OIL and GAS DIVISION

13 SEP 1982

BALEEN No. 1

WELL COMPLETION REPORT

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Hudbay Oil (Australia) Ltd.

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1.0 WELL HISTORY

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1.0 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

1.2 Participants

Beach Petroleum N.L.,
G.P.O. Box 1280L,
MELBOURNE VIC. 3000

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

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

1.3 Petroleum Title

Vic/P-11, Victoria

1.4 District:- Melbourne

1.5 Location: Refer to location diagram, Figure 1

Latitude: 38° 00' 36.63" S
Longitude: 148° 26' 8.40" E

Easting 626032
Northing 5792068

1.6

Water Depth	-	54.9 m below Mean Spring Low Water
Total Depth	-	1030 m below R.T., reached on 16 November, 1981
Rotary Table	-	9.45 m above Mean Spring Low Water
Spud Date	-	4 November, 1981
Rig Release Date	-	30 November, 1981
Rig on Location	-	3 November, 1981
Drilling Unit	-	Petromar "North Sea" (Drillship)

1.7 Well Status on Rig Release

Plugged and Abandoned Gas Discovery

1.8 Drilling Summary

The drillship "Petromar North Sea" departed the West Seahorse No 1 location at 1400 hours, 3rd November 1981, enroute to the Baleen No 1 location. The rig arrived at the proposed location at 2000 hours, 3 November 1981.

The eight anchors were run out into position, the rig pulled over location and the anchor chains tensioned up. The temporary guide base was run indicating water depth of 54.9m. (Rotary table to seabed of 64m.) The 36" hole was spudded at 2045 hours, 4 November, 1981 and was drilled to 71m. A 26" bit was then run and used to drill to 225m. The hole was displaced to high viscosity mud, a wiper trip made to the guide base, and the hole was re-filled with mud.

The 20" casing was then run and landed with the shoe at 209.05m. This casing was fitted with a 20-3/4" wellhead housing integral with a 30" pile joint, 30" wellhead housing and permanent guide base. The casing string was cemented in place, and the 20-3/4" BOP and 22" marine riser were run and latched to the 20-3/4" wellhead. The 20" casing was pressure tested to 500 psi.

A 17½" bottom hole assembly was made up, the 20" casing shoe drilled out and new hole drilled to 228m. A formation leak-off test was run indicating formation strength of 1.73 SG. The 17½" bit was pulled, a 12¼" bit and bottom hole assembly run, and 12¼" hole drilled to 577m without incident. An attempt was made to log but the tools hung up at 406m. The 12¼" bit was run back to bottom, a wiper trip made, and logging re-attempted. The DIT/BHCS/GR, FDC/CNL/GR/CAL and one sidewall core gun completed.

A conditioning trip was made and then 9-5/8" casing run and landed with the shoe at 566.08m. A 13-5/8" wellhead housing was adapted to run with this casing. The 9-5/8" casing was cemented in place and the 20-3/4" BOP and marine riser pulled. After waiting on weather the 13-5/8" BOP stack was run on the 22" marine riser. The BOP was latched to the 13-5/8" wellhead housing, casing was pressure tested to 2500 psi and the BOP fully tested.

An 8½" bit and bottom hole assembly were made up and run into the hole. The casing shoe was drilled out and 3m new hole drilled to 580m. A formation leak-off test was conducted indicating formation strength of 1.98 SG. The 8½" hole was drilled ahead to 663m with occasional stops to circulate up cuttings samples. A small kick was experienced at 663m with indicated surface drill pipe pressure of 450 psi. Kill mud was mixed to 1.54 SG, the well killed, and then mud weight reduced to 1.50 SG due to mud losses to the formation. The 8½" hole was continued to 1030m without further incident. A wiper trip was made prior to electric logging. The DLL/MSFL/GR, FDC/CNL/GR, BHCS/GR, HDT and velocity survey logs were completed. Two runs were made with an RFT tool for pressures and fluid samples, followed by two sidewall core guns.

A cement plug was set in the 8½" open hole to cover the interval 875 - 775m. A 7" casing liner was then run and landed with the shoe at 760m and with the liner hanger at 451.36m. The liner was cemented, the liner packer set and excess slurry reversed out of the hole. The 13-5/8" BOP stack was then pulled, the lower rams changed from 4½" to 3½" pipe rams, the stack re-run and pressure tested.

A 7" casing scraper was run to the top of soft cement at 721m, and KCL polymer mud spotted from 716 - 666m (over the proposed perforating zone). The CBL/VDL/GR log was run indicating top of cement around the 7" casing at 608m. A pressure test indicated the liner lap was leaking; hence, drill pipe was run, a 50 sack cement slurry plug spotted across the liner hanger and then squeezed to the liner lap.

An 8½" bit was used to drill out the cement from 430 - 461m. A 6" bit drilled out cement from 461 - 471m, the casing was then pressure tested to 2200 psi and KCL polymer mud re-spotted at 715m.

The interval 700 - 706m was perforated at 13 shots/m and DST tools picked up from DST No 1. The tools were run on 3½" Hydril tubing and the packer set at 685m. The test consisted of an initial flow period of 8 minutes, initial shut in of 57 minutes, final flow period of 10 hours 15 minutes and final shut in of 1 hour 17 minutes. Flow stabilized at about 1.8 mmscf/d on a 1" choke.

The test tools were pulled and a bridge plug run and set at 690m. The plug was pressure tested to 2200 psig. A 6" bit and casing scraper were run to 680m and KCL/Polymer mud spotted from 680 - 630m.

The interval 662 - 670m was perforated at 13 shots/metres after two gun failures. The DST tools were picked up for DST No 2. After running to bottom the tools were pulled due to a malfunction of the packer. The packer was eventually set at 648m. The test consisted of an initial flow period of 6 minutes, initial shut in of 39 minutes, final flow period of 300 minutes and final shut in period of 205 minutes. Final flow stabilized at about 6.3 mmscf/d on a 1" choke.

A 7" bridge plug was set at 652m and pressure tested to 2000 psig. An initial attempt to set a 17.5 sack cement plug on top of the bridge plug was unsuccessful, and a 30 sack plug was finally set. A surface cement plug of 80 sacks was set to cover the interval 165 - 100m. The BOP stack and riser were then pulled. A mechanical cutter was used to cut the 9-5/8" casing at 74.9m with the 13-5/8" wellhead housing and 9-5/8" casing stub subsequently recovered. The 20" casing was cut at 73.4m and the 20-3/4" wellhead housing with 20" casing stub similarly recovered. The temporary guide base then was pulled.

Anchors were pulled and the drilling vessel departed the Baleen No 1 location at 0600 hours, 30 November 1981.

1.9 Geological Summary (Enclosure 1)

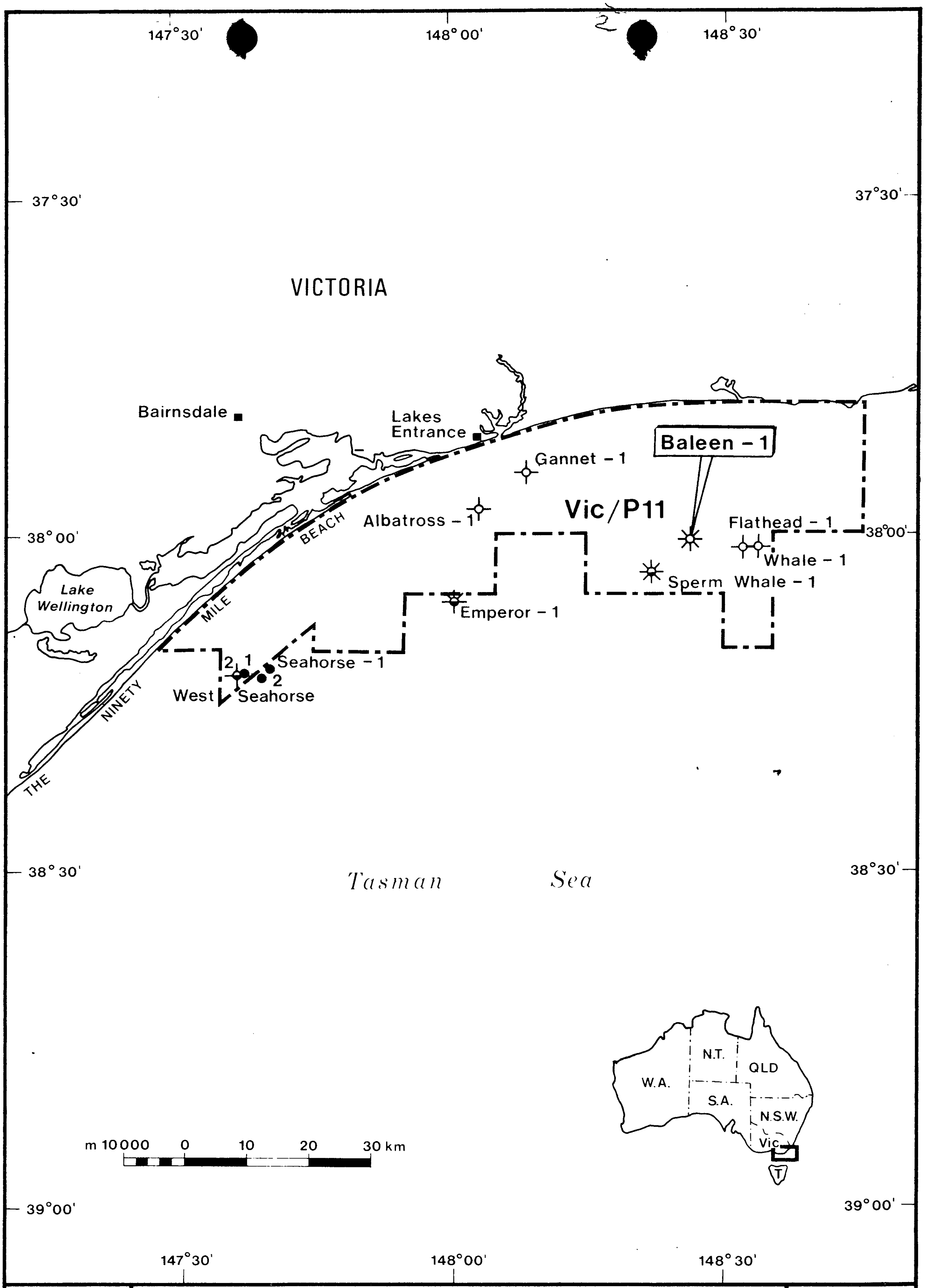
The Baleen No.1 well was drilled to test a structure formed by arching into a major east-west, high angle reverse fault. The structure consists of two culminations separated by a minor saddle. Closure was mapped at two horizons, designated "Top Latrobe" and "Top Strzelecki". Due to standard drilling practice, sampling commenced below the 20 inch casing shoe, set at 209 metres.

The interval 209-653 metres consisted of coarse-grained calcarenites, grading through calcisiltites and calcilutites, calcareous and glauconitic claystones. Based on palaeontological evidence this sequence has been dated from Upper Eocene to Pliocene.

A major lithological change occurred at 653 metres and continued to 707 metres. Three distinct zones within this interval were interpreted from wireline log responses and petrological studies. Two iron oxide/carbonate rich sandstone-siltstone bands were separated by a glauconitic, micaceous sandstone/siltstone/claystone sequence. These zones were interpreted as being Upper Eocene in age.

From 707-1030 metres the well penetrated a monotonous sequence of sandstones, argillaceous in part, siltstones, claystones and minor coals. Log interpretations suggest that this interval may have been weathered from 707 to 850 metres. Lithic fragments occurred throughout this interval. Palynological studies showed the interval to be of Lower Cretaceous age.

Drill Stem Tests proved movable hydrocarbons in two zones. DST No.1 over the interval 700-706 metres flowed 1.8 MMcf/d of dry gas. DST No.2 over the interval 662-670 metres flowed 6.3 MMcf/d of dry gas and formation permeabilities were calculated to be 747 md and 56 md respectively. The well bottomed in sediments of Lower Cretaceous age at a total depth of 1030 metres.



Scale	Hudbay Oil (Australia) Ltd. LOCATION MAP	Date April 1982
Drawn by H.O.A.L.	**BALEEN - 1**	Drawing Nº **A4-GP-487**

Figure 1

2.0 DRILLING

(Pages 6 - 22)

2.0 DRILLING

2.1 Drilling Operations

2.1.1 Drilling Data Summary

(i)	Drilling Contractor:	Petromarine Drilling (Aust) Pty Ltd Office Suite 1-5 1st Floor, Stratham House 49 Melville Parade SOUTH PERTH WA 6151
(ii)	Drilling Vessel:	'Petromar North Sea' drillship, rated to drill to 4570m with 5" drill pipe, maximum water depth 183m.
(iii)	Power Supply:	- Four Caterpillar D399B T.A. diesel engines, each driving a GE-606 D.C. Generator. - Three Caterpillar 379TA diesel engines, each driving a 350 KW A.C. Generator. - One 100 KW emergency generator driven by one GM 6-71 diesel engine.
(iv)	Derrick:	Pyramid special design 146 ft x 56 ft x 34 ft base, gross nominal capacity of 454 tonnes.
(v)	Blow Out Preventor Equipment:	- 20-3/4" x 2000 psi W.P. Cameron double gate type 'U' with 20-3/4" Hydril 2000 MSP annular. - 13-5/8" x 5000 psi W.P. Cameron Triple gate type 'U' with 13-5/8" Hydril 5000 psi W.P. type 'GL' annular.
(vi)	Mud Pumps:	Two National 12-P-160 Triplex single acting pumps each driven by two GE 752 HP electric motors.

2.1.1 Drilling Data Summary (Continued)

(vii) Drawworks: National Type 1625 DE powered by two GE 752 Traction motors with a 60" RC Parkersburg Hydromatic brake with over-running clutch, grooved drum to handle 1½" - 6 x 19 IWRC drilling line.

(viii) Rotary Table: National C-375 - 37½" independently driven by one GE 752 electric motor complete with master bushing and pin type kelly drive bushing.

(ix) Heave Compensator: One Western Gear single cylinder Heave Compensator with minimum 20 ft stroke and minimum capacity of 400,000 lbs in working mode and 1,000,000 lbs in latched mode.

2.1.2 General Well Data

(i) Location:

Latitude 38 deg 00 min. 36.630 sec South
Longitude 148 deg 26 min. 08.400 sec East
UTM Coordinates -
Northing 5792068 metres
Easting 626032 metres
(CM 147 deg)

The final location is 23 metres at a bearing of 207.7 deg from the proposed location.

(ii) Datum: Unless otherwise stated all depths are relative to Rotary Table, which for this rig is 9.45m above Mean Sea Level. Water Depth at the location was measured as 54.89m at Mean Springs Low Water.

That is: RT - MSL = 9.45m
RT - Seabed = 64.34m
Water Depth = 54.89m

2.1.2 General Well Data (Continued)

(iii) Dates

Commenced move to location -
1400 hours, 3 November 1981.

Arrived at location -
2000 hours, 3 November 1981.

Spudded -
2045 hours, 4 November 1981.

Reached Total Depth -
1500 hours, 16 November 1981.

Last Anchor bolstered, and
ready to move off -
0600 hours, 30 November 1981.

Drilling Time, Spud to Total Depth -
11 days, 18.25 hours.

(iv) Hole Size and Casing Details:

- Hole:	Size	36"	26"	17½"	12¼"	8½"
	Depth (m)	71	225	228	577	1030
- Casing:	Size	30"	20"	-	9-5/8"	7"
	Depth (m)	68	209	-	566	760
	API Grade	5L/'B'	5LX/X-52	-	5AC/K55	5AC/N80
	Weight	305	94	-	40	29

2.2 Daily Operations Record

2.2.1 Daily Drilling Operations Summary

See attached Figure 2.

Hudbay Oil (Australia) Ltd.

Subsidiary of Hudson's Bay Oil and Gas Company Limited

DAILY DRILLING OPERATIONS SUMMARY

WELL BALEEN NO 1

DATE	DEPTH	OPERATION
4/11/81	-	Rig departed West Seahorse No 1 location at 1400 hours, 3 November 1981, en route to Baleen No 1 location. Arrived at location at 2000 hours, 3 November 1981. Ran six anchors.
5/11/81	86m	Ran remaining two anchors, soaked anchors for 5½ hours, pulled rig over location and tensioned up. (Final ships heading 205 deg Mag.) Ran temporary guide base, (water depth 54.89m). Spudded with 36" bit at 2045 hours, 4 November 1981. Drilled 36" hole 64 - 71m, spotted 30 bbl Hi-vis mud on bottom. Ran 26" bit, drilled 71 - 86m.
6/11/81	225m	Drilled 26" hole 86 - 225m. Displaced hole with 550 bbls mud. Surveyed. Pulled out to guide base, ran in to 225m - no fill. Pumped 380 bbls mud and pulled out. Positioned permanent guide base in moonpool. Commenced running 20" casing.
7/11/81	225m	Completed running 20" casing, landed same with shoe at 209.05m. Displaced casing to seawater, cemented casing (details per Cementing Report). Rigged up and ran 20-3/4" BOP stack and 22" marine riser. Latched BOP to wellhead, pressure tested casing and blind rams to 500 psig, rams to 1000 psig, manifold to 2000 psig. Made up 17½" bottom hole assembly, commenced drilling out cement and shoe.
8/11/81	390	Completed drilling out cement and shoe. Drilled new hole 225 - 228m. Ran leak-off test - formation strength 1.73 SG. Changed from 17½" bit to 12¼" bit. Drilled 228 - 249m. Surveyed - misrun. Drilled 249 - 267m. Surveyed. Drilled 267 - 390m. String parted at saver sub - fished string, laid out drill pipe and collars for inspection. Drilled 390 - 428m.
9/11/81	577m	Drilled 390 - 428m. Surveyed. Drilled 428 - 577m. Pulled out to log. Made one run with DIT/BHCS/GR, unable to pass 406m. Run in hole with 12¼" bit to TD, no fill, worked pipe 245 - 264m. Made wiper trip to shoe, RIH, 3m fill. POOH. Logged DIT/BHCS/BR to 572m. FDC/CNL/GR/CAL.
10/11/81	577m	Completed logging FDC/CNL/GR/CAL. Took one SWC gun. Made up 9-5/8" casing hanger and running tool. RIH with 12¼" bottom hole assembly, washed 554 - 577m. Reamed and washed 544 - 577m. Conditioned mud and hole. Pulled out to run casing. Ran 9-5/8" casing to land casing with shoe at 566.08m.
11/11/81	577m	Circulated casing volume. Cemented 9-5/8" casing (see cementing report for details). Retrieved landing string. Pulled 22" marine riser and 20-3/4" BOP stack, racked back BOP stack. Moved 13-5/8" BOP to moonpool and secured rig due to deteriorating weather conditions.
12/11/81	577m	Waiting on weather.
13/11/81	577m	Waited on weather. Ran 13-5/8" BOP and 22" marine riser. Ran test plug, tested casing to 2500 psi, tested BOP stack. Pulled test plug and ran wear bushing. Made up 8½" bit, picked up 6½" drill collars, RIH and tagged top of cement at 522m.
14/11/81	663m	Drilled out cement, float collar and shoe, clean to bottom, drilled 577 - 580m. Completed leak off test indicating formation strength of 1.98 SG. Drilled 8½" hole 580 - 596m, circulated up sample. Drilled 596 - 625m, circulated up sample. Drilled 625 - 644m, circulated up sample. Drilled 644 - 653m, circulated up sample. Drilled 653 - 663m - pit gain - shut in well. Measured shut in drill pipe pressure 450 psi, mixed kill mud to 1.54 SG. Killed well with 1.54 SG mud, displaced riser to heavy mud. Opened pipe rams on BOP - losing mud. Reduced mud weight to 1.50 SG.
15/11/81	826m	Drilled 663 - 753m. Surveyed. Changed bits, picked up two 8½" stabilizers and RIH. Reamed 683 - 704m. Washed 704 - 753m. Drilled 753 - 826m.
16/11/81	956m	Drilled 826 - 938m. Pulled out to change bits - tight hole 735 - 690m (11.3 tonne overpull). Changed bits, RIH to 927m, washed 927 - 938m - no fill. Drilled 938 - 956m.
17/11/81	1030m	Drilled 956 - 1030m. Made wiper trip to shoe. Circulated and conditioned hole and mud. Rigged up Schlumberger (Line jumped sleave - damaged bridle line - repaired same). Logged DLL/MSFL/GR, commenced FDC/CNL/GR.
18/11/81	1030m	Completed FDC/CNL/CNL/GR log, logged BHCS/GR, and HDT. Ran velocity survey (- after repairing survey tools). Made two runs into hole with RFT tool for pressure and fluid samples. Picked up CST gun.

DAILY DRILLING OPERATIONS SUMMARY

WELL BALEEN NO 1 (Continued)

DATE	DEPTH	OPERATION
19/11/81	775m (PBTD)	Ran CST gun No 1 - 4 bullets lost. Ran CST run No 2 - full recovery. Ran into hole with 8½" bit to TD - no fill. Circulated and conditioned mud. Ran into hole with open ended drill pipe to 875m. Set cement plug 875 - 775m with 123 sacks cement (see abandonment report). Pulled up 4 stands, reversed out drill pipe. Pulled out of hole. Worked on drilling compensator.
20/11/81	735m (Landing Collar)	Completed work on drilling compensator. Made up 7" shoe, collar, hanger, packer, seal assembly, cement plug and liner hanger running tool. Ran 25 joints of 7" casing to set with shoe at 760m, liner hanger at 451.36m. Circulated volume of liner and running string with mud. Set hanger, backed out running tool. Cemented liner with 193 sacks Class 'G' cement (see cementing report). Set liner packer. Pulled back one single, reversed out drill pipe contents - slight cement contamination thoughout entire reverse circulation. Pulled out of hole laying down drill pipe and 6½" drill collars. Retrieved wear bushing. Nippled down and pulled 13-5/8" BOP stack.
21/11/81	735m	Continued pulling BOP stack, landed on dolly. Changed out upper pipe rams to 3½" rams, tested pipe rams to 5000 psig, lower annular to 2500 psig, upper annular to 1500 psig. Repaired high pressure manifold on blue control pod, function tested BOP on both pods. Changed AX ring. Ran BOP stack, landed on wellhead. Ran test plug on 5" DP, pressure tested lower pipe rams to 2500 psig, lower annular to 2000 psig, upper annular to 1500 psig. Ran 3½" DP and test plug, tested upper pipe rams to 2500 psig. Ran 13-5/8" wear bushing. Ran 6" bit and casing scraper, picked up 4-3/4" drill collars and 3½" hydril tubing.
22/11/81	721m	Ran 7" casing scraper to 721m. Circulated and conditioned mud. Worked scraper 682 - 693m. Spotted 6 bbls polymer mud from 716 - 666m. Made trip to wellhead with fluted hanger to check space-out for subsea test tree. Ran CBL-VDL-GR over 7" casing liner. Attempted pressure test of casing - no test. Established injection rate to formation - 1100 psig at 0.25 bbl/min. Picked up 6 joints 3½" drill pipe, ran in on 5" drill pipe to 466m, spotted 50 sacks Class 'G' plus 2% calcium chloride from 466 - 429m. Pulled 2 stands, reversed out drill pipe, hung off on lower pipe rams, squeezed cement to liner overlap. POOH.
23/11/81	721m	Made up 8½" bit and bottom hole assembly, tagged cement at 430m. Drilled out cement 430 - 461m (top of liner). POOH. Ran 6" bit, RIH to 461m, drilled out cement 461 - 471m. Pressure tested casing to 2200 psig. Ran in hole to 715m, spotted 6 bbls polymer mud from 715 - 665m. POOH. Rigged up Schlumberger and perforated 700 - 706 m at 13 s/m at 90 deg phasing. Made up DST tools and started in with 3½" - PH6 tubing.
24/11/81	721m	Completed running into hole with DST string. Rigged up surface equipment, pressure tested surface lines. Set packer at 685m, landed test string. Latched SPRO tool. Opened tools for DST No 1, initial flow period of 8 minutes. Closed in tools for 57 minutes, opened tools for second flow period of 10 hours 15 minutes, Shut in for 1 hour 17 minutes. Pulled SPRO tool.
25/11/81	721m	Unseated packer, circulated annulus free of gas, pulled test string. Rigged up Schlumberger, ran and set bridge plug at 690m after third run in hole. (top slips lost and setting tool misfire). Pressure tested bridge plug to 2200 psig. Ran 6" bit and 7" casing scraper to 680m, spotted KCL polymer mud 680 - 630m. Rigged up Schlumberger, perforated 667 - 670m. Rigged up Schlumberger, perforated 667 - 670m (second gun failed). Reloaded perforating gun, perforated 664 - 667m (third piggy-back gun failed).
26/11/81	721m	Repaired perforating gun, perforated 662 - 670m with 13 s/m. Made up DST string and ran into hole externally pressure testing connections to 9000 psig. Made up and pressure tested surface equipment. Attempted to set packer multiple times - no success. Rigged down surface equipment and pulled test string. Repaired packer. Changed pressure charts and rewound clocks. Ran in with test string externally pressure testing connections.
27/11/81	721m	Rigged up and pressure tested surface equipment. Set packer at 648m, latched SPRO tool. Opened well for initial flow of 7 minutes, closed in for 38 minutes, opened for second flow of 300 minutes, closed in for 140 minutes. Unseated packer, reverse circulated well free of gas. Pulled out test string.
28/11/81	721m	Laid out 3½" tubing and 3½" drill pipe. Rigged up Schlumberger and set 7" bridge plug at 652m. Pressure tested plug to 2000 psi. Ran in with 3½"/5" drill pipe to 652m, spotted 17.5 sacks cement plug (average slurry 1.87 SG). Pulled up to 600m, reverse circulated unbalanced cement plug out of drill pipe. Ran into 651m, spotted 30 sacks cement plug (average slurry 1.87 SG). Pulled out to 165m, circulated hole to seawater. Spotted 80 sacks cement plug (average

DAILY DRILLING OPERATIONS SUMMARY

WELL BALEEN NO 1 (Continued)

DATE	DEPTH	OPERATION
28/11/81 (Continued)		slurry 1.87 SG). Pulled up to 100m, reverse circulated. POOH. Rigged down diverter, unlatched BOP, nippled down slip joint.
29/11/81	-	Pulled 13-5/8" BOP stack, stowed same. Removed rig floor. WOW to offload cutting tools from workboat. Made up casing cutting tools, RIH, cut 9-5/8" casing at 74.92m. Made up 13-5/8" running tool, RIH attempted to screw into wellhead, running string started to back off. POOH, re-torqued tool joints, RIH. Stabbed wellhead, screwed into 13-5/8" housing and pulled same. Ran casing cutters, stabbed in after second attempt, cut 20" casing at 73.42m. Pulled cutting tools. Made up 20" running tool, RIH.
30/11/81	-	Screwed into 20-3/4" housing, pulled wellhead housing and permanent guide base, stowed same. Made up 'J' tool, RIH. Retrieved temporary guide base and hung same in moonpool. Pulled anchors.
		NOTE:
		Underway from Baleen location to Whale No 1 location at 0600 hours, 30 November 1981.

