 3½ PH BOX - 3½ IF PIN				0.21	671.66
X/O 3½ PHG TBG - 12.9 LB/FT				610.72	671.45
X/O 4½ ACME PIN / 3½ PHG BOX				0.20	60.73
FLUTED HANGER	FLOPETROL			0.27	60.53
SLICK JT	"			1.80	60.26
E-2 TREE	"			2.44	58.48
SAVER SUB	"			0.25	56.02
X/O 4½ ACME PIN / 4½ IF BOX				0.33	55.77
5" HWDP				61.05	55.44
X/O 6½ ACME PIN / 4½ IF PIN				6.32	- 5.61
FLOW HEAD	FLOPETROL				- 11.93
TOTAL BUTING				610.72	
Total Drill Pipe				61.05	
Total Drill Collar				109.88	

Comments: _____

DOWELL Schlumberger

Formation Evaluation Data

To be completed by Customer Representative

Report No. F 82011

Customer : HUDBAY OIL **Well No. :** SPERM WHALE 1 **Test No. :** 2

Tested Interval	Sand-stone	Lime-stone	Chalk	Clay	Shale	Other (please specify)
Major Mineral Species						
Minor Mineral Species						
Stringers or Lenses						

Is the tested interval : Open Hole : ☐ I.D. ____ in

In Casing : ☐ O.D. ____ in. Wt : ____ lb. ft. I.D. ____ in.

Open Hole Interval : (Total Depth) _____ (Foot of Casing) _____

Perforated Intervals : _____ _____ _____

_____ _____ _____ _____

In the tested interval how many productive zones do logs show :

1 ☐ 2 ☐ 3 ☐ more ☐

What is the average porosity of the interval ? ☐ %

Is the interval homogeneous ? Yes ☐ No ☐

Is formation consolidation : Good ☐ Mod ☐ Low ☐

What is the clay content : % or High ☐ Mod ☐ Low ☐

Is the formation fractured Heavily ☐ Mod ☐ Little ☐

In this interval, is there expected near the wellbore :

Geological fault ? Yes ☐ No ☐

Interval thickness change ? Yes ☐ No ☐

Fluid phase contact ? Yes ☐ No ☐

—If yes :— Oil-Water ☐ Gas-Water ☐ Oil-Gas ☐

During drilling of the interval, was there :

Lost circulation ? Yes ☐ No ☐

Sand production ? Yes ☐ No ☐

Other (please specify) _____

Before testing was there a :

Scraper run ? Yes ☐ No ☐

Caliper run ? Yes ☐ No ☐

Mud circulation to bottom ? Yes ☐ No ☐

—If yes :— for how long ☐ If no, how long since ☐

Additional Comments : _____

Customer Representative : _____

SYMBOLS USED

ΔT – INCREMENT OF TIME (MINUTES)

$\frac{T + \Delta T}{\Delta T}$ – DIMENSIONLESS TIME CONSTANT USED FOR THE HORNER PLOT

ΔT IS THE INCREMENT OF SHUT-IN TIME (MINUTES)

T IS TOTAL FLOW TIME PRECEDING SHUT-IN (MINUTES)

LOG – LOGARITHM TO BASE 10 OF $\frac{T + \Delta T}{\Delta T}$

$P_w - P_f$ – PRESSURE BUILD-UP ABOVE FINAL FLOWING PRESSURE PRECEDING THE BUILD UP WHICH IS USED FOR THE MCKINLEY PLOT.

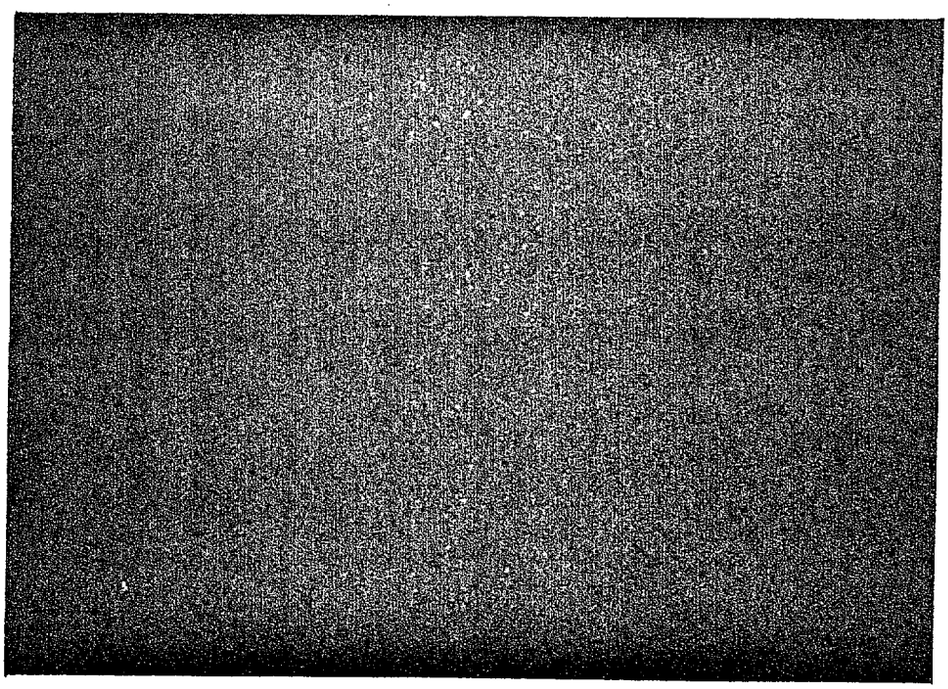
REPORT N° F 82012

JOB N°

INVOICE/SIR.

DATE FEBRUARY 5, 1982

TECHNICAL REPORT



COMPANY HUDBAY OIL

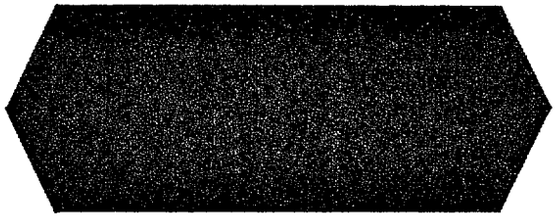
WELL SPERM WHALE 1

FIELD GIPPSLAND BASIN

COUNTRY AUSTRALIA

TEST N° 3

REPORT N° F 82012



CONFIRMATION OF REPORT DISTRIBUTION

TO HUDBAY OIL

WELL SPERM WHALE 1 FIELD GIPPSLAND BASIN TEST N° 3

COUNTRY AUSTRALIA DATE FEBRUARY 5, 1982

Dowell Schlumberger has been requested to furnish the following companies with Technical Reports. This distribution of Technical Reports will be used for :

☐ All tests on this well,

☐ This one test only,

unless otherwise notified.

_____ TECHNICAL REPORT (S)

_____ TECHNICAL REPORT (S)

_____ TECHNICAL REPORT (S)

_____ TECHNICAL REPORT (S)

_____ TECHNICAL REPORT (S)

_____ TECHNICAL REPORT (S)

Dowell Schlumberger

Cables: "Bigorange"
Telex: Orange RS 23005
Telephone: 2351022
2351287

FEBRUARY 5, 1982

REPORT NO : F 82012

GENTLEMEN,

The enclosed test appears to be a good drill stem test during which the tools did function properly.

Test indicates it is essentially a gas zone. A review of the test datas indicate high permeability.

FRANCIS SOO
RESERVOIRE EVALUATION DEPARTMENT

FS/rs

REPORT N° F 82012

RECORDER N° : J 1782 CAPACITY : 4700 PSI DEPTH : 814.84 M

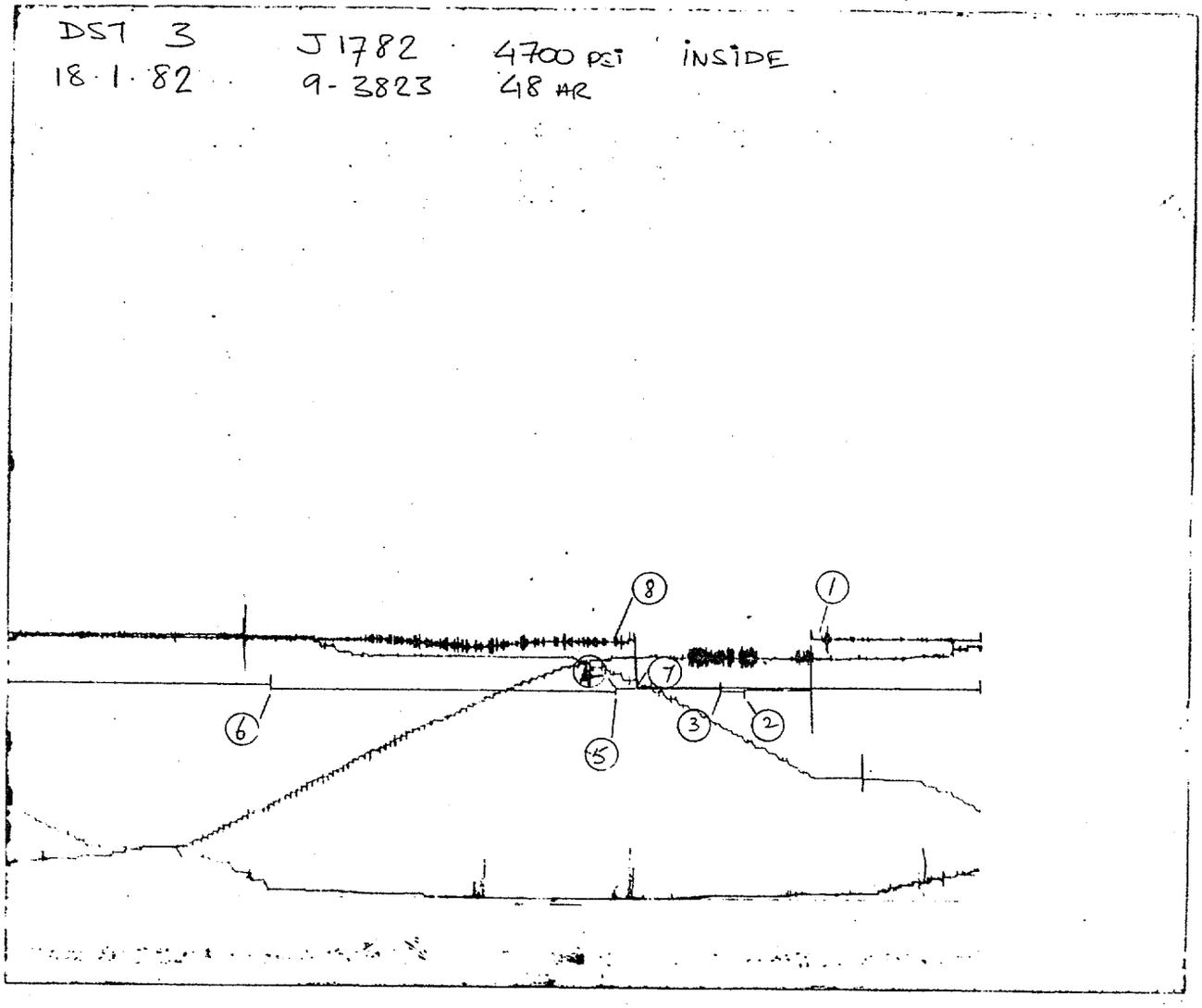
OPENING : INSIDE TEMPERATURES : 126 DEG F

CLOCK N° : 9-3823 CAP: 48 HRS CLOCK TRAVEL : 0.020138 in/min

CALIBRATION DATA AT M = 936.001
A = 1.10

PRESSURE (PSI) = DEFLECTION (INS) X M ± A

PRESSURE DATA FROM THIS CHART IS PRESENTED ON THE NEXT PAGE.



REPORT N° F 82012

PRESSURE DATA FOR RECORDER : J 1782

DESCRIPTION	LABEL POINT	PRESSURE (PSI)	TIME GIVEN	TIME COMPUTED
INITIAL HYDROSTATIC	1	1496		
INITIAL FLOW (1)	2	1167		
INITIAL FLOW (2)	3	1194	7	7
INITIAL SHUT-IN	4	1204	31	31
SECOND FLOW (1)				
SECOND FLOW (2)				
SECOND SHUT-IN				
THIRD FLOW (1)				
THIRD FLOW (2)				
THIRD SHUT-IN				
FINAL FLOW (1)	5	1187	0	0
FINAL FLOW (2)	6	1190	101	101
FINAL SHUT-IN	7	1216	180	180
FINAL HYDROSTATIC	8	1475		

REMARK :

REPORT N° F 82012

RECORDER N° : J 1629 CAPACITY : 2800 PSI DEPTH : 799.63 M

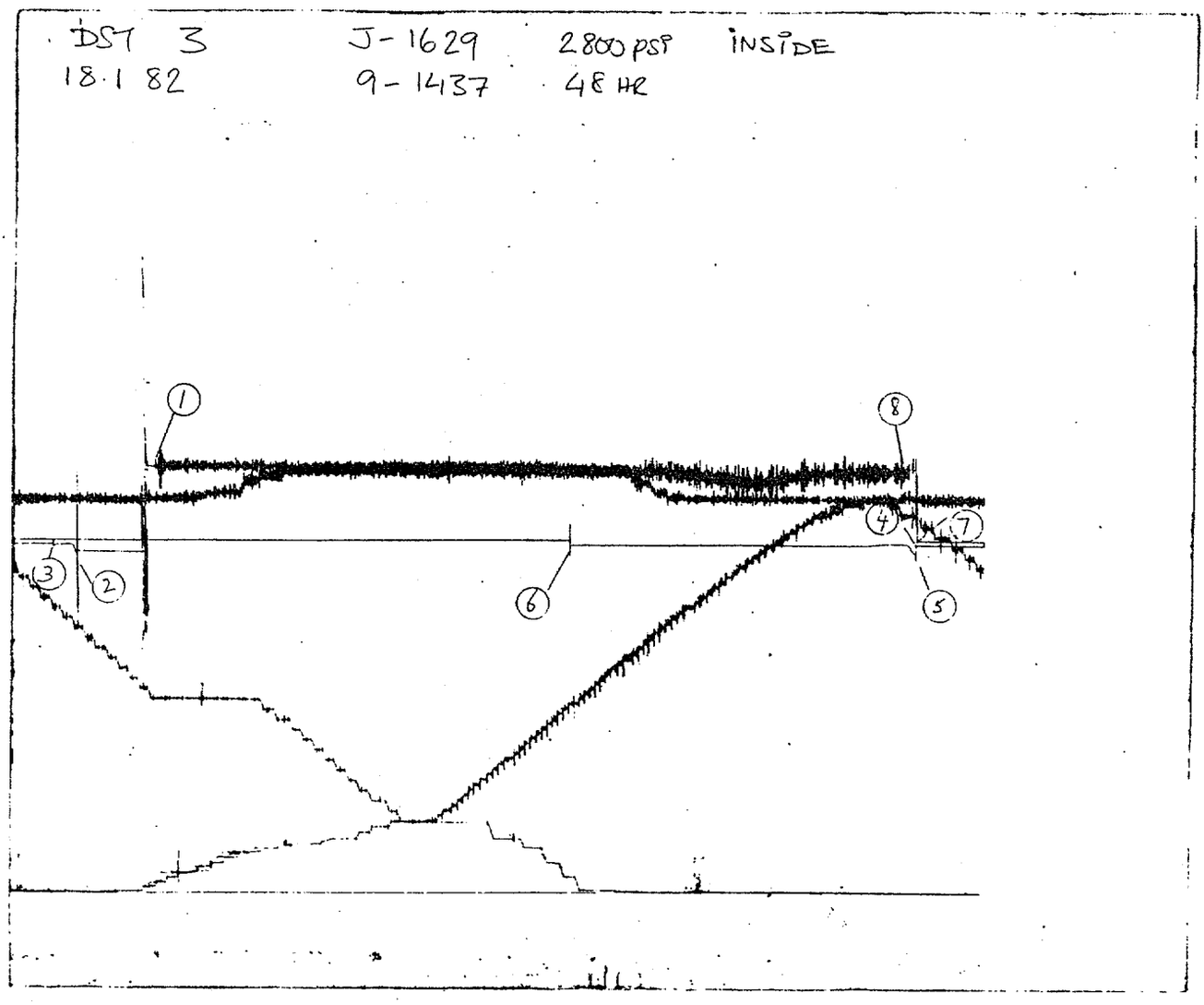
OPENING : INSIDE TEMPERATURES : 126 DEG F

CLOCK N° : 9-1437 CAP: 48 HRS CLOCK TRAVEL : 0.020524 in/min

CALIBRATION DATA AT M = 557.0221
A = - 1.1097

PRESSURE (PSI) = DEFLECTION (INS) X M ± A

PRESSURE DATA FROM THIS CHART IS PRESENTED ON THE NEXT PAGE.



REPORT N° F 82012

PRESSURE DATA FOR RECORDER : J 1629

DESCRIPTION	LABEL POINT	PRESSURE (PSI)	TIME GIVEN	TIME COMPUTED
INITIAL HYDROSTATIC	1	1461		
INITIAL FLOW (1)	2	1145		
INITIAL FLOW (2)	3	1178	7	7
INITIAL SHUT-IN	4	1183	31	31
SECOND FLOW (1)				
SECOND FLOW (2)				
SECOND SHUT-IN				
THIRD FLOW (1)				
THIRD FLOW (2)				
THIRD SHUT-IN				
FINAL FLOW (1)	5	1137	0	0
FINAL FLOW (2)	6	1179	101	101
FINAL SHUT-IN	7	1199	180	180
FINAL HYDROSTATIC	8	1445		

REMARK :

REPORT N° F 82012

RECORDER N° : J 1630 CAPACITY : 2800 PSI DEPTH : 813.04 M

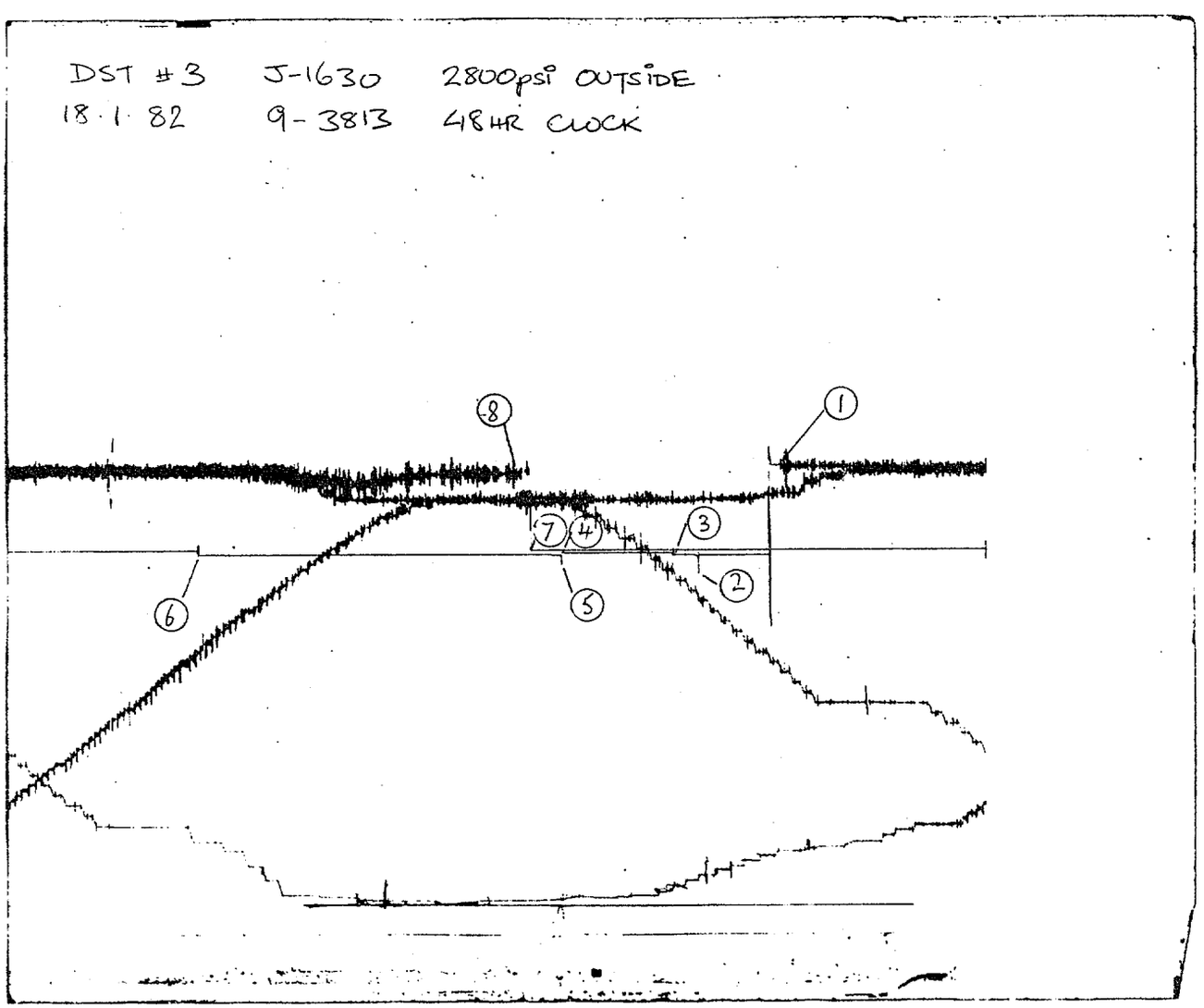
OPENING : OUTSIDE TEMPERATURES : 126 DEG F

CLOCK N° : 9-3813 CAP: 48 HRS CLOCK TRAVEL : 0.021235 in/min

CALIBRATION DATA AT M = 564.96988
A = 5.357018

PRESSURE (PSI) = DEFLECTION (INS) X M ± A

PRESSURE DATA FROM THIS CHART IS PRESENTED ON THE NEXT PAGE.



REPORT N° F 82012

PRESSURE DATA FOR RECORDER : J 1630

DESCRIPTION	LABEL POINT	PRESSURE (PSI)	TIME GIVEN	TIME COMPUTED
INITIAL HYDROSTATIC	1	1522		
INITIAL FLOW (1)	2	1152		
INITIAL FLOW (2)	3	1217	7	7
INITIAL SHUT-IN	4	1223	31	31
SECOND FLOW (1)				
SECOND FLOW (2)				
SECOND SHUT-IN				
THIRD FLOW (1)				
THIRD FLOW (2)				
THIRD SHUT-IN				
FINAL FLOW (1)	5	1183	0	0
FINAL FLOW (2)	6	1219	101	101
FINAL SHUT-IN	7	1233	180	180
FINAL HYDROSTATIC	8	1497		

REMARK :

PRESSURE DATA FOR RECORDER : J 1630

LABEL POINT	ΔT (mins)	PRESSURE (PSI)	$\frac{T + \Delta T}{\Delta T}$	LOG	Pw – Pf (PSI)	COMMENTS
1		1522				INITIAL HYDROSTATIC
2	0	1152				INITIAL FLOW (1)
	2	1217				
	4	1217				
3	7	1217				INITIAL FLOW (2)
3	0	1217				START SHUT-IN
	2	1223	4.50	0.65	6	T = 7
	4	1223	2.75	0.44	6	
	6	1223	2.17	0.34	6	
	8	1223	1.88	0.27	6	
	10	1223	1.70	0.23	6	
	15	1223	1.47	0.17	6	
	20	1223	1.35	0.13	6	INITIAL SHUT-IN
4	31	1223	1.23	0.09	6	FINAL FLOW (1)
5	0	1183				
	10	1218				
	20	1218				
	40	1219				
	60	1219				
	80	1219				
6	101	1219				FINAL FLOW (2)
6	0	1219				START SHUT-IN
	2	1233	55.00	1.74	14	T =108
	4	1233	28.00	1.45	14	
	6	1233	19.00	1.28	14	
	8	1233	14.50	1.16	14	
	10	1233	11.80	1.07	14	
	20	1233	6.40	0.81	14	
	40	1233	3.70	0.57	14	
	60	1233	2.80	0.45	14	
	80	1233	2.35	0.37	14	
	100	1233	2.08	0.32	14	
	150	1233	1.72	0.24	14	
7	180	1233	1.60	0.20	14	FINAL SHUT-IN
8		1497				FINAL HYDROSTATIC

DOWELL Schlumberger

Formation Testing Field Report

Report No. F 82012

WELL IDENTIFICATION

Company : HUDBAY OIL Well No : SPERM WHALE 1 Test No. : 3
Field : GIPPSLAND BASIN Location : OFFSHORE - VICTORIA Country : AUSTRALIA
Tested Interval : From 819 M ~~RK~~, to 826 M ~~RK~~
Co-ordinates :
Type Test : Open Hole ☐ Casing : ☒ Conventional ☒ Straddle : ☐ Land rig ☐ Jack-up ☐ Floater ☒
Valve : MFE ☐ PCT ☒ SPRO ☒ Other : with Packer ☒ Retainer ☐

HOLE DATA

Geologic Level : UPPER CRETACIOUS Description : -
Net Productive Interval : 8 M ~~RK~~ Estimated Porosity : 25 - 30 %
Total Depth : 894.53 M ~~RK~~ Depths measured from : RTKB Elevation : 9.35 M ~~RT~~
Open Hole Size : - in. - Rat Hole Size : - in., from - ft.
Casing Size : 9-5/8 in. 40 lbs/ft. Liner Size : - in., - lbs/ft. from - ft
Before test : Caliper Yes ☐ No ☒ Scraper Yes ☒ No ☐ Circulation Yes ☒ for 2 hrs; No ☐

MUD DATA

Mud Type : BARACARB BRINE Weight : 1.32 S G
Viscosity : 50 Water Loss 12 cc Mud Resistivity - at - °F
Filtrate Resistivity : - at - °F ; Chloride ppm : 111,000

INSTRUMENT AND CHART DATA

Recorder No.		J 1629	J 1630	J 1782	
Capacity (psig)		2300	2800	4700	
Depth		799.63 M	813.04 M	814.84 M	
Inside/Outside		INSIDE	OUTSIDE	INSIDE	
Above/Below valve		BELOW	BELOW	BELOW	
Clock No.		9-1437	9-3813	9-3823	
Capacity (hrs.)		48 HRS	48 HRS	48 HRS	
Temperature		126 DEG F	126 DEG F	126 DEG F	
Initial Hydrostatic Pressure		1468	1533	1526	
Pre-flow	(1) Start Pressure	983	1155	1172	
	(2) Finish Pressure	1194	1214	1199	
Initial Shut-in Pressure		1195	1232	1231	
Second Flow	(1) Start Pressure	1144	1186	1197	
	(2) Finish Pressure	1190	1229	1218	
Second Shut-in Pressure		1208	1244	1235	
Final Flow	(1) Start Pressure				
	(2) Finish Pressure				
Final Shut-in Pressure					
Final Hydrostatic Pressure		1457	1516	1516	

OPERATIONS SUMMARY

Left Station at 10 : 55 on 9.1.82 On Location at 13 : 00 on 10.1.82
Started Operations at 05 : 00 on 18.1.82 Finished Operations at 03 : 00 on 19.1.82
Off Location at : on Return Station at : on Mileage

Comments : TOOLS AND TEST NORMAL OPERATION.
SAMPLE CHAMBER RETURNED TO PERTH UN-DRAINED.