2.2.2 Bottom Hole Assembly Record

36"/26" Hole: 64 - 225m

- Bit, bit sub, 15 x 8" DC's, Cross Over
  Total Length = 54.91m

17½" Hole: 225 - 228m

- Bit, bit sub, 15 x 8" DC's, Cross Over
  Total Length = 134.18m

12¼" Hole: 228 - 577m

- Bit, bit sub, 15 x 8" DC's, Cross Over, 11 joints HWDP
  Total Length = 236.15m

8½" Hole: 577 - 758m

- Bit, bit sub, 12 x 6½" DC's, Cross Over, 1 joint HWDP, Jars, 11 joints HWDP
  Total Length = 226.30m

753 - 1030m

- Bit, bit sub, 2 x 6½" DC's, Stab, 1 x 6½" DC's, Stab, 9 x 6½" DC's, Cross Over, 1 joint HWDP, Jars, 11 joints HWDP
  Total Length = 229.00m

2.2.3 Bit Record

(See attached Bit Record Figure 3.)

2.2.4 Time Breakdown Analysis

(See attached Time Breakdown Analysis as Figure 4.)

2.2.5 Well History Chart

(See attached Well History Chart as Figure 5.)

2.3 Casing Record

2.3.1 Casing Details

(See Casing and Tubing Tally per Figures 6, 7, 8.)

2.3.2 Cementation Details

(See Casing, Running Reports per Figures 9, 10, 11.)

WELL NAME: BALEEN NO 1 LOCATION: GIPPSLAND BASIN VICTORIA RT-SB/XX 64 m.

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

SPUD DATE: 4 NOVEMBER 1981 COND. CSG: 73 m SURF. CSG: 209 m INTER. CSG: 566 m SEC. INTER. CSG: 760 m

DATE AT TD: 16 NOVEMBER 1981 PUMP NO 1: NATIONAL 12-P-160 PUMP NO 2: NATIONAL 12-P-160 PUMP POWER: 1600 HP

MUD TYPE: SW/GEL, SW/POLYMER TOOL JTS: Size - 4½" Type - I.F. O.D. 6-3/8"

DRILL COLLARS: No. - O.D. - 8"/6½" I.D. - 2-7/8"/2¼" Length -

BIT NO.	SIZE	MAKE	TYPE	JETS	SERIAL NO.	DEPTH IN (M)	DEPTH OUT (M)	HRS	M/HR	WT (TONNES)	RPM	PUMP PR. (kPA)	PUMP VOL. (L/MIN)	T	B	G	FORMATION/ REMARKS
RR1/HO	36"/26"	HTC	OSC-3AJ	3x26	RB269/ 7850	64	71	4	1.75	4.5	50/60	1400	1170	2	1	I	Seabed
RR2	26"	HTC	OSC-3AJ	NONE	LJ320	71	225	14.5	10.6	4.5-9	60/100	3450	2930	-	-	-	Seabed
3	17½"	HTC	OSC-3AJ	3x24	KX789	225	228	3	1.0	2.2-4.5	50	6200	-	-	-	-	-
4	12¼"	HTC	J1	2x18, 1x14	AFD 63	228	390	7	23.2	13.6-18.1	80	9650	2290	1	1	1	Pulled to change DC's
RR4	12¼"	HTC	J1	2x14, 1x18	AFD 63	390	577	9	20.8	4.5-13.6	95	9310	2290	2	2	I	-
5	8½"	HTC	JD3	2x12, 1x10	TH576	577	753	13½	13.0	11.3	80	8790	2100	6	2	I	Sandstone/S.S./ Clay
6	8½"	HTC	J4	2x12, 1x10	JR100	753	938	22	8.4	11.3	80	8270	2100	6	2	I	Silty Sandstone
7	8½"	HTC	J4	2x12, 1x10	JR220	938	1030	11	8.3	11.3	80	7930	2100	4	2	I	Sandstone/S.S./ Clay

Drawn by A.Clark

Scale N.T.S.

Hudbay Oil (Australia) Ltd.

BIT RECORD
BALEEN-1

Date March 1982

Drawing No A4-DR-558

Figure 3

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

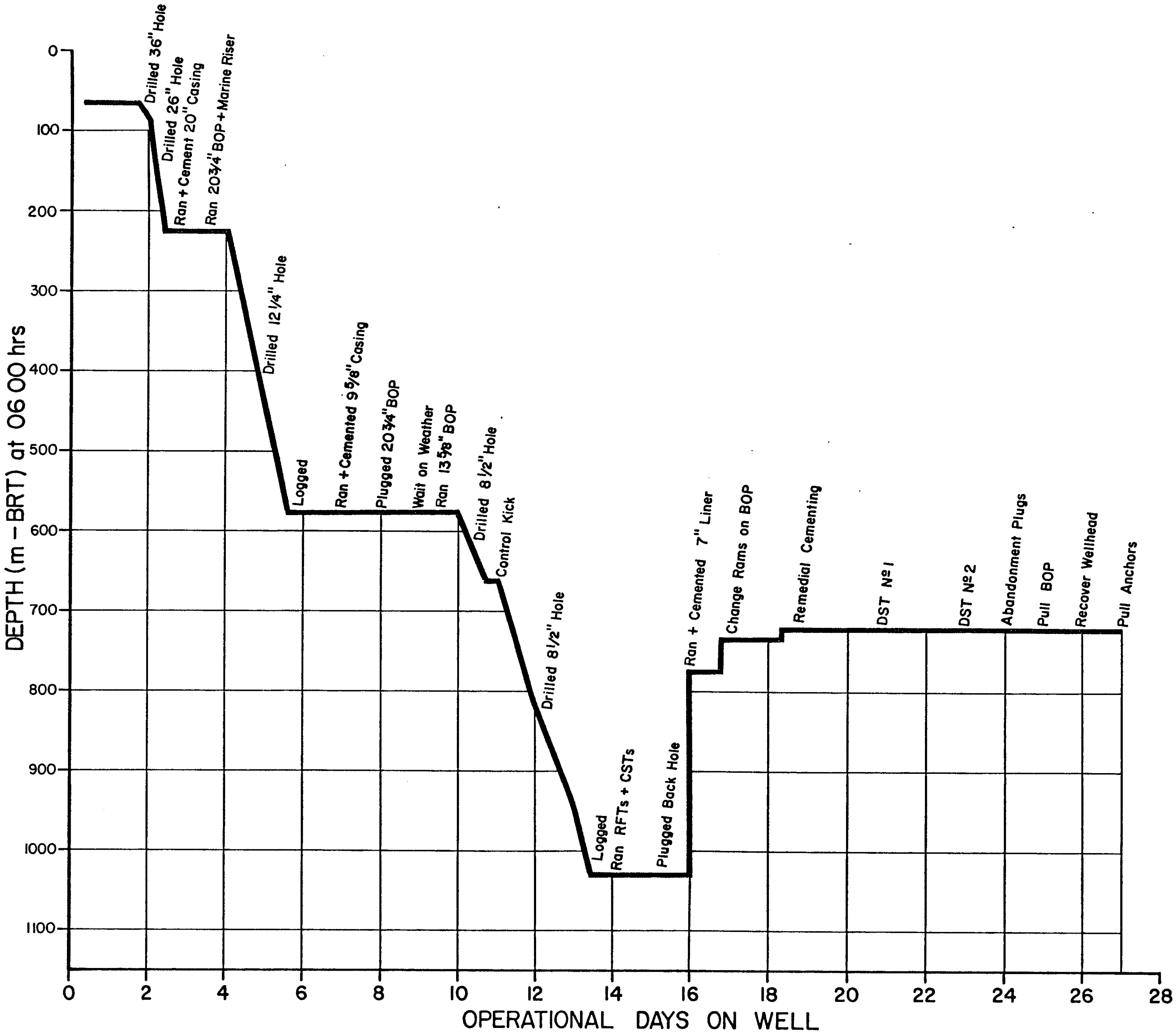
Hudbay Oil (Australia) Ltd.

WELL TIME BREAKDOWN ANALYSIS
BALEEN - 1

Scale: N.T.S.
Drawing Nº A4-DR-559

Figure 4

TIME ANALYSIS (Hours)	Moving/ Anchoring	36"/26" Hole	17½" Hole	12¼"Hole	8½"Hole	6"Hole	Comp/Test	Total	%
				SECTION OF HOLE					
DRILLING:									
Moving to/from Location	6½				-			6½	1.02
Anchor Handling	20½				-		18	38½	6.02
Drilling		18½		16	47			81½	12.73
Round Trips plus Surface Operations		6½		6½	19½		2½	35	5.47
Reaming, Cond. Hole, Cond. Trips		6½	N	8	16	N		30½	4.77
Running, Pulling and Cementing Casing		10	O	20	21	O	14½	65½	10.23
Running, Pulling Subsea Equipment		2	T	10	-	T	31½	43½	6.8[illegible]
Testing Wellhead and BOP's				3½	3		4	10½	1.64
Plugging Back, Abandonment, Completion			D		-	D	39	39	6.09
Curing Lost Circulation			R		-	R		-	-
Fishing and Washouts			I	12	-	I		12	1.88
Well Control			L		11	L		11	1.72
Surveys		½	L	1½	1	L		3	0.47
Downtime: Weather			E		39½	E	4½	44	6.88
Mechanical Surface			D		-	D	7	7	1.09
Mechanical Subsea					-		3	3	0.47
Others -- Remedial Cement Squeeze					-		23	23	3.59
					-				-
					-				-
EVALUATION:					-				-
Circulating Samples					2			2	0.31
Hole Cond, Trips for Coring, Logging, Testing				6½	-		19½	26	4.06
Coring					-			-	
Electric Logging				11	34		16	61	9.53
Wireline Flow Testing					6½			6½	1.02
Drill Stem and Production Testing					-		71½	71½	11.17
Downtime: Logging							4½	4½	0.70
Flow Testing							15	15	2.34
Others									
OTHERS									
Total Time	27	44	-	95	200½		273½	640	100.00
% Downtime	0.00	0.00		0.00	19.7		20.84	(26d 16hrs)	



NOTE: Total Time on Well 26 d 16 hrs

Hudbay Oil (Australia) Ltd.

Vic/P 11

WELL HISTORY CHART

BALEEN - 1

Authors: A. Eisenbarth	Scale
Drawn. C. Clarke	Drawing Nº
Date June 1982	A3-DR-92

Figure 5

HUDBAY OIL (AUSTRALIA) LIMITED
Casing and Tubing Tally
(METRIC)

Page 1 of 1

Well Name and No. BALEEN NO 1 Date 5 NOVEMBER 1981 Casing Size 20"

Weight 94 lb/ft Grade X52 Connection CIW 'CC' 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
	•							
	•		Carried Forward			Carried Forward		
01	13.20	Shoe Jt	41	•		81	•	
02	12.51		42	•		82	•	
03	12.51		43	•		83	•	
04	12.52		44	•		84	•	
05	12.51		45	•		85	•	
06	12.51		46	•		86	•	
07	12.52		47	•		87	•	
08	12.57		48	•		88	•	
09	12.52		49	•		89	•	
10	12.52		50	•		90	•	
Sub tot	125.89		Sub tot	•		Sub tot	•	
11	12.52		51	•		91	•	
12	10.13	Pile Jt to Top	52	•		92	•	
13	•	of 20" Hse	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	22.65		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	125.89
20	22.65
30	•
40	•
50	•
60	•
70	•
80	•
90	•
100	•
TOTAL	148.54

Tally By

Checked By

REMARKS

Operator's Representative J B McElhinney

Figure 6

HUDBAY OIL (AUSTRALIA) LIMITED

Casing and Tubing Tally

(METRIC)

Page 1 of 1

Well Name and No. BALEEN NO 1 Date 9TH NOVEMBER 1981 Casing Size 9-5/8"

Weight 40 lb/ft Grade K55 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	0.45							
01	11.37		Carried Forward			Carried Forward		
FC	0.34		41	12.08		81	.	
02	11.42		42	11.86		82	.	
03	11.85		43	3.96	Pup X/Over	83	.	
04	11.80		44	0.37	13-5/8" Hsg	84	.	
05	11.71		45	4.53		85	.	
06	11.74		46	.		86	.	
07	11.72		47	.		87	.	
08	11.77		48	.		88	.	
09	12.08		49	.		89	.	
10	11.70		50	.		90	.	
Sub tot	117.95		Sub tot	32.80		Sub tot	.	
11	11.66		51	.		91	.	
12	12.07		52	.		92	.	
13	11.74		53	.		93	.	
14	11.89		54	.		94	.	
15	12.00		55	.		95	.	
16	12.08		56	.		96	.	
17	11.77		57	.		97	.	
18	11.76		58	.		98	.	
19	11.98		59	.		99	.	
20	11.85		60	.		100	.	
Sub tot	118.80		Sub tot	.		Sub tot	.	
21	11.73		61	.				
22	12.07		62	.				
23	11.67		63	.				
24	11.81		64	.				
25	11.74		65	.				
26	11.79		66	.				
27	11.82		67	.				
28	11.95		68	.				
29	11.74		69	.				
30	11.63		70	.				
Sub tot	117.95		Sub tot	.				
31	12.08		71	.				
32	11.76		72	.				
33	11.77		73	.				
34	11.67		74	.				
35	12.02		75	.				
36	11.90		76	.				
37	11.80		77	.				
38	11.75		78	.				
39	11.94		79	.				
40	11.86		80	.				
Sub tot	118.55		Sub tot	.				

TALLY SUMMARY

Group No. Ending	Length (Forward)
10	117.95
20	118.80
30	117.95
40	118.55
50	32.80
60	.
70	.
80	.
90	.
100	.
TOTAL	506.05

Tally By

Checked By

REMARKS
Rotary Table to Seabed = 64.34 m (at MISLW)
Seabed to top 13-5/8" hsg = 4.31
RT to top 13-5/8" hsg = 60,03
13-3/8" Csg length as above = 506.05
Casing shoe depth = 566.08
TD of 12¼" hole = 577.44
Distance csg off bottom = 11.36m

Centralizers on joints no 1, 3, 5, 7, 9, and 11

Operator's Representative A Eisenbarth

Figure 7

Page 1 of 1

HUDBAY OIL (AUSTRALIA) LIMITED

Casing and Tubing Tally

(METRIC)

Well Name and No. BALEEN NO 1 Date 19 NOVEMBER 1982 Casing Size 7"

Weight 29 lb/ft Grade N-80 Connection BTC Joints Run 25

Joint No.	Length of (m) joint	Total in (m) Hole
Shoe	0·75	
01	12·10	
Collar	0·29	
02	11·91	
03	12·11	
04	12·02	
05	11·95	
06	12.00	
07	12·11	
08	11·81	
09	11·93	
10	11·93	
Sub tot	120·91	
11	11·98	
12	12·18	
13	11·84	
14	12·04	
15	11·92	
16	12·02	
17	12·03	
18	11·78	
19	11·55	
20	12·05	
Sub tot	119·39	
21	11·78	
22	11·70	
23	11·69	
24	12·10	
25	11·95	
26	•	
27	•	
28	•	
29	•	
30	59.22	
Sub tot	•	
31	•	
32	•	
33	•	
34	•	
35	•	
36	•	
37	•	
38	•	
39	•	
40	•	
Sub tot	•	

Joint No.	Length of (m) Joint	Total in (m) Hole
Carried Forward		
41	•	
42	•	
43	•	
44	•	
45	•	
46	•	
47	•	
48	•	
49	•	
50	•	
Sub tot	•	
51	•	
52	•	
53	•	
54	•	
55	•	
56	•	
57	•	
58	•	
59	•	
60	•	
Sub tot	•	
61	•	
62	•	
63	•	
64	•	
65	•	
66	•	
67	•	
68	•	
69	•	
70	•	
Sub tot	•	
71	•	
72	•	
73	•	
74	•	
75	•	
76	•	
77	•	
78	•	
79	•	
80	•	
Sub tot	•	

Joint No.	Length of Joint	Total in Hole
Carried Forward		
81	•	
82	•	
83	•	
84	•	
85	•	
86	•	
87	•	
88	•	
89	•	
90	•	
Sub tot	•	
91	•	
92	•	
93	•	
94	•	
95	•	
96	•	
97	•	
98	•	
99	•	
100	•	
Sub tot	•	

TALLY SUMMARY

Group No. Ending	Length (Forward)
10	120·91
20	119·39
30	59·22
40	•
50	•
60	•
70	•
80	•
90	•
100	•
TOTAL	299.52

Tally By J B McElhinney

Checked By

REMARKS The above 7" casing was run and hung off on TIW liner hanger
(Refer to casing, running report).

Operator's Representative J B McElhinney

Figure 8

HUDBAY OIL (AUSTRALIA) LIMITED

Casing, Running Report

Well Name and No. BALEEN NO 1 Date 6 NOVEMBER 1982 Casing Size 20"

HOLE	Size	26"				
	Depth (m)	225				
CASING	Size	20"				
	Depth (m)	209.05m				

MUD: Type SW/Spud Mud s.g. 1.04 Vis. 100+ YP - WL -

Power Tong Torque CIW 'CC' Connectors ft/lbs.

Fill up Points Every three joints

Calc. Displ. (m^3) 160 bbl Pump Strokes Howco Unit

350 psi psi

CASING INFORMATION		Depth (mRT)
TD		225m
OFF BOTTOM	15.95	
Shoe (make and type) Weatherford Landed at		209.05m
Length Shoe	13.20	195.85m
10 Joints. Grade X52 wt. 94 lb/ft ID. 19.124 ins.	125.21	70.64m
Landing Collar (make and type)		
Hanger or Suspension joint (make and type) CIW Combination 30"/20" Hsg	10.13	60.51m
Top Hanger or Suspension joint		
Landing String 20" R/T, 20 ft Pup, 1 Std HWDP, 1 x 10 ft Pup, 1 Std HWDP	64.54	
metres above R.T. at Zero Tide		
Less tide of		
metres up from R.T.		4.03m

DETAILED CASING AND CEMENTING REPORT

Casing landed on TGB and volume of string circulated prior to cementing with;

Fill of: 1036 sks of Class 'G' cement + 0.5% Thix set 'A' plus 0.25% Thix set 'B'
(700 lbs and 350 lbs respectively.)
Mixed with 247 bbls of drill water at average density of 1.53 S.G.

Tail of: 300 sks of Class 'G' cement
Mixed with 36 bbls of drill water at density of 1.89 S.G.

Cement was displaced to 9m above the shoe using HOWCO unit pumping 160 bbls. final displacement pressure 350 psi. During displacement returns were lost, so pumping was stopped on three occasions of 15 minutes each, so as to allow Thix Set mix to set up. Pressure was gradually increasing as final displacement was reached, indicating that the loss zone could have been plugged.
Float Shoe held.

Operators Representative J B McElhinney

Figure 9

HUDBAY OIL (AUSTRALIA) LIMITED

Casing, Running Report

Well Name and No. BALEEN NO 1 Date 10 NOVEMBER 1982 Casing Size 9-5/8"

HOLE	Size	36"	26"	12¼"		
	Depth (m)		225	577.44		
CASING	Size	30"	20"	9-5/8"		
	Depth (m)		209.05	566.08		

MUD: Type Seawater/Gel/Poly s.g. 1.05 Vis. 42 YP 9 WL 12.8

Power Tong Torque Maximum ______ ft/lbs. Minimum ______ ft/lbs.

Fill up Points

Calc. Displ. (m3) 18.92 (119 lbs) Pump Strokes Displaced by Hall

______ psi ______ psi

CASING INFORMATION

TD	577.44
OFF BOTTOM	11.36
Shoe (make and type) Weatherford Lamb Landed at	566.08
Length Shoe	0.45
	565.63
1 Joints. Grade K55 wt. 40 lb/ft ID. 8.835 ins.	11.37
	554.26
Landing Collar (make and type) Weatherford Lamb	0.34
	553.92
41 Joints, Gr. K55, Wt. 40 lb/ft, I.D. = 8.835	485.03
	68.89
1 Pup, Gr. K55, Wt. 40 lb/ft, I.D. = 8.835	3.96
	64.93
1 Crossover, 13-3/8" BTC Box x 9-5/8" BTC pin.	0.37
	64.56
Hanger or Suspension joint (make and type) Vetco 13-5/8" Wellhead Housing	4.53
Top Hanger or Suspension joint	60.03
Landing String Vetco 13-5/8" Housing, Running tool	0.44
	59.59
7 Joints 5" Gr. 'G' Drill Pipe	64.05
	- 4.46
metres above R.T. at Zero Tide	
Less tide of	0:25
metres up from R.T.	4.21m

DETAILED CASING AND CEMENTING REPORT

Casing landed with shoe at 566.08m, casing and landing string volume was circulated with mud. Pumped 15 bbl Halliburton CS-2 spacer. Rectify problems with water in fuel and centrifugal pump motor.

Mixed and pumped 360 sks Class 'A' cement slurry mixed with 93 bbls fresh mix water containing 2.5% prehydrated bentonite and 0.75% CFR-2, average slurry density 12.8 ppg, pumping pressure steady at 200 psi.

Followed with 300 sks Class 'A' tail slurry mixed with 36 bbls seawater and 0.1% HRL, average slurry density 15.8 ppg, pump pressure steady at 200 psi.

Released drill pipe dart, no indication that dart dropped from cementing head, opened cement head to release, pumped 3.6 bbls seawater, dart seated on top plug and sheared out at 3500 psi. Pumped casing volume of mud plus 70% of shoe joint - no bump. Displacement pump pressures increased gradually from 275 psi to 725 psi. Bled off line at pump with ½ bbl mud return - floats holding. Backed out running tool. Full mud returns throughout job.

Commenced pumping spacer fluid at 0808 hours, blended gel slurry at 0820 hours, neat cement slurry at 0913 hours and displacement mud at 0948 hours. Displacement completed at 1030 hours.

Operators Representative A Eisenbarth

Figure 10

HUDBAY OIL (AUSTRALIA) LIMITED

Casing, Running Report

Well Name and No. BALEEN NO 1 Date 19 NOVEMBER 1982 Casing Size 7" Liner

HOLE	Size	36"	26"	12¼"	8½"	
	Depth (m)		225	577.44	1030	
CASING	Size	30"	20"	9-5/8"	7"	
	Depth (m)		209.05	566.08	760.0	

MUD: Type SW/Gel/Polymer s.g. 1.44 Vis. 54 YP 16 WL 7.2

Power Tong Torque Maximum - ft/lbs. Minimum - ft/lbs.

Fill up Points Every 5 jts plus every stand drill pipe

Calc. Displ. (m^3) 23 bbls DP + 34 bbls 7" Liner Pump Strokes Displaced by HOWCO

1000 psi pumping Did not bump plug psi

CASING INFORMATION	Strap (m)	Depth (m BRT
TD Plugged back to 775m		775.00
OFF BOTTOM 15m		760.00
Shoe (make and type) TIW Float Shoe Landed at		760.00
Length Shoe	0.75	759.25
2 Joints. Grade N80 wt. 29 lb/ft ID. 6.184 ins.	24.01	735.24
Landing Collar (make and type) TIW Latch down collar	0.29	734.95
23 Joints N80 x 29 lb/ft 7" Liner BTC	274.47	460.48
Hanger or Suspension joint (make and type) TIW Hydro-set with extension	4.71	455.77
Top Hanger or Suspension joint TIW Type 'S' Packer	4.41	451.36
Landing String Running tool above liner	2.09	449.27
12 Jts HWDP	101.04	348.23
12 Stds DP + SGL	348.23	0
+ 5 ft Pup	1.52	-1.52
metres above R.T. at Zero Tide	1.52	
Less tide of 0.25	1.27	
metres up from R.T.		

DETAILED CASING AND CEMENTING REPORT

RIH with 7" liner on Drill Pipe to shoe setting depth of 760m (Top of Liner at 451.36m).
Circulated volume of Liner and Drill Pipe.
Dropped ball and set liner slips. Unlatched running tool and circulated to ensure packer not set.
Cemented liner: 5 bbls drill water ahead, mixed and pumped 193 sks cement 'G' + 0.75% CFR-2 + 19 Halad 22A at 1.94 S.G. with 20 bbls mix water.
Dropped dart and launched wiper plug after pumping 24 bbls mud. Pumped a further 35 bbls, did not bump plug. Shut down to avoid pumping cement out of liner.
(Calculated displacement 57 bbls total.)
Bled off pressure - no flow back.
Set liner Hanger packer with 30,000 lbs weight.

Operators Representative J B McElhinney

Figure 11

2.4 Mud System

2.4.1 Mud Report Summary

36" Hole to 71m, 26" Hole to 225m:

The 36" hole was drilled with a 36" hole opener and 26" bit to 71m, 30 bbls of spud mud was spotted on bottom. The hole opener was removed and 26" hole was then drilled to 225 metres.

Seawater was used to drill the hole, flushing with 15 bbls to 30 bbls spud mud each connection. At casing point 550 bbls of flocculated spud mud was displaced into the hole and the bit pulled to the Temporary Guide Base. After resting the hole for a brief period the bit was run back to bottom and although there was no fill a further 350 bbls of spud mud displaced. The 20" casing was run and cemented, returns being intermittent during cementing.

Leaky valves gave problems on two occasions, the first with a loss of 25 bbls of spud mud and on the second occasion the valve on the overboard line leaked and 260 bbls seawater diluted the spud mud. The valve on the overboard line was replaced.

Further problems with leaking valves persisted thoughout this well.