Station : AUS SIR No. : 62006 Date : 18.1.82
Customer Tester J PARTRIDGE Customer B MCELHENNY
Purchase Order Representative

Report No. F 82012

Customer : HUDBAY OIL **Well No :** SPERM WHALE 1 **Test No.** 3

TEST SEQUENCE AND FLOW RATE DATA

Description and Flow Rates	Date	Time hrs	Time mins	Pressure psig	Surface Choke
Packer Depth : 803.56 M ~~MK~~ Set at :	18.1.82	13	04	–	–
Opened Tool : (Annulus pressure 1400 psi)	"	13	27	–	–
STRONG BLOW IMMEDIATELY. DIESEL CUSHION RUN TO WELL HEAD.					
DIESEL TO SURFACE	"	13	28		
		13	29	250	½
		13	30	260	½
		13	31	200	½
		13	33	400	½
SHUT-IN TOOL	"	13	34	–	–
OPENED TOOL, ANNULUS PRESSURE 1400 PSI	"	14	05	–	–
		14	06	300	½
		14	07	760	½
		14	08	960	½
		14	09	1000	½
		14	19	900	½
H_2S AT 200 PPM		14	25	840	½
H_2S AT 200 ppm		15	31		
SHUT-IN TOOL	"	15	46	–	–
Reverse Circulation Started (Pump pressure 500 psig)	18.1.82	18	16	–	–
Reverse Circulation Finished	"	18	45	–	–
Pulled Packer Loose/Pulled Out of Retainer	"	18	46	–	–

Cushion Type : DIESEL Amount – bbls ; Length TO WELL HEAD ft ; Pressure 914 psi Bottom Choke 1"

RECOVERY DATA

	Recovery Description	Feet	Bbls	% Oil	% Water	% Other
1						
2						
3						
4						
5						
6						

	Oil-API Gravity	Gas Gravity	G.O.R.	Resistivity	Chlorides
1	° at °F			at °F	ppm
2	° at °F			at °F	ppm
3	° at °F			at °F	ppm
4	° at °F			at °F	ppm
5	° at °F			at °F	ppm
6	° at °F			at °F	ppm

Comments : _____

Equipment Data

Report No. F 82012

Customer : HUDBAY OIL	Well No. : SPERM WHALE 1	Test No. : 3

SAMPLE CHAMBER RECOVERY DATA

Sampler Drained On Location ☐ Elsewhere ☒ RETURNED TO DS OFFICE PERTH FOR DRAINING Name : _____ Address : 8 KINGSCOLE ST KENDALE	Recovery Gas _____ cu ft. Oil _____ c.c. Water _____ c.c. Mud _____ c.c. _____ °API _____ °F	Resistivity / Chlorides (ppm) Water _____ at _____ °F _____ Mud _____ at _____ °F _____ Mud Filtrate _____ at _____ °F _____ Pit Mud _____ at _____ °F _____ Pit Mud Filtrate _____ at _____ °F _____

Gas/Oil Ratio _____ cu ft./bbl Sample Chamber Pressure _____ psi.

EQUIPMENT SEQUENCE

Components (including D.P. and D.C.)	Type	O.D. (in)	I.D. (in)	Length	Depth
BULL NOSE		4¾	2¼	0.25	815.09
RECORDER CARRIER J 1782	JOTCO	4-7/8	1½	1.80	814.84
RECORDER CARRIER J 1630	"	"	1½	1.80	813.04
PERFORATED ANCHOR	"	4¾	2¼	6.10	811.24
X/O 3½ EUE BOX / 3½ FH PIN (1)	-	"	2-5/16	0.63	805.11
9-5/8 POSITEST PACKER	JOTCO	9-5/8	3	0.95	803.56
		40 lb/FT		0.66	
X/O 3½ EUE PIN / 3½ FH BOX (2)	-	4¾	2-5/16	0.32	802.90
SAFETY JOINT	BOWEN	4-5/8	2-7/16	0.60	802.58
TR 63 HYDRAULIC JARS	JOTCO	4-7/8	1½	2.35	801.98
RECORDER CARRIER J 1629	"	"	"	1.80	799.63
MFE/HRT	"	5	1-3/8	2.90	797.83
PCT	"	4¾	1	4.66	794.93
SPRO CONVERSION	"	"	2¼	2.69	790.27
X/O 4" IF BOX / 3½ FH PIN (3)	-	6	2-7/8	0.32	787.58
3 STDS 6½ DC		6½	"	81.59	787.26
X/O 4" IF PIN / 3½ IF PIN (4)	-	6¼	2-11/16	0.36	705.67
2 SLIP JOINTS	JOTCO	5	2¼	15.84	705.31
1 STD 4¾ D C		4¾		28.29	689.47
2 PUMP OUT SUBS	JOTCO	"		0.72	661.18
X/O 3½ IF PIN / 3½ PHG BOX	-			0.21	660.46
3½ PHG TUBING 12.9 LB/FT				599.28	660.25
X/O 4½ ACME PIN / 3½ PHG BOX	-			0.20	60.97
FLUTED HANGER	FLOPETROL			0.27	60.77
SLICK JOINT	"			1.80	60.50
E- 2 TREE	"			2.44	58.70
SAVER SUB	"			0.25	56.26
X/O 4½ ACME PIN / 4½ IF BOX	"			0.33	56.01
5" H.W.D.P.				61.05	55.68
X/O 6½ ACME PIN / 4½ IF PIN	-			0.32	- 5.37
FLOW HEAD	-				- 5.69
TOTAL TUBING				599.28	
Total Drill Pipe				61.05	
Total Drill Collar				109.88	

Comments : _____

DOWELL Schlumberger

Formation Evaluation Data

To be completed by Customer Representative

Report No. F 82012

Customer : HUDBAY OIL **Well No. :** SPERM WHALE 1 **Test No. :** 3

Tested Interval	Sand-stone	Lime-stone	Chalk	Clay	Shale	Other (please specify)
Major Mineral Species						
Minor Mineral Species						
Stringers or Lenses						

Is the tested interval : Open Hole : ☐ I.D. ____ in

In Casing : ☐ O.D. ____ in. Wt : ____ lb./ft. I.D. ____ in.

Open Hole Interval : (Total Depth) _____ (Foot of Casing) _____

Perforated Intervals : _____ _____ _____

_____ _____ _____ _____

In the tested interval how many productive zones do logs show :

1 ☐ 2 ☐ 3 ☐ more ☐

What is the average porosity of the interval ? ☐ %

Is the interval homogeneous ? Yes ☐ No ☐

Is formation consolidation : Good ☐ Mod ☐ Low ☐

What is the clay content : % or High ☐ Mod ☐ Low ☐

Is the formation fractured Heavily ☐ Mod ☐ Little ☐

In this interval, is there expected near the wellbore :

Geological fault ? Yes ☐ No ☐

Interval thickness change ? Yes ☐ No ☐

Fluid phase contact ? Yes ☐ No ☐

—If yes :— Oil-Water ☐ Gas-Water ☐ Oil-Gas ☐

During drilling of the interval, was there :

Lost circulation ? Yes ☐ No ☐

Sand production ? Yes ☐ No ☐

Other (please specify) _____

Before testing was there a :

Scraper run ? Yes ☐ No ☐

Caliper run ? Yes ☐ No ☐

Mud circulation to bottom ? Yes ☐ No ☐

—If yes :— for how long ☐ If no, how long since ☐

Additional Comments : _____

Customer Representative : _____

SYMBOLS USED

ΔT – INCREMENT OF TIME (MINUTES)

$\frac{T + \Delta T}{\Delta T}$ – DIMENSIONLESS TIME CONSTANT USED FOR THE HORNER PLOT

ΔT IS THE INCREMENT OF SHUT-IN TIME (MINUTES)

T IS TOTAL FLOW TIME PRECEDING SHUT-IN (MINUTES)

LOG – LOGARITHM TO BASE 10 OF $\frac{T + \Delta T}{\Delta T}$

Pw – Pf – PRESSURE BUILD-UP ABOVE FINAL FLOWING PRESSURE PRECEDING THE BUILD UP WHICH IS USED FOR THE MCKINLEY PLOT.

APPENDIX D4

POSITIONING

REPORT

SPERM WHALE-1

RIG POSITIONING REPORT

Submitted By: K.H. Sit,
SENIOR GEOPHYSICIST

Supervised By: A.J. Ferworn,
CHIEF GEOPHYSICIST

February, 1982

INTRODUCTION

The Sperm Whale-1 positioning survey was conducted between 21st and 26th December, 1981.

The survey consisted of:-

1. Setting up the Trisponder Survey net.
2. Checking the survey systems.
3. Positioning and setting the anchor buoys.
4. Determining the final rig position.

Decca Survey (Australia) Ltd. supplied both personnel and survey equipment.

The equipment used to conduct the survey consisted of:-

1. Two Trisponder Receivers.
2. One JMR-4 Satellite Receiver.
3. Four onshore Trisponder base stations.

The Trisponder was the primary navigation system used to position the rig with the Satellite navigation system as an independent check and a 100% backup.

A HOAL Geophysicist was on board to supervise the survey.

An independent report will be submitted by Decca Survey.

ANCHOR PATTERN AND BUOYS

Using the given bow heading of 230°, anchor line bearings, and anchor cable and chain length of 557 metres, its positions of the anchor buoys were determined geometrically.

The following table lists the positions:

Anchor Buoy No.	Bearing	Easting	Northing
1	260	619069	5786803
2	290	619094	5787091
3	350	619068	5787523
4	20	619896	5787497
5	80	620254	5787071
6	110	620228	5786784
7	170	619714	5786355
8	200	619427	5786377
Bow Heading	230°		

The anchor buoys consisted of a 51 mm pipe approximately 5.5 metres long with a Norwegian buoy at the centre. A 0.6 metre section of chain was attached to the bottom and a colourpennant was attached to the top. They were anchored by two 1 metre steel rails weighing approximately 112 kg (180 kg for the Moonpool buoy). Three concrete cylinders were also attached to the base of each buoy to keep the pipe vertical. 60 metres of rope were used at each anchor to allow a maximum swing of approximately 26 metres.

SURVEY NET VERIFICATION AND SURVEY CHECKS

The seabed topographic features on line GB81-40 were run on Monday 21st, December 1981 at 0900 hours to verify the survey net to make sure that the survey net used to position the rig matched that used in the seismic recording. The attempt to re-occupy the line proved to be very satisfactory.

The anchor buoys were layed at the Sperm Whale-1 location on Tuesday 22nd December, 1981 between the hourse 0910 and 1020. The co-ordinates of the buoys were checked soon after the last buoy was down between 1025 and 1050 the same day. All buoys were within 20 metres of their proposed locations.

On Thursday 24th December, 1981 the buoys were checked again between the hours 0817 and 0840. All buoys were found to be within 20 metres of their proposed locations.

PROPOSED LOCATION

The proposed location for Sperm Whale-1 was shotpoint 130, Line GB81-26.

The co-ordinates for the position were:-

Latitude	038°	03'	26.21" S
Longitude	148°	21'	50.23" E

UTM Co-ordinates from Central Meridian 147°

0619661 metres east
5786937 metres north

The following base stations were used for the survey:-

	Easting	Northing
Mt. Cann	674471.0	5831344.0
Raymond	640921.4	5824777.0
Jemmys	584670.0	5806793.0
Nowa Nowa	596071.5	5827552.2

The distances to the proposed Sperm Whale-1 well from the Base stations were:-

Mt. Cann	70556	metres
Raymond	43414	metres
Jemmys	40243	metres
Nowa Nowa	46984	metres

FINAL POSITIONING

The 'Petromar North Sea' departed the 'Whale' location at 0440 hours, Friday 25th December, 1981. It arrived on 'Sperm Whale' location at 0530 and the first anchor, No.5 was dropped at 0558, last anchor down at 1630. Trisponder signals were extremely good throughout.

At 2200 tensioning up was completed. The preliminary position of the 'Sperm Whale-1' well, as follows:-

Latitude	:	038^{o} 03' 26.09"
Longitude	:	148^{o} 21' 51.57"

UTM Co-ordinates from 147^{o} Central Meridian:

Northing	:	5786940 metres
Easting	:	0619694 metres

The stern is 33 metres at a bearing of 85^{o} from the proposed location.

FINAL POSITION

The final position of the 'Sperm Whale-1' well is:-

Latitude	038°	03'	25.863"
Longitude	148°	21'	51.644"

UTM Co-ordinates from the 147° Central Meridian:-

Northing	5786947	metres
Easting	619696	metres

The stern is 36 metres at a bearing of 74° from the proposed location.

Final distances to the 'Sperm Whale-1' well from base stations are:-

Mt. Cann	70487	metres
Raymond	43356	metres
Jemmys	40276	metres
Mt. Nowa Nowa	46987	metres

The JMR-4 Satellite Doppler observations were taken on board the rig to have independent checking on Sperm Whale-1 location established by the Trisponder observations. The Satellite gave the 'Sperm Whale-1' location after 4 passes is:

Latitude	038°	03'	25.450"
Longitude	148°	21'	51.565"

DAILY LOG

Sunday 20th December, 1981

2300 hrs.	H. Sit departed Perth.

Monday 21st December, 1981

0515 est.	Arrived Melbourne airport.
0640 hrs.	Arrived at Bairnsdale.
0710 hrs.	Arrived on rig "Petromar North Sea"
0900 hrs.	Checking Fathometer on line GB81-40.

Tuesday 22nd December, 1981

0900 hrs.	Arrived on Sperm Whale-1 location.
0910 hrs.	Moonpool buoy down.
1020 hrs.	Last buoy down.
1025 hrs.	Checking Moonpool buoy and eight anchor buoys position.
1050 hrs.	Finished first check, all within 20 metres of their proposed locations.

Wednesday 23rd December, 1981

	Anchored within markers buoy pattern.

Thursday 24th December, 1981

0820 hrs.	Rechecked buoy locations (all within 20 metres of proposed locations)

Friday 25th December, 1981

0440 hrs.	'Petromar North Sea' left 'Whale-1' for 'Sperm Whale-1'
0530 hrs.	Arrived on 'Sperm Whale-1' location.
0558 hrs.	First anchor (no.5) dropped.
1630 hrs.	Last anchor (no.2) dropped.
1900 hrs.	Phoned Al Ferworn, Perth, rig location accepted.
2200 hrs.	Commenced tensioning up anchors.

Saturday 26th December, 1981

0330 hrs.	Well spudded in.
1330 hrs.	H. Sit departed rig by helicopter for Bairnsdale.
1350 hrs.	Arrived Bairnsdale.
1410 hrs.	Driving to Melbourne.
1740 hrs.	Arrived Melbourne airport.
2000 hrs.	Departed Melbourne.
2030 (Perth time)	Arrived Perth.

3. GEOLOGY

(Pages 20 - 37)

3. GEOLOGY

3.1 Summary of Previous Investigations

Gippsland Basin exploration commenced in 1924 with the reported discovery of oil and gas in a water bore drilled onshore near Lakes Entrance. To date, over 125 wells have been drilled in the onshore part of the basin but only minor hydrocarbon accumulations have been encountered.

Initial exploration in the offshore Gippsland Basin was conducted by the Bureau of Mineral Resources when they undertook a regional gravity and aeromagnetic survey between 1951 and 1956. The first permits, covering a large part of the offshore Gippsland Basin, were taken up by BHP Co. Ltd. (later Hematite Petroleum Pty. Ltd.) in 1960. Esso joined the original permittee in 1964 and the first offshore well, Barracouta No.1, was drilled in 1965. Over eighty offshore wells have now been drilled in the basin resulting in the discovery of recoverable reserves approximately 3 billion barrels (0.466×10^{12} m^3) of oil and 8 trillion cubic feet (220.4×10^{12} m^3) of gas.

A summary of early contributions to the understanding of the geology and hydrocarbon potential of the Gippsland Basin was presented by W.F. Threlfall and others in 1974. Esso-BHP have published several papers on basinal stratigraphy and geological evolution during their exploration and development of the basin, and papers dealing with the geology of individual fields have been published as the fields were developed.

Exploration Permit Vic/P-11 consists of 51 blocks which previously formed parts of the Exploration Permits Vic/P-1 and Vic/P-8, held by Esso-BHP and a consortium headed by BOC Australia respectively. The area now covered by Vic/P-11 was gazetted in December 1976. The permit was granted to Gas and Fuel Corporation of Victoria on August 8, 1978, and Beach Petroleum subsequently became joint Permittee and Operator.

Hudbay Oil (Australia) Ltd. farmed into the Permit in December, 1980, and in February 1981 shot the GB81 Seismic Survey, consisting of 359 line kilometres of 36-fold seismic survey. Detailed mapping, incorporating data from the GB81 survey, Beach Petroleum's GB79 Seismic Survey and trade data from Esso's G80A Seismic Survey, defined five drillable prospects. Sperm Whale-1 was the fourth and final well of a four exploration well programme.

3.2 Geological Setting

3.2.1 Regional Setting

The Sperm Whale structure lies towards the northern margin of the Gippsland Basin, which is situated in south-eastern Australia and is bounded to the north and south by the Victorian Highlands and Bassian Rise respectively (Enclosure E2). The western limit of the basin is taken as the Mornington Peninsula and to the east the basin opens to the Tasman Sea. The Gippsland Basin covers approximately 50,000 km^2 and is filled with up to 10,000 metres of Lower Cretaceous to Recent sediments.

3.2.2 Tectonic Elements (Enclosure E2)

The offshore Gippsland Basin is separated by fault complexes into three major divisions: The North Platform, or Lakes Entrance Platform; the graben-like Central Deep or Strzelecki Basin; and the South Platform (Hocking & Taylor, 1964; James and Evans, 1971; Hocking, 1972).

The stable platforms to the north and south are areas where the Tertiary sequence unconformably overlies Palaeozoic basement. In these areas the structures within the Tertiary section consist simply of small-scale drapes over palaeo-topographic ridges and small fault scarps.

The Southern Platform is separated from the Central Deep Basin by a major fault complex, the South Bounding Fault. This is an offshore extension of the Foster Fault System and consists of a system of down-to-basin normal faults arranged en echelon. The northern boundary of the Central Deep is less well defined.

Major fault trends within the central part of the basin are offshore extensions of the southeast-northeast trending Foster Fault and the antithetic, east-west trending Rosedale Fault System. The latter is known to be a reverse fault superimposed upon an older normal fault within the Lower Cretaceous, and to have a throw of up to 160 metres in the West Seahorse area. Reverse movement along the fault system is believed to have occurred as a result of the same stresses

that led to the development of the major anticlines in the central basin during the Upper Eocene to Lower Oligocene. Numerous northwest-southeast, basin-forming normal faults have been recognized within the Central Deep.

The major hydrocarbon-bearing anticline structures in the central basin are elongate, with a dominant southwest-northeast axial trend. They were formed by right-lateral, convergent shearing brought about by the movement of continental plates, as will be discussed in Section 3.2.3. The main hydrocarbon traps in the Vic/P-11 Permit were formed as a result of the same shearing stress, resulting in arching associated with reverse movement superimposed upon older normal faults.

3.2.3 Geological Evolution and Regional Stratigraphy (Figure 11)

During the Lower to Middle Palaeozoic a series of major orogenies occurred within the Tasman Geosyncline. This resulted in a dominantly north-south structural grain within the tightly folded and faulted Palaeozoic metamorphics. These geosynclinal sediments were subsequently intruded by Lower Devonian granitic rocks. A major rift formed across southern Australia during the Jurassic due to the operation of the Antarctic and Australian cratons. The rift valley formed over the entire length of the present southern coast of Australia. Into this major depositional axis a typical sequence of rift valley sediments was rapidly deposited, as clastics were stripped from the adjacent Palaeozoic highlands. The initial deposits of the Upper Jurassic to Lower Neocomian consists of conglomeratic wedges and alluvial fan detritus, commonly of a quartzose sandstone nature. Jurassic intrusives and Lower Cretaceous extrusives, both associated with rifting, provided a major provenance for the 3,500 metres of Lower Cretaceous Strzelecki Group sediments.

During Lower Cretaceous times, the Gippsland Basin formed a half graben with the major subsidence along the southern Foster Fault system. The Strzelecki Group sediments are texturally mature but mineralogically immature, being felspathic and chloritic. They consist of a monotonous,

cyclic sequence of interbedded sands, silts and muds deposited on a subsiding fluvial plain. A large east-west rift developed, separating sediments of the Tasman Geosyncline. The eastern end of this rift is believed to have terminated in a triple junction formed by the Australian, Antarctic and Lord Howe Rise plates. The western arm of the triple junction was coincident with the ancestral Otway and Gippsland Basins and, as this arm of the triple junction failed during the Turonian, the Lord Howe Rise plate moved eastwards away from the Australian-Antarctic plate. This resulted in the rifting of the eastern portion of the Antarctic and Australian plates along a line parallel to, and off the west coast of, Tasmania. Therefore the Tasmanian craton remained attached to the Australian plate but was separated from it by an east-west, aborted, rift valley basin.

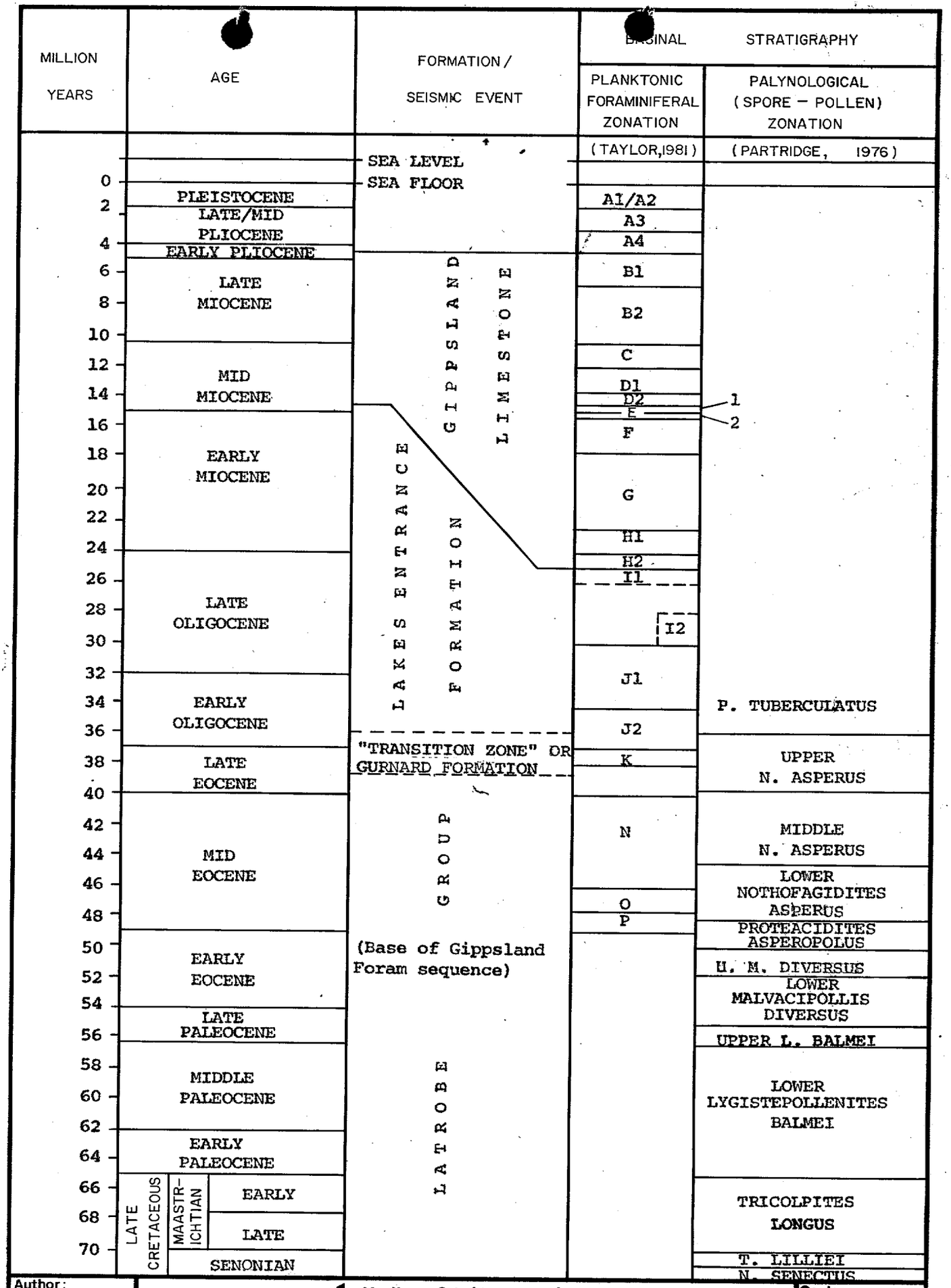
The Lower Cretaceous Strzelecki Group sediments are unconformably overlain by up to 5,000 metres of fluviatile and lacustrine Latrobe Group sediments. Upper Cretaceous sedimentation tended to be superimposed on the underlying Strzelecki Group with the deposition of shales, minor coals and poorly sorted sandstones in a fluviatile environment. In the Upper Senonian, approximately 85 million years B.P., the Lord Howe Rise Plate moved away, resulting in the deposition of a complex system of fluvial and deltaic plain sediments sourced from the northwest and north. Growth and movement on the basin-forming normal faults resulting in continued subsidence of the basin during the Palaeocene and Eocene.

The northern part of the basin was uplifted as fault movement elsewhere in the basin lessened during the Eocene. A period of submarine and subaerial channel-cutting occurred during the Middle to Upper Eocene in the Tuna-Flounder area. The channel-cutting preceded the onset of a marine transgression from the southeast during the uppermost Eocene to Lower Oligocene, a period of instability and basin tilting. The en echelon disposition of the fold trends and fault systems is most likely the result of Upper Eocene east-west, right lateral, convergent shear deformation. The crestal areas of the folds were subsequently eroded during an associated

period of relative sea level drop, while the deeper parts of the basin continued to receive sediments. The compressional regime reactivated the severe channeling and the Marlin Channel was formed as subaerial and submarine drainage systems were laterally restricted.

The transgression continued into the Lower Oligocene with the deposition of the shallow water glauconitic sands and silts of the Gurnard Formation. Around the margins of the basin, sand buildups occurred as the transgression reached its maximum extent. During the uppermost Eocene to Lower Oligocene, a marked change in sediment type occurred: the fluvial and deltaic coarse grained clastics were replaced by fine grained, calcareous shales and marls. The change in sediment type may be due, in part, to a change in provenance related to the widespread deposition onshore of volcanics during the Upper Eocene wrenching episode.

Sea level fluctuations during the Miocene produced a complex system of interfingering and overlapping channels, which cut into the soft limestones and marls of the Lakes Entrance Formation and Gippsland Limestone. A linear, submarine slump zone of over 125 kilometres in length has been observed along the major south-bounding fault system. A wedge of sediment moved towards the centre of the basin as a result of reactivation of this fault system during the Miocene, and a major cratonic uplift, the Kosciusko Uplift, was initiated in the Miocene and culminated during the Upper Pliocene and Lower Pleistocene. The Victorian Highlands were uplifted and provided a renewed clastic provenance, while faults and associated structures around the northern margins of the basin were rejuvenated. Extensive erosion is currently occurring in the Strzelecki Hills and a relatively thin veneer of Quarternary sediments is being deposited across the southeastern Gippsland coastal plain.



Author: B. Butcher
Drawn: A. Clark
Date: April 1982

Hudbay Oil (Australia) Ltd.

OFFSHORE GIPPSLAND BASIN

REGIONAL STATIGRAPHIC COLUMN

Scale:

Drawing No A4-GL-490

Figure 11

3.3 Stratigraphy

A sedimentary section ranging from Lower Cretaceous to Recent was penetrated in the Sperm Whale No.1 well (Figure 12).

Age determinations are based on the Palaeontological and Palynological studies of sidewall cores (Appendix G1 and G2). The age boundaries were selected with reference to this and other data, including lithology data from drilling cuttings and sidewall cores, and wireline log interpretations. Time divisions were placed midway between sidewall core points unless more accurate subdivisions were possible from log response or cuttings lithology.

Due to the standard drilling practice of by-passing the shakers until the installation of the 20" casing, no samples were recovered above 196 metres.

Lower Cretaceous (1417 - 947 metres)

The Strzelecki Group is represented by a monotonous sequence of arenaceous claystones and argillaceous sandstones, interbedded with cleaner sands and clays. Accessories within the sandstones include lithic fragments and silica cement. High resistivity peaks indicate silicified bands throughout the interval. Precise subdivisions within the Lower Cretaceous period are not possible but the evidence of Coptospora paradoxa suggests an Albian age above 1253 metres. An unconformity is placed at 947 metres based on the character changes of the Gamma Ray and Denisty Logs.

Palaeocene to Eocene (Undifferentiated) (947 - 805 metres)

Precise age datings over this interval have not been possible due to unfavourable lithologies and the poor diversity of spore/pollen assemblages. Lower Eocene and Palaeocene ages are inferred from the existence of M.diversus and L.balmei assemblages respectively. This evidence also confirms the presence of non-marine Latrobe Group sediments throughout the interval. There is palaeontological evidence to suggest a transitional environment at the top and directly overlying the Latrobe Group.

It is therefore possible to have Middle to Upper Eocene rocks within the Latrobe Group. Sidewall cores taken below 851 metres were considered barren of spore/pollen assemblages so Upper Cretaceous age sediments may well be present below 851 metres.

Lithologically this sequence consists of non-marine sandstones, claystones and thin coals. The sandstone units are often greater than 50 metres thick and have excellent porosities and permeabilities. The coal seams are generally less than 1 metre thick.

Late Eocene (805-800 Metres)

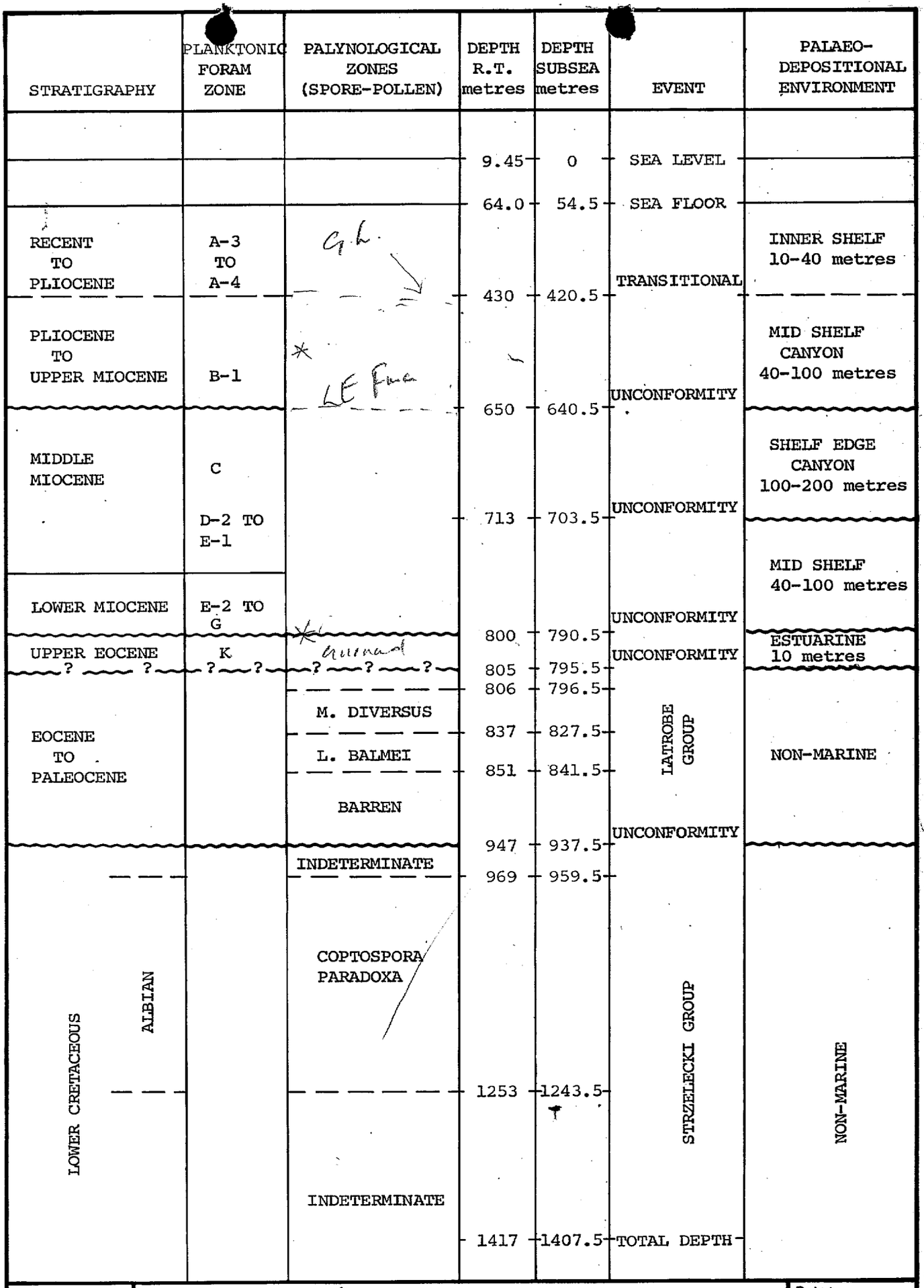
Planktonic foraminifera of zone k were described in a sidewall core at 803.9 metres hence a late Eocene age is given for this interval. Glauconitic calcarenites and calcisiltites typify this section, which was deposited in an estuarine environment. The top of this unit is marked by an unconformity as rocks of Oligocene age are absent in this well.

Lower to Middle Miocene (800-713 Metres)

This interval consists of calcilutites and calcisiltites which are recrystallized, wholly or in part, and are glauconitic at the base. Rapid transgression occurred during the Lower Miocene and a mid shelf environment dominated the Middle Miocene, with water depths of 40-100 metres.

Latest Middle Miocene (713-650 Metres)

Calcareous claystones and minor calcilutite characterize a shelf-slope environment, (approximately 200 metres water depth), over this interval. Unconformities are interpreted from palaeontological study, at the top and bottom of this section.



Author: M.Battrick	Hudbay Oil (Australia) Ltd.		Date: February, 1983
Drawn by: P. Murrowood	SPERM WHALE – 1		Drawing Nº A4-GL-690
	STRATIGRAPHIC TABLE		

Figure 12

PE904240

This is an enclosure indicator page.
The enclosure PE904240 is enclosed within the container PE902673 at this location in this document.

The enclosure PE904240 has the following characteristics:

ITEM_BARCODE	= PE904240
CONTAINER_BARCODE	= PE902673
NAME	= Predicted v Actual Section
BASIN	= GIPPSLAND
PERMIT	= VIC/P11
TYPE	= WELL
SUBTYPE	= STRAT_COLUMN
DESCRIPTION	= Predicted v Actual Stratigraphic Section for Sperm Whale-1
REMARKS	=
DATE_CREATED	= 31/05/82
DATE_RECEIVED	= 14/04/83
W_NO	= W762
WELL_NAME	= SPERM WHALE-1
CONTRACTOR	=
CLIENT_OP_CO	= HUDBAY OIL (AUSTRALIA) LIMITED

(Inserted by DNRE - Vic Govt Mines Dept)

Upper Miocene (650-450 Metres)

The Upper Miocene section is represented by calcilutite/calcisiltite with rare dolomitization. The carbonates are replaced by calcareous claystones below 630 metres. This interval was interpreted as an outer shelf-canyon environment with water depths of 100-200 metres. A minor period of inner shelf deposition occurs at the top.

Upper Miocene to Pliocene (450-200 Metres)

A coarsening upward carbonate sequence occurs over this interval with calcilutites grading through calcisiltites to skeletal calcarenites. Minor claystones and marls are evident below 400 metres. Faunal types include bryozoans, pelecypods, ostracods, echinoids and forams. The sequence was deposited in an inner shelf-canyon head environment, during a regressive phase, with water depths from 100 metres to less than 40 metres at the top.

3.4 Structure

The Sperm Whale No.1 well was drilled to the south of a major east-west, high angle reverse fault, upthrown to the south. The fault is part of a pre-existing, normal fault trend (Enclosure E2). Closure was formed by arching into the fault which resulted from reverse movement, associated with wrenching along the fault trend.

The regional fault trend formed during the Upper Jurassic to Lower Cretaceous times, with minor growth along the faults continuing through the Upper Cretaceous to the Lower Oligocene. Reverse movement occurred between Lower Oligocene and Upper Eocene times with associated wrenching, tilting and sub-aerial exposure. Within the Sperm Whale/Whale area continued movement occurred into the Lower Miocene. The Sperm Whale structure is an east-north-east trending, asymmetric anticline, covering approximately 3.75 km^2. Closure was mapped at two horizons, designated "Top Latrobe" and "Top Strzelecki".

A high resolution dipmeter log was run from 1415-709 metres and interpretation of the data was enhanced by the use of Cyberdip and Geodip. Geodip was run from 975-775 metres, with a structural dip component of 11^o to the NE removed. The dipmeter data can be subdivided into several intervals based on magnitude and orientation of recorded dips, viz:

Above 775 m	:	Dips are very low, $0\text{-}10^o$; generally north-north-easterly.
775 - 780 m	:	$23\text{-}31^o$; north-easterly.
780 - 790 m	:	No apparent dips.
790 - 800 m	:	Generally $16\text{-}25^o$ to the south-east, with 35^o to the north-west at 793 m.
800 - 810 m	:	$7\text{-}26^o$; random orientation.
810 - 814 m	:	No apparent dips.
814 - 818 m	:	$9\text{-}13^o$; easterly.

818 - 950 m	:	10-20^{o} to the north-east with random dips from 7-40^{o}; generally east to north-east.
950 - 1415 m	:	Generally 10-30^{o} from east-south-east to south-east.

3.5 Predicted and Actual Depth to Seismic Markers

The depths to the main seismic events recognized in Sperm Whale No.1 are listed in the following table. Further details can be found in Enclosures E3 and E4, and Figure 13.

Horizon Identification - Sperm Whale No.1

Location: Line GB81-26 Shot Point 130

Horizon	Predicted Depth*	Actual Depth*	Recorded 2-way Time (sec)
Sea Floor	-56 m	-54.53 m	0.072
Top Latrobe	-790 m	-795 m	0.741
Top Strzelecki	-915 m	-937 m	0.849
Total Depth	-1400 m	-1407 m	1.170

* Note: Depths quoted in this table are subsea.
R.T. depth is +9.45 m.

3.6 Porosities and Permeabilities

Porosities for Sperm Whale No. 1 have been estimated from wireline log interpretations and microscopic examination. A more detailed discussion of the porous zones can be found in the Wireline Log Interpretation section of this report (Appendix G3).

Sandstone layers in the uppermost section of the Latrobe Group sediments, 805-830 metres, have average sonic-derived porosities of 28.5%. Sandstones obtained in sidewall cores over this interval exhibited excellent porosities. The clay fraction noted in the descriptions may be related to invasion by filtrate.

Several zones between 830-845.5 metres showed porosities of 20-28% with 28% recorded between 831.5-833.5 metres. The remaining Latrobe Group section between 845-947 metres had interpreted porosities from 12-25%, with the values decreasing with depth. The decrease in porosity is due largely to an increase in clay and cementation by silica and carbonate. Within the Strzelecki Group, below 947 metres, clay minerals and silica cement fill pore spaces, reducing porosities even further.

Based on data obtained from D.S.T.'s over the interval 819-848 metres, formation permeabilities were considered very high.

3.7 Hydrocarbon Indications

3.7.1 Summary

Wireline log interpretations from Sperm Whale No.1 indicated a gross hydrocarbon column from 805-845.5 metres. Subsequent testing confirmed the presence of a clean gas-oil contact at 831.5 metres; an oil zone from 831.5-833.5 metres, and a transitional oil-water zone below 833.5 metres.

DST No.1 (b) recovered 17 barrels of formation water with a trace of oil over the interval 839-848 metres. DST No.2 flowed gas at rates up to 4 MMcf/d on a half inch choke over the interval 832-834 metres. The test is not considered representative due to the failure of the annulus and subsequent gas flow into the oil zone. This test also recovered 500 ml of oil. DST No.3, in the gas zone, flowed gas at rates up to 5.4 MMcf/d on a half inch choke over the interval 819-828 metres. Refer to Appendix G4 for compositional analyses of gas and oil samples recovered.

3.7.2 During Drilling

Continuous Gas Monitoring

A continuous record of gas levels in the drilling mud was maintained by Exploration Logging Inc., using a total gas analyser and a gas chromatograph. Monitoring commenced at 208 metres in the 17-1/2 inch hole, continuing to the total depth at 1417 metres.

Table 1 on the following page, summarizes the gas readings.

Fluorescence from Drill Cuttings

Examination of the drill cuttings showed only a trace of sample fluorescence between 845 and 860 metres. This was described as being pinpricks of bright yellow colour which exhibited slow, pale, white solvent fluorescence. Blocked jets in the bit and the subsequent trip may have flushed or diluted any liquid hydrocarbons present in cuttings above this interval. A minor trace of dull yellow-gold fluorescence was described at 795 metres. Traces of mineral fluorescence were encountered in the deeper sections of the hole.

TABLE 1

RANGE OF GAS READINGS

DEPTH (m)	TOTAL GAS	PET. VAP.	C_1	C_2	C_3	iC_4	nC_4	C_5
208-445	0-Tr	0	0-30	0-3	0	0	0	0
445-790	Tr-12	0-Tr	10-937	0-30	0-7	0	0	0
790-805	12-88	Tr-3	1562-12387	56-225	Tr-45	0-40	0-12	0-15
805-830	12-500+	1-14	4129-25110+	105-2250	11-226	10-273	6-60	0-60
830-900	1-8	Tr	68-803	0-7	0	0	0	0
900-950	1-13	0-2	218-1836	0-7	0	0	0	0
950-1100	0-2	0	65-294	0	0	0	0	0
1100-1417 T.D.	1/2-6	0-Tr	65-1320	0-10	0	0	0	0

Notes: 1) "Petroleum Vapours" includes C_2 and higher hydrocarbons.
2) Total Gas and Petroleum Vapours are given in units, where 1 unit = 200 ppm (methane equivalent).
3) C_1 - C_5 are given in ppm.

Oil Staining/Free Oil

No oil staining or free oil were observed in the cuttings or in the mud pits.

3.7.3 Sidewall Cores and Conventional Cores

Bright lemon-white sample fluorescence was observed in the sidewall core at 833 metres. This covered 50-70% of the freshly cut surface of the core and showed instant streaming and blooming blue-white solvent fluorescence. A dull yellow solvent "cut" was also described.

Traces of slow blooming lemon to milky-white solvent fluorescence were described in sidewall cores between 812 and 825 metres, at 859 metres, and at 948 metres, with little or no sample fluorescence.

For further details, refer to the sidewall core descriptions in Appendix G5.

3.7.4 Further Indications

Section 2.5 of this report summarizes the DST results. The RFT Programme is summarized in Section 4.3.2 and discussed further in Appendix G3.

3.8 Contributions to Geological Knowledge

1. Based on palaeontological data, the Sperm Whale No.1 well penetrated a thick marine sequence of Miocene to Pliocene age, underlain by a thin layer of Eocene sediments. The absence of Oligocene sediments in this section is contrary to that found in nearby wells (Appendix G1).

2. The well intersected 142 metres of non-marine Latrobe Group sediments, the top of which was encountered within 10 metres of the predicted depth. This section is downdip and 8.5 kilometres from the Baleen-Flathead-Whale trend, where no Latrobe Group sediments were identified. The zero edge must therefore lie somewhere between these two areas.

3. The Sperm Whale No.1 well confirmed the presence of excellent reservoir rocks within the Latrobe Group. Formation porosities averaged 28% between 805-830 metres and decreased to 12% at 947 metres.

4. Movable hydrocarbons were discovered within the zone 805-845 metres. Gas flowed at rates up to 5.4 MMcf/d during production tests. A thin oil leg between 831.5-833.5 metres was indicated on wireline logs. This was confirmed by the RFT programme with a 22.5 litre sample of oil recovered at 832 metres.

5. Although porosities are high throughout the interval 833.5-845 metres, both the log interpretation and the RFT results indicate the strong possibility of a transitionary zone below the oil leg. Both oil and water were recovered from RFT sample points indicating significant oil saturation within the zone. One possible explanation for the oil saturation is a variation in permeability.

6. Gas samples analysed contained less than 5% C_2^+ components and were therefore considered representative of a dry gas. Geochemical evaluation of the oil samples showed that the Sperm Whale No.1 oil is biodegraded.

7. Reservoir potential of the basal Latrobe Group/Top Strzelecki sections have been downgraded as a result of the Sperm Whale No.1 well. Wireline log interpretations, formation tests and microscopic examinations indicated poor porosity and permeability values below 947 metres.

8. The amplitude anomaly defined on the seismic section through the Sperm Whale structure appears to correspond to the gas-oil interface at approximately 830 metres.

4. WELL DATA

(Pages 38 - 41)

4. WELL DATA

4.1 Formation Sampling

A standard "Alpha" unit from Exploration Logging Australia Inc. was used for acquiring drilling and formation data from the well. Exlog personnel provided continuous monitoring of ditch gas and mud pit levels, and recorded the following parameters every 5 metres:

(i) ditch gas
(ii) gas chromatography
(iii) calcimetry
(iv) blender gas analyses
(v) mud weight in and out

Corrected drilling exponent calculations were also performed every 5 metres but were not considered reliable due to a faulty motion compensator on the drilling vessel.

Washed and dried cuttings samples were collected in 5 metre compilations from below the base of the 20" casing shoe, at 196 metres, to total depth at 1417 m. Hudbay and Exlog geologists maintained separate lithological logs (see Enclosures E5 and E6) and also Appendix G6.

400 gm. unwashed, 15m composite samples were bagged below the 20" casing shoe, and 100 gm. unwashed, 15 m composite samples were taken from below the 13-3/8" casing shoe at 710 m. The former were bagged awaiting palynological study; the latter were sealed, with preservatives, in cans and stored, awaiting submission for geochemical analysis.

4.2 Coring Programme

4.2.1 Conventional Cores

No conventional cores were cut at Sperm Whale No.1

4.2.2 Sidewall Cores

Summary

Suite 1 (30/12/81)

Interval cored	:	195.5 - 712.0 metres
Shots attempted	:	30
Cores recovered	:	28
Bullets empty	:	1
Bullets misfired	:	nil
Bullets lost	:	1

Suite 2 (09/01/82)

Interval cored	:	723.0 - 1411.1 metres
Shots attempted	:	81 (2 x 30, 1 x 21)
Cores recovered	:	81
Bullets empty	:	nil
Bullets misfired	:	nil
Bullets lost	:	nil

Total : 111 shots 109 recovered

Refer to Appendix G5 for Sidewall Core Description sheets.

Paltech Pty. Ltd. received 43 sidewall cores for palaeontological examination (Appendix G1).

Wayne Harris of Western Mining Corporation, South Australia received 66 sidewall cores, over the interval 806.0 - 1411.1 metres for palynological examination (Appendix G2).

4.3 Wireline Logging and Testing

Schlumberger Seaco ran the following wireline logs and Repeat Formation Tests in Sperm Whale No.1:

Suite	Date	Logs	Interval	Remarks
1	30/12/81	DIT-BHC-GR (1:200 & 1:500)	195.5 - 717 m	
1	31/12/81	FDC-GR (1:200 & 1:500)	195.5 - 718 m	
1	31/12/81	CST (1:200)	195.5 - 712 m	Very difficult to correlate with other logs due to lack of highly contrasted gamma ray.
2	07/01/82	BHC-GR (1:200 & 1:500)	709 - 1413 m	
2	07/01/82	LDL-CNL-GR (1:200 & 1:500)	709 - 1415 m	
2	08/01/82	DLL-MSFL-GR (1:200 & 1:500)	709 - 1410.5 m	
2	08/01/82	LDL-CNL-PCL-EPL-GR (1:200 & 1:500)	709 - 1415 m	
2	08/01/82	HDT (1:200)	709 - 1415 m	
2	08/01/82	RFT	709 - 1360 m	
2	09/01/82	CST (1:200)	723 - 1411.1 m	
2	13/01/82	Perforation Record	819 - 848 m	

Additional Services

Date	Logs	Interval
08/01/82	Geodip (1:200 & 1:40)	775 - 975 m
08/01/82	Cyberdip (1:200)	709 - 1415 m
08/01/82	Cyberlook (1:200)	760 - 1000 m
12/01/82	CBL-VDL-GR (1:200)	709 - 889 m
10/01/82	Delta-T & Denisty vs 2-way Time (3.75"/sec)	200 - 1410 m
19/01/82	Bridge Plug Setting (1:200)	817, 830, 837 m

Log interpretations and further details of the logging programme are provided in Appendix G3.

A Velocity Survey was conducted by Seismic Services Limited (Enclosures E3 and E4).

Repeat Formation Tests (RFT)

A total of 24 tests were carried out during the RFT programme in Sperm Whale No.1. The following table summarizes the testing programme conducted on the 9th, 10th January, 1982:-

Interval (m)	Pressure Tests	Sampling Attempts	Total
812 - 869 m	8	11	19
923 - 946 m	2	nil	2
1135 -1360 m	3	nil	3
	13	11	24

The RFT programme indicated the following:-

a) Gas samples greater than 15 Cu. ft. were obtained from tests at 812, 828 and 832 metres.
b) A clean gas-oil contact occurs at 831.5 m.
c) A 22.5 litre oil sample was obtained from the test at 832 metres with only traces recovered from tests at 836.7 and 842 metres.
d) An oil-water contact occurs at 833.5 m. and appears to be transitional from 833.5m to 845.5m.

Details of the RFT programme at Sperm Whale No.1 are given in Appendix G3.

5. REFERENCES

Hocking, J.B., 1972: Geological Evolution and Hydrocarbon Habitat, Gippsland Basin. J. Aust. Petrol. Expl. Assoc., 12 (1), pp 132-137.

Hocking, J.B., and Taylor, D., 1964: The Initial Marine Transgression in the Gippsland Basin, Victoria, Paps. Aust. Petrol. Expl. Assoc., 1964.

James, E.A., and Evans, P.R., 1971: The Stratigraphy of the Offshore Gippsland Basin. J. Aust. Petrol. Expl. Assoc., 11 pp. 71-74.

Threlfall, W.F., Brown, B.R., and Griffith, B.R., 1976: Petroleum Geology of the Offshore Gippsland Basin, in Economic Geology of Australia and Papua New Guinea. 3 Petroleum Australia Inst. Min. Metall.

APPENDIX G1

PALAEONTOLOGY

REPORT

FORAMINIFERAL SEQUENCE

IN SPERM WHALE # 1

For:- HUDBAY OIL (AUSTRALIA) LTD.

March 8th, 1982.

Paltech Report
1982/07

PALTECH PTY LTD

MARINE MICROPALEONTOLOGISTS
SYDNEY NEW SOUTH WALES
MIDLAND WESTERN AUSTRALIA

THE FORAMINIFERAL SEQUENCE
in SPERM WHALE # 1

Forty three sidewall cores from SPERM WHALE # 1 were examined for foraminiferal content. On the basis of that examination, the following breakdown of the sequence was noted.

Sidewall Cores Depth (m)	Approx E-log Unit Boundary	Age	Zone*	Paleoenvironment¶
217.0 to 384.0		Pliocene	A-3 to A-4	Inner shelf (∿40m) Mid shelf canyon (40-100m)
	?			
405.0 to 638.0		Early Pliocene to Late Miocene	B-1	Inner shelf (∿40m) Outer shelf canyon (100-200m)
	?			
662.0 to 712.0		Mid Miocene	C	Shelf/slope break (∿200m)
	713			
727.0 to 799.0		Mid to Early Miocene	D-2 to G	Mid shelf canyon (40-100m) to inner shelf (10-40m)
	801			
803.9		Late Eocene	K	Estuarine (<10m)
806.0		?	N.F.F.	Deltaic

* Planktonic foraminiferal zonation after Taylor (in prep.).
¶ Paleobathymetric range in parentheses.

A list of sidewall cores studied is shown on Tables 1 & 2. The deepest sidewall core from 806.0m contained no foraminifera; otherwise all samples contained both planktonic and benthonic foraminifera, although poor preservation, due to carbonate diagenesis, made identification difficult in some samples.

Tables 1 & 2 (herein) detail the record summarised on page 1. These tables are compilations of both planktonic and benthonic foraminiferal distribution, as well as the lithological characteristics of the residue grains. The micro-paleontological data sheet shows the interpreted reliability of the planktonic zone determinations.

COMMENT ON CANYON-FILL SEQUENCE IN SPERM WHALE # 1.

The sequence demonstrates fluctuations in both canyon cutting and filling from early Miocene to Pliocene. Two disconformities are recognised; one in the mid Miocene between Zones D-2 and C (at ∿713m) and the other in late Miocene between Zones C and B-1. The first event at 713m is evidenced by a disjunct environmental sequence from mid canyon fill at top of D-2 and shelf/slope deposition of the Zone C sample immediately above the biostratigraphic break.

A report correlating the foraminiferal sequences in wells drilled in the eastern portion of Vic/P11 is being prepared. However, a brief comment is warranted here, in that the SPERM WHALE canyon fill sequence appears to represent part of a major anastomosing sequence intersected in sections further seaward, rather than being related to the BALEEN, WHALE and FLATHEAD Miocene canyon system.

MICROPALEONTOLOGICAL DATA SHEET

BASIN: GIPPSLAND ELEVATION: KB: 9.6m GL: -54.6m

WELL NAME: SPERM WHALE # 1 TOTAL DEPTH:

AGE		FORAM. ZONULES	HIGHEST DATA					LOWEST DATA				
			Preferred Depth	Rtg	Alternate Depth	Rtg	Two Way Time	Preferred Depth	Rtg	Alternate Depth	Rtg	Two Way Time
PLEISTOCENE		A_1										
		A_2										
PLIOCENE		A_3						217	1			
		A_4	237	2				384	1			
MIOCENE	LATE	B_1	405	2				638	1			
		B_2										
	MIDDLE	C	662	1				712	1			
		D_1										
		D_2	727	2				750	0			
		E_1	768	0				768	0			
		E_2	773	2				773	2			
	EARLY	F	782	2				787	1			
		G	799	1				799	1			
		H_1										
OLIGOCENE	LATE	H_2										
		I_1										
		I_2										
	EARLY	J_1										
		J_2										
EOCENE		K	803.9	1				803.9	1			
		Pre-K										

COMMENTS: Disconformity between D-2 and C at ≈713m marked by frequent reworked D-2 planktonic faunas in basal C assemblage; as well as displaced benthonic elements. Probable disconformity between C and B-1 on biostratigraphic disjunction.

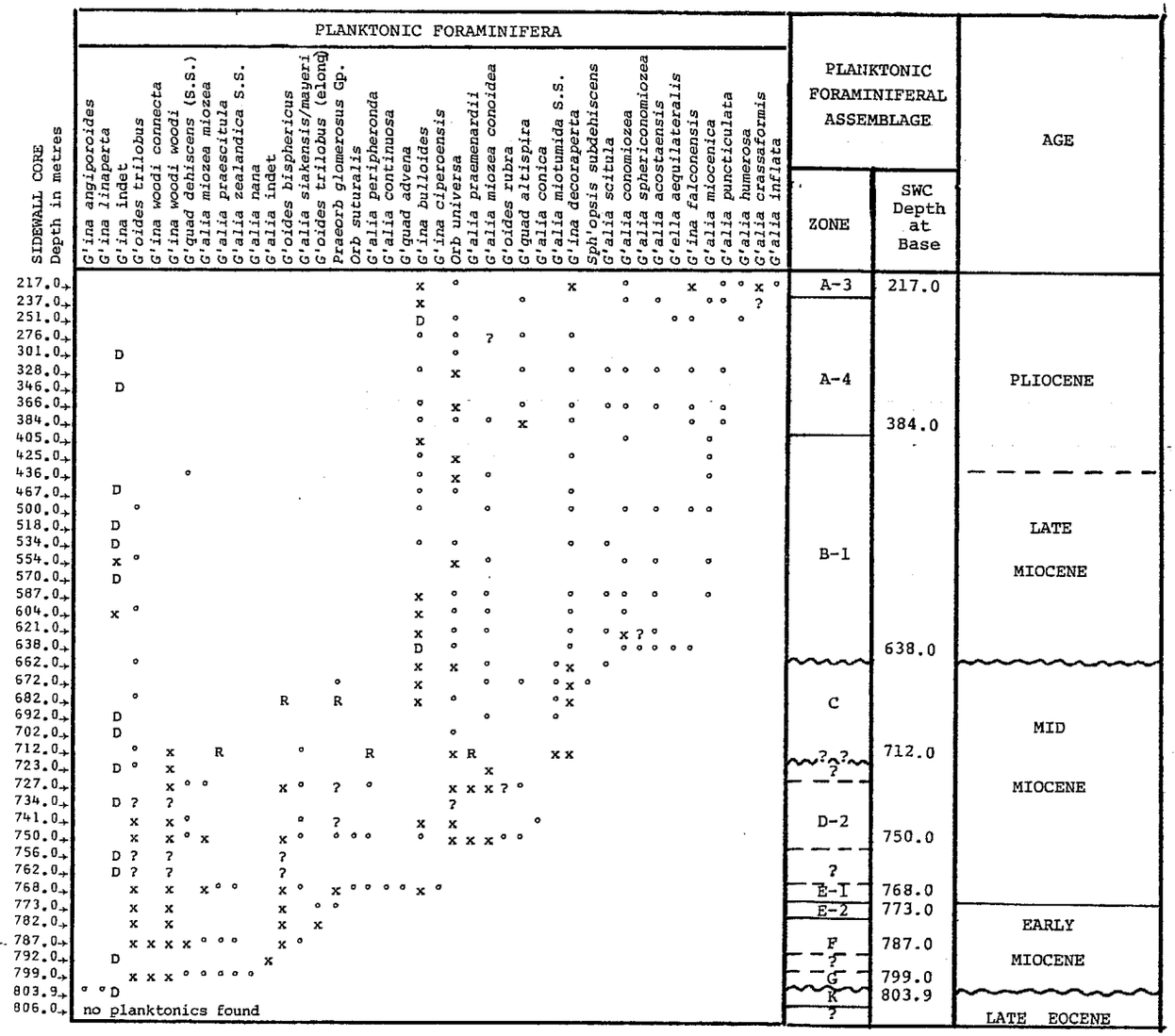
CONFIDENCE RATING:

- 0: SWC or Core - Complete assemblage (very high confidence).
- 1: SWC or Core - Almost complete assemblage (high confidence).
- 2: SWC or Core - Close to zonule change but able to interpret (low confidence).
- 3: Cuttings - Complete assemblage (low confidence).
- 4: Cuttings - Incomplete assemblage, next to uninterpretable or SWC with depth suspicion (very low confidence).