12¼" Hole to 577m:

After running and testing the BOP stack satisfactorily, the cement was drilled out using seawater. A 17½" bit was used to drill 3m to 225m prior to displacing to mud. A leak off test showed an equivalent to 1.72 SG formation strength. The hole was drilled ahead with a 12¼" bit to 390m where the drill string twisted off at the kelly saver sub. This was fished successfully and the drill pipe and collars laid out and new drill collars and drill pipe picked up. The mud had been made up of salvage mud from the previous interval with added prehydrated gel which gave a funnel viscosity range

2.4.1 Mud Report Summary

12¼" Hole to 577m: (Continued)

throughout of 39 to 44 seconds, a PV range of 5 to 10 cps and a yield point range of 8 to 11 lbs/100 sq ft. As the remainder of the hole to 577m was drilled, Dextrid 0.5 lb/bbl, Q-Broxin 1.6 lb/bbl and minor amounts of Mon Pac were used to reduce the filtrate down to 12 cc and control rheology. The desander and desilter were run continuously whilst drilling to control the mud weight. At casing point, Schlumberger logs were run, the hole was tight at 250m and the logs would not go below 406m. A wiper trip was then made which showed no drag, and logs were successfully re-run after conditioning the hole and mud. A further wiper trip was required with reaming from 554m to 577m before the 9-5/8" casing was run and cemented without problems.

8½" Hole to 1030m:

While waiting on weather the mud in the active tanks was contaminated by approximately 100 bbls seawater increase; this mud was conditioned on drilling out.

After drilling the cement, the mud was treated with Sodium Bicarbonate and a leak off test performed at 580m, equivalent to 1.98 SG. The mud was further treated with Q-Mix and Mon Pac to raise the viscosity slightly, and Dextrid and Q-Broxin added to reduce filter cake and fluid loss.
A gas kick was taken at 663m with the mud weight at 1.04 SG and with only a 10 bbl increase in pit volume. It was caught by the increased flow rate across the shakers.
Shut in drill pipe pressure was 450 psi and shut in casing pressure 480 psi. Whilst weighting mud up to 1.54 SG, the kick was circulated out to avoid exceeding fracture gradient at the shoe, as casing pressure was building up. However, on displacing to 1.54 SG this was found to exceed the fracture gradient and 107 bbls of mud was lost before mud weight could be reduced to 1.47, then to 1.44 SG.

2.4.1 Mud Report Summary

8½" Hole to 1030m: (Continued)

It can be calculated from later flow testing that some of the gas had entered the drill string at the initial kick. However, the mud weight was maintained at 1.44 SG for the remainder of the hole including testing as this gave an overbalance at 633m of 310 psi static, and 190 psi overbalance in the event of riser disconnect.

On the bit trip at 938m the hole gave 25000 lbs overpull at 690 - 735m. The mud was treated with Q-Broxin 0.95 lb/bbl and Dextrid 0.66 lb/bbl, and the tight spot reamed on the trip in with bit no. 7. At Total Depth a wiper trip was made, seawater (50 bbls) leaked in to the active system, the mud conditioned, and Schlumberger logs run.

On successfully completing the suite of logs, the hole was plugged back to 775m and the 7" liner was then run to 760m and cemented.

Testing:

After displacing the riser and changing the rams on the BOP's to 3½", the 7" casing scraper was run and the mud conditioned to 1.44 SG. Some 240 bbls of mud was accidentally pumped over by the rig personnel, then the packing gland on the mixing pump leaked another 75 bbls into the active system. The mud was conditioned and 6 bbls solids free KCl polymer mud made from (after pilot testing) 55 lb/bbls salt (27 lb/bbl KCl) 0.5 lb/bbl Dextrid, and 0.3 lb/bbl X-C Polymer. However, at this point a CBL log showed no cement at the overlap and a pressure test confirmed this. The overlap was squeezed and later 70 bbls mud was lost due to a leaking gate valve when testing burners by pumping water through them.

2.4.1 Mud Report Summary (Continued)

Testing:

After cleaning out the cement and conditioning mud a further KCl Polymer plug was spotted 715 - 665m and Schlumberger perforated the interval 700 - 706m. The packer was run and the first zone tested.

After circulating the hole free of gas at the conclusion of the test, a bridge plug was set at 685m and a further casing scraper run. A further KCl Polymer slug, 6 bbls, was set on bottom and the zone 662 - 670m perforated. After two attempts to set the packer the second zone was tested. On finishing testing and the hole circulated clean of gas, a bridge plug was set at 652m and tested to 2,000 psi. A cement plug was set at 652m, the first was not balanced and flowed out, and was reset with no problems, after conditioning mud which had been water contaminated during the setting of the first plug. The pipe was pulled to 165m, the mud displaced to seawater and the second cement plug set.

About 300 bbls mud was salvaged (sand traps, desander, degasser and slug tank were dumped due to water contamination) and stored as kill mud for the next well Whale No. 1.

2.4.2 Mud Engineering

All mud and chemcials used in the mud system on Baleen No 1 were supplied by Baroid (Australia) Ltd.

Engineers involved in the programme were:

Evan Hill
Alan Searle
Dave Parry

2.4.3 Mud Record

(As per Mud Properties Form Figure 12.)

HUDBAY OIL (AUSTRALIA) LIMITED

Mud Properties

WELL BALEEN NO 1

MUD COMPANY: BAROID (AUST) LTD

1. Specific gravity
2. Viscosity (sec)
3. A.P.I. Water Loss (ml)
4. Cake Condition
5. A.P.I. Cake (millimetre)
6. Sand (%)
7. Chloride (ppm x 1000)
8. pH
9. Solids (%)
10. Plastic Viscosity (cp @ 50^{o}C)
11. Yield Point (lb/100ft.^{2})
12. Gels (lb/100ft.^{2} 10 sec/10 min)
13. Ca Hardness (epm)
14. Pf
15. Mf
16. Oil %
17. "N" Factor
18. Bentonite (lbs/bbl)

Date	Depth 0600 hrs (metres)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
4/11	71	1.04	100+																
5/11	225	1.04	100+																
6/11	225	1.04	100+																
7/11	390	1.03	39	30		2.5	0.25	6500	10	4	5	11	6/-	320	0.08				
8/11	450	1.04	41	17.6		1.5	0.25	7500	10	4	8	8	3/7	160	0.1				
	577	1.04	44	12.4		1.5	0.2	9000	9.5	5	10	10	4/8	300	0.1				
9/11		1.05	42	12.8		1.5	0.2	9000	9	5	8	9	3/7	320	0.08				
10/11		1.05	42	12.8		1.5	0.2	9000	9	5	8	9	3/7	320	0.08				
11/11		1.05	42	12.8		1.5	0.2	9000	9	5	8	9	3/7	320	0.08				
12/11		1.04	37	30		1.5	0.2	8000	8.5	4	5	4	1/2	520	0.02				
13/11	598	1.04	35	25.5		2.5	0.1	6000	11.5	3	5	6	3/4	80	0.6				
	660	1.04	43	11.6		1	-	-	11	-	6	8	3/10	-	-				
	663	1.54	46	-		-	-	-	-	-	-	-	-	-	-				
14/11	663	1.49	42	16		2.5	Tr	7500	9	15	17	13	4/14	320	0.03				
	750	1.47	49	12.6		2	0.75	8000	9	15	16	18	8/20	280	0.05				
15/11	798	1.44	50	9.8		1.5	1	8000	9.5	16	15	18	13/29	240	0.03				
	931	1.44	45	12.0		1.5	2	10000	9	17	15	15	5/19	280	0.05				
16/11	949	1.41	47	13.8		2	1	9000	9	17	13	15	5/15	320	0.03				
	988	1.43	46	9.4		2	1.5	9000	9	17	14	12	4/13	280	0.04				
	1030	1.44	48	10.6		2	2	8000	9	17	15	15	6/14	240	0.03				
17/11	1030	1.44	48	10.6		2	2	8000	9	17	15	15	6/14	240	0.03				
18/11	775	1.39	54	9.2		3	2	9000	9.2	14	15	12	11/15	20	0.6				
19/11	760	1.44	55	7.2		2	2.5	9000	9.9	16	20	16	4/14	20	0.8				
21/11	760	1.34	36	6.6		1	2	8000	10	12	9	7	1/5	20	0.4				
22/11	760	1.44	47	7.0		1	2	9000	10	16	17	16	4/15	20	0.5				
23/11	721	1.44	46	7.0		1	2.5	9000	10	17	16	15	3/13	16	0.6				
24/11	721	1.44	55	8.4		2	2.5	9000	10	17	22	17	6/20	14	0.8				
25/11	721	1.44	50	8.8		2	2.5	9500	9.8	17	20	16	6/18	16	0.8				
26/11	721	1.44	49	8.8		2	2.5	9500	9.8	17	19	16	6/18	16	0.8				
27/11	721	1.44	53	9.0		2	2.5	9500	-	17	21	19	6/12	16	0.7				

Figure 12

2.4.4 Materials Consumption and Costs

Mud and mud chemicals consumption on this well were as follows:

Material	Unit	Quantity	Cost
Bentonite	100 lb	651	10,090.50
Barite	100 lb	4367	37,992.90
Dextrid	50 lb	88	4,540.80
Monpac	25 kg	12	1,458.00
Q-Broxin/FCL	25 kg	73	1,762.95
Cellogen	25 kg	6	729.00
Caustic Soda	23 kg	42	745.50
Lime	25 kg	6	40.50
Soda Ash	40 kg	15	217.50
Soda Bicarb	40 kg	20	429.80
Coat 888	50 lb	5	116.00
		Total Cost =	$58,122.95

The above costs include 200 sacks of barites used in the temporary guide base and 22 sacks bentonite used for cementing.

2.4.5 Mud Equipment Description

Mud Pumps:

Two National 12-P-160 triplex single acting, each equipped with independently driven centrifugal pumps, each powered by two GE 752 electric motors.

Mud Mixing Pumps:

Ingersoll Rand MIR 150 with 75 HP electric motors, 2 each on active tank and 2 each on reserve tanks.

Shale Shaker:

Brandt Dual Tandem separator.

Desander:

Demco 6 cone x 6" rated at 1050 GPM with a 6" x 8" Mission Centrifugal pump powered by 75 HP electric motor.

2.4.5 Mud Equipment Description (Continued)

Desilter:

Demco 12 cone x 4", rated at 1080 GPM, with Ingersoll Rand centrifugal pump powered by a 75 HP electric motor.

Adjustable Choke:

Swaco Super adjustable choke, 10,000 psi WP, complete wtih control panel.

Trip Tank:

25 bbl capacity, with high low level switch actuated motor for transfer pump.

Active Tank:

One 552 bbl capacity tank.

Reserve Tanks:

Four tanks, total 2608 bbls capacity.

2.5 Flow Testing

2.5.1 Flow Testing Summary

Two drill stem tests were run on this well.

The first drill stem test was run over the interval 700 - 706m RT. The interval was perforated with a 4 inch casing gun at 4 shots per foot with a 90 degree phasing.

Three downhole gauges were used to record pressures and temperatures during the test and a Surface Pressure Read Out (SPRO) Unit was used to provide a continuous surface monitor of the downhole conditions.

An initial 7 minute flow period on a ½ inch choke was followed by a 63 minute initial shut in period. Gas was observed at surface 4 minutes into the initial flow period and the final bottomhole flowing pressure was 413 psig. The final shut in bottomhole pressure at the end of the initial shut in period was 1079.9 psig. The final flow period lasted for 616 minutes. 135 minutes into the final flow period, the choke size was increased from ½ inch to 1 inch. The gas flow rate stabilized at 1.84 MMcf/D at a bottomhole flowing pressure of 177 psig. The well was shut in and after one minute the pressure was 1077.2 psig. The final shut in pressure was 1079.4 psig after 76 minutes.

The second drill stem test was run over the interval 662 - 670m RT. The interval was perforated with a 4 inch casing gun at 4 shots per foot with a 90 degree phasing.

Three downhole gauges were used to record pressures and temperatures during the test and a Surface Pressure Read Out (SPRO) unit was used to provide a continuous monitor of the downhole conditions.

An initial 7 minute flow period was followed by a 38 minute initial shut in. The final flowing period lasted 300 minutes and was followed by a final shut in of 140 minutes. During the final flow period, the well flowed gas on a ½ inch choke at 3.5 - 4.0 MMcf/D at a bottomhole pressure of 817 psig and at rates of 5.8 to 6.3 MMcf/D on a 1 inch choke at 670 psig. The final measured shut in pressure was 1068.3 psig.

2.5.2 Flow Data

The flow data as reported by Flopetrol is attached as Appendix A1 to this report.

2.5.3 Pressure Data

The pressure data as reported by Dowell Schlumberger is attached as Appendix A2 to this report.

2.5.4 Interpretation and Analysis

DST No 1 - Interval 700-706m RT

- Flowed 1.8 MMcf/D of dry gas on a 1 inch choke at a wellhead pressure of 80 psig and a flowing bottomhole pressure of 176 psig.
- Has a formation pressure of 1080 psig as measured by the SPRO gauge at 671m RT.
- Has excellent formation permeability of 747 md.
- Has severe formation damage near the wellbore as indicated by the calculated skin of +1235.
- Did not indicate any reservoir depletion during the test.

DST No 2 - Interval 662-670m RT

- Flowed 6.3 MMcf/D of dry gas on a 1 inch choke at a wellhead pressure of 263 psig and a flowing bottomhole pressure of 670 psig.
- Has a formation pressure of 1075 psig as measured by the SPRO gauge at 631m RT.
- Has a formation permeability of 56 md.
- Has relatively severe formation damage near the wellbore as indicated by a skin factor of +18.5.

DST No 2 - Interval 662-670m RT (Continued)

- Did not indicate any reservoir depletion during the test.

From the DST analysis, the two zones appear to be in pressure communication.

2.6 General Data

2.6.1 Positioning Report

(See Positioning Report per Figure 13, and Appendix A3.)

2.6.2 Downhole Surveys

A Totco 0-8 deg. Inclinometer was used for all downhole surveys in this well:

Depth (m)	Deviation (deg)	Depth (m)	Deviation (deg)
225	Misrun	1030	1/2
267	1		
577	0		
753	1		

2.6.3 Plug Back and Squeeze Cementation Record

(i) Prior to running the 7" liner, the 8½" open hole was plugged back by spotting a cement plug at 875m. This plug consisted of 123 sacks of Class 'G' cement slurry at average 15.8 ppg slurry weight without additives. The plug was sized to cover the interval 875 - 775m. The plug was not tagged.

(ii) A CBL log was run over the length of 7" casing liner and indicated the top of cement at approximately 608m. Pressure testing of the 7" casing liner then indicated a leak was present - this was correctly interpreted as a liner overlap leak. An injection rate of ¼ bbl/min was established past the packer. Drill pipe was run in to 966m and 50 sacks of Class 'G' cement slurry with 2 percent $CaCl_2$ was spotted with slurry weight of 15.8 ppg. A total of 2½ bbls slurry was squeezed away at up to 2200 psi pressure. After drilling out the cement inside the casing, another pressure test to 2200 psi confirmed a good seal.

Proposed Location: 038 deg 00 min 36.01 sec South **Latitude:**

148 deg 26 min 08.74 sec East **Longitude:**

Actual Location: 038 deg 00 min 36.630 sec South **Latitude:**

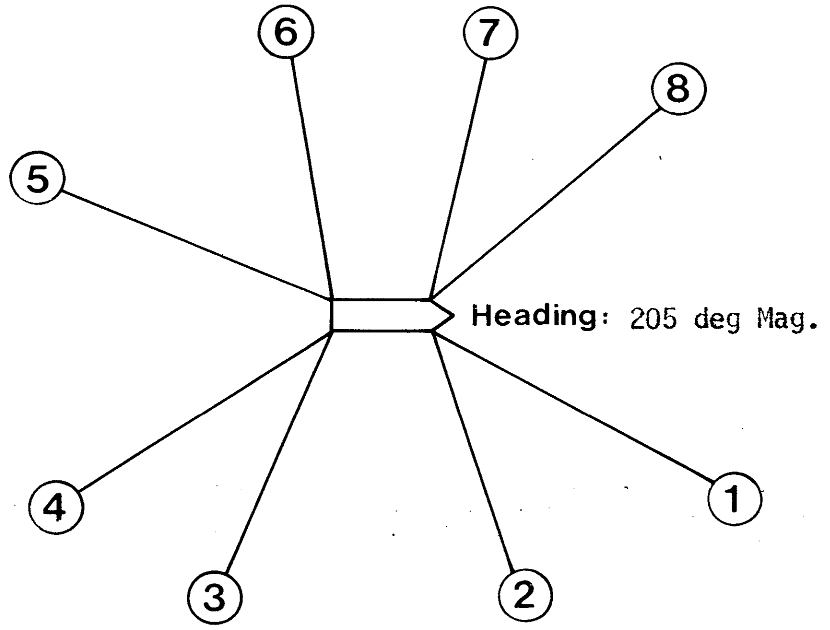
148 deg 26 min 08.400 sec East **Longitude:**

Distance and Bearing from Actual to Proposed: Actual location was 23 metres at 207.7 deg. True from the proposed location.

Survey Method: Trisponder survey, position confirmed by JMR-4 satellite receiver.

Checked By: Racal-Decca Survey Ltd

Anchor Pattern: 30 deg/60 deg pattern from bow and stern



Remarks Commenced running anchors at 2230 hours 3 November 1981, completed 5½ hours soaking, relaying of No. 4 and 5 anchors and final tensioning at 1700 hours 4 November 1981. (18½ hours.) All anchors run out to 1800 - 2000 ft radius. Occasional re-tensioning was required during the programme to maintain position over the wellhead.

Author: A. Eisenbarth

Drawn by H.O.A.L.

Hudbay Oil (Australia) Ltd.

POSITIONING
BALEEN - 1

Date June 1982

Drawing Nº A4-DR-531

Figure 13

2.6.4 Fishing Operations

The only fishing operation on this well occurred when the kelly saver sub parted. An overshot was made up and the string retrieved in 2 hours. The drill collars were laid down for inspection.

2.6.5 Side Tracked Hole

No side tracked hole occurred on this well.

2.6.6 Formation Leak Off Tests

(i) 20" casing set at 209m:

Open hole = 209 - 225m
New hole = 225 - 228m
Fluid in hole = Seawater (8.45 ppg)
Indicated Formation Strength = 14.4 ppg equivalent

(ii) 9-5/8" casing set at 566m:

Open hole = 566 - 577m
New hole = 577 - 580m
Fluid in Hole = Mud (8.7 ppg)
Indicated Formation Strength = 16.5 ppg equivalent

(iii) 7" casing set at 760m:

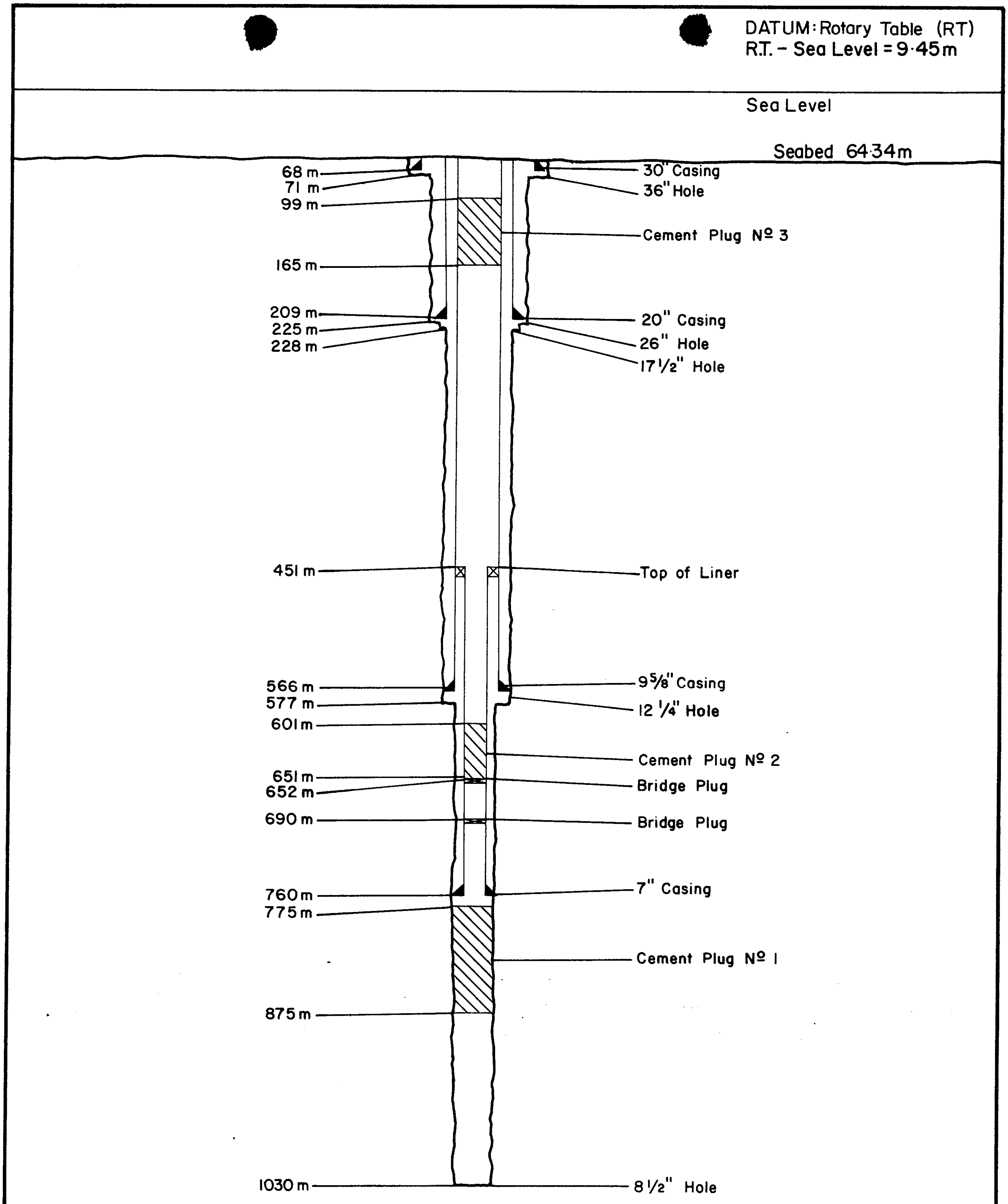
Casing shoe not drilled out.

2.7 Abandonment Report

(See As Abandoned Schematic per Figure 14.)

2.8 Recommendations for Future Drilling Programmes

The major problem encountered during drilling and evaluation of this well was the significant formation damage indicated by the production tests. This damage was deduced as directly a result of the type of mud system employed during the drilling phase. As a result of this information the following two wells (i.e. Whale No 1 and Sperm Whale No 1) were drilled with an inhibitive brine polymer mud system. This new mud system had minimal solids content and was in itself fully acid soluble.



NOTES:
1. Cement Plug Nº1 – 123 Sks. Class 'G' Neat, 15·8 PPG. 875m – 775m.
2. Cement Plug Nº2 – 30 Sks. Class 'G' Neat, 15·8 PPG. 651 m – 601 m.
3. Cement Plug Nº3 – 80 Sks. Class 'B' Neat, 15·6 PPG. 165m – 99m
4. DST Nº1 Perforations 706 m – 700m
5. DST Nº2 Perforations 670 m – 662m

Author: A. Eisenbarth	Hudbay Oil (Australia) Ltd.	Date: June 1982
Drawn: C. Clarke	**BALEEN - 1** **AS ABANDONED**	Drawing Nº: **A4-DR-533**

Figure 14

APPENDIX A1

WELL TESTING REPORT

No. 231181261181

FLOPETROL

DIVISION : N.T.D.

BASE : PERTH

REPORT N°: 231181261181

Well Testing Report

Client :	HUDBAY OIL		
Field :	BALEEN	Well :	# 1
Zone :	1	Date :	23.11.81 TO 24.11.81
ZONE:	2		25.11.81 TO 26.11.81

N°: DOP 100

INDEX

☒ 1 _ TEST PROCEDURE _
☒ 2 _ MAIN RESULTS _
☒ 3 _ OPERATING AND MEASURING CONDITIONS _
☒ 4 _ SURFACE EQUIPMENT DATA _
☒ 5 _ WELL COMPLETION DATA _
☒ 6 _ SEQUENCE OF EVENTS _
☒ 7 _ WELL TESTING DATA _

- TEST PROCEDURE -

D.S.T. # 1

1) SCHLUMBERGER RUN IN HOLE WITH 4" CASING GUN (90° PHASING, 4 SHOTS PER FOOT) AND PERFORATE INTERVAL 700 - 706 M.

2) PACKER RUN IN AND SET AT 688 METERS.

3) TEST STRING RUN IN HOLE CONSISTING OF DOWELL P.C.T., 3½" HYDRIL PH6 TUBING, FLOPETROL SUB SURFACE SAFETY VALVE, "E.Z. TREE".

4) SURFACE EQUIPMENT RIGGED UP AND PRESSURE TESTED.

5) WELL WAS OPENED AND PRODUCING DRY GAS FOR AN INITIAL FLOW OF APPROXIMATELY 10 MINUTES. THE WELL WAS THEN SHUT IN TO OBSERVE BUILD-UP FROM THE SPRO GAUGE.

   ON OPENING AGAIN THE WELL WAS CLEANED UP ON ½" CHOKE WHICH WAS LATER INCREASED TO 1" FIXED.

   USING THE LARGER CHOKE, RATES WERE OBTAINED THROUGH THE SEPARATOR IN THE REGION OF ± 1.80 MMSCF/D WITH NO FLUIDS PRODUCED.

   A FINAL BUILD UP WAS AGAIN MONITORED USING THE SPRO SYSTEM THEN THE WELL WAS KILLED.

D.S.T. # 2

MIS-RUN,UNABLE TO SET POSI-TEST PACKER.

- TEST PROCEDURE -

1) SCHLUMBERGER RUN IN HOLE WITH 4" CASING GUN, 90° PHASING 4 SHOTS PER FOOT, AND PERFORATE INTERVALS 662 - 670 METERS.

2) POSI-TEST PACKER SET AT 648.13 METERS.

3) TEST STRING RUN IN HOLE CONSISTING OF DOWELL P.C.T., 3½" PH6 TUBING, FLOPETROL SUB SURFACE SAFETY VALVE, "E.Z. TREE".

4) SURFACE EQUIPMENT RIGGED UP AND PRESSURE TESTED.

5) WELL WAS OPENED, WITH PRESSURE INCREASING RAPIDLY, FOR A 5 MINUTE PRE-FLOW, FOLLOWED BY A BUILD-UP OF 40 MINUTES.

FOLLOWING THIS THE WELL WAS THEN FLOWED FOR CLEAN UP ON ½" CHOKE GIVING AN ESTIMATED FLOW RATE OF ± 3.5 MMSCF/D.

THE FLOW WAS THEN SWITCHED THROUGH THE SEPARATOR GIVING RATES OF 4.020 MMSCF/D.

AFTER 30 MINUTES FLOWING THROUGH THE SEPARATOR THE CHOKE WAS INCREASED TO 1" FIXED AND RATES OBTAINED IN THE REGION OF ± 6.3 MMSCF/D.

A FINAL SHUT IN FOLLOWED AND THEN THE WELL WAS KILLED.

FLOPETROL

Base : PERTH

Client : HUDBAY
Field : BALEEN
Well : # 1

Section : 2
Page : 01
Report N° : 231181261181

_ MAIN RESULTS _ D.S.T. # 1

Tested interval : SANDSTONE Perforations : 700 - 706 METERS.

OPERATION	DURATION	BOTTOM HOLE PRESSURE	WELL HEAD PRESSURE	OIL PROD. RATE	GAS PROD. RATE	G.O.R
Units	MIN	PSIG	PSIG	B.O.P.D.	MMSCF/D	
INITIAL OPENING ON ½" FIXED CHOKE	8		MAX. RECORDED 280	-	ESTIMATED @ ± 1.6	-
SHUT-IN P.C.T.	50			-	-	
WELL FLOWING ON ½" FIXED CHOKE	142		330	-	ESTIMATED @ ± 1.6	-
INCREASE CHOKE TO 1" FIXED AND FLOW THROUGH SEPARATOR	489		81	-	1.809	-

Depth of bottom hole measurements : 671.3 METERS Reference : RT

Temperature : 111.5°C at : 671.3 MTR depth

Separator gas gravity (air : 1) at choke size : .575 @ 1" FIXED CHOKE

STO gravity at choke size : -

BSW : - Water cut : -

REMARKS AND OTHER OPERATIONS

RATES SHOWN AVERAGED.
WELL PRODUCED NO FLUIDS ALTHOUGH SLIGHT TRACES OF MUD DURING CLEAN UP.
TRACE OF CONDENSATE IN P.C.T. TOOL WHEN RIGGED DOWN ON SURFACE.

N°: DOP 103

FLOPETROL

Base : PERTH

Client : HUDBAY

Field : BALEEN

Well : # 1

Section : 2

Page : 02

Report N°: 231181261181

- MAIN RESULTS -

D.S.T. # 2A

Tested interval: SANDSTONE Perforations: 662 - 670 METERS

OPERATION	DURATION	BOTTOM HOLE PRESSURE	WELL HEAD PRESSURE	OIL PROD. RATE	GAS PROD. RATE	G.O.R
Units	MIN	-	PSIG	-	MMSCF/D	-
INITIAL OPENING ON ½" FIXED CHOKE	5		580			
SHUT - IN P.C.T.	40					
WELL FLOWING ON ½" FIXED CHOKE	45		667		ESTIMATED @ ± 3.5MM	
FLOW THROUGH SEPARATOR ON ½" FIXED	30		676		4.020	
INCREASE CHOKE TO 1" FIXED FLOW THROUGH SEPARATOR	210		263		6.349	

Depth of bottom hole measurements : 631 Reference : RT

Temperature : ______ at : ______ depth

Separator gas gravity (air : 1) at choke size : .575 @ 1" FIXED CHOKE

STO gravity at choke size :

BSW : Water cut :

REMARKS AND OTHER OPERATIONS

FLOPETROL

Base : PERTH

Client : HUDBAY
Field : BALEEN
Well : # 1

Section : 3
Page : 01
Report N° : 231181261181

- OPERATING AND MEASURING CONDITIONS -

A - TYPE OF GAUGE -

BOTTOM HOLE :
Pressure : SPRO + J 200
Temperature : SPRO + MAXI. THERMOMETER

WELL HEAD :
Pressure : FOXBORO D.W.T., PRESSURE GAUGE
Temperature : GLASS ROD THERMOMETER

SEPARATOR :
Pressure : BARTON
Temperature : GLASS ROD THERMOMETER

B - PRODUCTION RATE CONDITIONS AND SOURCES -

OIL PRODUCTION RATE
☐ Tank
☐ Meter – ☐ Floco / ☐ Rotron
☐ Dump
☐ ______

Reference conditions -
☒ Separator
☒ Atmospheric pressure 60°F

Shrinkage measurement -
☐ With tank
☐ With shrinkage tester

GAS PRODUCTION RATE
☒ Orifice meter
☐ ______

Standard conditions -
14.73 PSI @ 60^oF

WATER PRODUCTION RATE
☐ Tank
☐ Meter
☐ ______

C - WELL DATA -

WELL STATE DURING SURVEY :

Well producing through : tubing / ~~drill pipe / casing~~
Main casing size 7" set at ______ Total well depth ______
Tubing size 3½ HYD set at ______ Packer ______ set at ______
Perforations :
- Zone ______ From ______ to ______ From ______ to ______
- Zone ______ From ______ to ______ From ______ to ______
-

WELL STATE BEFORE TEST : EXPLORATION

☐ Well closed since ______
☐ Well flowing since ______ Producing zone ______
Choke size ______

FLOPETROL

Base : PERTH

Client : HUDBAY

Field : BALEEN

Well : # 1

Section : 4

Page : 01

Report N° 23118126118

SURFACE EQUIPMENT LAYOUT

REMARKS :

REFER TO HUDBAY DRAWING NO. A4-DR-276.

FLOPETROL

Base : PERTH

Client : HUDBAY

Field : BALEEN

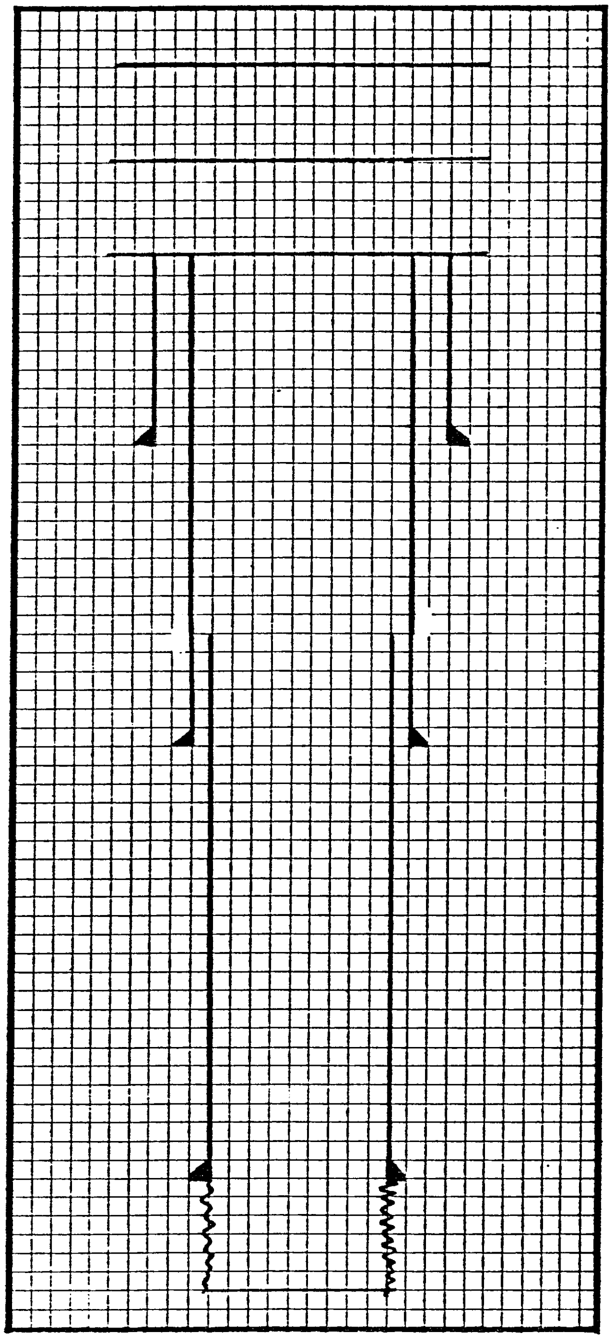
Well : # 1

Section : 5

Page : 01

Report N° : 2311812611

- WELL COMPLETION DATA -



RT

SEA LEVEL 9.5 METERS

SEA BED 54.9 METERS

20" CASING SET @ 209 METERS.

TOP OF 7" LINER @ 451 METERS.

9 5/8" CASING SET @ 564 METERS.

SHOE OF 7" LINER @ 760 METERS.

T.D. 1030 METERS.

REMARKS :

N.T.S. FLOR TEST STRING DATA REFER TO DOWELL SCHLUMBERGER REPORT.

N° : DOP 106

FLOPETROL

Base : PERTH

Client : HUDBAY

Field : BALEEN

Well : # 1

Section : 6

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- SEQUENCE OF EVENTS -

DATE	TIME	OPERATION
23.11.81		D.S.T. # 1
		PERFORATIONS = 706 - 700 METERS.
		POSI-TEST PACKER SET @ = 688 METERS.
		CUSHION - NONE.
	1640	PRESSURE ANNULUS TO OPEN P.C.T. OCCASIONAL BUBBLES
		FOLLOWED BY GOOD INCREASE IN PRESSURE.
	1642	SWITCH FLOW TO FLARE LINE (DRY GAS FLOWING).
	1646	TRACES OF MUD.
	1648	PRESSURE BLED OF ANNULUS TO CLOSE P.C.T.
	1738	PRESSURE ANNULUS TO OPEN P.C.T.
	1740	OPEN TO BURNER ON ½" FIXED CHOKE.
	1741	TRACES OF MUD TO SURFACE.
	1755	H2S = 0 PPM.
	1800	GAS SP. GRAVITY = 0.58
	1835	H2S = 0 PPM.
	1845	GAS SP. GRAVITY = 0.578.
	1900	H2S = -0 PPM.
	2000	INCREASE TO 1" ADJ. CHOKE.
	2003	CHANGE TO 1" FIXED CHOKE.
	2100	SWITCH FLOW THROUGH SEPARATOR.
	2130	START TO TAKE SPEARATOR READINGS, LINE BORE 4.026", ORIFICE
		PLATE = 2.000 ", PRESSURE ± 50 PSIG.
24.11.81	0300	START TO TAKE FIRST GAS SAMPLE FROM SEPARATOR.
		BOTTLE NO A-11977.
	0320	FINISH TAKING GAS SAMPLE FROM SEPARATOR.
	0325	BOTTLE NO. A-8526.
	0345	FINISH TAKING SECOND GAS SAMPLE FROM SEPARATOR.

FLOPETROL

SEQUENCE OF EVENTS (Continuation)

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DATE	TIME	OPERATION
24.11.81	0359	BY PASS SEPARATOR.
	0406	BLEED DOWN ANNULUS TO CLOSE P.C.T. CLOSE IN CHOKE MANIFOLD
		MONITORING BUILD-UP WITH S.P.R.O.
	0530	UNLATCH S.P.R.O. AND PULL OUT OF HOLE.
	0555	SCHLUMBERGER HUNG-UP AT 128 METERS.
	0600	SHEAR REVERSE OUT SUB AND REVERSE CIRCULATE.
	0614	MUD SAMPLE, WITH "BLOOM" OF CONDENSATE TAKEN AND
		MARKED AS FIRST RETURNS FROM REVERSE OUT.
	0635	OPEN LOWER RAMS AND CIRCULATE.
	0705	FINISH CIRCULATING.
	0710	FLUSH THROUGH SURFACE LINES THEN ATTEMPT TO FREE SCHLUMBERGER
	0855	S.P.R.O. LATCH ON SURFACE.
	0900	START TO RIG DOWN FLOWHEAD.
	1000	E.Z. TREE ON SURFACE THEN LAYED DOWN.
		END OF D.S.T. # 1
25.11.81		<u>D.S.T. # 2.</u>
		PERFORATIONS 662 - 670 METERS.
		POSI-TEST PACKER @ 648.13 METERS.
		CUSHION - NONE.
	1245	E.Z. TREE RUN IN HOLE.
	1340	RIGGING UP FLOWHEAD FOLLOWED BY SCHLUMBERGER.
	1645	ATTEMPT TO SET PACKER - UNABLE.
	1900	START TO PULL OUT OF HOLE.
	2000	E.Z. TREE ON SURFACE.
		D.S.T. # 2 IS MISS RUN.

FLOPETROL

- SEQUENCE OF EVENTS -(Continuation)

Section : 6

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DATE	TIME	OPERATION
26.11.81		D.S.T. # 2A
		PERFORATIONS @ 662 - 670 METERS.
		POSI-TEST PACKER @ 648.13 METERS.
		CUSHION - NONE.
	0445	E.Z. TREE RUN IN HOLE.
		RIG UP SURFACE EQUIPMENT.
	0730	START TO PRESSURE TEST.
	0835	RE-PRESSURE TEST DUE TO LEAKING CROSS OVER.
	0925	START TO RUN IN HOLE WITH S.P.R.O. LATCH.
	0945	S.P.R.O. LATCHED INITIAL HYDRO-STATIC 1016.3 PSIG ~~TO~~ AT 107.3°C
	1000	PRESSURE ANNULUS TO OPEN P.C.T.
	1001	STRONG BLOW TO SURFACE INCREASING QUICKLY.
	1003	WELL OPENED TO BURNER ON ½" FIXED CHOKE.
	1004	SOME MUD RETURNED.
	1005	BLEED DOWN ANNULUS TO CLOSE P.C.T.
	1045	PRESSURE ANNULUS TO OPEN P.C.T. AND FLOW DIRECTLY TO
		BURNER ON ½" FIXED CHOKE.
	1050	SWITCH FLOW THROUGH ½" ADJ. CHOKE AS ½" FIXED CHOKE
		SUSPECTED OF BEING PARTIALLY BLOCKED, FOUND NOT SO.

N°. DOP 108

No.: DOP 109

FLOPETROL

Base : PERTH

Client : HUDBAY

Field : BALEEN

Well : # 1

- WELL TESTING DATA SHEET -

Section : 7

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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	MIN			°F	PSIG							MMSCF/D	Air = 1				Units
23.11.81					D.S.T. # 1												
1640	0	PRESSURE ANNULUS TO OPEN P.C.T. TOOL.															
1641	1				200												
1642	2				300												
1642	-	OPEN WELL TO BURNER ON ½" FIXED CHOKE (DRY GAS)															
1643	3				290												
1644	4				280												
1645	5				260												
1646	6				280				TRACES OF MUD TO SURFACE								
1647	7				130												
1646	8				80				P.C.T. CLOSED.								

LIQUID FLOW RATE MEASURING CONDITIONS :

NO LIQUIDS PRODUCED.

TESTED INTERVAL : 706 - 700 METERS.

DEPTH REFERENCE : RT

DEPTH OF B.H. MEASUREMENTS :

No.: DOP 110

FLOPETROL _WELL TESTING DATA SHEET_(Continuation)

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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		H2S PPM		
HR MIN	MIN			°C	PSIG								Air=1				Units
1648																	
23/11/81																	
1648	0																
1738	50				20												
1738	0		PRESSURE ANNULUS TO OPEN P.C.T.														
1739	1				200												
1740	2				310												
1740	-		OPEN WELL TO BURNER ON ½"FIXED CHOKE														
1741	3				350				TRACES OF MUD TO SURFACE.								
1742	4				365												
1743	5				360												
1744	6				350												
1745	7				335												
1750	12				360												
1755	17				385										0		
1800	22			18	370								0.58				
1805	27			18	350												
1810	32			18	350												

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FLOPETROL | -WELL TESTING DATA SHEET-(Continuation) | Page : 03 | Report N°: 231181261181 | Section : 7

DATE - TIME		PRESSURE AND TEMPERATURE MEASUREMENTS							PROD. RATES AND FLUID PROPERTIES					GOR			
		BOTTOM HOLE		WELL HEAD			SEPARATOR		OIL OR CONDENSATE			GAS			H2S		
Time	Cumul	Temp.	Pressure	Tg.temp	Tg. press.	Cg. press.	Temp.	Press.	Rate	Gravity	BSW	Rate	Gravity		PPM		
HR MIN	MIN			°C	PSIG								Air=1				Units
1810	32																
23.11.81																	
1815	37			19	367				STILL FLOWING DRY GAS.								
1820	42			19	350												
1825	47			18	327												
1830	52			18	320												
1835	57			18	319										0		
1840	62			18	339												
1845	67			18	330								0.578				
1850	72			18	323												
1855	77			18	325												
1900	82			18	322												
1905	87			18	315										0		
1910	92			18	322												
1915	97			18	336												
1920	102			18	335												
1925	107			19	334												
1930	112			19	332												

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FLOPETROL	_WELL TESTING DATA SHEET_(Continuation)	Page : 04 Report N°: 231181261181	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		H2s		
HR MIN	MIN			°C	PSIG								Air=1		PPM		Units
1930	112																
23.11.81																	
1935	117			19	329												
1940	122			19	330												
1945	127			19	330								0.58				
1950	132			19	330												
1955	137			19	330												
2000	142			19	330												
2000	-		INCREASE TO 1" ADJ. CHOKE.														
2000	0																
2001	1			18	77												
2003	3		CHANGE TO 1" FIXED CHOKE														
2005	5			17	85												
2010	10			17	90												
2015	15			17	90										0		
2020	20			17	91								0.58				
2025	25			17	85												
2030	30			17	83												

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FLOPETROL

–WELL TESTING DATA SHEET–(Continuation)

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DATE – TIME		PRESSURE AND TEMPERATURE MEASUREMENTS							PROD. RATES AND FLUID PROPERTIES					GOR			
		BOTTOM HOLE		WELL HEAD			SEPARATOR		OIL OR CONDENSATE			GAS			DOWNSTREAM PRESS. PSIG	H2S PPM	
Time	Cumul	Temp.	Pressure	Tg.temp	Tg. press.	Cg.press.	Temp.	Press.	Rate	Gravity	BSW	Rate	Gravity				
HR MIN	MIN			°C	PSIG		°C	PSIG	B.O.P.D.	API @ 60		MMSCF/D	Air=1				Units
2030	30																
23.11.81																	
2035	35			18	81												
2040	40			18	83											0	
2045	45			18	81												
2050	50			18	80												
2055	55			18	80												
2100	60			18	76												
2100	-	SWITCH FLOW THROUGH SEPARATOR.															
2115	45			18	80								0.58				
2130	90			18	80		18	50	-			1.869					
2145	105			18	82		17	50	-			1.869			66		
2200	120			18	85		17	50	-			1.906			65		
2215	135			18	82		17	50	-			1.908			66		
2230	150			18	85		17	50	-			1.883			65		
2245	165			18	90		17	50	-			1.908			67		
2300	180			18	87		17	50	-			1.933			67		
2315	195			18	86		17	50	-			1.921			66		

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FLOPETROL — WELL TESTING DATA SHEET (Continuation)

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DATE - TIME		PRESSURE AND TEMPERATURE MEASUREMENTS							PROD. RATES AND FLUID PROPERTIES					GOR	C/M		
		BOTTOM HOLE		WELL HEAD			SEPARATOR		OIL OR CONDENSATE			GAS			DOWN STREAM PRESS.		
Time HR MIN	Cumul MIN	Temp.	Pressure	Tg. temp °C	Tg. press. PSIG	Cg. press.	Temp. °C	Press. PSIG	Rate	Gravity	BSW	Rate MMSCF/D	Gravity Air=1				Units
0300	430																
2411.81																	
0300	-	START TO TAKE GAS SAMPLE FROM SEPARATOR.															
0315	445			18	82		17	50	-			1.798			64		
0330	460			18	81		17	50	-			1.811			61		
0345	475			18	81		17	50	-			1.837			60		
0345	-	FINISH TAKING GAS SAMPLES FROM SEPARATOR.															
0359	489			18	81		17	50				1.837			60		
0359	-	BY PASS SEPARATOR.															
0406	496	BLEED DOWN ANNULUS TO CLOSE P.C.T. VALVE., FOR FINAL BUILD UP.															
0406	0																
0530	84	UNLATCH FROM SPRO AND PULL OUT OF HOLE.															
0555	109	SCHLUMBERGER "HUNG UP" AT 128 METERS.															
0600	114	REVERSE OUT SUB-SHEARED															
1015	-	E.Z. TREE ON SURFACE.															
		END OF D.S.T. # 1															

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FLOPETROL	WELL TESTING DATA SHEET (Continuation)	Page : 06 Report N°: 23118126118	Section : 7

DATE - TIME		PRESSURE AND TEMPERATURE MEASUREMENTS							PROD. RATES AND FLUID PROPERTIES					GOR	C/M		
		BOTTOM HOLE		WELL HEAD			SEPARATOR		OIL OR CONDENSATE			GAS			DOWN STREAM	H2S	
Time	Cumul	Temp.	Pressure	Tg. temp	Tg. press.	Cg. press.	Temp.	Press.	Rate	Gravity	BSW	Rate	Gravity			PPM	
HR MIN	MIN			°C	PSIG		°C	PSIG				MMSCF/D	Air=1		PSIG		Units
2315																	
23.11.81																	
2300	210			18	87		17	50	-			1.896			65		
2345	225			18	83		17	50	-			1.876	.575		66		
2400	240			18	85		17	50	-			1.876			66		
24.11.81																	
0015	255			18	83		17	50	-			1.863	.575		65		
0030	270			18	83		17	50	-			1.863			65		
0045	285			18	83		17	50	-			1.837			65		
0100	300			18	83		17	50	-			1.824			64		
0115	315			18	84		17	50	-			1.837			65		
0130	330			18	85		17	50	-			1.837			67		
0145	345			18	82		17	50	-			1.837			64		
0200	370			18	82		17	50	-			1.808			64		
0215	385			18	80		17	50	-			1.808			63		
0230	400			18	83		17	50	-			1.781			64		
0245	415			18	80		17	50	-			1.808			63		
0300	430			18	84		17	50	-			1.795	.575		64		

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FLOPETROL | WELL TESTING DATA SHEET (Continuation) | Page : 08 | Report N° 231181261181 | 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	MIN			°C	PSIG								Air=1				Units
26.11.81					D.S.T. NO. 2A												
			PERFORATIONS @ 662 - 670 METERS.														
			POSI-TEST PACKER @ 648.13 METERS.														
			CUSHION = NONE.														
1000	0		PRESSURE ANNULUS TO OPEN P.C.T.														
1001	1		BUBBLE + WATER FLOWING THROUGH BUBBLE HOSE STRONG BLOW.														
1002	2			100													
1003	3			450													
1003	-		WELL OPEN TO BURNER ON ½" FIXED CHOKE														
1004	4			615					MUD FLOWING TO SURFACE WITH GAS.								
1005	5			580													

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FLOPETROL _WELL TESTING DATA SHEET_(Continuation)

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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			H2S	
HR MIN	MIN			°C	PSIG								Air=1			PPM	Units
1005	5																
26.11	81																
1005	-		BLEED DOWN ANNULUS TO CLOSE P.C.T.														
1005	0																
1045	40																
1045	0		PRESSURE ANNULUS TO OPEN P.C.T. AND FLOW TO BURNER ½" CHOKE														
1046	1				620												
1047	2				635												
1048	3				620												
1049	4				615												
1050	5				610												
1050	-		SWITCH FLOW THROUGH ½" ADJ. CHOKE.														
1051	6		CHANGE BACK TO ½" FIXED - NO CHANGE IN PRESSURE.														
1052	7				610											0	
1053	8			17	625												
1054	9			17	635												
1055	10			17	630				(FLOW RATE ESTIMATED @ ± 3.5 MMSCF/D).								
1056	11			17	630												

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FLOPETROL _WELL TESTING DATA SHEET_(Continuation)

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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		H2S		
HR MIN	MIN			°C	PSIG		°C	PSIG				MMSCF/D	Air=1		PPM		,Units
1056	11																
26.11.81																	
1057	12			17	630												
1058	13			17	630												
1059	14			17	630												
1100	15			17	635												
1105	20			18	645												
1110	25			18	650										0		
1115	30			18	652												
1120	35			18	660										0		
1125	40			19	665												
1130	45			19	667												
1130	-		SWITCH FLOW THROUGH SEPARATOR ORIFICE = 2.750"														
1130	0																
1145	15			20	670		9	60				4.020	.578				
1200	30			20	676		9	60				4.020					
1200	-		INCREASE TO 1" FIXED CHOKE														
1200	0																

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FLOPETROL — WELL TESTING DATA SHEET (Continuation)

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DATE - TIME		PRESSURE AND TEMPERATURE MEASUREMENTS							PROD. RATES AND FLUID PROPERTIES					GOR			
		BOTTOM HOLE		WELL HEAD			SEPARATOR		OIL OR CONDENSATE			GAS			H2S		
Time HR MIN	Cumul MIN	Temp.	Pressure	Tg. temp oC	Tg. press. PSIG	Cg. press.	Temp. oC	Press. PSIG	Rate	Gravity	BSW	Rate MMSCF/D	Gravity Air=1		PPM		Units
1200																	
26.11	81																
1215	15			18	242		13	90				5.855					
1230	30			18	242		13	90				5.883	.578				
1245	45			19	247		14	90				5.901					
1300	60			19	247		14	90				5.929					
1310	70		START TO TAKE GAS SAMPLE # 1 FROM SEPARATOR (BOTTLE NO. A-11939)														
1315	75			19	249		13	95				6.054					
1326	86		FINISH TAKING GAS SAMPLE # 1.														
1330	90			19	250		13	96				6.139					
1330	-		START TO TAKE GAS SAMPLE # 2 FROM SEPARATOR (BOTTLE NO. A-11954)														
1345	105			19	251		14	97				6.155					
1347	107		FINISH TAKING GAS SAMPLE NO. 2														
1400	120			19	252		14	98				6.198					
1415	135			19	255		14	99				6.284	.575				
1430	150			19	257		14	100				6.311					
1445	165			19	257		14	100				6.311					
1500	180			19	260		14	100				6.340					

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FLOPETROL -WELL TESTING DATA SHEET-(Continuation)

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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	MIN			°C	PSIG		°C	PSIG				MMSCF/D	Air=1				Units
1500	180																
26.11	81																
1515	195			19	260		14	100				6.349	.575				
1530	210			19	263		14	100				6.349					
1530	-		BY PASS SEPARATOR														
1539	219		START TO CLOSE P.C.T. OVER-RIDE SYSTEM.														
1546	226		BLEED DOWN ANNULUS TO CLOSE P.C.T. FOR FINAL BUILD UP.														
1546	0																

FLOPETROL

DIVISION : N.T.D.