NOTE: If an entry is given a 3 or 4 confidence rating, an alternative depth with a better confidence rating should be entered, if possible. If a sample cannot be assigned to one particular zone, then no entry should be made, unless a range of zones is given where the highest possible limit will appear in one zone and the lowest possible limit in another.

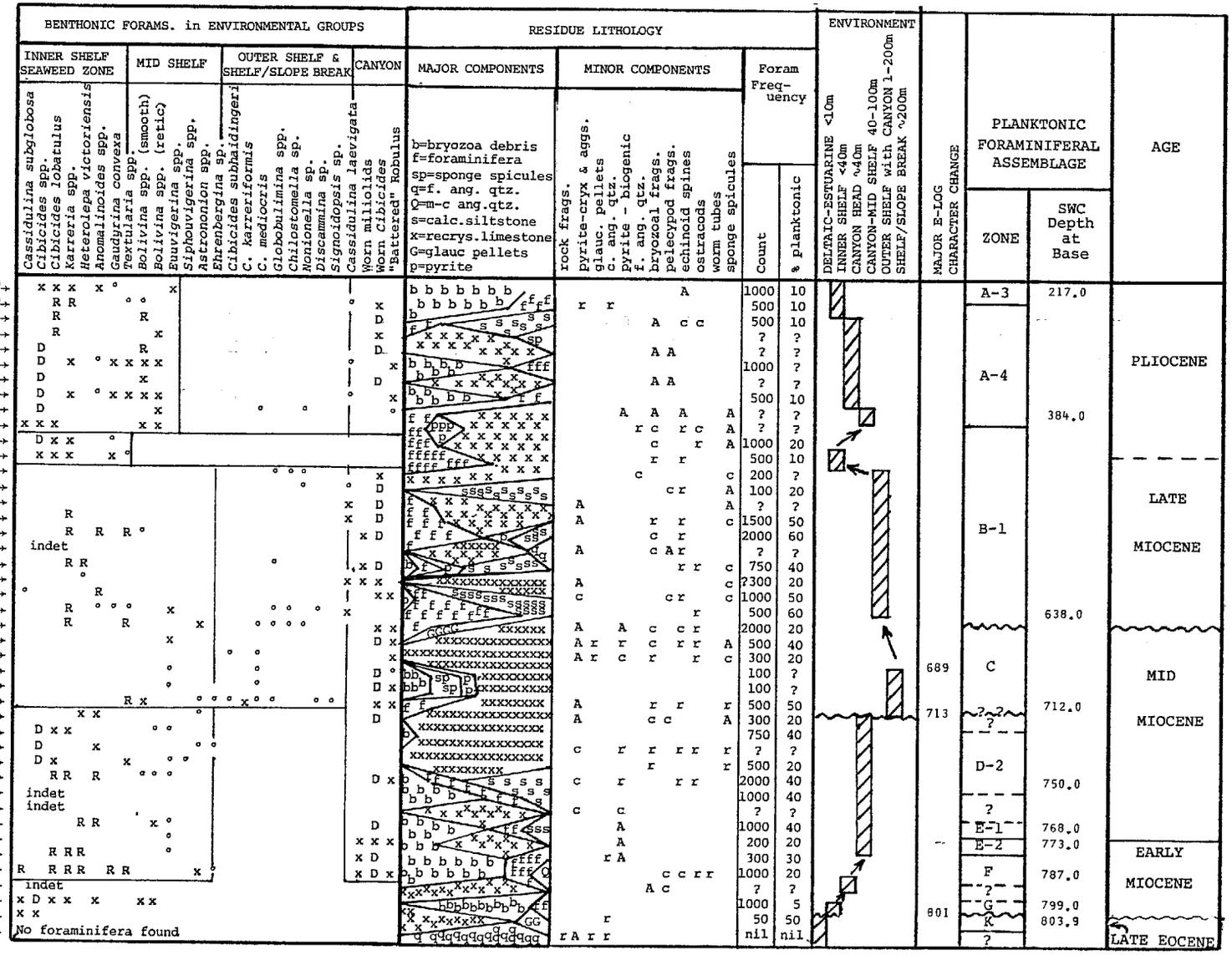
DATA RECORDED BY: *PALTECH PTY. LTD.* DATE: March 1st, 1982.

DATA REVISED BY: DATE:



KEY: ° <20 specimens R recycled early/mid Miocene specimens
x >20 specimens ? identification doubtful due to preservation.
D Dominant >60% of assemblage

TABLE 1:- PLANKTONIC FORAMINIFERAL DISTRIBUTION - SPERM WHALE # 1
PALTECH REPORT 1982/07



KEY: ° <20 specimens R recycled or displaced
x >20 specimens indet indeterminate due to preservation.
D Dominant >60% of assemblage

TABLE 2:- SIGNIFICANT BENTHONIC FORAMINIFERAL DISTRIBUTION, RESIDUE LITHOLOGY & PALEOENVIRONMENTAL ASSESSMENT - SPERM WHALE # 1

PALTECH REPORT 1982/07

APPENDIX G2

PALYNOLOGY

REPORT

SPERM WHALE NO. 1 WELL

GIPPSLAND BASIN

Palynological Examination and Kerogen
Typing of Sidewall Cores

by

W.K. Harris & C.B. Foster

PALYNOLOGICAL REPORT

Client : Hudbay Oil (Australia) Limited

Study : Sperm Whale No. 1 Well, Gippsland Basin

Aims : Determination of age and distribution of kerogen types and spore colour.

INTRODUCTION

Sixty six sidewall cores from Sperm Whale No. 1 Well drilled in the Gippsland Basin at Lat. 38°03'44"S, Long. 140°56'19"E in Vic. P-11 were processed by normal palynological procedures.

The basis for the biostratigraphy and consequent age determinations are based on Stover & Partridge (1973) and Partridge (1976) for the Tertiary sediments; and principally on Dettmann (1963), Dettmann & Playford (1969), with the modifications of Dettmann & Douglas (1976) and Burger (1973), for the Early Cretaceous sequence.

OBSERVATIONS AND INTERPRETATION

A. Biostratigraphy

Table I summarises the biostratigraphy and age determinations for the samples studied. Tables II and III indicate the distribution of species encountered in the Early Cretaceous and Tertiary sequences, respectively. Table II list samples between 958 and 1377.1m where significant assemblages have been recorded.

Many samples from this well are barren of plant microfossils and this is mostly due to unfavourable lithologies. These are dominated by light grey to white argillaceous sandstone and claystones generally representing oxidising environments of deposition.

Where plant microfossils have been recovered they range from well preserved to very poor, but assemblages were not very diverse limiting the biostratigraphic precision. Assemblages yielding only three or four specimens have been logged as barren. These species recorded are all long ranging forms.

1. Early Cretaceous: 958 to 1302.1m

Assemblages from this section of the well were generally poorly preserved and many samples yielded only very sparse or poorly diversified assemblages. Between 1261m and 1302.1m there is little diversity in the assemblages and nothing in particular that can be used for precise biostrtigraphic assignment. The species recorded are consistent with an Early Cretaceous age but their range is often much greater.

An assemblage at 1252.9m yielded the first record of Coptospora paradoxa marking the base of the zone of Coptospora paradoxa in this well.

Assemblages above this depth are poorly diversified and contain no

TABLE I
SPERM WHALE NO. 1

SUMMARY OF PALYNOLOGICAL DATA

DEPTH	SWC	PRESERVATION	DIVERSITY	SPORE/POLLEN ZONE	CONFIDENCE LEVEL	ENRIVONMENT
806	67	good	v. low	?M. diversus	3	?Non-marine
812	66	fair	v. low	?M. diversus	3	?Non-marine
817	65	fair	v. low	?M. diversus	3	?Non-marine
821	64	barren	-	-	-	-
825	63	barren	-	-	-	-
828	62	barren	-	-	-	-
843	60	barren	-	-	-	-
846	59	good	low	L. balmei	4	
851	58	fair	low	L. balmei	4	
859	57	barren	-	-	-	-
869	56	"	-	-	-	-
877	55	"	-	-	-	-
885	54	"	-	-	-	-
896	53	"	-	-	-	-
904	52	"	-	-	-	-
917	51	"	-	-	-	-
923	50	"	-	-	-	-
932	49	"	-	-	-	-
940	48	"	-	-	-	-
948	47	"	-	-	-	-
958	46	fair	v. low	E. Cretaceous undiff.	-	-
964	45	barren	-	-	-	-
969	44	fair	v. low	?C. paradoxa	3	non marine
977	43	v. poor	v. low	?C. paradoxa	3	non marine
989	42	fair	v. low	?C. paradoxa	3	non marine
998	41	"	-	-	-	-
1010	40	"	-	-	-	-
1020	39	"	-	-	-	-
1031	38	"	-	-	-	-
1041.9	37	"	-	-	-	-
1050	36	"	-	-	-	-
1060	35	barren	-	-	-	-

DEPTH	SWC	PRESERVATION	DIVERSITY	SPORE/POLLEN ZONE	CONFIDENCE LEVEL	ENVIRONMENT
1072	34	poor	v. low	?C. paradoxa	3	non marine
1080	33	poor to v. poor	"	"	3	"
1090	32	barren	-	-	-	-
1110	30	fair	v. low	?C. paradoxa	3	non marine
1120	29	barren	-	-	-	-
1131	28	"	-	-	-	-
1142	27	"	-	-	-	-
1157	26	"	-	-	-	-
1160	31	"	-	-	-	-
1162	25	"	-	-	-	
1177	24	"	-	-	-	-
1181.9	23	"	-	-	-	-
1191.9	22	"	-	-	-	-
1207	21	v. poor	v. low	?C. paradoxa	3	non marine
1217.9	20	barren	-	-	-	-
1228	19	"	-	-	-	-
1238.1	18	"	-	-	-	-
1244.9	17	"	-	-	-	-
1252.9	16	fair	v. low	C. paradoxa	4	non marine
1261	15	poor	v. low	E. Cretaceous undiff.	-	non marine
1272.9	14	barren	-	-	-	-
1282.9	13	v. poor	v. low	E. Cretaceous undiff.	-	non marine
1292.9	12	barren	-	-	-	-
1302.1	11	fair	v. low	E. Cretaceous undiff.	-	non marine
1315	10	barren	-	-	-	-
1325	9	"	-	-	-	-
1335	8	"	-	-	-	-
1345	7	"	-	-	-	-
1355	6	"	-	-	-	-
1365	5	"	-	-	-	-
1377.1	4	"	-	-	-	-
1386.1	3	"	-	-	-	-
1400	2	"	-	-	-	-
1411.1	1	"	-	-	-	-

Confidence Levels:

1 Cuttings sample, low diversity + contaminants
2 cuttings sample, good assemblage
3 core or sidewall core, low diversity + contaminants
4 core or sidewall core, low diversity
5 core or sidewall core, good assemblage

diagnostic species. For this reason the assemblages are tentatively equated with the C. paradoxa zone.

All of the Cretaceous assemblages are of non-marine aspect.

2. Early Tertiary

Although assemblages from this section of the well were moderately well preserved the samples yielded low quantities of organic matter and assemblages of very low diversity. Nevertheless two distinct units can be recognised.

a. Lygistepollenites balmei zone: 846-851m

Two samples are correlated with this zone and assemblages are characterised by L. balmei, G. edwardsii, H. harrisii, P. reticulosaccatus and N. flemingii. The presence of the latter species suggests that the assemblage is to be correlated with the Upper L. balmei zone, however the poor diversity precludes a firm assignment to this sub-zone.

Marine dinoflagellates were recorded at 846m and indicate deposition in a marginal marine environment.

b. ?Malvacipollis diversus zone: 806-817m

Assemblages from the three productive samples from this zone again are poorly diversified but do contain M. diversus and in the youngest sample C. orthoteichus.

The sample at 806m is certainly no older than the M. diversus zone provided that none of the samples have been contaminated by drilling mud.

No marine dinoflagellates were recorded and a non-marine environment of deposition is inferred.

B. Kerogen Types and Spore Colouration

During routine palynological processing of sidewall cores an unoxidised kerogen sample was taken and the nature of the kerogens and spore colouration are documented in Table V. Only those samples which yielded spore/pollen assemblages have been examined. Spore colour is expressed as the "Thermal Alteration Index" (TAI) of Staplin (1969) according to the scale in Table IV.

TABLE IV

Thermal - Alteration Index		Organic matter/spore colour
1	none	fresh, yellow
2	slight	brownish yellow
3	moderate	brown
4	strong	black
5	severe	black and evidence of rock metamorphism.

TABLE V
SPERM WHALE NO. 1

SUMMARY OF MATURATION AND KEROGEN DATA

DEPTH	TOM	SWC NO.	PHY.	AMORPHO	HYLOGEN	MELANO.	TAI
806	v. low	67	tr.	-	tr.	100	ND
812	v. low	66	5	-	-	95	-
817	v. low	65	10	-	tr	90	ND
821	barren	64	-	-	-	-	-
825	barren	63	-	-	-	-	-
828	v. low	62	-	100	-	-	-
843	low	60	30	40	20	10	ND
846	low	59	10	80	tr.	10	1+
851	v. low	58	70	-	10	20	ND
859	barren	57	-	-	-	-	-
869	"	56	-	-	-	-	-
877	"	55	-	-	-	-	-
885	"	54	-	-	-	-	-
896	"	53	-	-	-	-	-
904	"	52	-	-	-	-	-
917	"	51	-	-	-	-	-
923	"	50	-	-	-	-	-
932	"	49	-	-	-	-	-
940	"	48	-	-	-	-	-
948	"	47	-	-	-	-	-
958	mod	46	30	-	10	60	2
964	barren	45	-	-	-	-	-
969	mod	44	30	-	10	60	2-
977	low	43	30	-	30	40	2
989	v. low	42	-	-	-	-	NA
998	barren	41	-	-	-	-	-
1010	"	40	-	-	-	-	-
1020	"	39	-	-	-	-	-
1031	"	38	-	-	-	-	-
1041.9	"	37	-	-	-	-	-
1050	"	36	-	-	-	-	-
1060	"	35	-	-	-	-	-
1072	"	34	-	-	-	-	-
1080	v. low	33	50	-	35	15	2
1090	barren	32	-	-	-	-	-
1110	low	30	40	-	30	30	2
1120	barren	29	-	-	-	-	-
1131	"	28	-	-	-	-	-
1142	"	27	-	-	-	-	-
1157	"	26	-	-	-	-	-
1160	"	31	-	-	-	-	-
1162	"	25	-	-	-	-	-
1177	"	24	-	-	-	-	-
1181.9	"	23	-	-	-	-	-
1191.9	"	22	-	-	-	-	-
1207	mod	21	95	-	-	5	2
1217.9	barren	20	-	-	-	-	-
1228	"	19	-	-	-	-	-
1238.1	"	18	-	-	-	-	-

DEPTH	TOM	SWC NO.	PHYR.	AMORPHO	HYLOGEN	MELANO	TAI
1244.9	mod	17	-	-	-	-	-
1252.9	v.low	16	-	-	-	-	ND
1261	abundant	15	65	-	30	5	2
1272.9	v.low	14	-	-	-	-	-
1282.9	v.low	13	-	-	-	-	ND
1292.9	barren	12	-	-	-	-	-
1302.1	abundant	11	95	-	-	5	2
1315	v. low	10	-	-	-	-	-
1325	v. low	9	-	-	-	-	-
1335	barren	8	-	-	-	-	-
1345	v. low	7	-	-	-	-	-
1355	barren	6	-	-	-	-	-
1365.1	"	5	-	-	-	-	-
1377.1	"	4	-	-	-	-	-
1386.1	"	3	-	-	-	-	-
1400	"	2	-	-	-	-	-
1411.1	"	1	-	-	-	-	-

Total organic matter (TOM) is expressed semi-quantitatively in the scale- abundant, moderate, low, very low, barren. Samples classed as having abundant or moderate amounts of TOM would be expected to have TOC's (total organic content) greater than 1%.

In this report four classes of organic matter are recognised - amorphogen, phyrogen, hylogen and melanogen and these terms are more or less synonymous with amorphous, herbaceous, woody, and coaly. For reasons as outlined by Bujak et al. (1977) the former terms are preferred because they do not have a botanical connotation. The thermal alteration index scale follows that of Staplin (1969) and as outlined by Bujak et al. (1977). At a TAI of 2+ all four types of organic material contributed to hydrocarbon generation whereas at a TAI of 2, only amorphogen forms liquid hydrocarbons. The upper boundary defining the oil window is at a TAI of approximately 3 but varies according to the organic type. Above TAI 3+ all organic types only have a potential for thermally derived methane.

1. Cretaceous Section

Kerogen types in this unit are characterised by high phyrogen towards the bottom of the well and high melanogen towards the top.

Spore colour throughout is consistent at about 2 and cannot be considered to be mature. These factors together with low to very low TOM values, imitigates against this section as a potential hydrocarbon source.

2. Tertiary Section - Eocene

This section is characterised by very low TOM's and the dominant kerogen type is melanogen in the ?M. diversus zone and amorphogen is prominent in two samples from the L. balmei zone.

Where spore colour was determined it is indicative of immaturity.

All of the evidence suggests that this section in the early Tertiary is immature and does not contain sufficient organic matter of a favourable nature to be considered as a potential source rock for the generation of hydrocarbons.

5. REFERENCES

REFERENCES

Bujak, J.P., Barss, M.S., & Williams, G.L., 1977: Offshore East Canada's Organic Type and Colour and Hydrocarbon Potential. Oil Gas J., 45 (14): 198-202.

Burger, D., 1973: Spore Zonation and sedimentary history of the Neocomian, Great Artesian Basin Queensland. Spec. Publs. geol. Soc. Aust. 4: 97-118.

Dettman, M. & Playford, G., 1969: Palynology of the Australian Cretaceous: A review. IN Campbell. Ed. Stratigraphy and Paleontology: Essays in Honour of Dorothy Hill A.N.U. Press Canberra: 174-210.

Dettmann, M. & Douglas J., 1976: Lower Cretaceous Palaeontology IN Douglas et al ed. Geology of Victoria. Spec. Publs. Geol. Soc. Aust. 5: 164-176.

Partridge, A.D., 1976: The Geological Expression of Eustacy in the Early Tertiary of the Gippsland Basin. J. Aust. Petrol. Expl. Assoc., 16: 73-79.

Staplin, F.L. 1969: Sedimentary Organic Matter, Organic Metamorphism and Oil and Gas Occurrence. Bull Can. Pet. Geol., 17: 47-66.

Stover, L.E. & Partridge, A.D., 1973: Tertiary and Late Cretaceous Spores and Pollen from the Gippsland Basin, southeastern Australia. Proc. R. Soc. Vict., 85: 237-286.

W.K. Harris,

C.B. Foster,

13 January 1983

TABLE III

DISTRIBUTION OF TERTIARY SPECIES

SPERM WHALE #1

Spore/Pollen	Depth in metres	904	896	885	877	869	859	851	846	843	828	825	821	817	812	806
Araucariacites australis								X								
Clavifera triplex								X	X							
Cyathidites australis								X						X		
Dilwynites granulatus								X	X							
Gambierina edwardsii								X								
Haloragacidites harrisii								X	X					X	X	X
Lygistepollenites balmei								X	X							
L. florinii								X	X						X	
Laevigatosporites ovatus								X								X
Microcachynidites antarcticus								X	X						X	
Nothofagidites brachyspinulosis								X	X						X	
N. flemingii								X	X						X	
Podosporites sp.								X	X							
Podocarpidites sp.								X	X					X		X
Peromonolites densus								X								X
Phyllocladidites reticulosaccatus								X	X							
P. verrucosus								X								
Proteacidites spp.								X							X	X
P. parvus								X								
P. tenviexinus								X	X							
Simplicepollis meridianus								X								
Triporopollenites sp.								X	X							
Cyathidites splendens									X							
Gleicheniidites circinidites									X							
Latrobosporites ohaiensis									X							
Lygistepollenites ellipticus									X							
Phyllocladities mawsonii									X						X	X
Ischyosporites gremius															X	
Cupanieidites orthoteichus																X
Proteacidites annularis																X
Tricolpites sp.																X
Dinoflagellates																
Senegalinium dilwynense									X							
Spiniferites ramosus									X							

DISTRIBUTION OF CRETACEOUS SPECIES

TABLE II

SPERM WHALE #1

	Depth in metres	1377.1	1365.1	1355	1345	1335	1325	1315	1302.1	1292.9	1282.9	1272.9	1261	1252.9	1244.9	1238.1	1228	1217.9	1207	1191.9	1181.9	1177	1162	1160	1157	1142	1131	1120	1110	1090	1080	1072	1060	1050	1041.9	1031	1020	1010	998	989	977	969	964	958
Spore/Pollen																																											
Baculatisporites comaumensis									X		X		X	X															X											X		X	
Cicatricosporites australiensis									X				X	X	X														X											X		X	
Osmundacidites spp.									X																																		
Podocarpidites sp.		X							X		X							X	X			X							X							X							
Cingutriletes clavus									X					X																							X				X		
Ceratosporites equalis									X																																		
Corollina sp.									?																															X	X		
Trisaccites sp.									X																																		
Cyathidites sp.									X										X												X											
Podosporites microsaccatus									X				X																X											X	X		
Cicatricosisporites sp.														X																													
Ferminisporis assymetricus														X																													
Polypodidites sp.														?																											X		
Cepotespora paradoxa														X																													
Balmeisporites holodictyus														X																													
Nadraistrickia truncata						X											X																										
Classopollis sp.																	X																										
Leptolepidites verrucatus																		X											X											X		
Lycopodiumsporites sp.																													X		X			X						X		
Leiotriletes sp.																													X													
Microcachryidites antarcticus																													X													
Aequitriradites spinulosus																													X											X		
Podocarpidites ellipticus																													X		X											
Cinqutriletes clavus																													X													
Foraminisporis wonthaggiensis																													?													
Klukisporites scaberis																															X											
Neoraistrickia sp.																															X			X								
Annulispora folliculosa																															X											
Cycadopites sp.																															X											
Camerozonotriletes sp.																																						X				
Podocarpites sp.																																						X				
Baculatisporites sp.																																						X				
Kraeuselisporites sp.																																						X				
Cycadopites ovatus																																										
Stereisporites antiquasporites																																							X			
Cooksonites variabilis																																								?		
Lundbladispora sp.																																								X		
Ceratosporites spp.																																								?		
Triletes sp. cf. T. tuberculiformis																																								X		
Cuyeadopites follicularis																																								X		
Nodosus sp.																																								X		
Gleicheniidites sp.																																									X	
Schizosporis sp.																																									?	
Reworked Spores/Pollen																																										
Alisporites sp.											X																															
Puncatisporites gretensis																												X								X						
Striatopodocarpites sp.																															X											
Aratrisporites																																				X						
Gabonus sp.																																						X				
Horriditriletes ramosa																																							?			
Polypodiaceoisporites tortuosus																																								X		

APPENDIX G3

WIRELINE LOG INTERPRETATION

(SEE ATTACHED REPORT)

PE904241

APPENDIX G4

GEOCHEMISTRY

REPORT

GEOCHEMICAL ANALYSIS OF GAS SAMPLES A-4974, A-12042 9024-25 AND 15089/5 FROM SPERM WHALE #1

G.W. WOODHOUSE

Petroleum Geochemistry Group
School of Applied Chemistry
W.A. Institute of Technology
Kent Street
BENTLEY WA 6102

February, 1982

CONTENTS

RESULTS

RESULTS

COMPOSITIONAL DATA:

	All Volume %			
Component	A-4974	A-12042	9024-25	15089/5
Methane	93.4	87.8 (93.4)	93.5	93.8
Ethane	3.00	2.76 (2.94)	3.00	2.94
Propane	0.29	0.27 (0.28)	0.39	0.27
iso-Butane	0.084	0.051 (0.060)	0.100	0.060
n-Butane	0.030	0.015 (0.020)	0.030	0.020
Pentanes	0.004	0.005 (0.005)	0.002	0.001
Nitrogen	0.68	5.45 (0.69)	0.55	0.53
Carbon Dioxide	2.49	2.45 (2.59)	2.45	2.37
Oxygen	Trace	1.20 (Trace)	Trace	Trace

NB: Sample A-12042: The compositional data obtained from gas chromatographic analysis is shown in the left hand column. We believe this sample was contaminated by air during sampling and therefore assuming that the oxygen is from the air we have calculated the true composition of the gas and placed these calculated values in brackets.

ISOTOPE ANALYSIS:

Sample	$\delta^{13}C$ (PDB)
A-4974	-40.2
A-12042	-38.7
9024-25	-37.4
15089/5	-38.6

COMMENTS AND CONCLUSIONS

COMMENTS AND CONCLUSIONS

GENERAL

Four cylinders (A-4947, A-12042, 9024-25 and 15089/5) of gas from the Sperm Whale #1 exploration well were provided for geochemical analysis. Firstly, the C_2-C_5 hydrocarbon composition of each gas was determined by gas chromatography using a Chromosorb 102 column and flame ionization detector (FID). Secondly, the relative proportions of carbon dioxide, nitrogen plus oxygen, methane and ethane were determined for the samples by gas chromatography using a Chromosorb 102 column and thermal conductivity detector (TCD). Finally, the relative proportion of nitrogen and oxygen in each sample was determined by gas chromatography using a Molecular Sieve column and TCD. Since ethane was measured in the first two analyses on each sample and relative detector responses were obtained by using Town Gas as a standard, the relative proportion by volume of each component was able to be calculated. In this case the data from the third method of analysis of each sample was used to calculate the relative proportions of nitrogen and oxygen. This procedure is not normally necessary because natural gas generally contains an insignificant level of oxygen.

GAS COMPOSITION

If it is assumed that the A-12042 sample is contaminated with air and the corrected data is used for this sample then all four samples analysed have a very similar composition. Although these gases have considerably more of the C_2+ components than the recently analysed Baleen #1 gas samples they still have less than the 5% C_2+ components usually required to consider a gas as "wet". In other words the Sperm Whale gas samples have a composition which is representative of neither a truly wet gas nor a truly dry gas. Another interesting difference between the Sperm Whale and Baleen gases is that the Sperm Whale samples have a very significant carbon dioxide component and relatively much less nitrogen whereas the Baleen gases contained low levels of carbon dioxide and relatively much larger amounts of nitrogen.

CARBON ISOTOPE COMPOSITION

It is now well-established that the following carbon isotope criteria can often be used to characterize the source of natural gas:

Carbon Isotope Values	Gas Source
-75 to -58°/oo	dry bacterial methane
-58 to -40°/oo	gas associated with oil
-40 to -25°/oo	deep, dry thermal gas

Thus, the isotope ratios for the Sperm Whale gas samples suggest that these gases are very thermally mature and have probably been sourced from deep in the basin. Although the compositional data shows that the gas samples are not as dry as might be expected on the basis of isotope data, there has probably been a contribution to the C_2+ components of the gas from oil associated with this gas.

GEOCHEMICAL EVALUATION OF RFT #2, RFT #21, RFT #1, DST #1B, DST #2 AND THE 833m SIDEWALL CORE FROM SPERM WHALE #1

G.W. WOODHOUSE

Petroleum Geochemistry Group
School of Applied Chemistry
W.A. Institute of Technology
Kent Street
BENTLEY WA 6102

February, 1982

CONTENTS

TABULATED DATA

WELLNAME = SPERM WHALE NO 1 S.W.C. DATE OF JOB = FEBRUARY 1982

COMPOSITIONAL DATA

DEPTH(m)	%SAT	%AROM	%NSO	PRIST/PHYT	PRIST/NC17	PHYT/NC18	PAP	AROM/SAT	CPI(1)	CPI(2)	21+22/28+29
833.0	60.0	26.8	13.2	nd	nd	nd	nd	0.45	nd	nd	nd

WELLNAME = SPERM WHALE NO 1 S.W.C. DATE OF JOB = FEBRUARY 1982

ORGANIC CONTENT OF SEDIMENTS

DEPTH(m)	%SOM	%TOC	SOM(mg)/TOC(g)	SAT(mg)/TOC(g)	%SaOM
833.0	.525	nd	nd	nd	.315

N-ALKANE DISTRIBUTIONS

OILNAME	CN12	CN13	CN14	CN15	CN16	CN17	CN18	CN19	CN20	CN21	CN22	CN23	CN24	CN25	CN26	CN27	CN28	CN29	CN30	CN31
SPERM WHALE 1 RFT 2	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
SPERM WHALE 1 RFT 21	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
SPERM WHALE 1 RFT 1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
SPERM WHALE 1 DST 2	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
SPERM WHALE 1 DST 1B	1.5	5.0	10.9	13.8	14.0	12.5	10.4	9.1	6.9	5.1	3.7	2.6	1.8	1.1	0.8	0.4	0.2	0.1	0.1	0.0

COMPOSITIONAL DATA

OILNAME	%SAT	%AROM	%NSO	PRIST/PHYT	PRIST/NC17	PHYT/NC18	PAP	AROM/SAT	CPI(1)	CPI(2)	21+22/28+29
SPERM WHALE 1 RFT 2	63.0	30.8	6.3	nd	nd	nd	nd	0.49	nd	nd	nd
SPERM WHALE 1 RFT 21	61.0	28.6	10.4	nd	nd	nd	nd	0.47	nd	nd	nd
SPERM WHALE 1 RFT 1	59.5	31.7	8.8	nd	nd	nd	nd	0.53	nd	nd	nd
SPERM WHALE 1 DST 2	60.4	30.4	9.2	nd	nd	nd	nd	0.50	nd	nd	nd
SPERM WHALE 1 DST 1B	67.6	27.0	5.4	2.45	.39	.19	nd	0.40	1.06	1.06	26.2

GRAVITY AND SULPHUR DATA - SPERM WHALE #1

Sample	API Gravity	% Sulphur
RFT #2 832m	25.6	0.50
RFT #21 836.6m	25.6	0.36
RFT #1 842m	23.9	0.43
DST #2	15.7	2.40
DST #1B	37.0	0.50
SWC 833m	nd*	0.59%

* no data due to insufficient sample

KEY

%SOM = Percentage of soluble organic matter in the sediment sample (W/W)

%SAT = Percentage by weight of saturated compounds in the extract

%AROM = Percentage by weight of aromatic compounds in the extract

%NSO = Percentage by weight of asphaltenes plus resins in the extract

PRIST = Pristane

PHYT = Phytane

NC17 = n-heptadecane (i.e. n-alkane with 17 carbon atoms)

NC18 = n-octadecane (i.e. n-alkane with 18 carbon atoms)

PAP = Percentage of aromatic protons in the aromatic fraction

CPI = Carbon Preference Index

n-Alkane Composition: CN12 etc. = n-alkane with 12 carbon atoms etc.
(Values are weight percent of the n-alkane fraction)

TOC = Total organic carbon (soluble + insoluble)

C_T = Total insoluble organic carbon

C_R = Residual organic carbon

HC = Hydrocarbon

nd = No data

21+22/28+29: Sum of percentages of n-alkanes with carbon numbers 21 and 22 divided by sum of percentages of n-alkanes with carbon numbers 28 and 29

%SaOM = Percentage of saturated organic matter in the sediment sample (W/W)

GAS AND FUEL CORPORATION OF VICTORIA
SCIENTIFIC SERVICES DEPARTMENT

SPECIAL TEST REPORT

Requested by: Hudbay Oil (Aust) Pty. Ltd.
Sample Book No. 82/081
Date Received: -
Material: Natural Gas
Job No. 253
Query: Analysis
Report No. 82/73/AN
Origin of Sample: Sperm Whale

REPORT

Please type only within the lines

Please type only within the lines

Analysis of Cylinder A 4926.

Component	Mole Concentration
Methane	93.3 ± 0.2 %
Ethane	2.83 ± 0.2 %
Propane	0.28 ± 0.01 %
iso-Butane	0.069 ± 0.002 %
n-Butane	0.027 ± 0.002 %
neo-Pentane	30 ppm ± 5 ppm
iso-Pentane	60 ppm ± 5 ppm
n-Pentane	50 ppm ± 5 ppm
Higher Hydrocarbons	100 ppm ± 5 ppm
Carbon Dioxide	2.84 ± 0.03 %
Nitrogen	0.64 ± 0.01 %
Oxygen + Argon	0.02 ± 0.01 %
Helium	25 ppm ± 10 ppm

Pressure in cylinder approximately 550 lb/in^2.

Chemist: C. Rudolph & K. Jones
Checked:
Date Laboratory: 12/2/82

GAS AND FUEL CORPORATION OF VICTORIA
SCIENTIFIC SERVICES DEPARTMENT

SPECIAL TEST REPORT

Requested by: Hudbay Oil (Aust) Pty. Ltd.
Sample Book No. 82/08%
Date Received: -
Material: Natural Gas
Job No. 253
Query: Analysis
Report No. 82/75/AN
Origin of Sample: Sperm Whale

REPORT

Please type only within the lines

Please type only within the lines

Analysis of Cylinder 15098/17

Component	Mole Concentration
Methane	93.5 ± 0.2 %
Ethane	2.82 ± 0.2 %
Propane	0.27 ± 0.01 %
iso-Butane	0.069 ± 0.002 %
n-Butane	0.025 ± 0.002 %
neo-Pentane	20 ppm ± 5 ppm
iso-Pentane	50 ppm ± 5 ppm
n-Pentane	30 ppm ± 5 ppm
Higher Hydrocarbons	15 ppm ± 5 ppm
Carbon Dioxide	2.63 ± 0.03 %
Nitrogen	0.61 ± 0.01 %
Oxygen + Argon	0.02 ± 0.01 %
Helium	30 ppm ± 10 ppm

Chemist: C. Rudolph & K. Jones
Checked: G. W. Mackay
Date Laboratory: 12/2/82

GAS AND FUEL CORPORATION OF VICTORIA
SCIENTIFIC SERVICES DEPARTMENT

SPECIAL TEST REPORT

Requested by	Hudbay Oil (Aust) Pty. Ltd.	Sample Book No. 82/082
Date Received	-	
Material	Natural Gas	Job No. 253
Query	Analysis	Report No. 82/74/AN
Origin of Sample	Sperm Whale	

REPORT

Analysis of Cylinder A 7387.

Component	Mole Concentration
Methane	93.8 ± 0.2 %
Ethane	2.60 ± 0.2 %
Propane	0.21 ± 0.01 %
iso-Butane	0.045 ± 0.002 %
n-Butane	0.013 ± 0.001 %
neo-Pentane	20 ppm ± 5 ppm
iso-Pentane	30 ppm ± 5 ppm
n-Pentane	20 ppm ± 5 ppm
Higher Hydrocarbons	20 ppm ± 5 ppm
Carbon Dioxide	2.56 ± 0.03 %
Nitrogen	0.70 ± 0.01 %
Oxygen + Argon	0.04 ± 0.01 %
Helium	35 ppm ± 10 ppm

Please type only within the lines

Please type only within the lines

Chemist: C. Rudolph & K. Jones
Checked
Date Laboratory: 12/2/82

THEORY AND METHOD

THEORY AND METHOD

1. API GRAVITY

A 1 ml specific gravity (SG) bottle was accurately weighed, then filled with petroleum at 60°F and finally reweighed. The weight difference was divided by the weight of 1 ml of water at 60°F to obtain the specific gravity. The following formula was then used to calculate the API gravity :

$$\text{API Gravity} = \left(\frac{141.5}{\text{SG (60°F)}}\right) - 131.5$$

The reported gravity value is the average of duplicate determinations.

2. SULPHUR DETERMINATION

The % sulphur values were measured using an x-ray fluorescence spectrometer equipped with a liquid sample holder. This parameter is influenced by the nature of the source material from which a crude is derived, the depositional environment of the source rocks, and reservoir alteration processes such as bacterial alteration.

3. EXTRACTION OF SEDIMENT SAMPLES

Crushed sediment (maximum of 250g) and 320 mls of purified dichloromethane: methanol (10:1) were placed in a 500 ml conical flask. A double surface condenser was fitted to the flask, and the sample was then extracted under the influence of ultra-sonic vibration (60-70°C) using a Buehler Ultramet II sonic bath for 2 hours. The solvent was then separated from the sediment using a large Buchner filtration system. The extract was recovered by careful evaporation of the solvent on a steam bath and weighed. The weight of extract was used to calculate %SOM(UNC) using the following formula:

$$\%\text{SOM(UNC)} = \frac{\text{Wt. extract}}{\text{Wt. sediment extracted}} \times \frac{100}{1}$$

4. SEPARATION OF PETROLEUM INTO CONSTITUENT FRACTIONS

The petroleum was separated into saturated, aromatic and NSO (asphaltenes plus resins) fractions by column chromatography on silicic acid. The crude sample was applied to the top of a silicic acid column (sample to adsorbent ratio 1:50) and the saturated compounds were eluted with n-pentane, aromatic compounds with a 50:50 mixture of ether and n-pentane,

and finally the NSO fraction was eluted with a 20:1 mixture of methanol and dichloromethane. The neat fractions were recovered by careful removal of the solvent by fractional distillation and weighed.

The sum weight of the three fractions was used to calculate the %SOM using the following formula:

$$\%SOM = \frac{\text{Wt. AROM. + Wt. SAT. + Wt. NSO}}{\text{Wt. SEDIMENT EXTRACTED}} \times \frac{100}{1}$$

This parameter can be used to assess the suitability of the sediments as source rocks according to the classification shown (later in this section) in the table "Classification of Source Rock Richness".

The weight of saturated compounds was used to calculate the percentage of saturated compounds in the sediment according to the following formula:

$$\%SaOM = \frac{\text{Wt. Saturates}}{\text{Wt. Sediment Extracted}} \times \frac{100}{1}$$

This parameter can be used to assess the suitability of the sediments as oil source rocks according to the classification shown in the table "Classification of Source Rock Richness".

The weight of each fraction was used to calculate the % by weight of each fraction in the extract according to the following formula:

$$\%\ \text{Fraction} = \frac{\text{Wt. Fraction}}{\text{Wt. All Fractions}} \times \frac{100}{1}$$

The composition of the extracts can provide information about their levels of maturity and/or source type (LeTran et al., 1974; Philippi, 1974). Generally, marine extracts have relatively low concentrations of saturated and NSO compounds at low levels of maturity, but these concentrations increase with increased maturation. Terrestrially derived organic matter usually has a low level of saturates and large amount of aromatic and NSO compounds irrespective of the level of maturity.

5. GLC ANALYSIS OF SATURATED COMPOUNDS

Capillary GLC traces were recorded for each saturate fraction. The following information was obtained from these traces:

(a) n-Alkane Distribution - The C_{12}-C_{31} n-alkane distribution was determined from the area under peaks representing each of these n-alkanes. This distribution can yield information about both the level of maturity and the source type (LeTran et al., 1974).

(b) Carbon Preference Index - Two values were determined:

$$CPI(1) = \frac{(C_{23} + C_{25} + C_{27} + C_{29})Wt\% + (C_{25} + C_{27} + C_{29} + C_{31})Wt\%}{2 \times (C_{24} + C_{26} + C_{28} + C_{30})Wt\%}$$

$$CPI(2) = \frac{(C_{23} + C_{25} + C_{27})Wt\% + (C_{25} + C_{27} + C_{29})Wt\%}{2 \times (C_{24} + C_{26} + C_{28})Wt\%}$$

The CPI is believed to be a function of both the level of maturity (Cooper and Bray, 1963; Scalan and Smith, 1970) and the source type (Tissot and Welte, 1978). Marine extracts tend to have values close to 1 irrespective of maturity whereas values for terrestrial extracts decrease with maturity from values as high as 20 but don't usually reach a value of 1.

(c) $C_{21}+C_{22}/C_{28}+C_{29}$ - This parameter provides information about the source of the organic matter (Philippi, 1974). Generally, a terrestrial source gives values <1.2 whereas a marine source results in values >1.5.

(d) Pristane/Phytane Ratio - This value was determined from the areas of peaks representing these compounds. The ratio renders information about the depositional environment according to the following scale (Powell and McKirdy, 1975):

<3.0 Marine depositional environment (i.e. reducing environment)
3.0-4.5 Mixed depositional environment (i.e. reducing/oxidising environment)
>4.5 Terrestrial depositional environment (i.e. oxidising environment)

(e) Pristane/n-C_{17} Ratio - This ratio was determined from the areas of peaks representing these compounds. The value can provide information about both the source type and the level of maturation (Lijmbach, 1975). Very immature crude oil has a pristane/n-C_{17} ratio >1.0, irrespective of the source type. However, the following

classification can be applied to mature crude oil:

<0.5	Marine source
0.5-1.0	Mixed source
>1.0	Terrestrial source

In the case of sediment extracts these values are significantly higher and the following classification is used:

<1.0	Marine source
1.0-1.5	Mixed source
>1.5	Terrestrial source

(f) Phytane/$\underline{n}$-C_{18} Ratio - This ratio was determined from the areas of peaks representing these compounds. The value usually only provides information about the level of maturity of petroleum. The value decreases with increased maturation.

(g) Relative Amounts of $\underline{n}$-Alkanes and Naphthenes - Since $\underline{n}$-alkanes and naphthenes are the two dominant classes of compounds in the saturate fraction, a semi-quantitative estimate of the relative amounts of these compounds was made. This information can be used to assess the degree of maturation and/or the source type of the petroleum (Philippi, 1974; Tissot and Welte, 1978). Very immature petroleum has only small proportions of $\underline{n}$-alkanes, but as maturity increases the relative amount of $\underline{n}$-alkanes increases. In addition, terrestrial petroleum has a greater proportion of high molecular weight naphthenes than marine petroleum.

REFERENCES

Alexander, R., Kagi, R.I. and Woodhouse, G.W. "Measurement of thermal maturation of petroleum by proton magnetic resonance spectroscopy". Nature, 276, 1978, 598.

Alexander, R., Kagi, R.I. and Woodhouse, G.W. "A new method for measuring the maturity of petroleum in source rocks". APEA J., 19, 1979, 90-93.

Cooper, J.E. and Bray, E.E. "Apostulated role of fatty acids in petroleum formation". Geochim. Cosmochim. Acta, 27, 1963, 1113-1127.

Gransch, J.A. and Eisma, E. "Characterization of the insoluble organic matter of sediments by pyrolysis". Advances in Organic Geochemistry, 1966, 407-426.

Hunt, J.M. "Geochemistry of petroleum". Am. Assoc. Pet. Geol. Continuing Education Lecture Series.

Lijmbach, G.W.M. "On the origin of petroleum". Proc. 9th World Petroleum Congress, 2, 1975, 357-369.

LeTran, K., Connan, J. and Van der Weide, B. "Diagenesis of organic matter and occurrence of hydrocarbons and hydrogen sulphide in the S.W. Aquitaine Basin". Bull. Centre Rech., Pau-SNPA, 8, 1974, 111.

Philippi, G.T. "The influence of marine and terrestrial source material on the composition of petroleum". Geochim. Cosmochim. Acta, 38, 1974, 947.

Powell, T.G. and McKirdy, D.M. "Geological factors controlling crude oil composition in Australia and Papua New Guinea". Amer. Assoc. Petrol. Geol. 59, 1975, 1176.

Scalan, R.S. and Smith, J.E. "An improved measure of the odd-even predominance in the normal alkanes of sediment extracts and petroleum". Geochim. Cosmochim. Acta, 34, 1970, 611-620.

Stahl, W.J. "Carbon and nitrogen isotopes in hydrocarbon research and exploration". Chem. Geol., 20, 1977, 121-149.

Stahl, W.J. "Source rock-crude oil correlation by isotopic type-curves". Geochim. Cosmochim. Acta, 42, 1978, 1573-1577.

Tissot, B. et al. "Origin and evolution of hydrocarbons in early Toarcian shales, Paris Basin, France". Amer. Assoc. Petrol. Geol., 55, 1971, 2177.

Tissot, B. et al. "Influence of nature and diagenesis of organic matter in the formation of petroleum". Amer. Assoc. Petrol. Geol., 58 1974, 499.

Tissot, B. and Welte, D.H. "Petroleum Formation and Occurrence". Springer-Verlag. Berlin Heidelberg New York, 1978.

Welte, D.H., et al., "Correlation between petroleum and source rock". Proc. 9th World Petroleum Congress, 2, 1975, 179-191.

COMMENTS AND CONCLUSIONS

COMMENTS AND CONCLUSIONS

GENERAL

Three RFT samples (#1, #2, #21), two DST samples (#1B, #2) and one sidewall core (833m) were provided for geochemical analysis. The RFT #1, RFT #21, DST #1B and DST #2 were provided as oil/water mixtures and therefore the oil had to be separated from the water and dried prior to being analysed.

Each oil sample was firstly analysed for its % sulphur content and API gravity. An aliquot of each sample was then liquid chromatographed to obtain saturate, aromatic and NSO fractions. The saturate fractions were analysed by capillary column gas chromatography and combined capillary column gas chromatography/ mass spectrometry (GC/MS). It should be noted that the results and discussion for the GC/MS study are included in a separate report.

The sidewall core was placed in an extraction flask, covered with dichloromethane/ methanol (10:1) solvent, partially crushed with a stainless steel rod and was then ultrasonically extracted. After removal of the extracting solvent from the partially crushed SWC the sediment was carefully dried, crushed to 0.1 mm and extracted for a second time. The soluble organic matter recovered after the double extraction was analysed by the same sequence of methods as those described above for the oil samples.

Normally our report for this type of study would include n-alkane histograms and values for parameters such as pristane/phytane, pristane/n-C_{17} and the carbon preference index. From this data it is generally possible to draw conclusions about the maturity and type of organic matter under investigation. However, in this case the composition of the extracts has prevented the preparation of a report of this type, although the maturity and type of organic matter is discussed in the GC/MS report on these samples.

COMPOSITION OF THE SOM

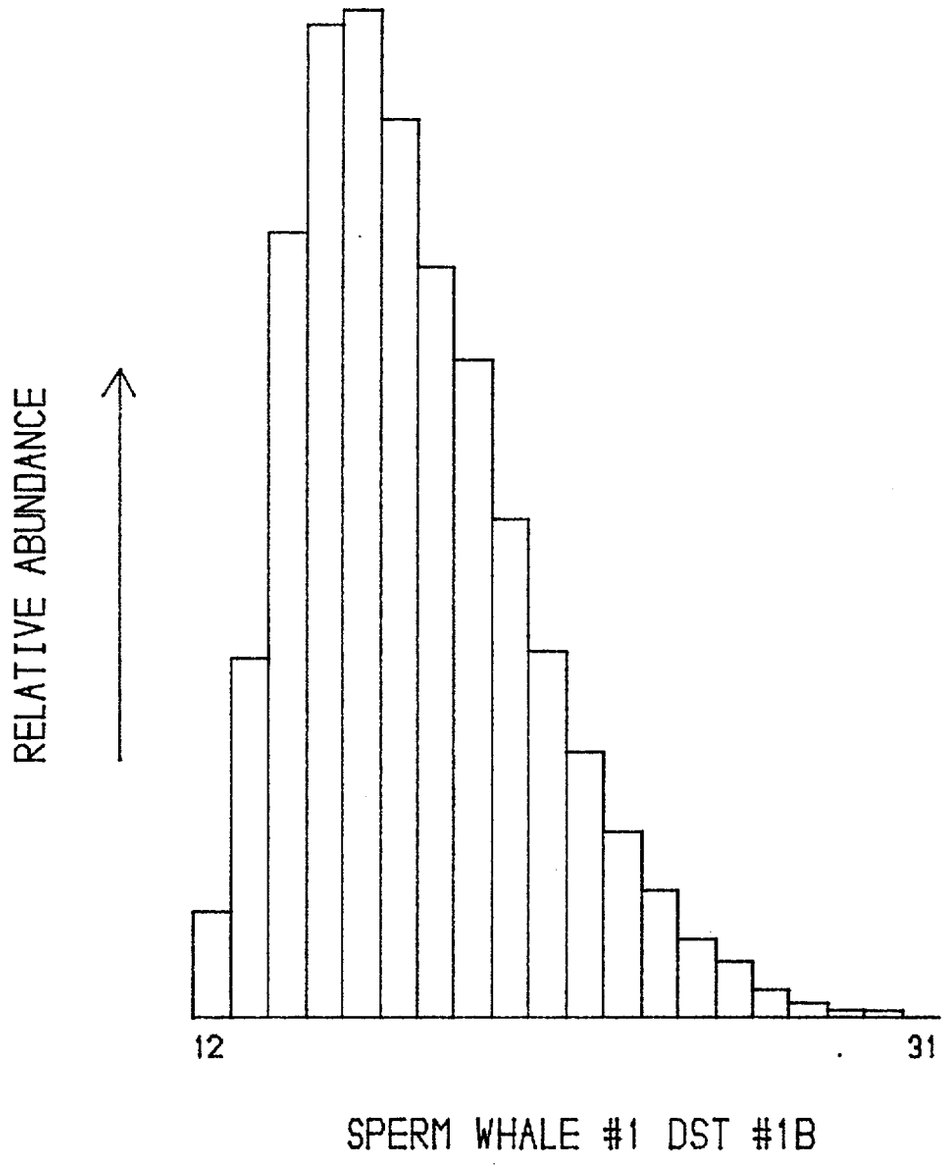
The capillary GLC trace for the DST #1B saturate fraction shows that this sample is dominated by n-alkanes. However, the distribution of n-alkanes is very similar to that observed for diesel. Since this sample is anomalous compared to the other Sperm Whale samples and its n-alkane distribution is very similar to that for diesel it is assumed that it is severely contaminated with diesel and therefore is excluded from any further discussion.

The capillary GLC traces of the saturate fraction from the RFT #1, RFT #2, RFT #21 and DST #2 samples and the SWC extract show that these samples are almost devoid of n-alkanes and therefore it is most likely that they have been altered by bacteria. The level of saturates in the SOM and the API gravities for these samples are much lower than the values normally observed for unaltered Gippsland crudes while the % sulphur values are much higher than those commonly observed for unaltered Gippsland oils. These variations are consistent with biodegradation having taken place and support the contention that the Sperm Whale oil samples and SWC extract are biodegraded.

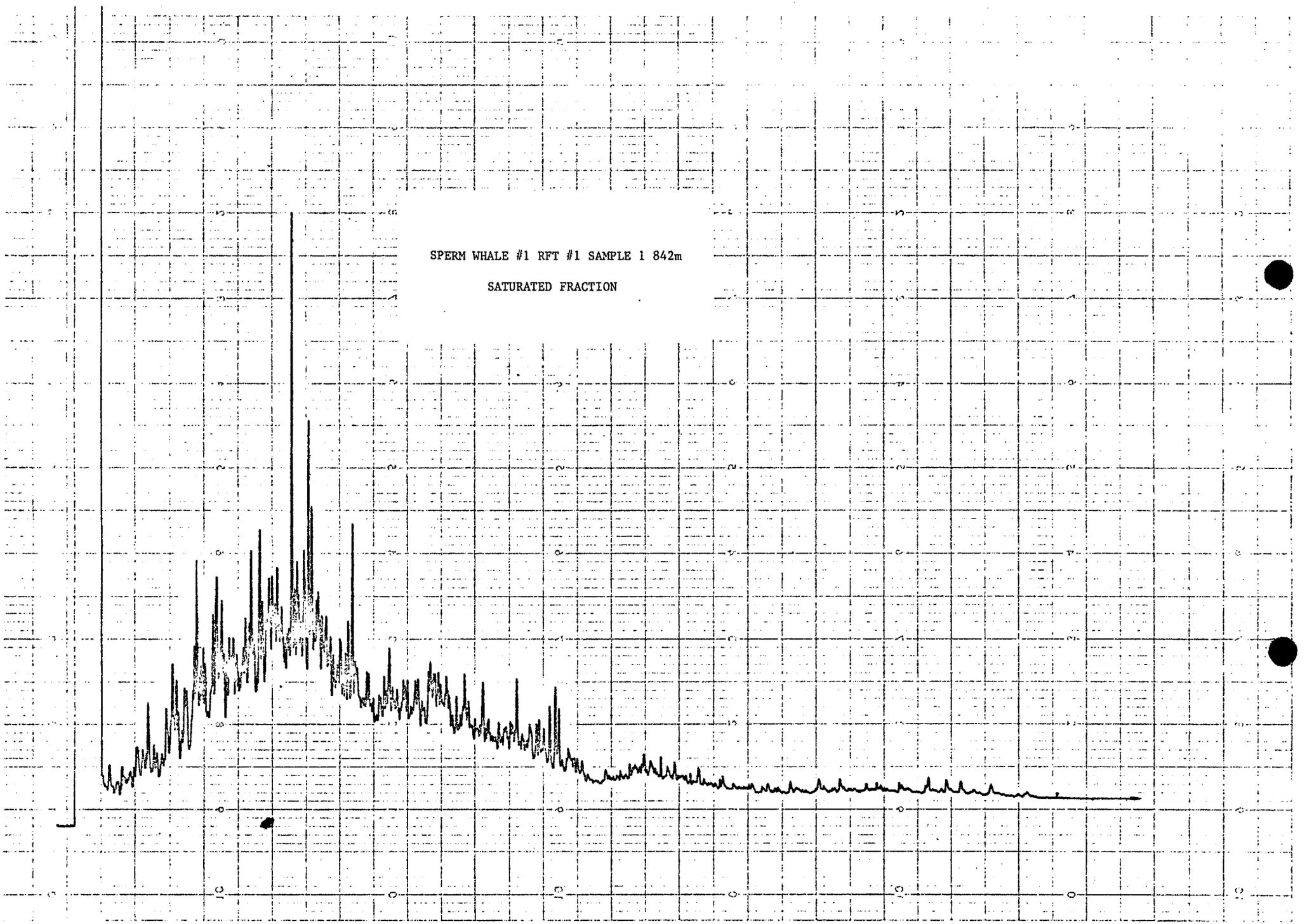
OTHER COMMENTS

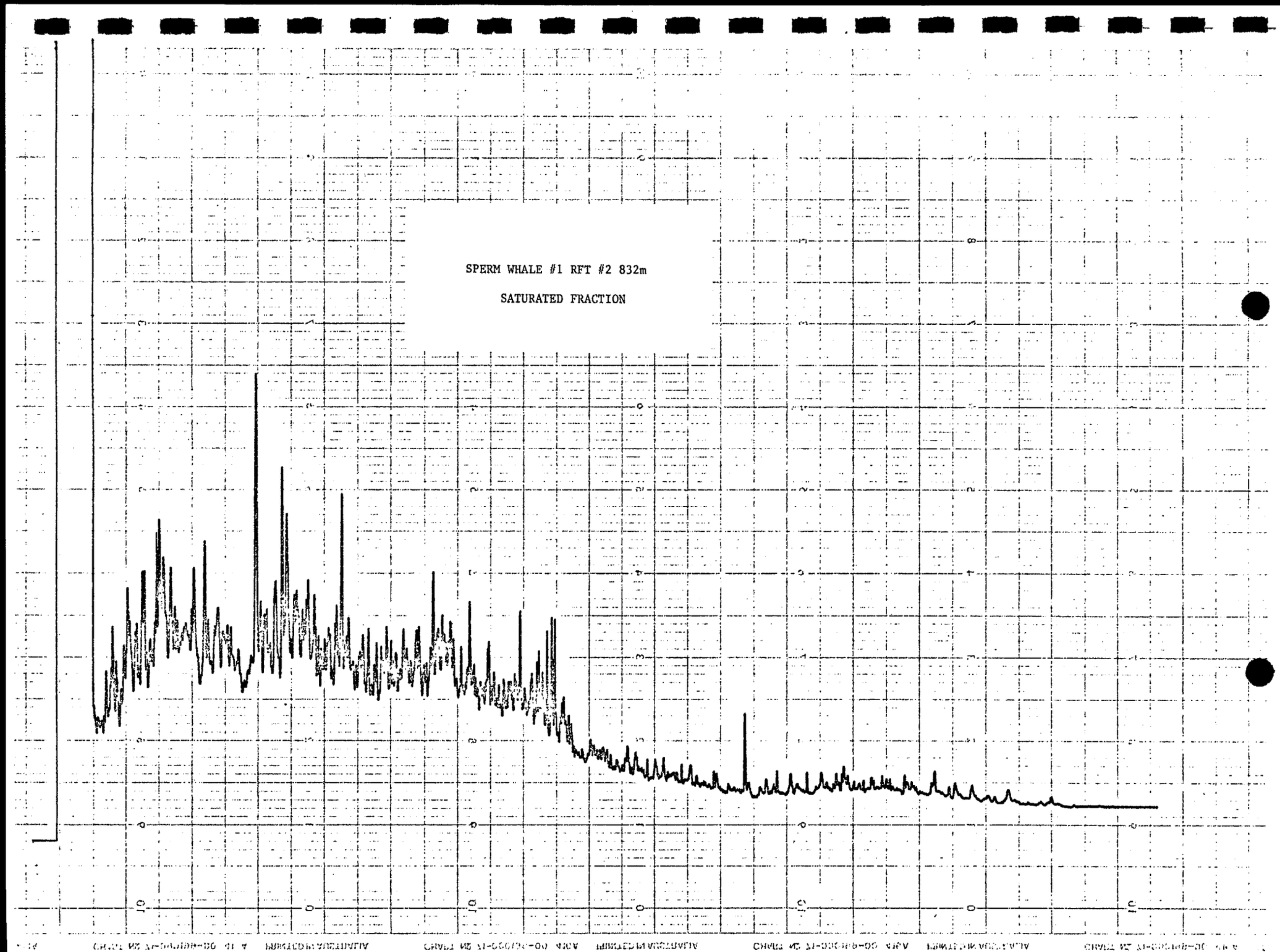
It is of interest that the DST #2 sample has a lower API gravity and higher % sulphur value than the other samples. This observation suggests that the DST #2 sample is significantly more biodegraded than the other samples, although it could be accounted for by other more tenuous explanations.