BASE : PERTH

REPORT N°: 231181261181

Well Testing Report Annexes —

Client = HUDBAY OIL

Field = BALEEN Well = # 1

Zone = NO. 1 Date = 23.11.81 TO 24.11.81

ZONE: NO. 2 25.11.81 TO 26.11.81

FLOPETROL Base : PERTH	Client : HUDBAY Field : BALEEN Well : # 1	Section : ANNEX Page : 01 Report N°: 231181261181

INDEX of ANNEXES

☐ 1 - BOTTOM HOLE PRESSURE AND TEMPERATURE MEASUREMENT -

- ☐ 1.1 - B.H. gauge calibration -
- ☐ 1.2 - B.H. pressure calculation -
- ☐ 1.3 - B.H. temperature calculation -

☐ 2 - LIQUID PRODUCTION RATE MEASUREMENT -

- ☐ 2.1 - Measurements with tank -
- ☐ 2.2 - Measurements with meter -

☒ 3 - GAS PRODUCTION RATE MEASUREMENT -

☒ 4 - SAMPLING SHEETS -

- ☐ 4.1 - Bottom hole sampling -
- ☒ 4.2 - Surface sampling -

☒ 5 - CHARTS AND MISCELLANEOUS -

N°: DOP 112

FLOPETROL

Base : PERTH

Client : HUDBAY
Field : BALEEN
Well : # 1

Section:ANNEX **3**

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- 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.

$$C = F_u \times F_b \times F_g \times Y \times F_{tf} \times F_{pv}$$

F_u : Unit conversion factor in desired reference conditions.
F_b : Basic orifice factor (Q in Cu.ft / hour).
F_g : Specific gravity factor.
Y : Expension factor
F_{tf} : Flowing temperature factor.
F_{pv}: Supercompressibility factor (estimated).

Remarks

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

TABLE OF F_u FACTOR

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

* Mercury at 32°F

b) METER DATA -

Meter type : DANIEL
Flange taps - Pf taken down/up stream
Flow recorder type: BARTON
ID of meter tube : 4.026"

c) SPECIFIC GRAVITY SOURCE -

Sampling point : GAS OUTLET LINE
Gravitometer type : KIMRAY

d) SUPFRCOMPRESSIBILITY FACTOR F_{pv} -

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 : BALEEN

Well : # 1

- GAS PRODUCT. RATE MEASUREMENT -

Section : ANNEX **3**

Page : 01

Report N : 231181261118

DATE - TIME Time HR MIN	Interval MIN	Flowing Temp. °F	P_f absolute psia	h_w "of wat.	$\sqrt{h_w \times P_f}$	Orifice diameter Inches	Gas gravity (air=1)	F_b	F_g	Y	F_{tf}	F_{pv}	C	Gas production rate : Q MMSCF/D	Cumulative Production MMSCF
					D.S.T. # 1										
23.11.81															
1738	0	WELL OPENED TO BURNER ON 1/2" FIXED CHOKE													
2000	142	CHANGE TO 1" FIXED CHOKE													
2100	202	SWITCH FLOW THROUGH SEPARATOR													
2130	232	START TO TAKE READINGS												ESTIMATED	.575
2145	15	64	65	75	69.82	2.00	.58	842.12	1.3153	1.0071	.9962	1.004	26767.55	1.869	.594
2200	15	63	65	78	71.20	"	.58	"	"	1.0074	.9962	1.004	26775.14	1.906	.614
2215	15	63	65	78	71.20	"	"	"	"	1.0074	.9971	1.004	26801.33	1.908	.634
2230	15	63	65	76	70.29	"	"	"	"	1.0072	.9971	1.004	26796.26	1.883	.654
2245	15	63	65	78	71.20	"	"	"	"	1.0074	.9971	1.004	26801.33	1.908	.674
2300	15	63	65	80	72.11	"	"	"	"	1.0075	"	"	26806.40	1.933	.694
2315	15	63	65	79	71.66	"	"	"	"	"	"	"	26803.86	1.921	.714
2330	15	63	65	77	70.75	"	"	"	"	1.0073	"	"	26798.80	1.896	.734

Fu = 24

Recorder ranges : P_f = 1000 PSIG

h_w = 200" W.C. Temp. = 0 - 240°F

TESTED INTERVAL : SANDSTONE

PERFORATIONS : 706 - 700 METERS.

No.: DOP 126

FLOPETROL	GAS PRODUC. RATE MEASUREMENT-(Continuation)	Page : 02 Report N°: 231181261181	Section : ANNEX **3**

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 rate : Q	Cumulative Production
Time	Interval	Temp.	absolute			diameter	gravity								
HR MIN	MIN	oF	psia	"of wat.		Inches	(air = 1)							MMSCF/D	MMSCF
2330															
23.11.81															.734
2345	15	63	65	75	69.82	2.00	.575	842.12	1.3188	1.0071	.9971	1.004	26862.67	1.876	.754
2400	15	63	65	75	"	"	"	"	"	"	"	"	"	1.876	.774
24.11.81															
0015	15	63	65	74	69.35	"	"	"	"	"	"	"	26860.13	1.863	.794
0030	15	63	65	74	"	"	"	"	"	"	"	"	"	1.863	.814
0045	15	63	65	72	68.41	"	"	"	"	1.0068	"	"	26855.06	1.837	.830
0100	15	63	65	71	67.93	"	"	"	"	1.0067	"	"	26852.52	1.824	.850
0115	15	63	65	72	68.41	"	"	"	"	1.0068	"	"	26855.06	1.837	.870
0130	15	63	65	72	68.41	"	"	"	"	"	"	"	"	1.837	.890
0145	15	63	65	72	"	"	"	"	"	"	"	"	"	1.837	.91[illegible]
0200	15	63	65	70	67.45	"	"	"	"	1.0066	"	1.002	26799.48	1.808	.930
0215	15	63	65	70	67.45	"	"	"	"	"	"	"	"	1.808	.950
0230	15	63	65	68	66.48	"	"	"	"	1.0064	.9971	1.002	26794.42	1.781	.968
0245	15	63	65	70	67.45	"	"	"	"	1.0066	"	"	26799.48	1.808	.988
0300	15	63	65	69	66.97	"	"	"	"	1.0065	"	"	26796.94	1.795	1.006
0300	-	START TO TAKE GAS SAMPLES FROM SEPARATOR.													

No.: DOP 126

FLOPETROL | GAS PRODUC. RATE MEASUREMENT-(Continuation) | Page : 03 | Report N° 231181261181 | Section : ANNEX 3

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
HR MIN	MIN	°F	psia	"of wat.		Inches	(air = 1)							MMSCF/D	MMSCF
0300															
24.11.81															
0315	15	63	65	69	66.97	2.00	.575	842.12	1.3188	1.0065	.9971	1.004	26847.45	1.798	1.026
0330	15	63	65	70	67.45	"	"	"	"	1.0066	"	"	26849.98	1.811	1.046
0345	15	63	65	72	68.41	"	"	"	"	1.0068	"	"	26855.06	1.837	1.066
0359	14	63	65	72	68.41	"	"	"	"	"	"	"	"	1.837	1.088
0359	-	BY PASS SEPARATOR													
0406	-	WELL SHUT IN FOR FINAL BUILD UP.													
		END OF D.S.T. # 1													

No.: DOP 126

FLOPETROL

GAS PRODUC. RATE MEASUREMENT-(Continuation)

Page : 04
Report N°: 231181261181

Section : ANNEX 3

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
HR MIN	MIN	°F	psia	"of wat.		Inches	(air = 1)							MMSCF/D	
26.11.81					D.S.T. NO. 2 A										
1045	0	WELL OPENED TO BURNER ON ½" FIXED CHOKE													
1130	45	SWITCH FLOW THROUGH SEPARATOR													
1145	15	START TO TAKE READINGS.													
1145	0	48	75	68	71.41	2.750	.578	1746.7	1.3153	1.0042	1.0117	1.005	56293.80	4.020	
1200	15	48	75	68	71.41	"	"	"	"	"	"	"	56293.80	4.020	
1200	-	INCREASE TO 1" FIXED CHOKE													
1215	15	55	105	104	104.50	2.750	.578	1746.7	1.3153	1.0046	1.0045	1.007	56028.31	5.855	
1230	15	55	105	105	105.00	"	"	"	"	"	"	"	56030.81	5.883	
1245	15	57	105	106	105.50	2.750	.578	"	"	1.0047	1.0027	1.007	55931.32	5.901	
1300	15	57	105	107	106.00	"	"	"	"	"	"	"	55933.81	5.929	
1310	-	START TO TAKE GAS SAMPLES FROM SEPARATOR.													
1315	15	55	110	106	107.98	2.750	"	"	"	1.0045	1.0048	1.007	56065.93	6.054	
1330	15	55	111	108	109.49	"	"	"	"	"	"	"	56072.76	6.139	
1345	15	57	112	108	109.98	"	"	"	"	"	1.0029	"	55961.1	6.155	

No.: DOP 126

FLOPETROL	GAS PRODUC. RATE MEASUREMENT-(Continuation)	Page : 05 Report N° 231181261181	Section : ANNEX **3**

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
HR MIN	MIN	°F	psia	"of wat.		Inches	(air = 1)							MMSCF/D	
1345	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
26.11.81															
1400	15	57	113	108	110.47	2.750	.575	1746.70	1.3188	1.0044	1.0029	1.007	56105.16	6.198	
1415	15	57	114	110	111.98	"	"	"	"	1.0045	"	1.008	56111.85	6.284	
1430	15	57	115	110	112.47	"	"	"	"	1.0044	"	1.008	56113.94	6.311	
1445	15	57	115	110	"	"	"	"	"	"	"	"	"	6.311	
1500	15	57	115	111	112.98	"	"	"	"	1.0045	1.0029	"	56116.23	6.340	
1515	15	57	115	112	113.49	"	.575	"	"	"	"	"	56118.51	6.349	
1530	15	57	115	112	"	"	"	"	"	"	"	"	56118.51	6.349	
1530	-	BY PASS SEPARATOR.													
		END OF D.S.T. 2A													

FLOPETROL

Base : PERTH

Client : HUDBAY

Field : BALEEN

Well : # 1

Section : ANNEX **4.2**

Page : 01

Report N°: 231181261131

D.S.T. # 1

- SURFACE SAMPLING -

Date of sampling : 24.11.81 Service order : Sampling No.: #1

Sample nature : GAS Sampling point : GAS OUTLET ON SEPARATOR

A - RESERVOIR AND WELL CHARACTERISTICS -

Producing zone : SANDSTONE Perforations : 706-700 METERS Sampling interval : 6 METERS

Depth origin : RT Tubing Dia. : 3½ Casing Dia. : 7" LINER

Surface elevation : Shoe : Shoe :

Bottom hole static conditions

Initial pressure : 1079 PSIG at depth : 671.3 MTR date : 23.11.81

Latest pressure measured : 1079.3 PSIG at depth : " date : 24.11.81

Temperature : 111.5°F at depth : " date : 24.11.81

B - MEASUREMENT AND SAMPLING CONDITIONS -

Time at which sample was taken : 0300-0320 HRS Time elapsed since stabilisation : ± 6 HOURS

Bottom hole dynamic conditions

Choke size : 1" since : 23.11.81 Well head pressure : 81 Well head temp. : 18°C

Bottom hole pressure : 176.7 PSIG at depth : 671.3 MTR date : 24.11.81

Bottom hole temp. : at depth : date :

Flow measurement of sampled gas - Gravity (air : 1) : .575 Factor Fpv = $\frac{1}{\sqrt{Z}}$: 1.004

Values used for calculations :

Separator

Pressure : 50 PSIG

Temp. : 17 °F

Rates - Gas : 1.811 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 : VACUUM

Transfer duration : 20 MIN

Final conditions of the shipping bottle :

Pressure : 50 PSIG Temp : 17°C

C - IDENTIFICATION OF THE SAMPLE -

Shipping bottle No. : A-11977 sent on : by : Shipping order No. :

Addressee :

Coupled with

	LIQUID		GAS	
Bottom hole samples No.				
Surface samples No.			A-8526	

Measurement conditions.

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

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

D - REMARKS -

NO FLUIDS PRODUCED DURING TEST.

Visa Chief Operator

No. : DOP 127

FLOPETROL
Base : PERTH

Client : HUDBAY
Field : BALEEN
Well : # 1

Section : ANNEX 4.2
Page : 02
Report N° : 231181261181

D.S.T. # 1

– SURFACE SAMPLING –

Date of sampling : 24.11.81 Service order : Sampling No. : # 2
Sample nature : GAS Sampling point : GAS OUTLET ON SEPARATOR

A – RESERVOIR AND WELL CHARACTERISTICS –

Producing zone : SANDSTONE Perforations : 706-700 MTRS Sampling interval : 6 MTRS

Depth origin : RT Tubing Dia. : 3½" HYD Casing Dia. : 7" LINER
Surface elevation : Shoe : Shoe :

Bottom hole static conditions	Initial pressure :	1079.9 PSIG	at depth :	671.3 MTR	date :	23.11.81
	Latest pressure measured :	1079.3 PSIG	at depth :	"	date :	24.11.81
	Temperature :	115.5°F	at depth :	"	date :	24.11.81

B – MEASUREMENT AND SAMPLING CONDITIONS –

Time at which sample was taken : 0325-0345 hrs Time elapsed since stabilisation : ± 6 HOURS

Bottom hole dynamic conditions	Choke size : 1"	since : 23.11.81	Well head pressure :	81	Well head temp. :	18° C
	Bottom hole pressure :	176.7 PSIG	at depth :	671.3 MTRS	date :	24.11.81
	Bottom hole temp. :		at depth :		date :	

Flow measurement of sampled gas – Gravity (air : 1) : .575 Factor Fpv = $\frac{1}{\sqrt{Z}}$: 1.004
Values used for calculations :

Separator	Pressure : 50 PSIG Temp. : 17 °C	Rates – Gas : 1.837 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 : VACUUM Transfer duration : 20 MINS

Final conditions of the shipping bottle :
Pressure : 50 PSIG Temp : 17°C

C – IDENTIFICATION OF THE SAMPLE –

Shipping bottle No. : A-8526 sent on : by : Shipping order No. :
Addressee :

Coupled with	LIQUID		GAS	
Bottom hole samples No.				
Surface samples No.			A-11977	

Measurement conditions.
A – Tank. B – Meter. C – Dump.
a – Corrected with shrinkage tester. b – Corrected with tank.

D – REMARKS –

NO FLUIDS PRODUCED DURING TEST.

Visa Chief Operator

No.: DOP 127

FLOPETROL
Base : PERTH

Client : HUDBAY
Field : BALEEN
Well : # 1

Section : ANNEX 4.2
Page : 03
Report N° : 231181261181

D.S.T. # 2

SURFACE SAMPLING

Date of sampling : 26.11.81
Service order :
Sampling No. : # 3
Sample nature : GAS
Sampling point : GAS OUTLET ON SEPARATOR

A – RESERVOIR AND WELL CHARACTERISTICS –

Producing zone : SANDSTONE
Perforations : 662-670 MTRS
Sampling interval : 8 METERS
Depth origin : RT
Tubing Dia. : 3½ PH6 HYD
Casing Dia. : 7" LINER
Surface elevation :
Shoe :
Shoe :

Bottom hole static conditions

Initial pressure : 1073.9 PSIG at depth : 631 MTR date : 26.11.81
Latest pressure measured : at depth : " date : 26.11.81
Temperature : at depth : " date : 26.11.81

B – MEASUREMENT AND SAMPLING CONDITIONS –

Time at which sample was taken : 1310-1347 HRS
Time elapsed since stabilisation : ± 1 HR

Bottom hole dynamic conditions

Choke size : 1" since : 1200HR Well head pressure : 249PSIG Well head temp. : 19°C
Bottom hole pressure : at depth : date :
Bottom hole temp. : at depth : date :

Flow measurement of sampled gas – Gravity (air:1) : .578 Factor Fpv = $\frac{1}{\sqrt{Z}}$: 1.007
Values used for calculations :

Separator

Pressure : 95 PSIG
Temp. : 13 °C
Rates – Gas 6.054 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 : PURGED 4 TIMES
Transfer duration : 15 MINS

Final conditions of the shipping bottle :
Pressure : 95 PSIG Temp : 13°C

C – IDENTIFICATION OF THE SAMPLE –

Shipping bottle No. : A-11939 sent on : by : Shipping order No. :
Addressee :

Coupled with

	LIQUID		GAS	
Bottom hole samples No.				
Surface samples No.			A-11954	

Measurement conditions.
A – Tank. B – Meter. C – Dump.
a – Corrected with shrinkage tester. b – Corrected with tank.

D – REMARKS –

NO CONDENSATE PRODUCED, SMALL AMOUNT OF WATER/MUD.

Visa Chief Operator

No.: DOP 127

FLOPETROL
Base : PERTH

Client : HUDBAY
Field : BALEEN
Well : # 1

Section : ANNEX 4.2
Page : 04
Report N°: 231181261 81

D.S.T. # 2

- SURFACE SAMPLING -

Date of sampling : 26.11.81 Service order : Sampling No.: # 4
Sample nature : GAS Sampling point : GAS OUTLET LINE ON SEPARATOR

A - RESERVOIR AND WELL CHARACTERISTICS -

Producing zone : Perforations: 662-670 MTRS Sampling interval: 8 MTRS
Depth origin : RT Tubing Dia.: 3½" PH6 HYD Casing Dia.: 7" LINER
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: 1330-1345 HRS Time elapsed since stabilisation: ± 1.25 HRS

Bottom hole dynamic conditions
Choke size: 1" FIXED since: Well head pressure: 251 PSIG Well head temp.: 19°C
Bottom hole pressure: at depth: date:
Bottom hole temp. : at depth: date:

Flow measurement of sampled gas - Gravity (air: 1): .578 Factor Fpv = $\frac{1}{\sqrt{Z}}$: 1.007
Values used for calculations :

Separator
Pressure: 96 PSIG
Temp. : 14°C °F
Rates - Gas : 6.155MM 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 : PURGED 4 TIMES
Transfer duration : 15 MINS

Final conditions of the shipping bottle :
Pressure: Temp:

C - IDENTIFICATION OF THE SAMPLE -

Shipping bottle No.: A-11954 sent on : by: - Shipping order No.:
Addressee :

Coupled with	LIQUID		GAS	
Bottom hole samples No.				
Surface samples No.			A-11939	

Measurement conditions.
A - Tank. B - Meter. C - Dump.
a - Corrected with shrinkage tester. b - Corrected with tank.

D - REMARKS -

NO CONDENSATE PRODUCED ALTHOUGH SMALL AMOUNT OF WATER/MUD.

Visa Chief Operator

No.: DOP 127

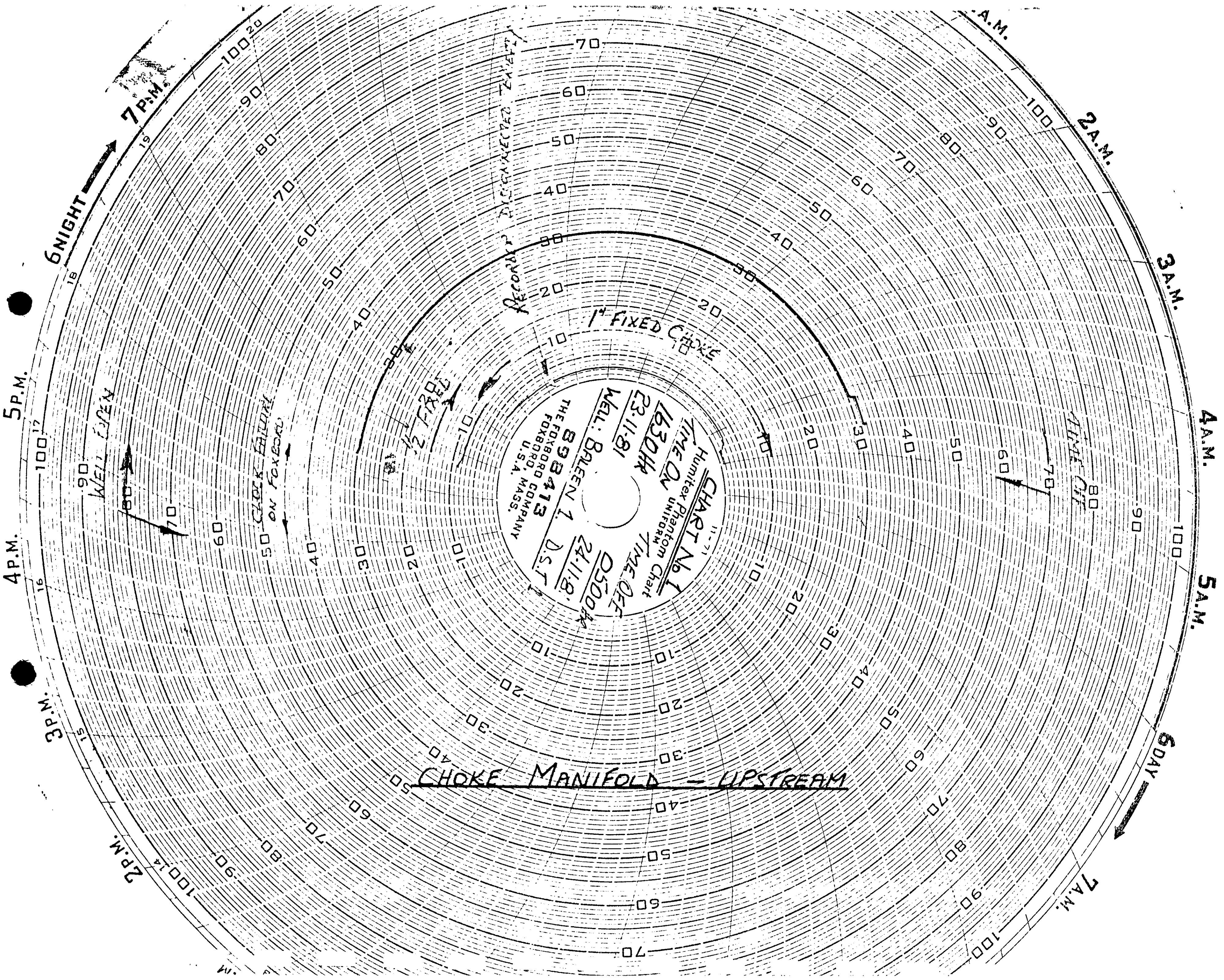


CHART No 1

Humitex Phantom Chart UNIFORM

TIME ON 1630 Hr 23.11.81

TIME OFF 0500 Hr 24.11.81

WELL: BALEEN 1 D.S.T 1

898413

THE FOXBORO COMPANY
FOXBORO, MASS.
U.S.A.

CHOKE MANIFOLD – UPSTREAM

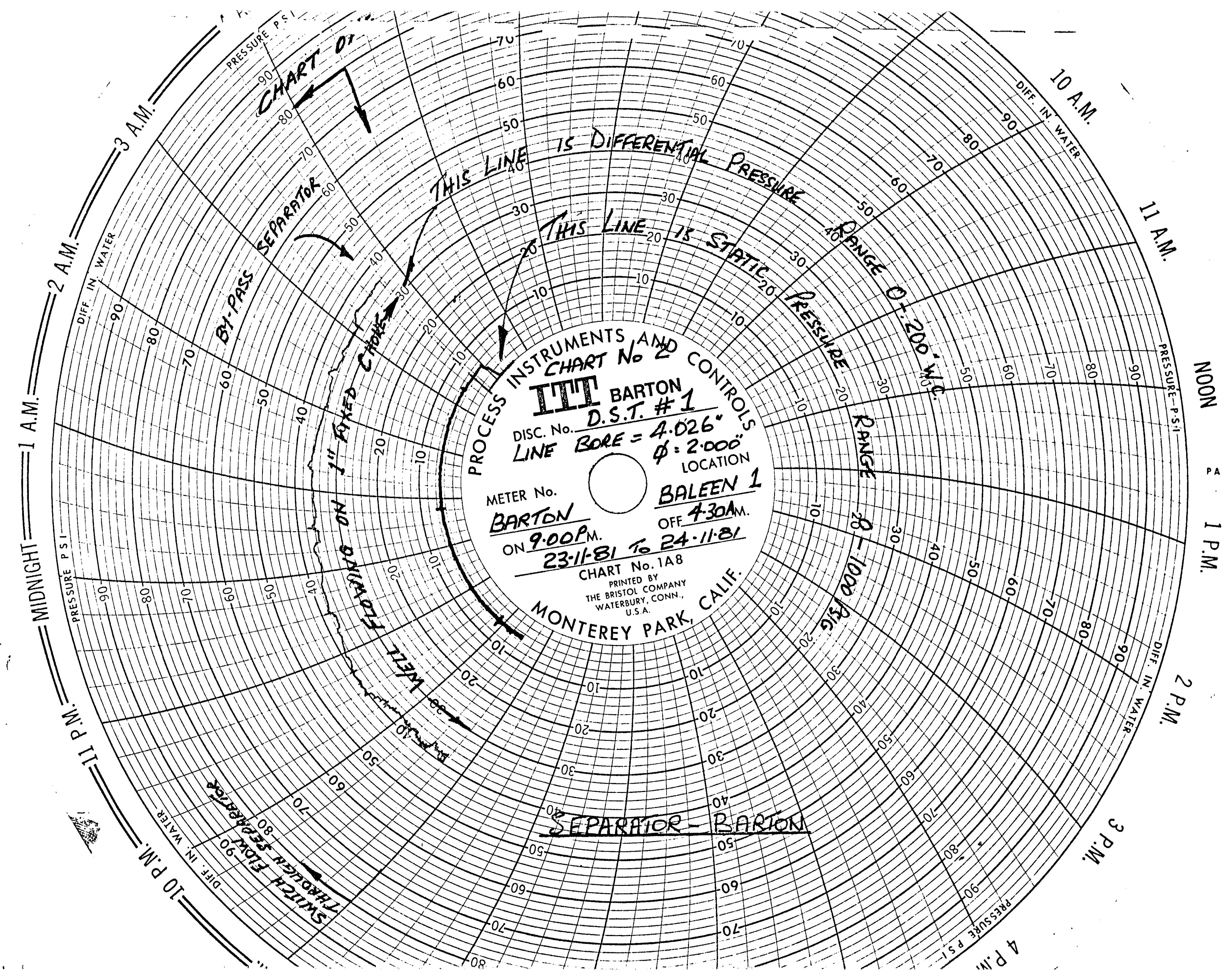


CHART 01

THIS LINE IS DIFFERENTIAL PRESSURE RANGE 0-200" W.C.