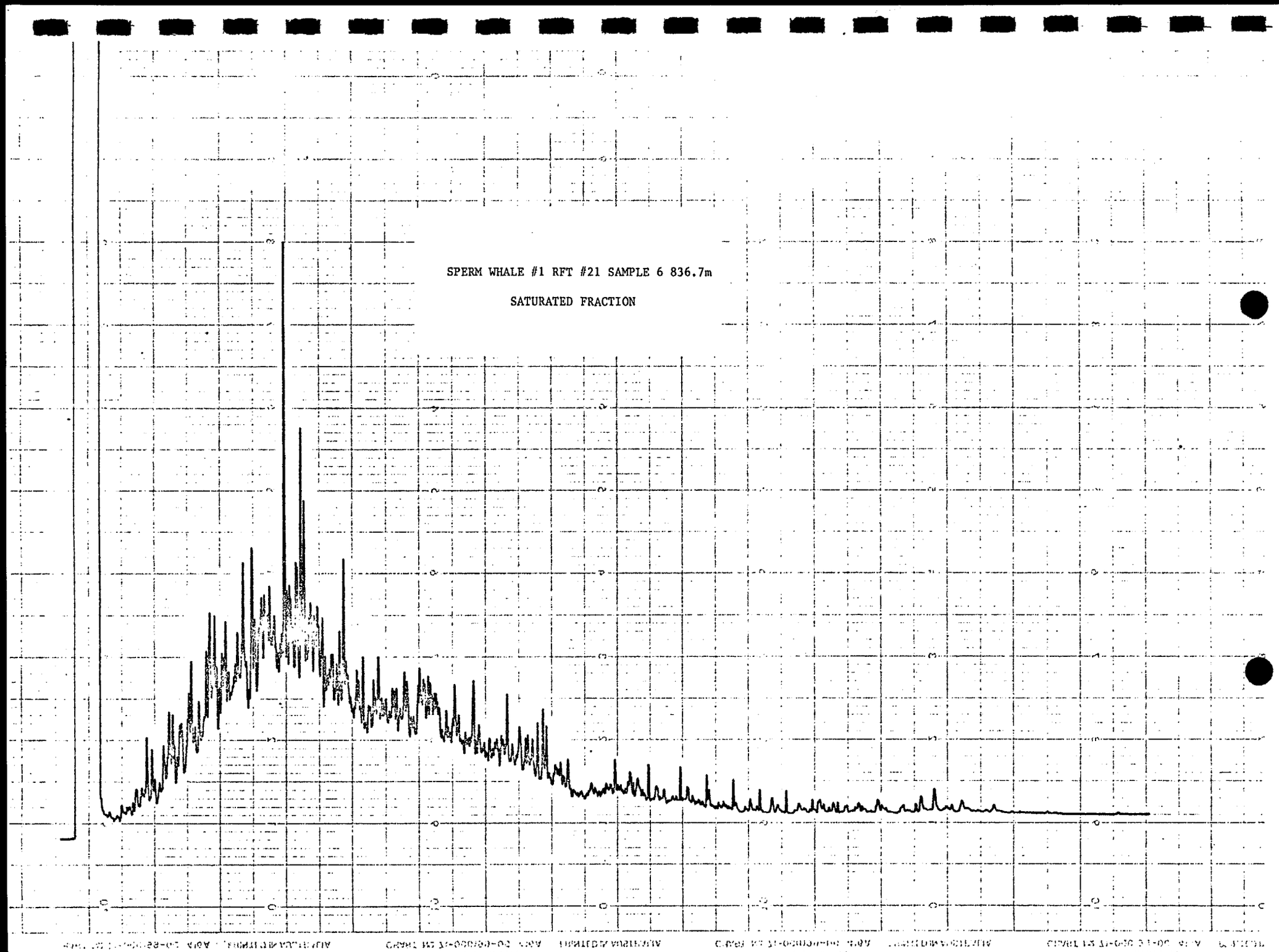
n-ALKANE DISTRIBUTION

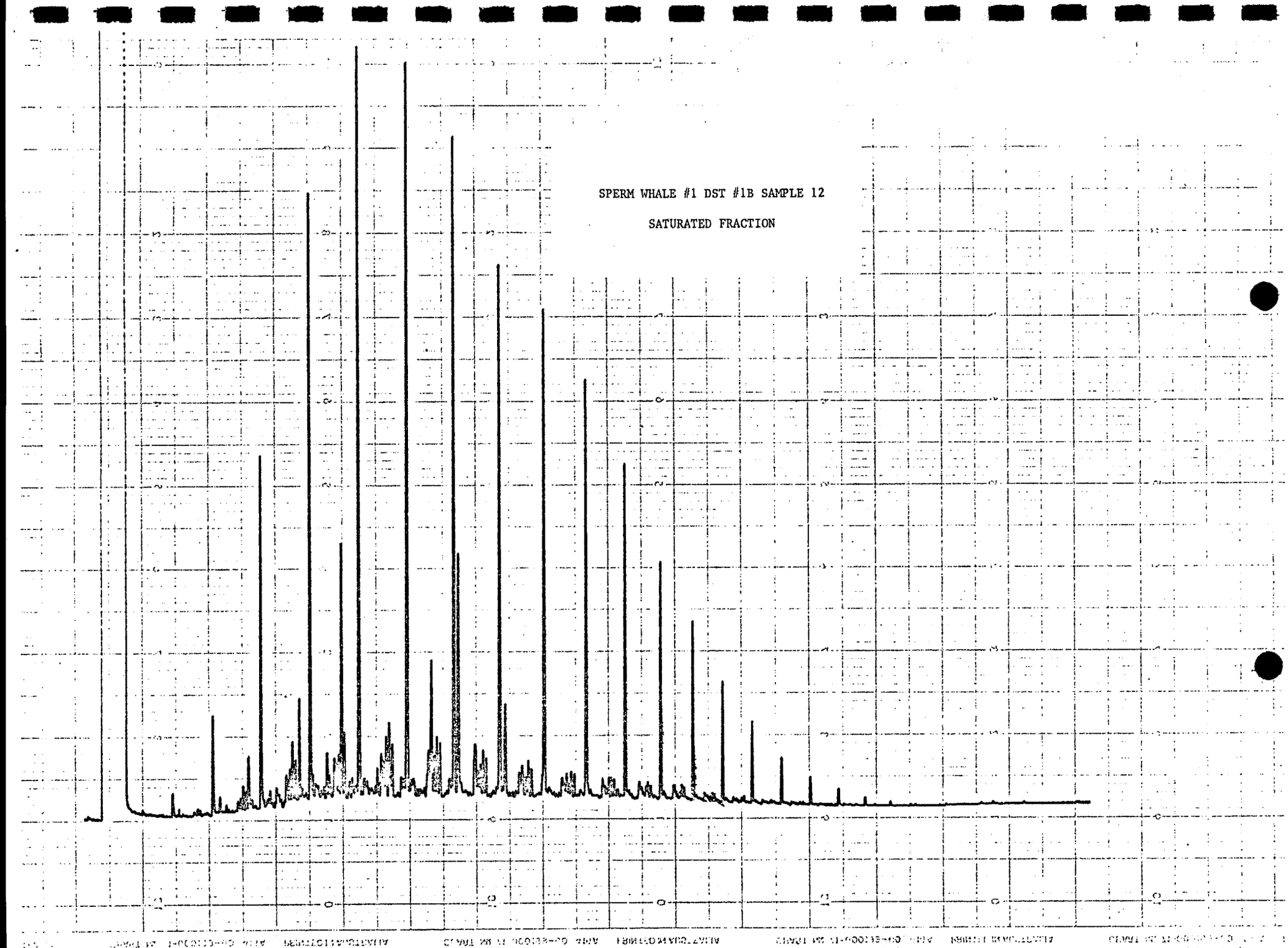

RELATIVE ABUNDANCE
12
31
SPERM WHALE #1 DST #1B

CAPILLARY GLC TRACES


SPERM WHALE #1 RFT #1 SAMPLE 1 842m
SATURATED FRACTION

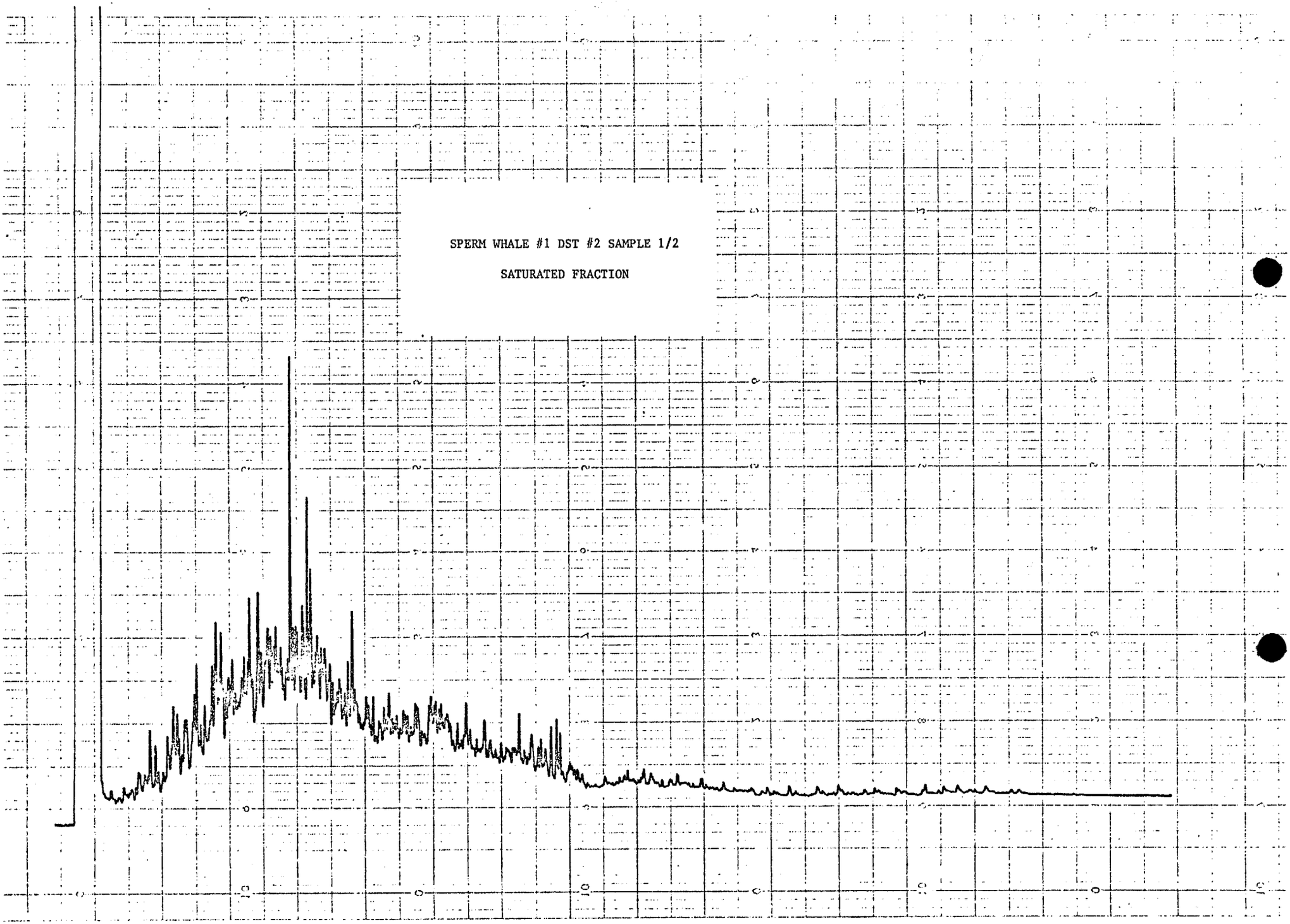

SPERM WHALE #1 RFT #2 832m
SATURATED FRACTION

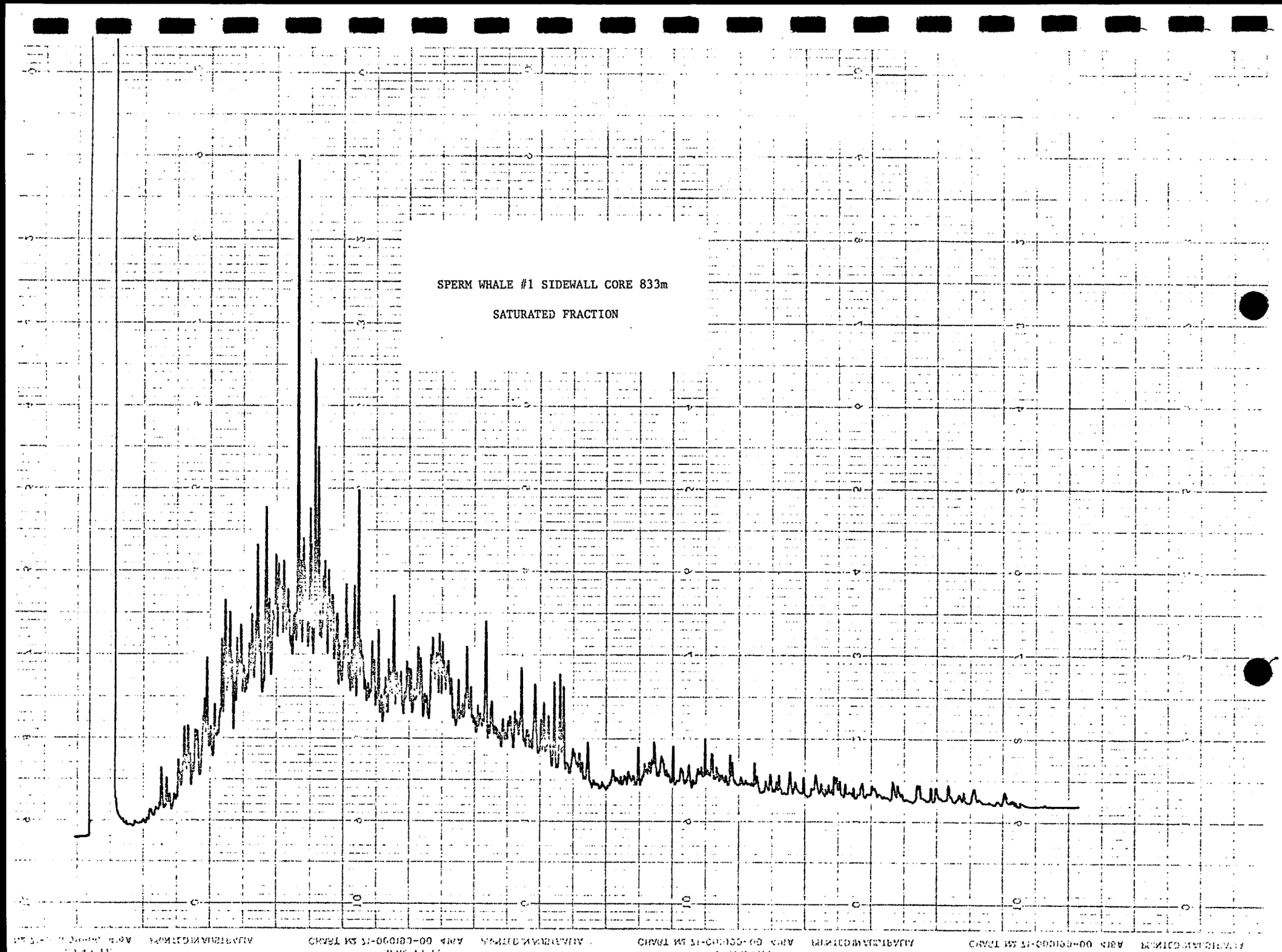

SPERM WHALE #1 RFT #21 SAMPLE 6 836.7m
SATURATED FRACTION


SPERM WHALE #1 DST #1B SAMPLE 12
SATURATED FRACTION

SPERM WHALE #1 DST #2 SAMPLE 1/2

SATURATED FRACTION




SPERM WHALE #1 SIDEWALL CORE 833m
SATURATED FRACTION

APPENDIX G5 LOG OF CORES

Hudbay Oil (Australia) Ltd.

Subsidiary of Hudson's Bay Oil and Gas Company Limited

SIDEWALL CORE DESCRIPTIONS

WELL: SPERM WHALE - 1

DEPTH (metres)	RECOVERY (centimetres)	ROCK TYPE	COLOUR	CLAY SIZE %		SILT SIZE %		GRAINS TYPE & %			GRAINS SIZE		CEMENT		DIAGENESIS			ROUNDING	SORTING	HARDNESS	POROSITY TYPE & %	ACCESSORIES			HYDROCARBONS	SEDIMENTARY STRUCTURES	SUPPLEMENTARY DATA
				CLAY MINERALS	MICRITE	QUARTZ	CALCITE	QUARTZ	SKELETAL	CALCITE	RANGE	DOMINANT	TYPE & %	TYPE & %	TYPE	%	TEXTURE					TYPE & %	TYPE & %	TYPE & %			
217	5.0	CALCISILTITE	Lt gry	Tr	40		60													S							
237	5.0	CALCILUTITE	Lt gry to Lt olv gry	5	65		30													S							
251	5.0	CALCILUTITE	Lt gry	10	80		10													S							
276	2.5	CALCILUTITE	Lt gry		90		10													S							
301	3.0	CALCISILTITE	Lt gry		40		60		Tr											S							
328	5.0	CALCILUTITE	Lt gry	Tr	80		20		Tr											S							
346	1.5	CALCILUTITE	Lt gry	Tr	80		20		Tr											S							
366	5.0	CALCILUTITE	Lt olv gry	5	75		20		Tr											S							
384	2.0	CALCILUTITE	Lt olv gry	Tr	80		20		Tr											S							
405	2.0	CALCILUTITE	Lt olb gry	Tr	90		10		Tr											S							

STRUCTURES (STRATIFICATION, SEDIMENTARY, DIAGENETIC)

SYNGENETIC STRUCTURES

Stratification

Parallel Type

Thickness of bedding

Metric System

millimeter bed 1mm-10mm mm

centimeter bed 1cm-10cm cm

Cross Bedding

in general

with angle indicated 10°

chevron

climbing

festoon

planar

Irregular bedding

Graded bedding

No apparent bedding

Nodular bedding

Current-produced markings

Ripple marks

asymmetrical a

interference i

symmetrical s

Pull over flame structure

Scour and fill

Flute cast

Groove cast

Striation

Parting lineation

Organism-produced markings

Burrowed

slightly burrowed s

moderately burrowed m

well burrowed w

Churned

Bored

Bored surface

Organism tracks and trails

Plant root tubes

Vertebrate tracks

Penecontemporaneous deformation structures

Mud cracks

Rain or hail prints

Pull-apart

Slump structures and contorted bedding

Convolute bedding

Load cast

Tepee structure

Birdseye, fenestral fabric

EPIGENETIC STRUCTURES

Solution structures

Breccia, solution, collapse S

Disolution - compaction (horse tail)

Sylolite

Vadose pisolite

Vadose silt

Boxwork

Salt hoppers or casts

Tectonic structures

Fractures

Slickensides

Breccia, tectonic T

Miscellaneous

Geopetal fabric

Cone-in-cone

Stromatactics

Boudinage, ball and age flow

Abbreviations:

GRAIN SIZE
VF Very Fine
F Fine
M Medium
C Course
VC Very Coarse
G Granule & larger

CEMENT
Q Silica
Py Pyrite
C Calcite
D Dolomite
Sd Siderite

DIAGENESIS
D Dolomitization
Q Silicification
X Recrystallization
Ce Chloritization

ROUNDING
R Rounded
SR Subrounded
SA Subangular
A Angular

SORTING
P Poor
M Moderate
W Well
VW Very Well

HARDNESS
U Unconsolidated
VS Very Soft
S Soft
M Moderate
H Hard

POROSITY
g Intergranular
v Vugular
i Intraskeletal

ACCESSORIES
Py Pyrite
Mc Mica
Ch Chert
Cc Lignite/Coal
Hm Heavy minerals
Lf Lithic fragments
Gl Glauconite

DIAGENETIC TEXTURES
CX Crypto <1/256mm
MX Micro 1/256 - 1/16mm

HYDROCARBONS
* Signifies presence
Full details described under supplementary data

Hudbay Oil (Australia) Ltd.
Subsidiary of Hudson's Bay Oil and Gas Company Limited

SIDEWALL CORE DESCRIPTIONS

WELL: SPERM WHALE - 1

DEPTH (metres)	RECOVERY (centimetres)	ROCK TYPE	COLOUR	CLAY SIZE %		SILT SIZE %		GRAINS TYPE & %			GRAINS SIZE		CEMENT		DIAGENESIS			ROUNDING	SORTING	HARDNESS	POROSITY TYPE & %	ACCESSORIES			HYDROCARBONS	SEDIMENTARY STRUCTURES	SUPPLEMENTARY DATA
				CLAY MINERALS	MICRITE	QUARTZ	CALCITE	QUARTZ	SKELETAL	CALCITE	RANGE	DOMINANT	TYPE & %	TYPE & %	TYPE	%	TEXTURE					TYPE & %	TYPE & %	TYPE & %			
425	5.0	CALCILUTITE	Lt gry	5	60		30		5		VF	VF								S							
436	5.0	CALCILUTITE	Lt olv gry	Tr	80		20													S							
452		INSUFFICENT RECOVERY																									
467	1.5	CALCILUTITE	Lt gry	Tr	75		25													S							
483		LOST BULLET																									
500	5.0	CALCILUTITE	Lt olv gry	5	60		35		Tr											S		G Tr					
518	5.0	CALCILUTITE	Lt gry	5	60		35		Tr											S		G Tr					
534	1.5	CALCISILTITE	Lt olv gry	20	25		50		Tr						D	5	Mx			S							
554	2.5	CALCILUTITE	Lt olv gry	Tr	75		25		Tr											S		G Tr					
570	2.5	CALCILUTITE	Lt olv gry	Tr	75		25													S		G Tr					

STRUCTURES (STRATIFICATION, SEDIMENTARY, DIAGENETIC)

SYNGENETIC STRUCTURES

Stratification

Parallel Type

Thickness of bedding
Metric System
millimeter bed 1mm-10mm mm
centimeter bed 1cm-10cm cm

Cross Bedding
in general
with angle indicated 15°
chevron
climbing
festoon
planar

Irregular bedding
Graded bedding
No apparent bedding
Nodular bedding

Current-produced markings

Ripple marks
asymmetrical
interference
symmetrical
Pull over flame structure
Scour and fill
Flute cast
Groove cast
Striation
Parting lineation

Organism-produced markings

Burrowed
slightly burrowed
moderately burrowed
well burrowed
Churned
Bored
Bored surface
Organism tracks and trails
Plant root tubes
Vertebrate tracks

Penecontemporaneous deformation structures

Mud cracks
Rain or hail prints
Pull-apart
Slump structures and contorted bedding
Convolute bedding
Load cast
Tepee structure
Birdseye, fenestral fabric

EPIGENETIC STRUCTURES

Solution structures

Breccia, solution, collapse
Disolution - compaction(horse tail)
Sylolite
Vadose pisolite
Vadose silt
Boxwork
Salt hoppers or casts

Tectonic structures

Fractures
Slickensides
Breccia, tectonic

Miscellaneous

Geopetal fabric
Cone-in-cone
Stromatactics
Boudinage, ball and age flow

Abbreviations:

GRAIN SIZE
VF Very Fine
F Fine
M Medium
C Course
VC Very Coarse
G Granule & larger

CEMENT
Q Silica
Py Pyrite
C Calcite
D Dolomite
Sd Siderite

DIAGENESIS
D Dolomitization
Q Silicification
X Recrystallization
Ce Chloritization

ROUNDING
R Rounded
SR Subrounded
SA Subangular
A Angular

SORTING
P Poor
M Moderate
W Well
VW Very Well

HARDNESS
U Unconsolidated
VS Very Soft
S Soft
M Moderate
H Hard

POROSITY
g Intergranular
v Vugular
i Intraskeletal

ACCESSORIES
Py Pyrite
Mc Mica
Ch Chert
Cc Lignite/Coal
Hm Heavy minerals
Lf Lithic fragments
Gl Glauconite

DIAGENETIC TEXTURES
CX Crypto <1/256mm
MX Micro 1/256 - 1/16mm

HYDROCARBONS
* Signifies presence
Full details described under supplementary data

Hudbay Oil (Australia) Ltd.
Subsidiary of Hudson's Bay Oil and Gas Company Limited

SIDEWALL CORE DESCRIPTIONS

WELL: SPERM WHALE - 1

DEPTH (metres)	RECOVERY (centimetres)	ROCK TYPE	COLOUR	CLAY SIZE %		SILT SIZE %		GRAINS TYPE & %			GRAINS SIZE		CEMENT		DIAGENESIS			ROUNDING	SORTING	HARDNESS	POROSITY TYPE & %	ACCESSORIES			HYDROCARBONS	SEDIMENTARY STRUCTURES	SUPPLEMENTARY DATA
				CLAY MINERALS	MICRITE	QUARTZ	CALCITE	QUARTZ	SKELETAL	CALCITE	RANGE	DOMINANT	TYPE & %	TYPE & %	TYPE	%	TEXTURE					TYPE & %	TYPE & %	TYPE & %			
587	3.0	CALCILUTITE	Lt olv gry	Tr	80		20													S		Mc Tr					
604	5.0	CALCILUTITE	Olv gry - lt olv gry	10	85		5													S		Mc Tr					
621	2.5	CALCILUTITE	Lt olv gry - olv gry	15	80		5													S		G Tr					
638	5.0	Calcareous CLAYSTONE	Olv gry	60	40															S-M							
662	4.5	Calcareous CLAYSTONE	Olv gry - lt olv gry	40	30		25													S-M		G 5					
672	2.0	CALCILUTITE	Lt olv gry	25	40		20		15		VF -F	VF								S							
682	1.5	Argillaceous CALCILUTITE	Lt olv gry	30	30		20		20		VF -F	VF								S							
692	4.0	Calcareous CLAYSTONE	Olv gry	50	30		20													S							
702	4.0	Calcareous CLAYSTONE	Olv gry	40	40		20													S							
712	2.5	Calcareous CLAYSTONE	Olv gry	40	40		20													S							

STRUCTURES (STRATIFICATION, SEDIMENTARY, DIAGENETIC)

SYNGENETIC STRUCTURES

Stratification

Parallel Type

Thickness of bedding
Metric System
millimeter bed 1mm-10mm mm
centimeter bed 1cm-10cm cm

Cross Bedding
in general
with angle indicated ∠10°
chevron
climbing
festoon
planar

Irregular bedding
Graded bedding
No apparent bedding
Nodular bedding

Current-produced markings
Ripple marks
asymmetrical
interference
symmetrical
Pull over flame structure
Scour and fill
Flute cast
Groove cast
Striation
Parting lineation

Organism-produced markings
Burrowed
slightly burrowed
moderately burrowed
well burrowed
Churned
Bored
Bored surface
Organism tracks and trails
Plant root tubes
Vertebrate tracks

Penecontemporaneous deformation structures
Mud cracks
Rain or hail prints
Pull-apart
Slump structures and contorted bedding
Convolute bedding
Load cast
Tepee structure
Birdseye, fenestral fabric

EPIGENETIC STRUCTURES

Solution structures
Breccia, solution, collapse
Disolution - compaction(horse tail)
Sylolite
Vadose pisolite
Vadose silt
Boxwork
Salt hoppers or casts

Tectonic structures
Fractures
Slickensides
Breccia, tectonic

Miscellaneous
Geopetal fabric
Cone-in-cone
Stromatactics
Boudinage, ball and age flow

Abbreviations:

GRAIN SIZE
VF Very Fine
F Fine
M Medium
C Course
VC Very Coarse
G Granule & larger

CEMENT
Q Silica
Py Pyrite
C Calcite
D Dolomite
Sd Siderite

DIAGENESIS
D Dolomitization
Q Silicification
X Recrystallization
Ce Chloritization

ROUNDING
R Rounded
SR Subrounded
SA Subangular
A Angular

SORTING
P Poor
M Moderate
W Well
VW Very Well

HARDNESS
U Unconsolidated
VS Very Soft
S Soft
M Moderate
H Hard

POROSITY
g Intergranular
v Vugular
i Intraskeletal

ACCESSORIES
Py Pyrite
Mc Mica
Ch Chert
Cc Lignite/Coal
Hm Heavy minerals
Lf Lithic fragments
Gl Glauconite

DIAGENETIC TEXTURES
CX Crypto <1/256mm
MX Micro 1/256 - 1/16mm

HYDROCARBONS
* Signifies presence
Full details described under supplementary data

Hudbay Oil (Australia) Ltd.
Subsidiary of Hudson's Bay Oil and Gas Company Limited

SIDEWALL CORE DESCRIPTIONS

WELL: SPERM WHALE - 1

DEPTH (metres)	RECOVERY (centimetres)	ROCK TYPE	COLOUR	CLAY SIZE %		SILT SIZE %		GRAINS TYPE & %			GRAINS SIZE		CEMENT		DIAGENESIS			ROUNDING	SORTING	HARDNESS	POROSITY TYPE & %	ACCESSORIES			HYDROCARBONS	SEDIMENTARY STRUCTURES	SUPPLEMENTARY DATA
				CLAY MINERALS	MICRITE	QUARTZ	CALCITE	QUARTZ	SKELETAL	CALCITE	RANGE	DOMINANT	TYPE & %	TYPE & %	TYPE	%	TEXTURE					TYPE & %	TYPE & %	TYPE & %			
723	4.7	CALCILUTITE	Olv gry	30	70				10						X	Tr	Mx			M							
727	3.1	Calcilutitic CALCISILTITE	Pale olv gry	10	20	60		Tr							X	10	Mx			H							
734	4.8	CALCILUTITE	Med to olv gry	5	65	10			10						X	10	Mx			H		Cc Tr					
741	4.1	CALCILUTITE	Olv gry	15	70	5									X	10	Mx			M-H							
750	3.5	Argillaceous MICRITE	Olv gry	30	60			5							X	5	Mx			S-M		G Tr					
756	2.5	Calcilutitic CALCISILTITE	Lt olv gry - Olv gry		45		45		Tr						X	10	Mx			S-M							
762	2.0	CALCISILTITE	Lt olv gry		15		70			Tr					X	15	Mx			H		Py Tr					
768	4.4	CALCILUTITE	Olv gry		100					Tr					X	Tr	Mx			H		Py Tr					
773	5.0	CALCILUTITE	Olv gry		65		15		Tr	Tr					X	15	Mx			M		Py 5					
782	4.8	CALCILUTITE	Olv gry		85		10		Tr						X	5	Mx			S-M		Py Tr					Shell fragments are recrystallised

STRUCTURES (STRATIFICATION, SEDIMENTARY, DIAGENETIC)

SYNGENETIC STRUCTURES

Stratification

Parallel Type

Thickness of bedding

Metric System

millimeter bed — 1mm-10mm mm

centimeter bed — 1cm-10cm cm

Cross Bedding

in general

with angle indicated 12°

chevron

climbing

festoon

planar

Irregular bedding

Graded bedding

No apparent bedding

Nodular bedding

Current-produced markings

Ripple marks

asymmetrical

interference

symmetrical

Pull over flame structure

Scour and fill

Flute cast

Groove cast

Striation

Parting lineation

Organism-produced markings

Burrowed

slightly burrowed

moderately burrowed

well burrowed

Churned

Bored

Bored surface

Organism tracks and trails

Plant root tubes

Vertebrate tracks

Penecontemporaneous deformation structures

Mud cracks

Rain or hail prints

Pull-apart

Slump structures and contorted bedding

Convolute bedding

Load cast

Tepee structure

Birdseye, fenestral fabric

EPIGENETIC STRUCTURES

Solution structures

Breccia, solution, collapse

Disolution - compaction(horse tail)

Sylolite

Vadose pisolite

Vadose silt

Boxwork

Salt hoppers or casts

Tectonic structures

Fractures

Slickensides

Breccia, tectonic

Miscellaneous

Geopetal fabric

Cone-in-cone

Stromatactics

Boudinage, ball and age flow

Abbreviations

GRAIN SIZE: VF Very Fine; F Fine; M Medium; C Course; VC Very Coarse; G Granule & larger

CEMENT: Q Silica; Py Pyrite; C Calcite; D Dolomite; Sd Siderite

DIAGENESIS: D Dolomitization; Q Silicification; X Recrystallization; Ce Chloritization

ROUNDING: R Rounded; SR Subrounded; SA Subangular; A Angular

SORTING: P Poor; M Moderate; W Well; VW Very Well

HARDNESS: U Unconsolidated; VS Very Soft; S Soft; M Moderate; H Hard

POROSITY: g Intergranular; v Vugular; i Intraskeletal

ACCESSORIES: Py Pyrite; Mc Mica; Ch Chert; Cc Lignite/Coal; Hm Heavy minerals; Lf Lithic fragments; Gl Glauconite

DIAGENETIC TEXTURES: CX Crypto<1/256mm; MX Micro 1/256 - 1/16mm

HYDROCARBONS: * Signifies presence. Full details described under supplementary data

A4-GL-514

Hudbay Oil (Australia) Ltd.
Subsidiary of Hudson's Bay Oil and Gas Company Limited

SIDEWALL CORE DESCRIPTIONS

WELL: SPERM WHALE - 1

DEPTH (metres)	RECOVERY (centimetres)	ROCK TYPE	COLOUR	CLAY SIZE %		SILT SIZE %		GRAINS TYPE & %			GRAINS SIZE		CEMENT		DIAGENESIS			ROUNDING	SORTING	HARDNESS	POROSITY TYPE & %	ACCESSORIES			HYDROCARBONS	SEDIMENTARY STRUCTURES	SUPPLEMENTARY DATA
				CLAY MINERALS	MICRITE	QUARTZ	CALCITE	QUARTZ	SKELETAL	CALCITE	RANGE	DOMINANT	TYPE & %	TYPE & %	TYPE	%	TEXTURE					TYPE & %	TYPE & %	TYPE & %			
787	4.1	Calcilutitic CALCISILTITE	Med gry - olv gry		20		40		Tr	Tr					O X	15 25	Mx Mx			M- H		G Tr	Py Tr			≈	Fine laminations
792	5.0	Calcilutitic CALCISILTITE	Grnsh gry		10		20		Tr						X	70	Mx			H		Py Tr				=	
799	5.5	CALCILUTITE	V lt gry and med gry		85		5		Tr	5			C 5							S		Py Tr				≈	Irregular lump of v.lt gry Clslt Bivalve and coral stems evident replaced by calcite
803.9	3.2	CALCARENITE	Lt grnsh gry		10	10	10	30		30	VF-F	VF						A-SA	W	M		G 10				≈	Mnr clast of Clclt, pale brn & some gry Clslt. Min Fluor only
806	4.0	Argillaceous SILTSTONE	Dk gry - olv blk	25		50		20			VF							A-SR	W	VS		Py 5				.....	
812	5.0	SANDSTONE	Olv blk	5				95			VF-G	C-VC						A-R	P	U	g 25				*	=	Mnr Tr Spl Fluor. V. Min slow blooming mky solu Fluor - no cut
817	5.0	SILTSTONE PYRITE SANDSTONE	Dk yel brn Lt olv gry Med gry	35 - 10		60 - -		5 - 70			VF - VF-M	F						- - A-	- - M	S M VS	- - g 10	Py Tr Py100 Py 20	Cc Tr - Cc Tr		*	≈ ~	Load cast with Pyr & silt over sand Minor Tr slow blooming milky solu fluor
821	2.5-3.0	SANDSTONE	Med dk - dk gry	Tr-5				100-95			C-G	VC						SA-SR	P	U	g 30	Cc Tr	? Lf Tr	? Py Tr	*	=	No Spl Fluor -Slow blooming lemon solv Fluor -Tr gry cut
825	4.2	SANDSTONE	Lt olv gry	5				95			F-C	M						SA-R	M	U	g 25	Cc Tr			*	=	Mnr Tr, dull, lemon Spl Fluor -Slow blooming lemon solv Fluor -no cut
828	4.5	SANDSTONE	Brnsh blk	Tr-5				100-95			F-G	VC						SA-SR	P	U	g 30					=	Clay may be due to filtrate or O res Oily smell no Fluor (Spl solv or cut)

STRUCTURES (STRATIFICATION, SEDIMENTARY, DIAGENETIC)

SYNGENETIC STRUCTURES

Stratification

Parallel Type

Thickness of bedding

Metric System

millimeter bed 1mm-10mm mm
centimeter bed 1cm-10cm cm

Cross Bedding
- in general
- with angle indicated ∠10°
- chevron
- climbing
- festoon
- planar

Irregular bedding
Graded bedding
No apparent bedding
Nodular bedding

Current-produced markings

- Ripple marks
  - asymmetrical
  - interference
  - symmetrical
- Pull over flame structure
- Scour and fill
- Flute cast
- Groove cast
- Striation
- Parting lineation

Organism-produced markings

- Burrowed
  - slightly burrowed
  - moderately burrowed
  - well burrowed
- Churned
- Bored
- Bored surface
- Organism tracks and trails
- Plant root tubes
- Vertebrate tracks

Penecontemporaneous deformation structures

- Mud cracks
- Rain or hail prints
- Pull-apart
- Slump structures and contorted bedding
- Convolute bedding
- Load cast
- Tepee structure
- Birdseye, fenestral fabric

EPIGENETIC STRUCTURES

Solution structures

- Breccia, solution, collapse
- Disolution - compaction(horse tail)
- Sylolite
- Vadose pisolite
- Vadose silt
- Boxwork
- Salt hoppers or casts

Tectonic structures

- Fractures
- Slickensides
- Breccia, tectonic

Miscellaneous

- Geopetal fabric
- Cone-in-cone
- Stromatactics
- Boudinage, ball and age flow

Abbreviations

GRAIN SIZE
VF Very Fine
F Fine
M Medium
C Course
VC Very Coarse
G Granule & larger

CEMENT
Q Silica
Py Pyrite
C Calcite
D Dolomite
Sd Siderite

DIAGENESIS
D Dolomitization
Q Silicification
X Recrystallization
Ce Chloritization

ROUNDING
R Rounded
SR Subrounded
SA Subangular
A Angular

SORTING
P Poor
M Moderate
W Well
VW Very Well

HARDNESS
U Unconsolidated
VS Very Soft
S Soft
M Moderate
H Hard

POROSITY
g Intergranular
v Vugular
i Intraskeletal

ACCESSORIES
Py Pyrite
Mc Mica
Ch Chert
Cc Lignite/Coal
Hm Heavy minerals
Lf Lithic fragments
Gl Glauconite

DIAGENETIC TEXTURES
CX Crypto <1/256mm
MX Micro 1/256 - 1/16mm

HYDROCARBONS
* Signifies presence
Full details described under supplementary data

Hudbay Oil (Australia) Ltd.
Subsidiary of Hudson's Bay Oil and Gas Company Limited

SIDEWALL CORE DESCRIPTIONS

WELL: SPERM WHALE-1

DEPTH (metres)	RECOVERY (centimetres)	ROCK TYPE	COLOUR	CLAY SIZE %		SILT SIZE %		GRAINS TYPE & %			GRAINS SIZE		CEMENT		DIAGENESIS			ROUNDING	SORTING	HARDNESS	POROSITY TYPE & %	ACCESSORIES			HYDROCARBONS	SEDIMENTARY STRUCTURES	SUPPLEMENTARY DATA
				CLAY MINERALS	MICRITE	QUARTZ	CALCITE	QUARTZ	SKELETAL	CALCITE	RANGE	DOMINANT	TYPE & %	TYPE & %	TYPE	%	TEXTURE					TYPE & %	TYPE & %	TYPE & %			
833	5.0	SANDSTONE	Lt olv gry - olv gry	Tr - 5				100 -95			F-VC	C						SA-SR	M	U	g 30	Cc Tr			*	⫩	-50-70% lemon-wh Fluor -Instant streaming & blooming Bl-wh solv -V dull yel cut Oily smell
843	4.8	COAL SILTSTONE SANDSTONE	Blk Dusky yel brn Olv gry	- 15 5		75 -		- 10 95			- VF M-G	- VF C						- SR SA	- W M	S-M VS U	- - g 20	Cc 100 - -			- - -	≋ ⩛	-Ctc between A & T is sharp -Sand is cleaner at contacts -Sd strgrs (1mm) between silt & coal
846	5.3	CLAYSTONE	Olv blk	100																S-M						⫩	
851	4.0	Argillaceous Arenaceous SILTSTONE	Lt olv gry	20		60		20			VF	VF						SA	W	S		Py Tr	Lf Tr	Cc Tr		⫩	
859	2.0	SANDSTONE	Lt olv gry	Tr				100			F-G	C-G						SA-R	P	U	g 30				*	⫩	-Grains 5-10mm in diameter Nil-Tr lemon p.p. Fluor Tr blooming (slow) solv Fluor
869	4.0	SANDSTONE	Lt gry - Lt olv gry	Tr				100			F-VC	M-C						SA-SR	M	U	g 25	Cc Tr				⫩	May-be?? Some oil staining???
877	4.8	SANDSTONE	Lt gry	Tr				100			F-G	VC						SA-R	P	U	g 25	Cc Tr				⫩	Smokey Quartz
885	5.0	SANDSTONE	Med gry	5	Tr			95			F-C	M	Q Tr					SA-SR	M	U	g 20					⫩	
896	3.8	Argillaceous SILTSTONE	Lt olv gry	25		65		10			VF	VF	Q Tr	C Tr				SA	W	S		Cc Tr				⫩	
904	5.0	SANDSTONE	Lt olv gry	10				90			VF-M	VF	Q Tr					SA-SR	W	VS	g 5	Lf Tr			*	⫩	Mnr iron staining Tr orange Fluor No cut

STRUCTURES (STRATIFICATION, SEDIMENTARY, DIAGENETIC)

Stratification

Parallel Type

Thickness of bedding

Metric System

millimeter bed — 1mm-10mm (mm)
centimeter bed — 1cm-10cm (cm)

Cross Bedding
- in general
- with angle indicated (10°)
- chevron
- climbing
- festoon
- planar

Irregular bedding
Graded bedding
No apparent bedding
Nodular bedding

SYNGENETIC STRUCTURES

Current-produced markings
- Ripple marks: asymmetrical (a), interference (i), symmetrical (s)
- Pull over flame structure
- Scour and fill
- Flute cast
- Groove cast
- Striation
- Parting lineation

Organism-produced markings
- Burrowed: slightly burrowed (s), moderately burrowed (m), well burrowed (w)
- Churned
- Bored
- Bored surface
- Organism tracks and trails
- Plant root tubes
- Vertebrate tracks

Penecontemporaneous deformation structures
- Mud cracks
- Rain or hail prints
- Pull-apart
- Slump structures and contorted bedding
- Convolute bedding
- Load cast
- Tepee structure
- Birdseye, fenestral fabric

EPIGENETIC STRUCTURES

Solution structures
- Breccia, solution, collapse (S)
- Disolution - compaction (horse tail)
- Sylolite
- Vadose pisolite
- Vadose silt
- Boxwork
- Salt hoppers or casts

Tectonic structures
- Fractures
- Slickensides
- Breccia, tectonic (T)

Miscellaneous
- Geopetal fabric
- Cone-in-cone
- Stromatactics
- Boudinage, ball and age flow

Abbreviations:

GRAIN SIZE
VF Very Fine; F Fine; M Medium; C Course; VC Very Coarse; G Granule & larger

CEMENT
Q Silica; Py Pyrite; C Calcite; D Dolomite; Sd Siderite

DIAGENESIS
D Dolomitization; Q Silicification; X Recrystallization; Ce Chloritization

ROUNDING
R Rounded; SR Subrounded; SA Subangular; A Angular

SORTING
P Poor; M Moderate; W Well; VW Very Well

HARDNESS
U Unconsolidated; VS Very Soft; S Soft; M Moderate; H Hard

POROSITY
g Intergranular; v Vugular; i Intraskeletal

ACCESSORIES
Py Pyrite; Mc Mica; Ch Chert; Cc Lignite/Coal; Hm Heavy minerals; Lf Lithic fragments; Gl Glauconite

DIAGENETIC TEXTURES
CX Crypto <1/256mm
MX Micro 1/256 - 1/16mm

HYDROCARBONS
* Signifies presence
Full details described under supplementary data

Hudbay Oil (Australia) Ltd.
Subsidiary of Hudson's Bay Oil and Gas Company Limited

SIDEWALL CORE DESCRIPTIONS

WELL: SPERM WHALE - 1

DEPTH (metres)	RECOVERY (centimetres)	ROCK TYPE	COLOUR	CLAY SIZE %		SILT SIZE %		GRAINS TYPE & %			GRAINS SIZE		CEMENT		DIAGENESIS			ROUNDING	SORTING	HARDNESS	POROSITY TYPE & %	ACCESSORIES			HYDROCARBONS	SEDIMENTARY STRUCTURES	SUPPLEMENTARY DATA
				CLAY MINERALS	MICRITE	QUARTZ	CALCITE	QUARTZ	SKELETAL	CALCITE	RANGE	DOMINANT	TYPE & %	TYPE & %	TYPE	%	TEXTURE					TYPE & %	TYPE & %	TYPE & %			
917	2.6	Silty SANDSTONE	Lt olv gry	5		30		65			VF	VF	Q Tr					SR	W	VS	g Tr	Lf Tr	Cc Tr			≠	
923	4.0	SANDSTONE	Lt gry	10				90			VF-C	M	Q Tr					SA-SR	W	U	g 20	Lf Tr	Cc Tr			≠	
932	2.0	Argillaceous SANDSTONE	Lt gry	30		10		60			VF-G	VF	Q Tr					A-SR	W	S	g Tr					≠	5mm + Quartz grain some smokey quartz
940	2.0	Silty SANDSTONE	V Lt gry	20		40		40			VF-G	VF	Q Tr					SR-R	P	S	g Tr					≠	Two quartz pebbles greater than 5mm
948	3.0	Argillaceous SANDSTONE	Med blsh gry	45		5		40			VF-F	F	Q Tr					SA	W	S-M	g Tr	Lf 10			*	≠	Spl is Mtrx supported. No spl Fluor, solv Fluor slow mky yel (blooming)
958	3.8	CLAYSTONE	Med gry	85		15												SA-SR		M		Cc Tr	Py Tr			≠	Laminations apparent
964	4.1	SANDSTONE	Med blsh gry	15		5		50			VF-M	F	Q Tr					SA-SR	W	M	g Tr	Lf 30	Cc Tr			≠	
969	4.0	SANDSTONE	Med gry	10		Tr		70			VF-M	F	Q Tr					SA-SR	W	S-M	g Tr	Lf 20	Cc Tr			≠	Mnr lamination due to percent increase of coal or silt
977	1.8	SANDSTONE	Med gry	15		10		55			VF-M	F	Q Tr					SA-SR	W	S-M	g Tr	Lf 20	Cc Tr			≈	
989	3.0	Argillaceous SANDSTONE	Med bl gry	20		Tr		45			VF-F	F	Q Tr					SA-SR	W	S-M	g Tr	Lf 30	Cc 5			≠	

STRUCTURES (STRATIFICATION, SEDIMENTARY, DIAGENETIC)

SYNGENETIC STRUCTURES

Stratification

Parallel Type

Thickness of bedding
Metric System
millimeter bed 1mm-10mm mm
centimeter bed 1cm-10cm cm

Cross Bedding
in general
with angle indicated 10°
chevron
climbing
festoon
planar

Irregular bedding
Graded bedding
No apparent bedding
Nodular bedding

Current-produced markings

Ripple marks
asymmetrical
interference
symmetrical
Pull over flame structure
Scour and fill
Flute cast
Groove cast
Striation
Parting lineation

Organism-produced markings

Burrowed
slightly burrowed
moderately burrowed
well burrowed
Churned
Bored
Bored surface
Organism tracks and trails
Plant root tubes
Vertebrate tracks

Penecontemporaneous deformation structures

Mud cracks
Rain or hail prints
Pull-apart
Slump structures and contorted bedding
Convolute bedding
Load cast
Tepee structure
Birdseye, fenestral fabric

EPIGENETIC STRUCTURES

Solution structures

Breccia, solution, collapse
Disolution - compaction(horse tail)
Sylolite
Vadose pisolite
Vadose silt
Boxwork
Salt hoppers or casts

Tectonic structures

Fractures
Slickensides
Breccia, tectonic

Miscellaneous

Geopetal fabric
Cone-in-cone
Stromatactics
Boudinage, ball and age flow

Abbreviations:

GRAIN SIZE: VF Very Fine; F Fine; M Medium; C Course; VC Very Coarse; G Granule & larger

CEMENT: Q Silica; Py Pyrite; C Calcite; D Dolomite; Sd Siderite

DIAGENESIS: D Dolomitization; Q Silicification; X Recrystallization; Ce Chloritization

ROUNDING: R Rounded; SR Subrounded; SA Subangular; A Angular

SORTING: P Poor; M Moderate; W Well; VW Very Well

HARDNESS: U Unconsolidated; VS Very Soft; S Soft; M Moderate; H Hard

POROSITY: g Intergranular; v Vugular; i Intraskeletal

ACCESSORIES: Py Pyrite; Mc Mica; Ch Chert; Cc Lignite/Coal; Hm Heavy minerals; Lf Lithic fragments; Gl Glauconite

DIAGENETIC TEXTURES: CX Crypto <1/256mm; MX Micro 1/256 - 1/16mm

HYDROCARBONS: * Signifies presence. Full details described under supplementary data

Hudbay Oil (Australia) Ltd.
Subsidiary of Hudson Bay Oil and Gas Company Limited

SIDEWALL CORE DESCRIPTIONS

WELL: SPERM WHALE-1

DEPTH (metres)	RECOVERY (centimetres)	ROCK TYPE	COLOUR	CLAY SIZE %		SILT SIZE %		GRAINS TYPE & %			SIZE		CEMENT		DIAGENESIS			ROUNDING	SORTING	HARDNESS	POROSITY TYPE & %	ACCESSORIES			HYDROCARBONS	SEDIMENTARY STRUCTURES	SUPPLEMENTARY DATA
				CLAY MINERALS	MICRITE	QUARTZ	CALCITE	QUARTZ	SKELETAL	CALCITE	RANGE	DOMINANT	TYPE & %	TYPE & %	TYPE	%	TEXTURE					TYPE & %	TYPE & %	TYPE & %			
998	0.5	Argillaceous SANDSTONE	Lt gry	25		5		50			VF	VF	Q Tr					SA-SR	W	H		Lf 20	Cc Tr			≠	
1010	4.0	SANDSTONE	Med bl gry	10				70			VF-M	F	Q Tr					SA-SR	M	M	g Tr	Cc 5	Ch Tr	Lf 15		≠	
1020	3.0	CLAYSTONE	Olv gry	80		15		5			VF							SR	W	M		Cc Tr					Laminations of silt
1031	3.4	SANDSTONE	Med gry	10				80			VF-F	VF	Q Tr					SA-SR	W	M	g Tr	Lf 10	Cc Tr			≠	
1041.9	2.5	SANDSTONE	Med gry	15				75			VF-F	VF	Q Tr					SA-SR	W	S-M	g Tr	Lf 10	Cc Tr			≠	
1050	3.0	CLAYSTONE	Dk gry	90		10							C Tr							M		Cc Tr	Py Tr				
1060	2.4	SANDSTONE	Med bl gry	15		5		75			VF-F	VF	Q Tr					SA-SR	W	S-M	g Tr	Lf 5	Py Tr			≠	
1072	2.9	SANDSTONE	Med gry	10				90			VF-M	F	Q Tr					SA-SR	W	S-M	g Tr	Lf Tr				≠	
1080	3.2	SANDSTONE	Med gry	15		5		70			VF-F	F	Q Tr					SA-R	W	S-M	g Tr	Cc 10	Lf Tr			≠	
1090	3.0	Argillaceous SANDSTONE	Med gry	20				80			VF-F	VF	Q Tr					SA-R	W	H	g Tr	Lf Tr				≠	

STRUCTURES (STRATIFICATION, SEDIMENTARY, DIAGENETIC)

SYNGENETIC STRUCTURES

Stratification

Parallel Type

Thickness of bedding
Metric System
millimeter bed 1mm-10mm mm
centimeter bed 1cm-10cm cm

Cross Bedding
in general
with angle indicated 10°
chevron
climbing
festoon
planar

Irregular bedding
Graded bedding
No apparent bedding
Nodular bedding

Current-produced markings

Ripple marks
asymmetrical
interference
symmetrical
Pull over flame structure
Scour and fill
Flute cast
Groove cast
Striation
Parting lineation

Organism-produced markings

Burrowed
slightly burrowed
moderately burrowed
well burrowed
Churned
Bored
Bored surface
Organism tracks and trails
Plant root tubes
Vertebrate tracks

Penecontemporaneous deformation structures

Mud cracks
Rain or hail prints
Pull-apart
Slump structures and contorted bedding
Convolute bedding
Load cast
Tepee structure
Birdseye, fenestral fabric

EPIGENETIC STRUCTURES

Solution structures

Breccia, solution, collapse
Disolution - compaction(horse tail)
Sylolite
Vadose pisolite
Vadose silt
Boxwork
Salt hoppers or casts

Tectonic structures

Fractures
Slickensides
Breccia, tectonic

Miscellaneous

Geopetal fabric
Cone-in-cone
Stromatactics
Boudinage, ball and age flow

Abbreviations:

GRAIN SIZE
VF Very Fine
F Fine
M Medium
C Course
VC Very Coarse
G Granule & larger

CEMENT
Q Silica
Py Pyrite
C Calcite
D Dolomite
Sd Siderite

DIAGENESIS
D Dolomitization
Q Silicification
X Recrystallization
Ce Chloritization

ROUNDING
R Rounded
SR Subrounded
SA Subangular
A Angular

SORTING
P Poor
M Moderate
W Well
VW Very Well

HARDNESS
U Unconsolidated
VS Very Soft
S Soft
M Moderate
H Hard

POROSITY
g Intergranular
v Vugular
i Intraskeletal

ACCESSORIES
Py Pyrite
Mc Mica
Ch Chert
Cc Lignite/Coal
Hm Heavy minerals
Lf Lithic fragments
Gl Glauconite

DIAGENETIC TEXTURES
CX Crypto<1/256mm
MX Micro 1/256 - 1/16mm

HYDROCARBONS
* Signifies presence
Full details described under supplementary data

Hudbay Oil (Australia) Ltd.
Subsidiary of Hudson's Bay Oil and Gas Company Limited

SIDEWALL CORE DESCRIPTIONS

WELL: SPERM WHALE - 1

DEPTH (metres)	RECOVERY (centimetres)	ROCK TYPE	COLOUR	CLAY SIZE %		SILT SIZE %		GRAINS TYPE & %			GRAINS SIZE		CEMENT		DIAGENESIS			ROUNDING	SORTING	HARDNESS	POROSITY TYPE & %	ACCESSORIES			HYDROCARBONS	SEDIMENTARY STRUCTURES	SUPPLEMENTARY DATA
				CLAY MINERALS	MICRITE	QUARTZ	CALCITE	QUARTZ	SKELETAL	CALCITE	RANGE	DOMINANT	TYPE & %	TYPE & %	TYPE	%	TEXTURE					TYPE & %	TYPE & %	TYPE & %			
1100	2.7	CLAYSTONE	Med to dk gry	100																M							
1110	2.6	CLAYSTONE	Med gry	100																M							
1120	3.5	SANDSTONE	Med gry	10				70			VF-F	VF	Q Tr					SA-SR	W	M	g Tr	G Tr	Lf 20				
1131.1	3.1	CLAYSTONE	Olv blk	100																M							
1142	4.0	Argillaceous SILTSTONE	Med gry	25		60		15			VF							SA-SR	W	M		Py Tr					
1152.1	3.5	CLAYSTONE	Grnsh blk	100																H							
1162	3.5	Argillaceous SILTSTONE	Med gry	30		60		10			VF							SA-SR	W	H							
1172	4.0	SANDSTONE	Lt blsh gry	10				75			VF-F	F	Q 5					SA-SR	W	H	g Tr	Lf 10	Cc Tr				Mnr laminae of coal denoting bedding
1181.9	3.2	SANDSTONE	Grnsh blk	5				75			VF-F	F	Q 10					SA-SR	W	H	g Tr	Lf 10	Cc Tr				Some quartz grains appear stained (Iron)
1191.9	3.6	Lithic SANDSTONE	Grnsh gry					70			VF-M	F	Q 5					SA-SR	W	H	g Tr	Lf 25	Cc Tr	G Tr			