THIS LINE IS STATIC PRESSURE RANGE 0-1000 PSIG

BY-PASS SEPARATOR

WELL FLOWING ON 1" FIXED CHOKE

SWITCH FLOW THROUGH SEPARATOR

SEPARATOR - BARTON

PROCESS INSTRUMENTS AND CONTROLS

CHART No 2

ITT BARTON

DISC. No. D.S.T. #1

LINE BORE = 4.026"
ϕ: 2.000"

LOCATION BALEEN 1

METER No. BARTON

OFF 4.30A M.

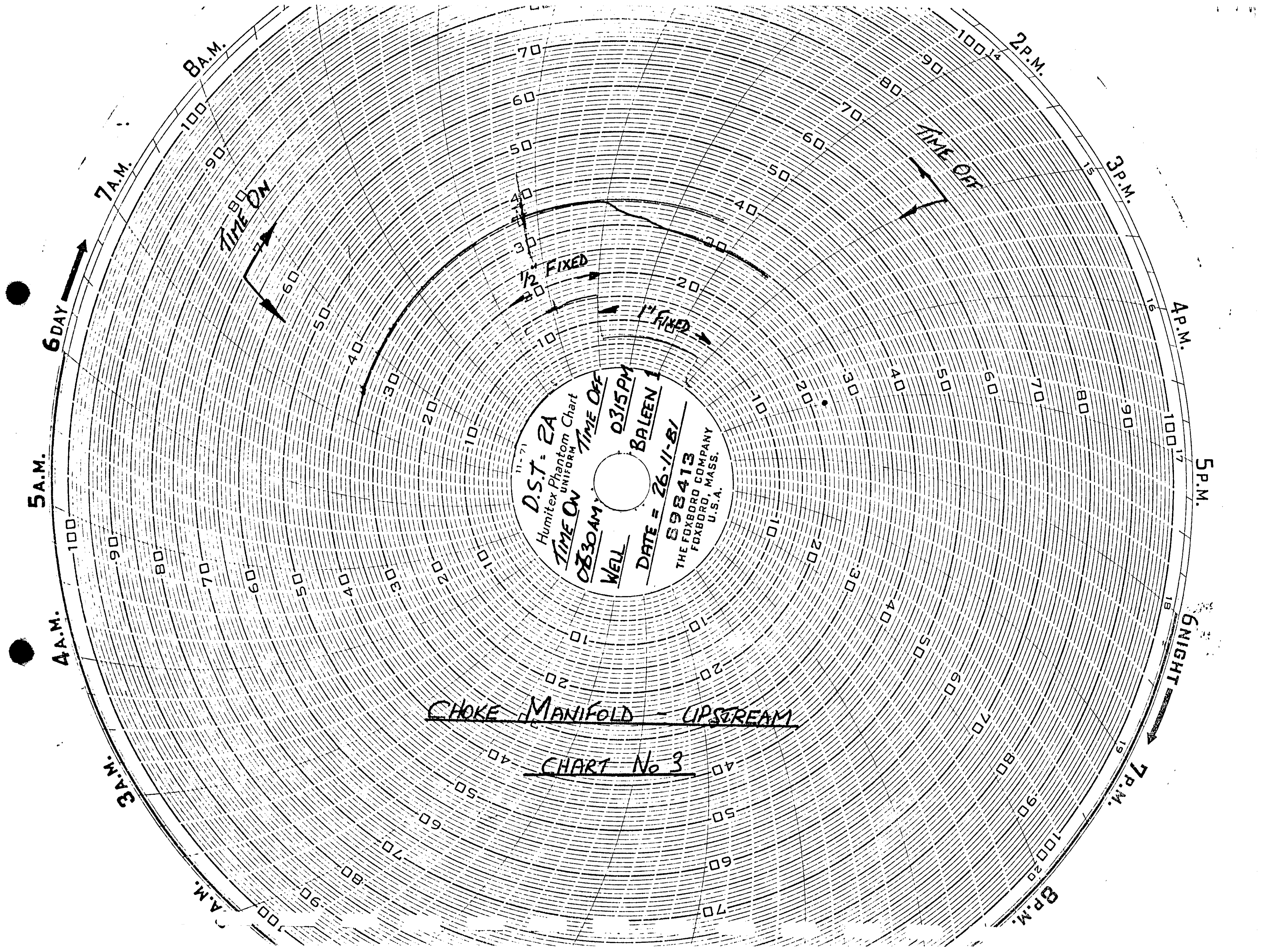
ON 9.00P M.

23.11.81 To 24.11.81

CHART No. 1A8

PRINTED BY
THE BRISTOL COMPANY
WATERBURY, CONN.,
U.S.A.

MONTEREY PARK, CALIF.



D.S.T. = 2A

TIME ON 0730AM

TIME OFF 0315PM

WELL BALEEN 1

DATE = 26-11-81

CHOKE MANIFOLD - UPSTREAM

CHART No 3

APPENDIX A2 DOWELL SCHLUMBERGER
TECHNICAL REPORT Nos.
F8112, F8113

REPORT N° F 81112
JOB N°
INVOICE/SIR.
DATE DECEMBER 29, 1981

DOWELL
Schlumberger

SPECIAL DATA ANALYSIS

COMPANY HUDBAY OIL AUSTRALIA WELL BALEEN 1 FIELD GYPPSLAND
TEST N° 1 COUNTRY AUSTRALIA

Prepared by the
Reservoir Evaluation Department
of Dowell Schlumberger

ASSUMPTIONS MADE FOR CALCULATIONS OF LIQUID RECOVERIES

1. Q is averaged at a constant rate.
2. Pf is formation flowing pressure at a constant rate.
3. Formation flow is single phase, and any gas produced at surface is assumed to have separated in the drill pipe.
4. Radial flow is assumed.
5. Where specific reservoir parameters are not available, an Estimated Damage Ratio is calculated by assuming :

Effective permeability, K, is 1-200md	Formation porosity, Ø, is . . . . 10-30 %
Fluid compressibility, C, is . . . . 10^{-6} to 10^{-4}	Fluid viscosity, μ, is . . . . 0.05 to 50cp
Well bore radius, rw, is . . . . 3 7/8" to 4 3/8"	

which gives an average value for the function $\log \dfrac{K}{\varnothing \mu C r_w^2}$ of 5.5

6. Other standard radial flow equilibrium assumptions.

EMPIRICAL EQUATIONS

1. $\text{D.R.} = \dfrac{Po - Pf}{M\left[\log \dfrac{KT}{\varnothing \mu C r_w^2} - 2.85\right]}$ where $M = \dfrac{P1 - P10}{\text{log cycle}}$

2. $\text{Transmissibility} = \dfrac{Kh}{\mu} = \dfrac{162.6QB}{M}$

3. DST $J = \dfrac{Q}{Po - Pf}$ Theoretical $J = \dfrac{7.08 \times 10^{-3}\, kh}{\mu B \ln (re/rw)}$ Assumed $\ln(re/rw) = 7.60$

4. Radius of investigation, $ri = \sqrt{\dfrac{KT}{57{,}600\, \varnothing \mu C}}$ where T = flow time in minutes

5. $\Delta P \text{ Skin} = Po - Pf - \left[\dfrac{Po - Pf}{DR}\right]$ psi

ASSUMPTIONS MADE FOR CALCULATIONS FOR GAS RECOVERIES

1. Qg is steady state flow, and unless stated otherwise is at standard conditions, 14.7 psi and 60° F.
2. Pf is final formation flowing pressure at steady state flow.
3. Formation flow is single phase, and any liquid (condensate) produced at surface is assumed to have condensed in the drill pipe.
4. Radial flow is assumed.
5. Where specific reservoir parameters are not available, an Estimated Damage Ratio is calculated by assuming :

Effective permeability, K, is 1-200md	Formation porosity, Ø, is . . . .10-30 %
Fluid compressibility, C, is . . .. .10^{-6} to 10^{-4}	Fluid viscosity, μ, is . . . . . . .0.05 to 50cp
Well Bore radius, rw, is . . . . .3 7/8" to 4 3/8"	

which gives an average value for the function $\log \dfrac{K}{\varnothing \mu C r_w^2}$ of 5.5

6. If not given, gas specific gravity is assumed to be 0.7 (air 1.0), with a pseudo critical temperature of 385 Rankin and a pseudo critical pressure of 668 psia.
7. Other standard radial flow steady state assumptions.

EMPIRICAL EQUATIONS

1. $\text{D.R.} = \dfrac{Po^2 - Pf^2}{Mg\left[\log \dfrac{KT}{\varnothing u C r_w^2} - 2.85\right]}$ where $Mg = \dfrac{P_1^2 - P_{10}^2}{\text{log cycle}}$

2. $\text{Transmissibility} = \dfrac{Kh}{\mu} = \dfrac{1637\, Q\, Tr\, Z}{Mg}$

3. Radius of Investigation, $ri = \sqrt{\dfrac{KT}{57{,}600\, \varnothing \mu C}}$ where T = flow time in minutes

4. $\Delta P \text{ Skin} = Po - Pf - \left[\dfrac{Po - Pf}{DR} \text{ psi}\right]$

REPORT Nº F 81112

CONFIRMATION OF REPORT DISTRIBUTION

TO HUDBAY OIL AUSTRALIA

WELL BALEEN 1 FIELD GYPPSLAND TEST Nº 1

COUNTRY AUSTRALIA DATE DECEMBER 29, 1981

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.

6 TECHNICAL REPORT (S)

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TECHNICAL REPORT (S)

REPORT Nº F 81112

SPECIAL DATA ANALYSIS

HORNER METHOD

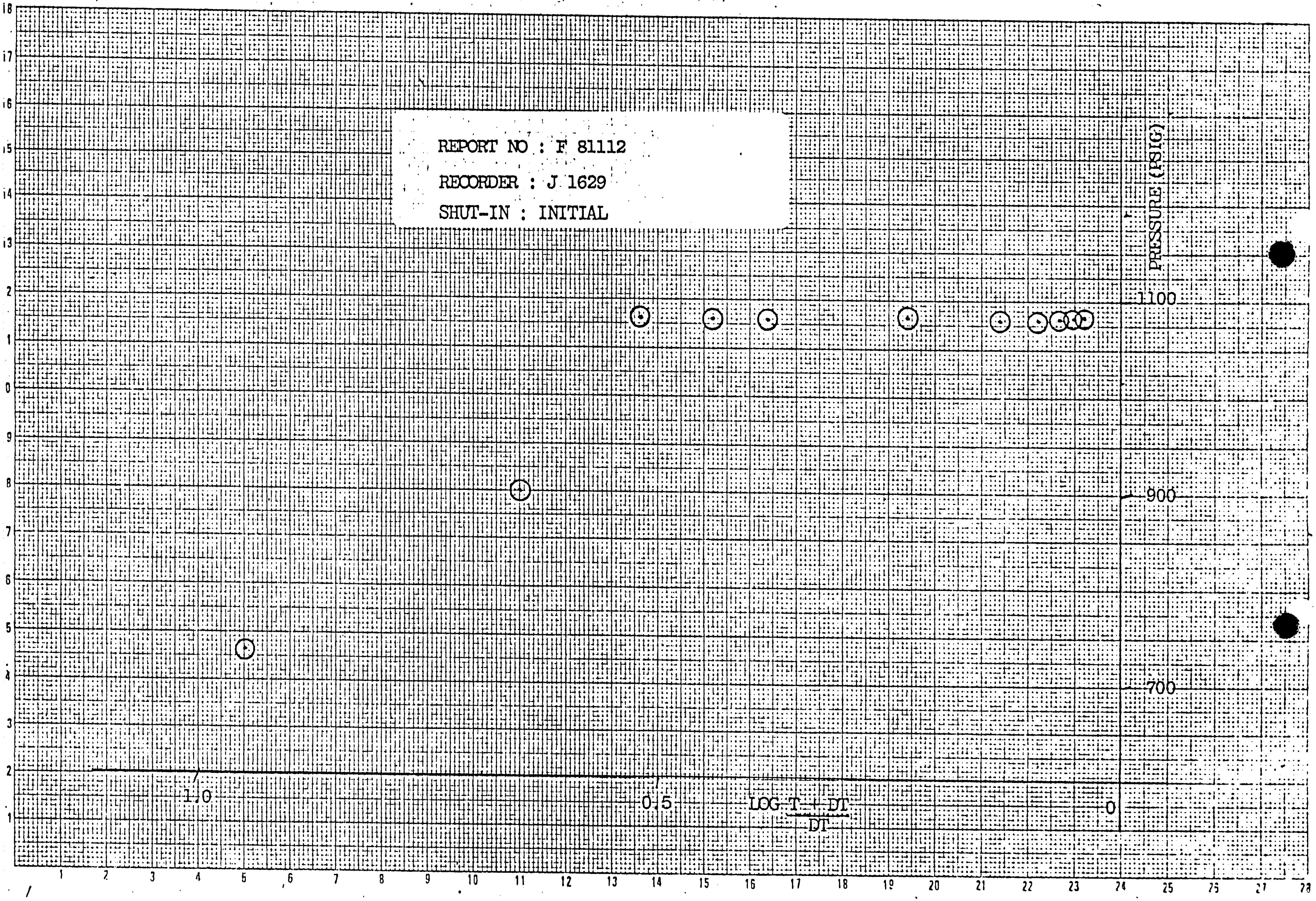
RESERVOIR ENGINEERING DATA – GAS TEST

RECORDER N J 1629

Maximum Reservoir Pressure INITIAL	Po	1081	psig	Flow Rate (gas)	Qg	1800	MCF/day
Damage Ratio	DR	10.3		Flow Rate (equivalent)	Q	6612	Bbls/day
Transmissibility (to gas)	Kh/μ	83564	Md-ft/Cp	Slope of Shut-In Curve FINAL	Mg_1	17264	psi^2/log cycle
Productive Capacity	Kh	919	Md-ft	Slope of Shut-In Curve	Mg_2		psi^2/log cycle
Permeability (to gas)	K	48.9	Md	Gas Specific Gravity		0.6	
Radius of Investigation	ri	538	ft.	Oil Gravity		–	°API
Pressure Gradient		0.51	psi/ft.	ΔP skin		–	psi

These calculations were based on the following data, either supplied from the well, or obtained from the current technical literature.

Net Productive Interval	h	18.8	ft	Gas Deviation Factor	Z	0.9	
Porosity	Ø	10	%	Gas viscosity at reservoir conditions.	μ_g	0.011	cps
Test Temperature	Tr	544	°R	Gas Compressibility	C	1.6×10^{-3}	
Well Bore Radius	rw	3.5	in.	Total Flow Time	T	601	mins.



REPORT NO : F 81112

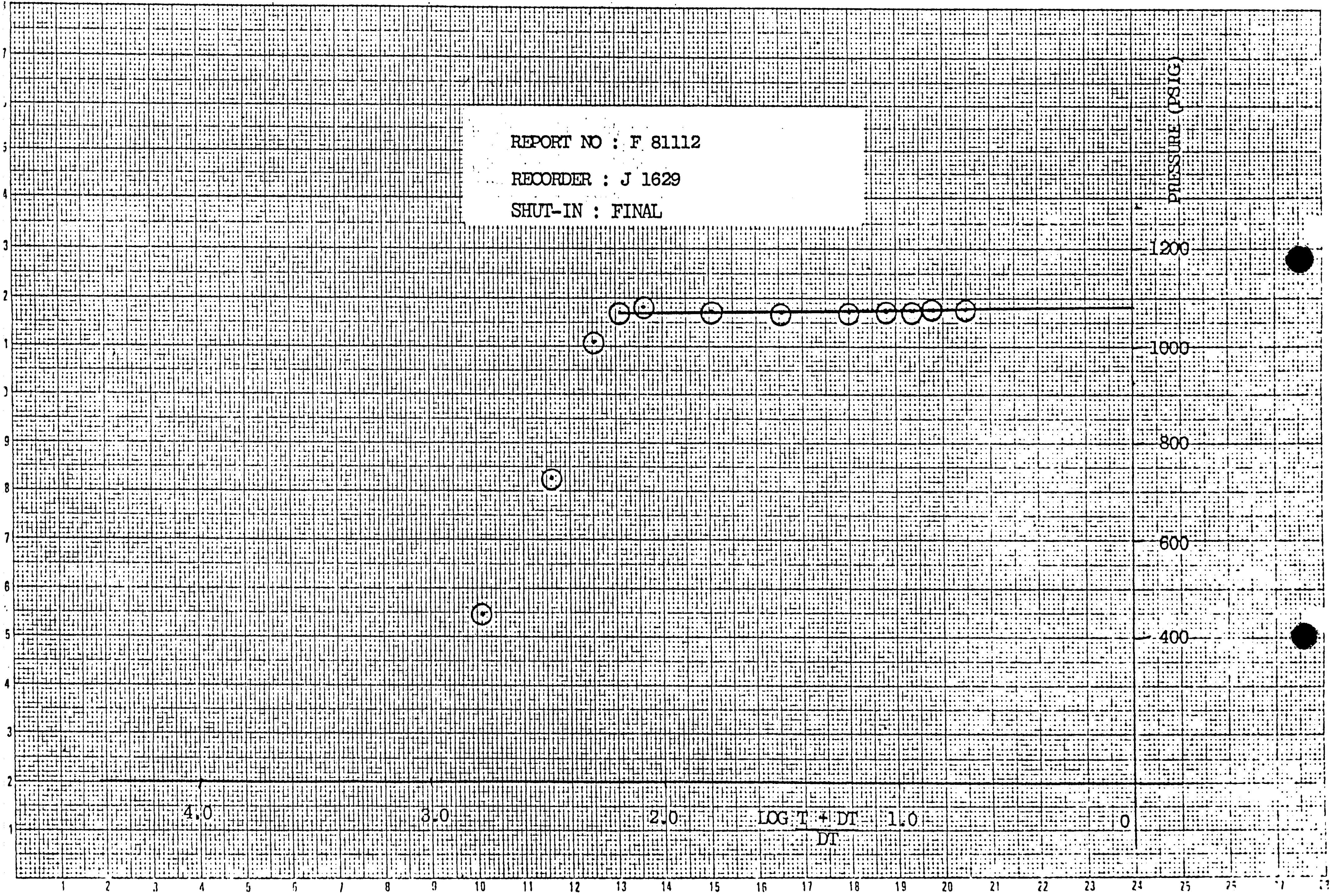
RECORDER : J 1629

SHUT-IN : INITIAL

REPORT NO : F 81112

RECORDER : J 1629

SHUT-IN : FINAL



PRESSURE DATA FOR RECORDER : J 1629

LABEL POINT	ΔT (mins)	PRESSURE (PSI)	$\frac{T + \Delta T}{\Delta T}$	LOG	Pw – Pf (PSI)	COMMENTS
1		1378				INITIAL HYDROSTATIC
2	0	251				INITIAL FLOW (1)
	3	414				
3	7	453				INITIAL FLOW (2)
3	0	453				START SHUT-IN
	1	731	8.00	0.90	278	T = 7
	2	900	4.50	0.65	447	
	3	1080	3.33	0.52	627	
	4	1080	2.75	0.44	627	
	5	1080	2.40	0.38	627	
	10	1080	1.70	0.23	627	
	20	1080	1.35	0.13	627	
	30	1080	1.23	0.09	627	
	40	1080	1.18	0.07	627	
	50	1080	1.14	0.06	627	
	60	1081	1.12	0.05	628	
4	65	1081	1.11	0.04	628	INITIAL SHUT-IN
5	0	361				FINAL FLOW (1)
	20	514				
	40	483				
	60	478				
	80	449				
	100	452				
	150	329				
	200	257				
	300	245				
	400	245				
	500	245				
6	594	231				FINAL FLOW (2)
6	0	231				START SHUT-IN
	1	448	602.00	2.78	217	T = 601

Schlumberger

REPORT Nº F 81112

RECORDER Nº : J 1782 CAPACITY : 4700 PSI DEPTH : 2176.71 FT

OPENING : OUTSIDE TEMPERATURES : 84 DEG F

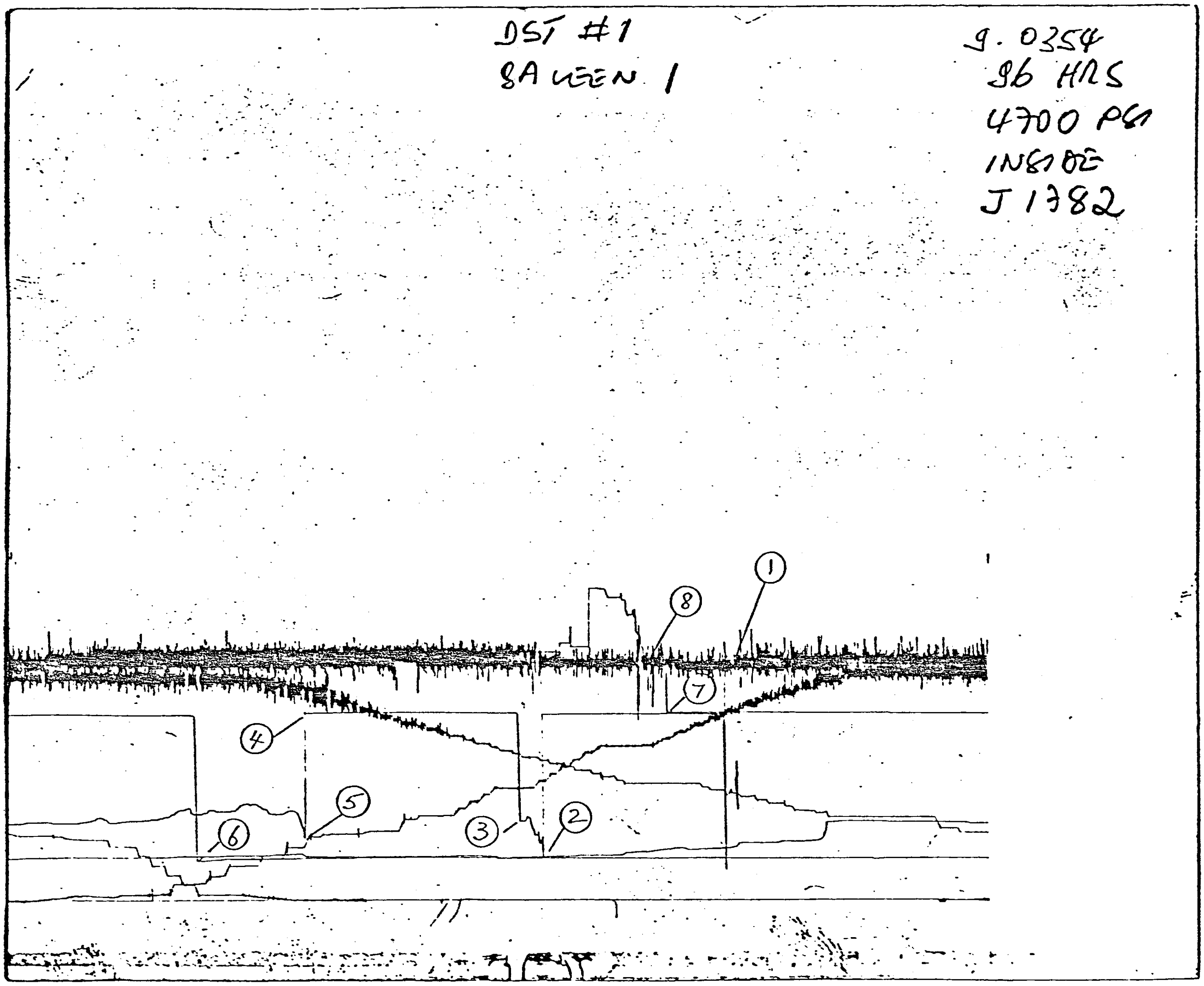
CLOCK Nº : 9-0354 CAP: 48 HRS CLOCK TRAVEL : 0.020385 in/min

CALIBRATION DATA AT M = 936.001

A = 1.100

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

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



PRESSURE DATA FOR RECORDER : J 1782

DESCRIPTION	LABEL POINT	PRESSURE (PSI)	TIME GIVEN	TIME COMPUTED
INITIAL HYDROSTATIC	1	1377		
INITIAL FLOW (1)	2	250		
INITIAL FLOW (2)	3	450	7	7
INITIAL SHUT-IN	4	1074	63	61
SECOND FLOW (1)				
SECOND FLOW (2)				
SECOND SHUT-IN				
THIRD FLOW (1)				
THIRD FLOW (2)				
THIRD SHUT-IN				
FINAL FLOW (1)	5	358	0	0
FINAL FLOW (2)	6	226	615	599
FINAL SHUT-IN	7	1065	130	149
FINAL HYDROSTATIC	8	1358		

REMARK :