STRUCTURES (STRATIFICATION, SEDIMENTARY, DIAGENETIC)

SYNGENETIC STRUCTURES

Stratification

Parallel Type

Thickness of bedding

Metric System

millimeter bed — 1mm-10mm mm

centimeter bed — 1cm-10cm cm

Cross Bedding

in general

with angle indicated ∠10°

chevron

climbing

festoon

planar

Irregular bedding

Graded bedding

No apparent bedding

Nodular bedding

Current-produced markings

Ripple marks

asymmetrical

interference

symmetrical

Pull over flame structure

Scour and fill

Flute cast

Groove cast

Striation

Parting lineation

Organism-produced markings

Burrowed

slightly burrowed

moderately burrowed

well burrowed

Churned

Bored

Bored surface

Organism tracks and trails

Plant root tubes

Vertebrate tracks

Penecontemporaneous deformation structures

Mud cracks

Rain or hail prints

Pull-apart

Slump structures and contorted bedding

Convolute bedding

Load cast

Tepee structure

Birdseye, fenestral fabric

EPIGENETIC STRUCTURES

Solution structures

Breccia, solution, collapse (S)

Disolution - compaction (horse tail)

Sylolite

Vadose pisolite (V)

Vadose silt

Boxwork

Salt hoppers or casts

Tectonic structures

Fractures

Slickensides

Breccia, tectonic (T)

Miscellaneous

Geopetal fabric

Cone-in-cone

Stromatactics

Boudinage, ball and age flow

Abbreviations:

GRAIN SIZE
VF Very Fine
F Fine
M Medium
C Course
VC Very Coarse
G Granule & larger

CEMENT
Q Silica
Py Pyrite
C Calcite
D Dolomite
Sd Siderite

DIAGENESIS
D Dolomitization
Q Silicification
X Recrystallization
Ce Chloritization

ROUNDING
R Rounded
SR Subrounded
SA Subangular
A Angular

SORTING
P Poor
M Moderate
W Well
VW Very Well

HARDNESS
U Unconsolidated
VS Very Soft
S Soft
M Moderate
H Hard

POROSITY
g Intergranular
v Vugular
i Intraskeletal

ACCESSORIES
Py Pyrite
Mc Mica
Ch Chert
Cc Lignite/Coal
Hm Heavy minerals
Lf Lithic fragments
Gl Glauconite

DIAGENETIC TEXTURES
CX Crypto < 1/256mm
MX Micro 1/256 - 1/16mm

HYDROCARBONS
* Signifies presence
Full details described under supplementary data

Hudbay Oil (Australia) Ltd.
Subsidiary of Hudson's Bay Oil and Gas Company Limited

SIDEWALL CORE DESCRIPTIONS

WELL: SPERM WHALE - 1

DEPTH (metres)	RECOVERY (centimetres)	ROCK TYPE	COLOUR	CLAY SIZE %		SILT SIZE %		GRAINS TYPE & %			GRAINS SIZE		CEMENT		DIAGENESIS			ROUNDING	SORTING	HARDNESS	POROSITY TYPE & %	ACCESSORIES			HYDROCARBONS	SEDIMENTARY STRUCTURES	SUPPLEMENTARY DATA
				CLAY MINERALS	MICRITE	QUARTZ	CALCITE	QUARTZ	SKELETAL	CALCITE	RANGE	DOMINANT	TYPE & %	TYPE & %	TYPE	%	TEXTURE					TYPE & %	TYPE & %	TYPE & %			
1207	2.0	CLAYSTONE	Grysh blk	100																S-M						≠	
1217.9	3.2	Lithic SANDSTONE	Med blsh gry					55			F-M	M	Q 10					SA-SR	W	H	g Tr	Lf 35				≠	
1228	2.2	Argillaceous SANDSTONE	Grnsh blk	30				50			VF-F	F	Q Tr					SA-SR	W	H	g Tr	Lf 20					Mud clasts, coal beds, reddish sand grains
1238.1	1.5	Lithic SANDSTONE	Grnsh gry					70			VF-F	G	Q 5					SA-SR	W	S-M	g Tr	Lf 25					Reddish sand-size grains
1244.9	2.6	Silty CLAYSTONE	Med gry	60		30		10			VF							SA-SR	W	H		Cc Tr					
1252.9	1.8	CLAYSTONE	Med dk gry	100																M							
1261	2.0	CLAYSTONE	Olv blk	100																M		Cc Tr					
1272.9	3.0	SANDSTONE	Med blsh gry					75			VF-F	F	Q 10					SA-SR	W	M	g Tr	Lf 15					
1282.9	1.6	SANDSTONE	Grnsh blk	5		20		55			VF-F	F	C Tr					SA-SR	W	M	g Tr	Lf 20					Clay and silt occur as foreign bodies (clasts)
1292.9	2.6	SANDSTONE	Med dk gry					75					C 5					SA-SR	W	M	g Tr	Lf 20					

STRUCTURES (STRATIFICATION, SEDIMENTARY, DIAGENETIC)

SYNGENETIC STRUCTURES

Stratification

Parallel Type

Thickness of bedding
Metric System
millimeter bed 1mm-10mm mm
centimeter bed 1cm-10cm cm

Cross Bedding
in general
with angle indicated ∠10°
chevron
climbing
festoon
planar

Irregular bedding
Graded bedding
No apparent bedding
Nodular bedding

Current-produced markings

Ripple marks
asymmetrical
interference
symmetrical
Pull over flame structure
Scour and fill
Flute cast
Groove cast
Striation
Parting lineation

Organism-produced markings

Burrowed
slightly burrowed
moderately burrowed
well burrowed
Churned
Bored
Bored surface
Organism tracks and trails
Plant root tubes
Vertebrate tracks

Penecontemporaneous deformation structures

Mud cracks
Rain or hail prints
Pull-apart
Slump structures and contorted bedding
Convolute bedding
Load cast
Tepee structure
Birdseye, fenestral fabric

EPIGENETIC STRUCTURES

Solution structures

Breccia, solution, collapse
Disolution - compaction (horse tail)
Sylolite
Vadose pisolite
Vadose silt
Boxwork
Salt hoppers or casts

Tectonic structures

Fractures
Slickensides
Breccia, tectonic

Miscellaneous

Geopetal fabric
Cone-in-cone
Stromatactics
Boudinage, ball and age flow

Abbreviations:

GRAIN SIZE
VF Very Fine
F Fine
M Medium
C Course
VC Very Coarse
G Granule & larger

CEMENT
Q Silica
Py Pyrite
C Calcite
D Dolomite
Sd Siderite

DIAGENESIS
D Dolomitization
Q Silicification
X Recrystallization
Ce Chloritization

ROUNDING
R Rounded
SR Subrounded
SA Subangular
A Angular

SORTING
P Poor
M Moderate
W Well
VW Very Well

HARDNESS
U Unconsolidated
VS Very Soft
S Soft
M Moderate
H Hard

POROSITY
g Intergranular
v Vugular
i Intraskeletal

ACCESSORIES
Py Pyrite
Mc Mica
Ch Chert
Cc Lignite/Coal
Hm Heavy minerals
Lf Lithic fragments
Gl Glauconite

DIAGENETIC TEXTURES
CX Crypto <1/256mm
MX Micro 1/256 - 1/16mm

HYDROCARBONS
✱ Signifies presence
Full details described under supplementary data

Hudbay Oil (Australia) Ltd.
Subsidiary of Hudson's Bay Oil and Gas Company Limited

SIDEWALL CORE DESCRIPTIONS

WELL: SPERM WHALE - 1

DEPTH (metres)	RECOVERY (centimetres)	ROCK TYPE	COLOUR	CLAY SIZE %		SILT SIZE %		GRAINS TYPE & %			GRAINS SIZE		CEMENT		DIAGENESIS			ROUNDING	SORTING	HARDNESS	POROSITY TYPE & %	ACCESSORIES			HYDROCARBONS	SEDIMENTARY STRUCTURES	SUPPLEMENTARY DATA
				CLAY MINERALS	MICRITE	QUARTZ	CALCITE	QUARTZ	SKELETAL	CALCITE	RANGE	DOMINANT	TYPE & %	TYPE & %	TYPE	%	TEXTURE					TYPE & %	TYPE & %	TYPE & %			
1302.1	3.5	CLAYSTONE	Olv blk	100																M							
1315	2.2	SANDSTONE	Med blsh gry					80			VF-F	VF	Q 5	C Tr						S-M	g Tr	Lf 15	G Tr				
1325	2.0	Lithic SANDSTONE	Med blsh gry					70			VF-M	F	Q 5								g Tr	Lf 25	G Tr				
1335	3.4	Lithic SANDSTONE	Med blsh gry					70			VF-F	F	Q 5					SA-SR	W	H	g Tr	Lf 25	G Tr				
1345	2.7	Lithic SANDSTONE	Med blsh gry					70			VF-M	M	Q 5					SA-SR	W	H	g Tr	Lf 25	G Tr				
1355	1.9	SANDSTONE	Med blsh gry					75			VF-M	M	Q 5					SA-SR	W	H	g Tr	Lf 15	G 5				
1365.1	2.1	Arenaceous SILTSTONE	Lt bl gry	Tr		80		20			VF		Q Tr					SA-SR	W	H							
1377.1	2.2	CLAYSTONE	Olv blk	100																S-M							
1386.1	2.5	Silty SANDSTONE	Lt olv gry			40		60			VF		Q Tr					SA-SR	W	M	g Tr						
1400	2.1	SANDSTONE	Blsh gry			15		85			VF		Q Tr					SA-SR	W	M	g Tr						

STRUCTURES (STRATIFICATION, SEDIMENTARY, DIAGENETIC)

SYNGENETIC STRUCTURES

Stratification

Parallel Type

Thickness of bedding
Metric System
millimeter bed 1mm-10mm mm
centimeter bed 1cm-10cm cm

Cross Bedding
in general
with angle indicated 10°
chevron
climbing
festoon
planar

Irregular bedding
Graded bedding
No apparent bedding
Nodular bedding

Current-produced markings
Ripple marks
asymmetrical
interference
symmetrical
Pull over flame structure
Scour and fill
Flute cast
Groove cast
Striation
Parting lineation

Organism-produced markings
Burrowed
slightly burrowed
moderately burrowed
well burrowed
Churned
Bored
Bored surface
Organism tracks and trails
Plant root tubes
Vertebrate tracks

Penecontemporaneous deformation structures
Mud cracks
Rain or hail prints
Pull-apart
Slump structures and contorted bedding
Convolute bedding
Load cast
Tepee structure
Birdseye, fenestral fabric

EPIGENETIC STRUCTURES

Solution structures
Breccia, solution, collapse (S)
Disolution - compaction(horse tail)
Sylolite
Vadose pisolite
Vadose silt
Boxwork
Salt hoppers or casts

Tectonic structures
Fractures
Slickensides
Breccia, tectonic (T)

Miscellaneous
Geopetal fabric
Cone-in-cone
Stromatactics
Boudinage, ball and age flow

Abbreviations:

GRAIN SIZE
VF Very Fine
F Fine
M Medium
C Course
VC Very Coarse
G Granule & larger

CEMENT
Q Silica
Py Pyrite
C Calcite
D Dolomite
Sd Siderite

DIAGENESIS
D Dolomitization
Q Silicification
X Recrystallization
Ce Chloritization

ROUNDING
R Rounded
SR Subrounded
SA Subangular
A Angular

SORTING
P Poor
M Moderate
W Well
VW Very Well

HARDNESS
U Unconsolidated
VS Very Soft
S Soft
M Moderate
H Hard

POROSITY
g Intergranular
v Vugular
i Intraskeletal

ACCESSORIES
Py Pyrite
Mc Mica
Ch Chert
Cc Lignite/Coal
Hm Heavy minerals
Lf Lithic fragments
Gl Glauconite

DIAGENETIC TEXTURES
CX Crypto <1/256mm
MX Micro 1/256 - 1/16mm

HYDROCARBONS
* Signifies presence
Full details described under supplementary data

Hudbay Oil (Australia) Ltd.
Subsidiary of Hudson's Bay Oil and Gas Company Limited

SIDEWALL CORE DESCRIPTIONS

WELL: SPERM WHALE - 1

DEPTH (metres)	RECOVERY (centimetres)	ROCK TYPE	COLOUR	CLAY SIZE %		SILT SIZE %		GRAINS TYPE & %			GRAINS SIZE		CEMENT		DIAGENESIS			ROUNDING	SORTING	HARDNESS	POROSITY TYPE & %	ACCESSORIES			HYDROCARBONS	SEDIMENTARY STRUCTURES	SUPPLEMENTARY DATA
				CLAY MINERALS	MICRITE	QUARTZ	CALCITE	QUARTZ	SKELETAL	CALCITE	RANGE	DOMINANT	TYPE & %	TYPE & %	TYPE	%	TEXTURE					TYPE & %	TYPE & %	TYPE & %			
1411.1	2.1	SANDSTONE	Blsh gry			10		80			VF		Q 10					SA-SR	W	M	g Tr						
1417	TD																										

STRUCTURES (STRATIFICATION, SEDIMENTARY, DIAGENETIC)

SYNGENETIC STRUCTURES

Stratification

Parallel Type

Thickness of bedding
Metric System
millimeter bed 1mm-10mm mm
centimeter bed 1cm-10cm cm

Cross Bedding
in general
with angle indicated 12°
chevron
climbing
festoon
planar

Irregular bedding
Graded bedding
No apparent bedding
Nodular bedding

Current-produced markings

Ripple marks
asymmetrical
interference
symmetrical
Pull over flame structure
Scour and fill
Flute cast
Groove cast
Striation
Parting lineation

Organism-produced markings

Burrowed
slightly burrowed
moderately burrowed
well burrowed
Churned
Bored
Bored surface
Organism tracks and trails
Plant root tubes
Vertebrate tracks

Penecontemporaneous deformation structures

Mud cracks
Rain or hail prints
Pull-apart
Slump structures and contorted bedding
Convolute bedding
Load cast
Tepee structure
Birdseye, fenestral fabric

EPIGENETIC STRUCTURES

Solution structures

Breccia, solution, collapse
Disolution - compaction(horse tail)
Sylolite
Vadose pisolite
Vadose silt
Boxwork
Salt hoppers or casts

Tectonic structures

Fractures
Slickensides
Breccia, tectonic

Miscellaneous

Geopetal fabric
Cone-in-cone
Stromatactics
Boudinage, ball and age flow

Abbreviations:

GRAIN SIZE
VF Very Fine
F Fine
M Medium
C Course
VC Very Coarse
G Granule & larger

CEMENT
Q Silica
Py Pyrite
C Calcite
D Dolomite
Sd Siderite

DIAGENESIS
D Dolomitization
Q Silicification
X Recrystallization
Ce Chloritization

ROUNDING
R Rounded
SR Subrounded
SA Subangular
A Angular

SORTING
P Poor
M Moderate
W Well
VW Very Well

HARDNESS
U Unconsolidated
VS Very Soft
S Soft
M Moderate
H Hard

POROSITY
g Intergranular
v Vugular
i Intraskeletal

ACCESSORIES
Py Pyrite
Mc Mica
Ch Chert
Cc Lignite/Coal
Hm Heavy minerals
Lf Lithic fragments
Gl Glauconite

DIAGENETIC TEXTURES
CX Crypto <1/256mm
MX Micro 1/256 - 1/16mm

HYDROCARBONS
* Signifies presence
Full details described under supplementary data

A4-GL-514

APPENDIX G6 LOG OF SAMPLES

SPERM WHALE No.1 - LOG OF SAMPLES

Description of Cuttings Samples

All depths quoted are below the Rotary Table, which is 9.4 metres above Mean Spring Low Water and 64 metres above the sea floor.

Colours are taken from the Geological Society of America's "Rock Colour Chart". Samples were collected from the base of the 20 inch casing shoe at 196 metres R.T.

210 - 275 metres (65 metres)	Calcarenite, skeletal, olive grey to dark, greenish grey, very fine to granular, dominantly coarse, poorly to moderately well sorted, 10-15% carbonate grains, trace-15% calcite silt, 10-15% micrite, 5-10% calcite cement, trace pyrite, 0-trace chlorite, very soft to moderately hard, trace to fair porosity. With 5-20% Claystone, olive grey, 10-15% micrite, trace glauconite, very soft to soft.
275 - 305 metres (30 metres)	Calcisiltite, calcilutitic, calcarenitic, olive grey, 10% carbonate grains, 25-40% skeletal fragments increasing with depth, very fine to granular, poorly sorted, angular to subangular, 20-35% micrite decreasing with depth, 0-trace quartz silt, trace calcite cement, trace glauconite, pyrite and chlorite, soft. With 15-20% Claystone, calcilutitic, olive grey, 20% micrite, trace glauconite, soft.
305 - 355 metres (50 metres)	Calcarenite, calcilutitic at 310m, and 350m, calcisiltitic at 350m, olive grey, very fine to granular, dominantly medium to coarse, poorly sorted, angular to subrounded, 5-15% carbonate grains, 5-20% calcite silt, 15-20% micrite, trace-10% calcite cement, trace glauconite, pyrite and chlorite, soft, nil to poor porosity.

With 5-10% Claystone, calcilutitic, as between 275-300 m.

355 - 420 metres (65 metres)

Calcilutite, calcisiltitic and calcarenitic in part, light olive grey to olive grey, trace carbonate grains, 15-25% skeletal fragments, 15-35% calcite silt, trace-10% clay minerals, trace glauconite and pyrite, trace carbonaceous material to 370m, trace dolomitisation below 395m, very soft.

With below 400m, 5-40% Marl, increasing with depth, olive grey, 40-65% micrite, 35-60% clay minerals, very soft to soft.

420 - 445 metres (25 metres)

Claystone, olive grey, 10-15% micrite, trace glauconite and pyrite, soft.

With 10-20% Calcilutite, as between 355-420m.

445 - 475 metres (30 metres)

Calcisiltite, calcarenite, calcilutitic, olive grey, 0-5% carbonate grains, 25% skeletal fragments, very fine to granular, poorly sorted, angular to rounded, 20-50% micrite, trace-5% clay minerals, 0-trace calcite cement, trace glauconite, pyrite and dolomitisation, very soft to soft.

With 20-50% Claystone, olive grey, 10-15% calcilutite, very soft to soft.

475 - 700 metres (225 metres)

Claystone, calcilutitic in part, olive grey, 5-40% micrite, trace glauconite and pyrite, trace chlorite between 565-650m, trace mica below 650m, very soft to moderately hard.

With 15-50% Calcilutite, calcisiltitic and calcarenitic in part, as between 355-420m.

700 - 760 metres (60 metres)

Claystone, calcilutitic, light olive grey to dark grey, 0-20% skeletal fragments, very fine to fine, 10-20% calcite silt, 10-20% micrite, trace glauconite, trace

pyrite to 720m, trace mica to 725m, soft to moderately hard.

760 - 805 metres (45 metres)

Claystone, calcilutitic, light olive grey to dark grey, trace skeletal fragments, very fine, 10% calcite silt, 40% micrite trace glauconite, trace pyrite below 790m, soft.

With 10-30% Calcilutite decreasing with depth, light grey, 20-30% calcite silt, trace-10% glauconite, very soft.

805 - 830 metres (25 metres)

Sandstone, clear-frosted, very fine to pebble, dominantly coarse-very coarse, becoming coarser with depth, angular to subrounded, moderately to well sorted, trace pyrite, unconsolidated.

With between 805-815m, 5-10% Calcite, white, 100% calcite grains, very fine to medium, dominantly fine, moderately hard, grains are angular and were probably derived from a carbonate band.

With between 810-820m, trace-5% Coal, brown, lignitic, earthy, soft.

And trace Pyrite nodules.

830 - 885 metres (55 metres)

Sandstone, clear to white, very fine to granule, dominantly medium to coarse, subangular to well rounded, poorly sorted, trace pyrite, unconsolidated.

885 - 955 metres (70 metres)

Sandstone, as between 830-885m, with traces of calcite cement, trace to 5% lithic fragments, trace-5% chert between 935-945m.

With trace-40% (increasing with depth) Sandstone, argillaceous in part, white to grey, very fine to fine, dominantly very fine, subangular to rounded, well sorted, 10-30% clay minerals, trace calcite cement, trace-10% lithic fragments, soft, trace porosity.

And below 930m, 20-30% Claystone, light grey 10% micrite, soft.

955 - 1085 metres (130 metres)

Claystone, silty in part, light brown grey to medium dark grey, 0-10% micrite, 10-20% quartz silt, 10-15% lithic fragments, trace glauconite, trace carbonaceous matter below 1070m, soft.

With down to 1010m, 25%-trace Sandstone, clear to frosted, dominantly coarse to very coarse, angular to sub-rounded, moderate to well sorted, trace pyrite, unconsolidated.

1085 - 1225 metres (140 metres)

Claystone, medium dark grey to grey black, 0-10% micrite, trace carbonaceous matter to 1150m, soft.

With Claystone, arenaceous in part, light grey, 5-30% quartz grains, very fine to fine, trace-10% quartz silt, 0-5% lithic fragments, trace glauconite below 1200m, soft.

And trace Coal, black, below 1215m.

1225 - 1250 metres (25 metres)

Sandstone, argillaceous in part, light green grey, very fine to coarse, dominantly fine, subangular to rounded, well sorted, 10-20% clay minerals, 10-20% glauconite, trace calcite cement, trace skeletal fragments between 1235-1245m, soft, trace porosity.

With 20-50% Claystone, medium dark grey, as between 1085-1225m.

1250 - 1275 metres (25 metres)

Claystone, medium dark grey to grey black, 0-10% micrite, soft.

With Claystone, arenaceous, as between 1085-1225m.

And below 1270m, 35% Sandstone, as between 1225-1250m.

1275 - 1370 metres (95 metres)

Sandstone argillaceous below 1315m, light green grey, very fine to coarse, dominantly fine, subangular to subrounded, well sorted, 15-35% clay minerals, 5-10% calcite cement below 1330m, 5-10% glauconite, trace-10%

coal below 1330m, soft to moderately hard, trace porosity.

With trace-30% Claystone decreasing with depth, light grey, soft.

And below 1280m, trace Coal, black.

1370 - 1405 metres (35 metres)

Claystone, light grey, 10% quartz silt, soft.

With 5-30% Sandstone, argillaceous, as between 1290-1360m.

1405 - 1417 metres (T.D.) (12 metres)

Sandstone, argillaceous, light grey, very fine to medium grained, dominantly fine, well sorted, subangular to rounded, 35% clay minerals, trace calcite cement, trace-5% carbonaceous material, soft.

With 30-40% Claystone, medium dark grey to grey black, 0-10% micrite, soft.

PE601362

This is an enclosure indicator page.
The enclosure PE601362 is enclosed within the container PE902673 at this location in this document.

The enclosure PE601362 has the following characteristics:

ITEM_BARCODE	= PE601362
CONTAINER_BARCODE	= PE902673
NAME	= Composite Well Log
BASIN	= GIPPSLAND
PERMIT	=
TYPE	= WELL
SUBTYPE	= COMPOSITE_LOG
DESCRIPTION	= Composite Well Log
REMARKS	=
DATE_CREATED	= 22/01/82
DATE_RECEIVED	= 14/04/83
W_NO	= W762
WELL_NAME	= Sperm Whale-1
CONTRACTOR	= Hudbay Oil Australia Ltd
CLIENT_OP_CO	= Hudbay Oil Australia Ltd

(Inserted by DNRE - Vic Govt Mines Dept)

PE604604

This is an enclosure indicator page.
The enclosure PE604604 is enclosed within the container PE902673 at this location in this document.

The enclosure PE604604 has the following characteristics:

ITEM_BARCODE	= PE604604
CONTAINER_BARCODE	= PE902673
NAME	= Velocity Log
BASIN	= GIPPSLAND
PERMIT	= VIC/P11
TYPE	= WELL
SUBTYPE	= WELL_LOG
DESCRIPTION	= Velocity Log for Sperm Whale-1
REMARKS	=
DATE_CREATED	= 7/01/82
DATE_RECEIVED	= 14/04/83
W_NO	= W762
WELL_NAME	= SPERM WHALE-1
CONTRACTOR	= SEISMOGRAPH SERVICE LIMITED
CLIENT_OP_CO	= HUDBAY OIL (AUSTRALIA) LIMITED

(Inserted by DNRE - Vic Govt Mines Dept)

PE604605

This is an enclosure indicator page.
The enclosure PE604605 is enclosed within the container PE902673 at this location in this document.

The enclosure PE604605 has the following characteristics:

ITEM_BARCODE	= PE604605
CONTAINER_BARCODE	= PE902673
NAME	= Lithology Log
BASIN	= GIPPSLAND
PERMIT	= VIC/P11
TYPE	= WELL
SUBTYPE	= WELL_LOG
DESCRIPTION	= Lithology Log for Sperm Whale-1
REMARKS	=
DATE_CREATED	= 22/01/82
DATE_RECEIVED	= 14/04/83
W_NO	= W762
WELL_NAME	= SPERM WHALE-1
CONTRACTOR	=
CLIENT_OP_CO	= HUDBAY OIL (AUSTRALIA) LIMITED

(Inserted by DNRE - Vic Govt Mines Dept)

PE604606

This is an enclosure indicator page.
The enclosure PE604606 is enclosed within the container PE902673 at this location in this document.

The enclosure PE604606 has the following characteristics:

ITEM_BARCODE	= PE604606
CONTAINER_BARCODE	= PE902673
NAME	= Mud Log
BASIN	= GIPPSLAND
PERMIT	= VIC/P11
TYPE	= WELL
SUBTYPE	= MUD_LOG
DESCRIPTION	= Mud Log for Sperm Whale-1
REMARKS	=
DATE_CREATED	= 6/01/82
DATE_RECEIVED	= 14/04/83
W_NO	= W762
WELL_NAME	= SPERM WHALE-1
CONTRACTOR	= EXPLORATION LOGGING
CLIENT_OP_CO	= HUDBAY OIL (AUSTRALIA) LIMITED

(Inserted by DNRE - Vic Govt Mines Dept)

PE904242

This is an enclosure indicator page.
The enclosure PE904242 is enclosed within the container PE902673 at this location in this document.

The enclosure PE904242 has the following characteristics:

ITEM_BARCODE	= PE904242
CONTAINER_BARCODE	= PE902673
NAME	= Well Velocity and Calibrated Log Data
BASIN	= GIPPSLAND
PERMIT	= VIC/P11
TYPE	= WELL
SUBTYPE	= VELOCITY _CHART
DESCRIPTION	= Air Gun Well Velocity Survey and Calibrated Log Data for Sperm Whale-1
REMARKS	=
DATE_CREATED	= 8/01/82
DATE_RECEIVED	= 14/04/83
W_NO	= W762
WELL_NAME	= SPERM WHALE-1
CONTRACTOR	= SEISMOGRAPH SERVICE LIMITED
CLIENT_OP_CO	= HUDBAY OIL (AUSTRALIA) LIMITED

(Inserted by DNRE - Vic Govt Mines Dept)

PE902674

This is an enclosure indicator page.
The enclosure PE902674 is enclosed within the container PE902673 at this location in this document.

The enclosure PE902674 has the following characteristics:

ITEM_BARCODE	= PE902674
CONTAINER_BARCODE	= PE902673
NAME	= Tectonic Elements Map
BASIN	= GIPPSLAND
PERMIT	=
TYPE	= WELL
SUBTYPE	= MAP
DESCRIPTION	= Tectonic Elements Map
REMARKS	=
DATE_CREATED	= 1/05/82
DATE_RECEIVED	= 14/04/83
W_NO	= W762
WELL_NAME	= Sperm Whale-1
CONTRACTOR	= Hudbay Oil Australia Ltd
CLIENT_OP_CO	= Hudbay Oil Australia Ltd

(Inserted by DNRE - Vic Govt Mines Dept)