DOWELL Schlumberger

REPORT Nº F 81112

RECORDER Nº : J 1630

CAPACITY : 2800 PSI

DEPTH : 2182.36 FT

OPENING : OUTSIDE

TEMPERATURES : 83 DEG F

CLOCK Nº : 9-3487 CAP: 48 HRS

CLOCK TRAVEL : 0.022299 in/min

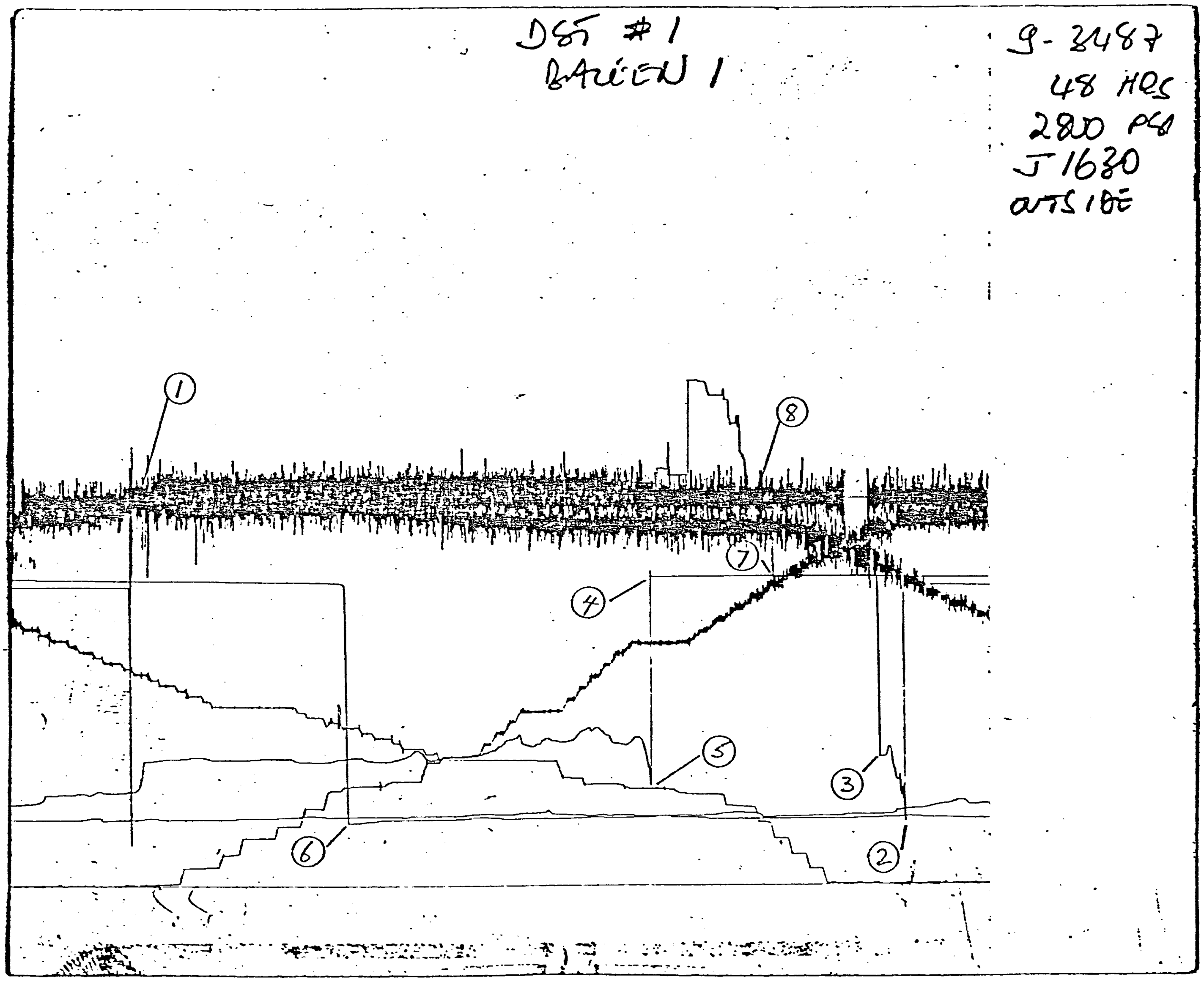
CALIBRATION DATA AT

M = 569.94154

A = 5.357018

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

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



REPORT Nº F 81112

PRESSURE DATA FOR RECORDER : J 1630

DESCRIPTION	LABEL POINT	PRESSURE (PSI)	TIME GIVEN	TIME COMPUTED
INITIAL HYDROSTATIC	1	1382		
INITIAL FLOW (1)	2	224		
INITIAL FLOW (2)	3	454	7	7
INITIAL SHUT-IN	4	1095	63	62
SECOND FLOW (1)				
SECOND FLOW (2)				
SECOND SHUT-IN				
THIRD FLOW (1)				
THIRD FLOW (2)				
THIRD SHUT-IN				
FINAL FLOW (1)	5	357	0	0
FINAL FLOW (2)	6	225	615	599
FINAL SHUT-IN	7	1092	130	148
FINAL HYDROSTATIC	8	1373		

REMARK :

REPORT Nº F 81112

RECORDER Nº : J 1629 CAPACITY : 2800 PSI DEPTH : 2121.84 FT

OPENING : INSIDE TEMPERATURES : 84 DEG F

CLOCK Nº : 9.0936 CAP: 96 HRS CLOCK TRAVEL : 0.010885 in/min

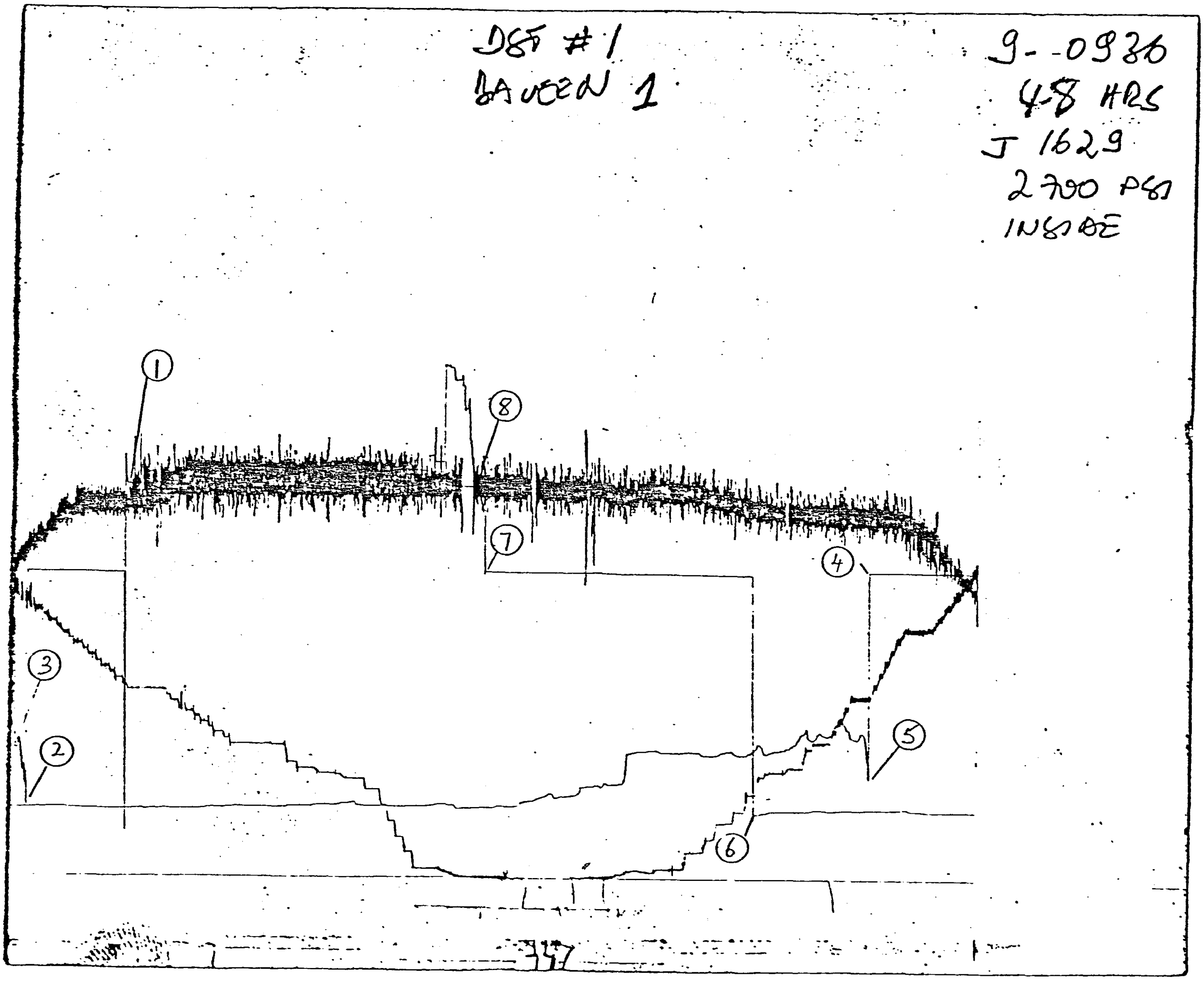
CALIBRATION DATA AT

M = 558.9304

A = 0.8222

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

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



PRESSURE DATA FOR RECORDER : J 1629

DESCRIPTION	LABEL POINT	PRESSURE (PSI)	TIME GIVEN	TIME COMPUTED
INITIAL HYDROSTATIC	1	1378		
INITIAL FLOW (1)	2	251		
INITIAL FLOW (2)	3	453	7	7
INITIAL SHUT-IN	4	1081	63	65
SECOND FLOW (1)				
SECOND FLOW (2)				
SECOND SHUT-IN				
THIRD FLOW (1)				
THIRD FLOW (2)				
THIRD SHUT-IN				
FINAL FLOW (1)	5	361	0	0
FINAL FLOW (2)	6	231	615	594
FINAL SHUT-IN	7	1076	130	149
FINAL HYDROSTATIC	8	1374		

REMARK :

PRESSURE DATA FOR RECORDER : J 1629

LABEL POINT	ΔT (mins)	PRESSURE (PSI)	$\frac{T + \Delta T}{\Delta T}$	LOG	Pw − Pf (PSI)	COMMENTS
	2	726	301.50	2.48	495	
	3	1010	201.33	2.30	779	
	4	1069	151.25	2.18	838	
	5	1070	121.20	2.08	839	
	10	1070	61.00	1.79	839	
	20	1070	31.05	1.49	839	
	40	1073	16.02	1.20	842	
	60	1073	11.02	1.04	842	
	80	1074	8.51	0.93	843	
	100	1075	7.01	0.85	844	
7	149	1076	5.03	0.70	845	FINAL SHUT-IN
8		1374				FINAL HYDROSTATIC

DOWELL
Schlumberger

Formation Testing Field Report

Report No. F 81112

WELL IDENTIFICATION

Company : HUDBAY OIL AUSTRALIA Well No : BALEEN 1 Test No. : 1
Field : GYPPSLAND Location : BASS STRAIT Country : AUSTRALIA
Tested Interval : From 2198 Ft, to 2216.8 Ft. 18.8
Co-ordinates : LAT 38° 0' 36 01 S LONG 148° 26' 8 74" E
Type Test : Open Hole ☐ Casing ; ☒ Conventional ☐ Straddle ; ☐ Land rig ☐ Jack-up ☐ Floater ☒
Valve : MFE ☐ PCT ☒ SPRO ☒ Other : with Packer ☐ Retainer ☐

HOLE DATA

Geologic Level : LOWER CRETALEOUS Description : SANDSTONE, SHALE, MINOR COAL
Net Productive Interval : 18.8 ft. Estimated Porosity : POOR %
Total Depth : 2386.4 ft. Depths measured from : RKTB Elevation : 29.35 ft.
Open Hole Size : 8½ in. Rat Hole Size : in., from ft.
Casing Size : 9-5/8 in. 40 lbs/ft. Liner Size : 7 in., 2- lbs/ft. from 1417.27 ft
Before test : Caliper Yes ☐ No ☐ Scraper Yes ☒ No ☐ Circulation Yes ☒ for 2 hrs; No ☐

MUD DATA

Mud Type : POLYMER Weight : 1.08 SG
Viscosity : 38 Water Loss 7 cc Mud Resistivity at °F
Filtrate Resistivity : at °F ; Chloride ppm :

INSTRUMENT AND CHART DATA

Recorder No.		J 1782	J 1630	J 1629	SPRO
Capacity (psig)		4700	2800	2800	
Depth		2176.71	2182.36	2131.84	
Inside/Outside		OUTSIDE	OUTSIDE	INSIDE	
Above/Below valve		BELOW	BELOW	BELOW	
Clock No.		9-0354	9-3487	9-0936	
Capacity (hrs.)		48 HRS	48 HRS	96 HRS	
Temperature		84° F	83 DEG F	84 DEG F	
Initial Hydrostatic Pressure					1032.2
Pre-flow	(1) Start Pressure				95.8
	(2) Finish Pressure	CHARTS TO BE READ AT STATION			413.2
Initial Shut-in Pressure			590.8		590.8
Second Flow	(1) Start Pressure				367.0
	(2) Finish Pressure				-
Second Shut-in Pressure					-
Final Flow	(1) Start Pressure				1079.3
	(2) Finish Pressure				
Final Shut-in Pressure					
Final Hydrostatic Pressure					

OPERATIONS SUMMARY

Left Station at : on On Location at : on
Started Operations at 02 : 00 on 22.11.81 Finished Operations at 15 : 30 on 24.11.81
Off Location at : on Return Station at : on Mileage

Comments : GOOD TEST. TOOLS WORKED GOOD.
SPRO GAUGE GOOD (81205)
SOME PROBLEMS WITH DIGITAL TO ANAWY PANELS.

Station : AUS SIR No. : 61651 - 61652 Date : 24.11.81
Customer Tester CIT. ROUX Customer

Surface Data

Report No. F 81112

Customer: HUDBAY OIL AUSTRALIA **Well No:** BALEEN 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: 685.2 M ~~ft~~ Set at:	23.11.81	15	40		
Opened Tool: (Annulus pressure 1032.5 psi)	"	16	40		
MEDIUM BLOW	"			95	½
GAS TO SURFACE		16	44	385	½
MUD TO SURFACE		16	46	410	½
CLOSE PUT FOR FIRST SHUT-IN (SEE SPRO DATA		16	47	413	½
FOR PRESSURE READINGS + PLOTS)					
OPEN POT FOR SECOND FLOW		17	50		
FLOWING DRY GAS G1 SG 0.578		18	00	360	½
		18	30	330	½
		19	00	320	½
CHANGE CHOKE		20	00		1
THROUGH SEPARATOR		21	00	95	1
	24.11.81	0	00	104	1
CLOSED PUT FOR FINAL SHUT-IN (SEE SPRO)		4	05		1
UNLATCH SPRO/POH GAUGE		5	33		1
Reverse Circulation Started (Pump pressure 500 psig)		5	45		
Reverse Circulation Finished		6	07		
Pulled Packer Loose/Pulled Out of Retainer		6	12		

Cushion Type: NO Amount bbls; Length ft; Pressure psi Bottom Choke 1"

RECOVERY DATA

	Recovery Description	Feet	Bbls	% Oil	% Water	% Other
1						
2						
3	1.8 MMCFD DRY GAS					
4						
5	MUD IN DC BELOW REV. SUBS	30	0.3			
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 81112

Customer : HUDBAY OIL AUSTRALIA **Well No. :** BALEEN 1 **Test No. :** 1

SAMPLE CHAMBER RECOVERY DATA

Sampler Drained
On Location ☒
Elsewhere ☐
Name :
Address :

Recovery			Resistivity			Chlorides (ppm)
Gas	7	cu ft.	Water	at	°F	
Oil		c.c.	Mud	at	°F	
Water	TR	c.c.	Mud Filtrate	at	°F	
Mud	TR	c.c.	Pit Mud	at	°F	
°API	°F		Pit Mud Filtrate	at	°F	

Gas/Oil Ratio cu ft./bbl Sample Chamber Pressure 104 psi.

EQUIPMENT SEQUENCE

Components (including D.P. and D.C.)	Type	O.D. (in)	I.D. (in)	Length M	Depth
BULL NOSE	JOTCO	4¾	2¼	0.25	
RECORDER CARRIER J 200 J 1782	J 200	4-7/8	1½	1.80	
RECORDER CARRIER J 200 J 1630	J 200	4-7/8	1½	1.80	
PERFORATED ANCHORS	JOTCO	4¾	2¼	6.20	
X O 2-7/8 EUE / 3½ FH	"	4¾	2¼	0.32	
BELOW PACKER 7" POSITEST	"	5.23	2.0	0.67	685.2
ABOVE PACKER	"	"	"	0.41	
X O 3½ FH / 2-7/8 IF	"	4¾	2¼	0.33	
SAFETY JOINT	BOWEN	4¾	2-1/16	0.60	
TR 03 HYDRAULIC JAR	JOTCO	4¾	1½	2.35	
RECORDER CARRIER J 200 J 1629	"	4¾	1½	1.80	
MFE/HRT	"	5	1-3/8	2.90	
PRESSURE CONTROLED TEST	"	4¾	1	7.66	
X O ACME PIN X 3½ FH PIN	"				
SPRO BARREL ACME BOX/BOX	JOTCO	4¾	2¼	2.40	
LIFTING SUB 3½ FH BOX X ACME PIN	"				
X O 3½ IF BOX X 3½ FH PIN	"				
DRILL COLLAR	PETRONAR	4¾	2¼		
PUMP OUT SUB	JOTCO	4¾	2¼	0.36	
DRILL COLLAR	PETRONAR	4¾	2¼		
PUMP OUT SUB	JOTCO	4¾	2¼		
DRILL COLLAR	PETRONAR	4¾	2¼	0.36	
SLIP JOINT	JOTCO	5	2¼	7.16	
SLIP JOINT	JOTCO	5	2¼	8.68	
DRILL COLLAR	PETRONAR	4¾	2¼		
X O 3½ PH 6 X 3½ IF PIN	"			0.30	
TUBING	"	3½	–		
X O 4½ ACME PIN X 3½ PH 6 PIN	"			0.20	
FLUTED HANGER ACME BOX / BOX	"	4½		0.61	
SLICK JOINT	"			1.80	
E 2 TREE	FLOPETROL			2.44	
SPACER SUB	FLOPETROL			1.52	
X O 3½ PH 6 BOX X 4½ ACME PIN				0.30	
TUBING					
X O 4½ IF BOX X 3½ PH 6 PIN				0.34	
SAVER SUB				0.26	
X O 6½ ACME PIN X 4½ IF PIN				0.32	
FLOW HEAD 7-7/8 BOWEN WING / 6½ ACME BOX					
SCHLUM X O SCHLUM PIN X 7-7/8 BOWEN					
SCHLUM WIRELINE BOP					
SCHLUM RISER PIPE					
SCHLUM GREASE INT					
Total Drill Pipe					
Total Drill Collar					

Comments :

DOWELL Schlumberger

[illegible]ormation Evaluation Da[illegible]

To be completed by Customer Representative

Page 4 of 4

Report No. F 81112

Customer : HUDBAY OIL AUSTRALIA **Well No. :** BALEEN 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 ☐

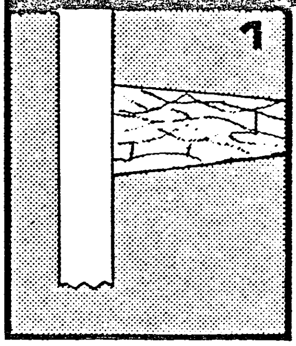
—If yes :— for how long ☐ If no, how long since ☐

Additional Comments : ________

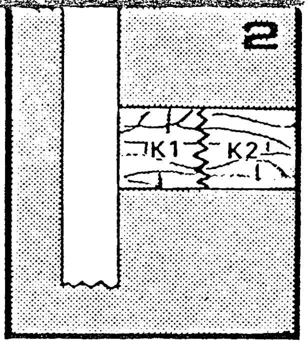
Customer Representative : ________

GEOLOGICAL INTERPRETATION GUIDE *

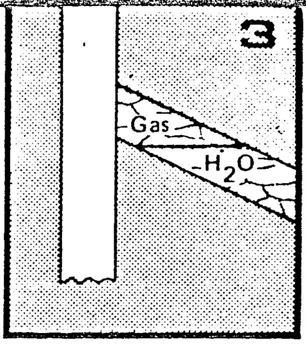
1 GENERAL CAUSES OF A BREAK UPWARD IN SLOPE VALUE



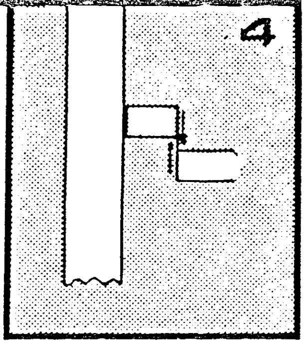
Decrease in thickness of pay zone away from well bore



Decrease in effective permeability away from well bore (facies change) K1 K2

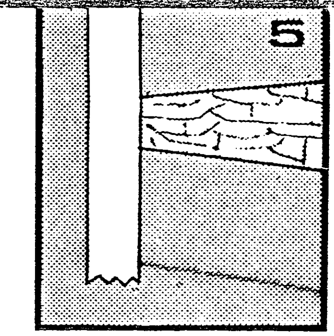


Increase in fluid viscosities away from the well bore (gas-water contact, gas-oil contact)

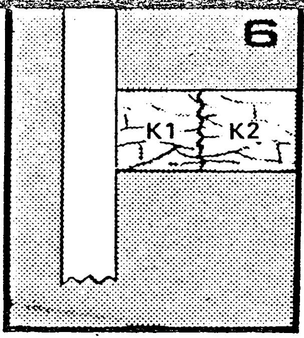


Sealing barrier (fault)

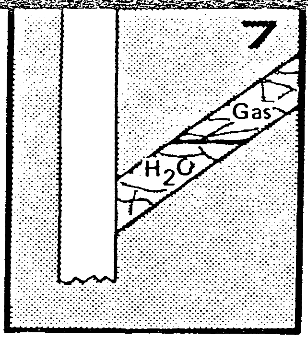
2 GENERAL CAUSES OF A BREAK DOWNWARD IN SLOPE VALUE



Increase in thickness of pay zone away from well bore

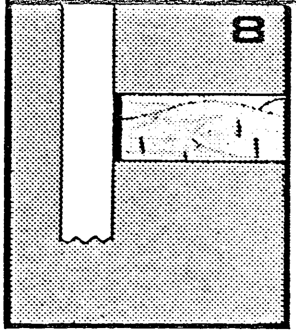


Increase in effective permeability away from well bore K1 K2

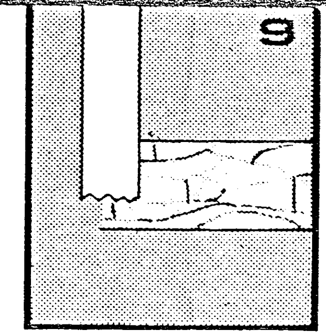


Decrease in fluid viscosities away from well bore

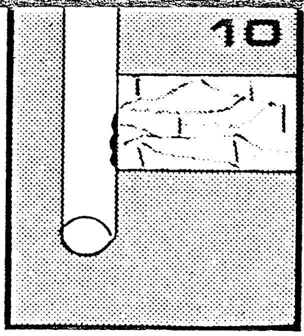
3 CONDITIONS WHICH WILL GIVE INDICATION OF DAMAGE OR STIMULATION



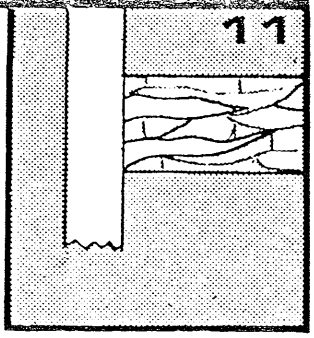
True Skin Damage - (Caused by : filtrate invasion, bit damage, drilling solids invasion, etc..)



Pseudo Damage - Incomplete penetration of porous zone



Pseudo Damage - Choking effect of perforations (cased hole)



Stimulation limited natural fracture system

* ILLUSTRATED CAUSES OF ANOMALIES DETECTED THROUGH PRESSURE BUILD-UP ANALYSIS

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                DOWELL SCHLUMBERGER
                *******************

                     SURFACE
                     PRESSURE
                     READ
                     OUT
                     ********

           COMPANY                  HUDBAY OIL AUSTRALIA LTD.

           WELL                     BALEEN N.1

           TEST                     N.1

           DEPTH                    685.29 MT.

           PRESS/TEMP GAUGE         FLOPETROL 81205

           GAUGE CAPACITY           10000 PSIA

           GAUGE DEPTH              671.3 MT.


   TIME      DEL T  PRESSURE TEMPERATURE  T+DEL T  LOG(T+DEL T)  PRESSURE    COMMENTS
 HR:MN:SE     MIN     PSI     DEGREES F    DEL T    ( DEL T )     DIFF
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 16:27:08             988.6      -8.31
 16:27:16            1020.4      85.48
 16:27:20            1020.5      85.48
 16:27:30            1020.4      85.48
 16:27:40            1020.4      85.48
 16:27:50            1020.4      85.48
 16:28:00            1032.2     111.54
 16:28:10            1032.3     111.54
 16:28:20            1032.3     111.54
```

```
16:29:00              1032.3    111.57
16:29:10              1032.4    111.57
16:29:20              1032.4    111.57



16:29:30              1032.4    111.57
16:29:40              1032.4    111.57
16:29:50              1032.4    111.57
16:30:00              1032.4    111.56
16:30:10              1032.5    111.56
16:30:20              1032.4    111.56
16:30:30              1032.5    111.56
16:30:40              1032.5    111.56
16:30:50              1032.4    111.56
16:31:00              1032.4    111.54
16:31:10              1032.5    111.54
16:31:20              1032.5    111.54
16:31:30              1032.5    111.54
16:31:40              1032.6    111.54
16:31:50              1032.6    111.54
16:32:00              1032.5    111.51
16:32:10              1032.5    111.51
16:32:20              1032.5    111.51
16:32:30              1032.5    111.51
16:32:40              1032.5    111.51
16:32:50              1032.6    111.51
16:33:00              1032.5    111.47
16:33:10              1032.5    111.47
16:33:20              1032.4    111.47
16:33:30              1032.5    111.47
16:33:40              1032.5    111.47
16:33:50              1032.5    111.47
16:34:00              1032.5    111.45
16:34:10              1032.5    111.45
16:34:20              1032.5    111.45
16:34:30              1032.5    111.45
16:34:40              1032.5    111.45
16:34:50              1032.7    111.45
16:35:00              1033.3    111.42
16:35:10              1033.8    111.42
16:35:20              1034.1    111.42
16:35:30              1034.4    111.42
16:35:40       0.0      95.8    111.42                                 1st Flow
```

```
16:36:30     0.8    247.3    111.41
16:36:40     1.0    252.2    111.41
16:36:50     1.2    275.0    111.41



16:37:01     1.4    303.7    111.54
16:37:10     1.5    310.3    111.54
16:37:20     1.7    319.3    111.54
16:37:30     1.8    322.7    111.54
16:37:40     2.0    325.7    111.54
16:37:50     2.2    331.0    111.54
16:38:00     2.3    336.4    111.78
16:38:10     2.5    345.4    111.78
16:38:20     2.7    356.1    111.78
16:38:30     2.8    362.9    111.78
16:38:40     3.0    371.4    111.78
16:38:50     3.2    386.3    111.78
16:39:00     3.3    402.1    112.01
16:39:10     3.5    419.1    112.01
16:39:20     3.7    435.1    112.01
16:39:30     3.8    447.7    112.01
16:39:40     4.0    454.5    112.01
16:39:50     4.2    458.1    112.01
16:40:00     4.3    457.3    112.20
16:40:10     4.5    451.3    112.20
16:40:20     4.7    441.7    112.20
16:40:30     4.8    434.3    112.20
16:40:40     5.0    427.5    112.20
16:40:50     5.2    421.7    112.20
16:41:00     5.3    415.4    112.36
16:41:10     5.5    413.3    112.36
16:41:20     5.7    411.9    112.36
16:41:30     5.8    409.9    112.36
16:41:40     6.0    408.8    112.36
16:41:50     6.2    406.5    112.36
16:42:00     6.3    408.0    112.46
16:42:10     6.5    410.0    112.46
16:42:20     6.7    413.2    112.46                                          1st Shut in
16:42:30     0.2    590.8    112.46     43.000       1.6335       -0
16:42:40     0.3    901.9    112.46     22.000       1.3424       311
16:42:50     0.5   1054.8    112.46     15.000       1.1761       464
16:43:00     0.7   1075.7    112.48     11.500       1.0607       485
16:43:10     0.8   1077.4    112.48      9.400       0.9731       487
16:43:20     1.0   1078.0    112.48      8.000       0.9031       487
```

```
        16:44:00        1.7   1078.9     112.40        5.200        0.7160        488
        16:44:10        1.8   1079.0     112.40        4.818        0.6829        488
        16:44:20        2.0   1079.1     112.40        4.500        0.6532        488
        16:44:30        2.2   1079.3     112.40        4.231        0.6264        488
        16:44:41        2.3   1079.3     112.40        3.979        0.5997        489
        16:44:51        2.5   1079.4     112.40        3.781        0.5777        489
        16:45:01        2.7   1079.5     112.20        3.609        0.5574        489
        16:45:12        2.9   1079.6     112.20        3.442        0.5368        489
        16:45:20        3.0   1079.8     112.20        3.333        0.5229        489
        16:45:30        3.2   1079.8     112.20        3.211        0.5066        489
        16:45:40        3.3   1079.9     112.20        3.100        0.4914        489
        16:45:50        3.5   1079.9     112.20        3.000        0.4771        489
        16:46:00        3.7   1079.9     111.96        2.909        0.4638        489
        16:46:10        3.8   1079.8     111.96        2.826        0.4512        489
        16:46:20        4.0   1079.9     111.96        2.750        0.4393        489
        16:46:30        4.2   1079.9     111.96        2.680        0.4281        489
        16:46:40        4.3   1079.9     111.96        2.615        0.4175        489
        16:46:50        4.5   1079.9     111.96        2.556        0.4075        489
        16:47:01        4.7   1079.8     111.76        2.495        0.3970        489
        16:47:10        4.8   1079.9     111.76        2.448        0.3889        489
        16:47:20        5.0   1079.9     111.76        2.400        0.3802        489
        16:47:30        5.2   1079.9     111.76        2.355        0.3720        489
        16:47:40        5.3   1079.9     111.76        2.313        0.3641        489
        16:47:50        5.5   1079.9     111.76        2.273        0.3565        489
        16:48:00        5.7   1079.8     111.64        2.235        0.3493        489
        16:48:10        5.8   1079.8     111.64        2.200        0.3424        489
        16:48:20        6.0   1079.8     111.64        2.167        0.3358        489
        16:48:30        6.2   1079.9     111.64        2.135        0.3294        489
        16:48:40        6.3   1079.9     111.64        2.105        0.3233        489
        16:48:50        6.5   1079.9     111.64        2.077        0.3174        489
        16:49:00        6.7   1079.8     111.56        2.050        0.3118        489
        16:49:10        6.8   1079.8     111.56        2.024        0.3063        489
        16:49:20        7.0   1079.8     111.56        2.000        0.3010        489
        16:49:30        7.2   1079.9     111.56        1.977        0.2960        489
        16:49:40        7.3   1079.8     111.56        1.955        0.2910        489
        16:49:50        7.5   1079.9     111.56        1.933        0.2863        489
        16:50:00        7.7   1079.8     111.52        1.913        0.2817        489
        16:50:10        7.8   1079.8     111.52        1.894        0.2773        489
        16:50:20        8.0   1079.8     111.52        1.875        0.2730        489
        16:50:30        8.2   1079.8     111.52        1.857        0.2688        489
        16:50:40        8.3   1079.8     111.52        1.840        0.2648        489
        16:50:50        8.5   1079.8     111.52        1.824        0.2609        489
```

```
16:51:20      9.0   1079.8   111.50      1.778      0.2499        489
16:51:30      9.2   1079.8   111.50      1.764      0.2464        489
16:51:40      9.3   1079.8   111.50      1.750      0.2430        489
16:51:50      9.5   1079.8   111.50      1.737      0.2398        489



16:52:00      9.7   1079.8   111.50      1.724      0.2366        489
16:52:10      9.8   1079.8   111.50      1.712      0.2335        489
16:52:20     10.0   1079.8   111.50      1.700      0.2304        489
16:52:30     10.2   1079.8   111.50      1.689      0.2275        489
16:52:40     10.3   1079.8   111.50      1.677      0.2246        489
16:52:50     10.5   1079.8   111.50      1.667      0.2218        489
16:53:00     10.7   1079.8   111.51      1.656      0.2191        489
16:53:10     10.8   1079.8   111.51      1.646      0.2165        489
16:53:20     11.0   1079.8   111.51      1.636      0.2139        489
16:53:30     11.2   1079.8   111.51      1.627      0.2114        489
16:53:40     11.3   1079.8   111.51      1.618      0.2089        489
16:53:50     11.5   1079.8   111.51      1.609      0.2065        489
16:54:00     11.7   1079.8   111.53      1.600      0.2041        489
16:54:10     11.8   1079.8   111.53      1.592      0.2018        489
16:54:20     12.0   1079.8   111.53      1.583      0.1996        489
16:54:30     12.2   1079.8   111.53      1.575      0.1974        489
16:54:40     12.3   1079.8   111.53      1.568      0.1952        489
16:54:50     12.5   1079.8   111.53      1.560      0.1931        489
16:55:00     12.7   1079.8   111.55      1.553      0.1911        489
16:56:00     13.7   1079.8   111.58      1.512      0.1796        489
16:57:00     14.7   1079.8   111.60      1.477      0.1695        489
16:58:00     15.7   1079.8   111.63      1.447      0.1604        489
16:59:00     16.7   1079.8   111.66      1.420      0.1523        489
17:00:00     17.7   1079.8   111.69      1.396      0.1450        489
17:01:00     18.7   1079.8   111.72      1.375      0.1383        489
17:02:00     19.7   1079.8   111.74      1.356      0.1322        489
17:03:00     20.7   1079.8   111.77      1.339      0.1267        489
17:04:00     21.7   1079.8   111.79      1.323      0.1216        489
17:05:00     22.7   1079.8   111.82      1.309      0.1169        489
17:06:00     23.7   1079.8   111.84      1.296      0.1125        489
17:07:00     24.7   1079.8   111.86      1.284      0.1085        489
17:08:00     25.7   1079.8   111.88      1.273      0.1047        489
17:09:00     26.7   1079.8   111.90      1.263      0.1012        489
17:10:00     27.7   1079.8   111.92      1.253      0.0980        489
17:11:00     28.7   1079.8   111.94      1.244      0.0949        489
17:12:00     29.7   1079.8   111.96      1.236      0.0920        489
17:13:00     30.7   1079.8   111.98      1.228      0.0893        489
17:14:00     31.7   1079.9   112.00      1.221      0.0867        489
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17:18:00	35.7	1079.9	112.06	1.196	0.0778	489
17:19:00	36.7	1079.9	112.07	1.191	0.0759	489
17:20:00	37.7	1079.8	112.09	1.186	0.0740	489
17:21:00	38.7	1079.8	112.10	1.181	0.0723	489
17:22:00	39.7	1079.9	112.11	1.176	0.0706	489
17:23:00	40.7	1079.8	112.12	1.172	0.0690	489
17:24:00	41.7	1079.9	112.13	1.168	0.0674	489
17:25:00	42.7	1079.8	112.14	1.164	0.0660	489
17:26:00	43.7	1079.8	112.15	1.160	0.0646	489
17:27:00	44.7	1079.8	112.16	1.157	0.0632	489
17:28:00	45.7	1079.9	112.17	1.153	0.0619	489
17:29:00	46.7	1079.8	112.17	1.150	0.0607	489
17:30:00	47.7	1079.8	112.18	1.147	0.0595	489
17:31:00	48.7	1079.8	112.19	1.144	0.0584	489
17:32:00	49.7	1079.9	112.19	1.141	0.0573	489
17:33:00	50.7	1079.8	112.20	1.138	0.0562	489
17:34:00	51.7	1079.8	112.21	1.135	0.0552	489
17:35:00	52.7	1079.8	112.21	1.133	0.0542	489
17:36:00	53.7	1079.9	112.22	1.130	0.0532	489
17:37:00	54.7	1079.8	112.22	1.128	0.0523	489
17:38:00	55.7	1079.8	112.23	1.126	0.0514	489
17:39:00	56.7	1079.9	112.23	1.124	0.0506	489
17:40:00	57.7	1079.8	112.24	1.121	0.0498	489
17:41:00	58.7	1079.9	112.24	1.119	0.0490	489
17:41:20	59.0	1079.8	112.24	1.119	0.0487	489
17:41:30	59.2	1079.9	112.24	1.118	0.0486	489
17:41:40	59.3	1079.8	112.24	1.118	0.0484	489
17:41:50	59.5	1079.9	112.24	1.118	0.0483	489
17:42:00	59.7	1079.8	112.25	1.117	0.0482	489
17:42:10	59.8	1079.9	112.25	1.117	0.0480	489
17:42:20	60.0	1079.9	112.25	1.117	0.0479	489
17:42:30	60.2	1079.9	112.25	1.116	0.0478	489
17:42:40	60.3	1079.9	112.25	1.116	0.0477	489
17:42:50	60.5	1079.9	112.25	1.116	0.0475	489
17:43:00	60.7	1079.8	112.25	1.115	0.0474	489
17:43:10	60.8	1079.8	112.25	1.115	0.0473	489
17:43:20	61.0	1079.9	112.25	1.115	0.0472	489
17:43:30	61.2	1079.9	112.25	1.114	0.0471	489
17:43:40	61.3	1079.9	112.25	1.114	0.0469	489
17:43:50	61.5	1079.9	112.25	1.114	0.0468	489
17:44:00	61.7	1079.8	112.26	1.114	0.0467	489
17:44:10	61.8	1079.8	112.26	1.113	0.0466	489

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17:45:00      62.7   1079.9   112.26     1.112     0.0460      489
17:45:10      62.8    530.7   112.26     1.111     0.0459      -60
17:45:20      63.0    380.7   112.26     1.111     0.0458     -210   2nd Flow



17:45:30       0.5    308.1   112.26
17:45:40       0.7    320.4   112.26
17:45:50       0.8    335.4   112.26
17:46:00       1.0    347.3   112.18
17:46:10       1.2    366.0   112.18
17:46:20       1.3    380.4   112.18
17:46:30       1.5    397.9   112.18
17:46:40       1.7    413.8   112.18
17:46:50       1.8    429.6   112.18
17:47:00       2.0    441.6   111.81
17:47:10       2.2    452.7   111.81
17:47:20       2.3    463.3   111.81
17:47:30       2.5    471.4   111.81
17:47:40       2.7    478.0   111.81
17:47:50       2.8    483.1   111.81
17:48:00       3.0    486.9   111.40
17:48:10       3.2    489.6   111.40
17:48:20       3.3    492.0   111.40
17:48:30       3.5    493.8   111.40
17:48:40       3.7    494.5   111.40
17:48:50       3.8    494.7   111.40
17:49:00       4.0    494.1   111.06
17:49:10       4.2    493.2   111.06
17:49:20       4.3    491.9   111.06
17:49:30       4.5    490.6   111.06
17:49:40       4.7    488.7   111.06
17:49:50       4.8    487.0   111.06
17:50:00       5.0    484.3   110.81
17:50:10       5.2    481.7   110.81
17:50:20       5.3    479.4   110.81
17:50:30       5.5    476.7   110.81
17:50:40       5.7    474.6   110.81
17:50:50       5.8    472.0   110.81
17:51:00       6.0    469.7   110.60
17:51:10       6.2    468.2   110.60
17:51:20       6.3    466.5   110.60
17:51:30       6.5    465.2   110.60
17:51:40       6.7    463.8   110.60
17:51:50       6.8    462.6   110.60
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```
17:52:20     7.3    459.3    110.41
17:52:30     7.5    456.6    110.41
17:52:40     7.7    456.8    110.41
17:52:50     7.8    457.3    110.41




17:53:00     8.0    457.2    110.22
17:53:10     8.2    457.2    110.22
17:53:20     8.3    456.5    110.22
17:53:30     8.5    456.2    110.22
17:53:40     8.7    457.0    110.22
17:53:50     8.8    457.7    110.22
17:54:00     9.0    457.7    110.00
17:54:10     9.2    458.2    110.00
17:54:20     9.3    458.4    110.00
17:54:30     9.5    458.9    110.00
17:54:40     9.7    459.1    110.00
17:54:50     9.8    459.2    110.00
17:55:00    10.0    459.3    109.75
17:55:10    10.2    459.5    109.75
17:55:20    10.3    460.3    109.75
17:55:30    10.5    460.6    109.75
17:55:40    10.7    461.3    109.75
17:55:50    10.8    462.8    109.75
17:56:00    11.0    467.8    109.45
17:56:10    11.2    470.4    109.45
17:56:20    11.3    472.3    109.45
17:56:30    11.5    480.2    109.45
17:56:40    11.7    482.8    109.45
17:56:50    11.8    485.3    109.45
17:57:00    12.0    487.3    109.10
17:57:10    12.2    489.5    109.10
17:57:20    12.3    491.9    109.10
17:57:30    12.5    493.5    109.10
17:57:40    12.7    495.1    109.10
17:57:50    12.8    496.4    109.10
17:58:00    13.0    497.6    108.71
17:58:10    13.2    499.2    108.71
17:58:20    13.3    501.1    108.71
17:58:30    13.5    503.5    108.71
17:58:40    13.7    504.5    108.71
17:58:50    13.8    506.1    108.71
17:59:00    14.0    507.8    108.28
17:59:10    14.2    509.1    108.28
17:59:20    14.3    511.6    108.28
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```
17:59:50      14.8      513.1      108.28
18:00:00      15.0      512.2      107.82
18:00:10      15.2      511.7      107.82
18:00:20      15.3      510.9      107.82



18:00:30      15.5      509.4      107.82
18:00:40      15.7      508.1      107.82
18:00:50      15.8      505.3      107.82
18:01:00      16.0      503.8      107.35
18:01:10      16.2      502.2      107.35
18:01:20      16.3      504.0      107.35
18:01:30      16.5      504.0      107.35
18:01:40      16.7      504.6      107.35
18:01:50      16.8      508.7      107.35
18:02:00      17.0      508.6      106.88
18:02:10      17.2      508.1      106.88
18:02:20      17.3      507.4      106.88
18:02:30      17.5      506.8      106.88
18:02:40      17.7      506.5      106.88
18:02:50      17.8      505.3      106.88
18:03:00      18.0      503.0      106.41
18:03:10      18.2      501.6      106.41
18:03:20      18.3      500.7      106.41
18:03:30      18.5      500.5      106.41
18:03:40      18.7      499.8      106.41
18:03:50      18.8      498.4      106.41
18:04:00      19.0      496.5      105.95
18:04:10      19.2      495.8      105.95
18:04:20      19.3      494.6      105.95
18:04:30      19.5      491.5      105.95
18:04:40      19.7      488.9      105.95
18:04:50      19.8      487.3      105.95
18:05:00      20.0      484.7      105.49
18:05:10      20.2      482.7      105.49
18:05:20      20.3      430.5      105.49
18:05:30      20.5      478.3      105.49
18:05:40      20.7      477.4      105.49
18:05:50      20.8      475.5      105.49
18:06:00      21.0      472.8      105.06
18:06:10      21.2      470.7      105.06
18:06:20      21.3      469.9      105.06
18:06:30      21.5      469.6      105.06
18:06:40      21.7      468.5      105.06
18:06:50      21.8      466.6      105.06
```

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18:07:20     22.3    464.3    104.65
18:07:30     22.5    463.7    104.65
18:07:40     22.7    462.2    104.65
18:08:00     23.0    461.7    104.28



18:08:30     23.5    462.1    104.28
18:09:00     24.0    461.3    103.94
18:09:30     24.5    462.0    103.94
18:10:00     25.0    464.5    103.61
18:10:30     25.5    466.5    103.61
18:11:00     26.0    468.0    103.31
18:11:30     26.5    469.6    103.31
18:12:00     27.0    472.3    103.00
18:12:30     27.5    475.5    103.00
18:13:00     28.0    474.5    102.70
18:13:30     28.5    472.3    102.70
18:14:00     29.0    467.6    102.41
18:14:30     29.5    464.5    102.41
18:15:00     30.0    457.9    102.13
18:15:30     30.5    454.4    102.13
18:16:00     31.0    451.3    101.86
18:16:30     31.5    448.4    101.86
18:17:00     32.0    446.4    101.60
18:17:30     32.5    447.5    101.60
18:18:00     33.0    450.7    101.36
18:18:30     33.5    453.3    101.36
18:19:00     34.0    454.9    101.13
18:19:30     34.5    458.4    101.13
18:20:00     35.0    461.6    100.90
18:20:30     35.5    479.8    100.90
18:21:00     36.0    477.5    100.67
18:21:30     36.5    476.6    100.67
18:22:00     37.0    475.7    100.43
18:22:30     37.5    473.1    100.43
18:23:00     38.0    471.3    100.19
18:23:30     38.5    469.7    100.19
18:24:00     39.0    467.2     99.97
18:24:30     39.5    463.2     99.97
18:25:00     40.0    455.3     99.77
18:25:30     40.5    451.5     99.77
18:26:00     41.0    446.7     99.57
18:26:30     41.5    442.3     99.57
18:27:00     42.0    437.4     99.39
```

```
 18:29:00      44.0     425.0     99.08
 18:29:30      44.5     423.5     99.08
 18:30:00      45.0     421.9     98.94
 18:30:30      45.5     420.5     98.94
 18:31:00      46.0     419.9     98.80
 18:31:30      46.5     419.5     98.80
 18:32:00      47.0     419.7     98.67
 18:32:30      47.5     418.6     98.67
 18:33:00      48.0     416.9     98.53
 18:33:30      48.5     415.5     98.53
 18:34:00      49.0     415.5     98.40
 18:34:30      49.5     414.6     98.40
 18:35:00      50.0     414.0     98.28
 18:35:30      50.5     413.4     98.28
 18:36:00      51.0     411.8     98.15
 18:36:30      51.5     411.9     98.15
 18:37:00      52.0     412.3     98.03
 18:37:30      52.5     412.5     98.03
 18:38:00      53.0     411.7     97.91
 18:38:30      53.5     412.1     97.91
 18:39:00      54.0     410.9     97.79
 18:39:30      54.5     409.9     97.79
 18:40:00      55.0     408.8     97.66
 18:40:30      55.5     409.0     97.66
 18:41:00      56.0     409.2     97.53
 18:41:30      56.5     409.1     97.53
 18:42:00      57.0     407.1     97.40
 18:42:30      57.5     406.6     97.40
 18:43:00      58.0     404.9     97.27
 18:43:30      58.5     403.2     97.27
 18:44:00      59.0     403.0     97.15
 18:44:30      59.5     402.6     97.15
 18:45:00      60.0     406.3     97.04
 18:45:30      60.5     408.4     97.04
 18:46:00      61.0     415.6     96.92
 18:46:30      61.5     421.9     96.92
 18:47:00      62.0     427.2     96.80
 18:47:30      62.5     431.7     96.80
 18:48:00      63.0     431.4     96.66
 18:48:30      63.5     433.5     96.66
 18:49:00      64.0     430.2     96.50
 18:50:00      65.0     422.5     96.33
 18:51:00      66.0     418.1     96.18
```

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18:55:30     70.5    389.9     79.57
18:55:40     70.7    391.2     79.57
18:55:50     70.8    391.7     79.57



18:56:00     71.0    398.3     95.43
18:56:10     71.2    398.2     95.43
18:56:20     71.3    398.3     95.43
18:56:30     71.5    398.6     95.43
18:56:40     71.7    398.8     95.43



18:56:50     71.8    398.8     95.43
18:57:00     72.0    398.5     95.34
18:57:10     72.2    398.7     95.34
18:57:20     72.3    399.4     95.34
18:57:30     72.5    399.4     95.34
18:57:40     72.7    399.3     95.34
18:57:50     72.8    399.4     95.34
18:58:01     73.0    399.2     95.28
18:58:10     73.2    399.3     95.28
18:58:20     73.3    399.3     95.28
18:58:30     73.5    399.3     95.28
18:58:40     73.7    399.0     95.28
18:58:50     73.8    399.1     95.28
18:59:00     74.0    399.0     95.23
18:59:10     74.2    399.4     95.23
18:59:20     74.3    400.2     95.23
18:59:30     74.5    400.7     95.23
18:59:40     74.7    400.8     95.23
18:59:50     74.8    400.8     95.23
19:00:00     75.0    400.6     95.17
19:00:10     75.2    401.7     95.17
19:00:20     75.3    402.0     95.17
19:00:30     75.5    402.3     95.17
19:00:40     75.7    402.4     95.17
19:00:50     75.8    402.6     95.17
19:01:00     76.0    402.9     95.11
```

```
19:01:10     76.2     403.4     95.11
19:01:20     76.3     403.5     95.11
19:01:30     76.5     403.6     95.11
19:01:40     76.7     403.9     95.11
19:01:50     76.8     404.5     95.11
19:02:00     77.0     406.4     95.03
19:02:10     77.2     407.4     95.03
19:02:20     77.3     407.9     95.03
19:02:30     77.5     408.3     95.03
19:02:40     77.7     408.2     95.03
19:02:50     77.8     408.3     95.03
19:03:00     78.0     409.7     94.95
19:04:00     79.0     411.7     94.86
19:05:00     80.0     411.8     94.77



19:06:00     81.0     410.0     94.67
19:07:00     82.0     408.4     94.59
19:08:00     83.0     406.3     94.51
19:09:00     84.0    -904.6     58.06
19:10:00     85.0     381.5     30.76
19:11:38     86.6     380.3     30.76
19:12:00     87.0     397.1     94.18
19:17:52   1532.9     399.2     93.90
19:18:00   1533.0     399.3     93.76
19:19:00   1534.0     398.1     93.71
19:20:00   1535.0     400.7     93.67
19:21:00   1536.0     403.6     93.63
19:22:00   1537.0     409.1     93.58
19:23:00   1538.0     409.9     93.52
19:24:00   1539.0     410.6     93.46
19:25:00   1540.0     412.0     93.40
19:26:00   1541.0     412.3     93.35
19:27:00   1542.0     412.2     93.29
19:28:00   1543.0     411.5     93.24
19:29:00   1544.0     410.6     93.18
19:30:00   1545.0     408.7     93.13
19:31:00   1546.0     407.2     93.07
19:32:00   1547.0     406.0     93.03
19:33:00   1548.0     405.4     92.98
19:34:00   1549.0     404.6     92.94
19:35:00   1550.0     404.8     92.90
19:36:00   1551.0     405.4     92.87
```

19:42:00	1557.0	404.8	92.67
19:43:00	1558.0	404.9	92.63
19:44:00	1559.0	406.1	92.58
19:45:00	1560.0	410.4	92.54
19:46:00	1561.0	412.8	92.49
19:47:00	1562.0	413.2	92.45
19:48:00	1563.0	412.8	92.41
19:49:00	1564.0	413.1	92.38
19:50:00	1565.0	412.2	92.36
19:51:00	1566.0	410.1	92.34
19:52:00	1567.0	408.7	92.33
19:53:00	1568.0	408.1	92.32
19:54:00	1569.0	407.7	92.31
19:55:00	1570.0	408.7	92.29
19:56:00	1571.0	409.3	92.28
19:57:00	1572.0	407.6	92.25
19:58:00	1573.0	406.2	92.22
19:59:00	1574.0	404.5	92.20
20:00:00	1575.0	403.9	92.17
20:01:00	1576.0	402.8	92.16
20:02:00	1577.0	402.4	92.14
20:03:00	1578.0	401.5	92.13
20:04:00	1579.0	$$$$$$$	92.10
20:05:00	1580.0	$$$$$$$	91.97
20:06:00	1581.0	265.9	91.79
20:07:00	1582.0	266.2	91.53
20:08:00	1583.0	262.5	91.23
20:09:00	1584.0	263.2	90.95
20:11:59	1587.0	265.4	90.95
20:12:19	1587.3	255.8	64.80
20:13:03	1588.1	255.8	64.80
20:14:39	1589.7	247.0	64.80
20:15:52	1590.9	269.6	88.77
20:16:37	1591.6	263.9	88.61
20:17:00	1592.0	262.0	88.49
20:18:00	1593.0	257.0	88.33
20:19:00	1594.0	261.6	88.19
20:20:00	1595.0	261.3	88.04
20:21:00	1596.0	262.2	87.89
20:22:00	1597.0	256.5	87.73
20:23:00	1598.0	256.2	87.57
20:24:00	1599.0	256.2	87.40

```
20:27:00   1602.0   251.8   86.90
20:28:00   1603.0   252.2   86.73
20:29:00   1604.0   253.3   86.56
20:30:00   1605.0   244.0   86.41
20:31:00   1606.0   234.1   86.27
20:32:00   1607.0   229.9   86.14
20:33:00   1608.0   228.2   86.03
20:34:00   1609.0   227.5   85.94
20:35:00   1610.0   225.9   85.84
20:36:00   1611.0   223.8   85.75
20:37:00   1612.0   222.3   85.66
20:38:00   1613.0   222.0   85.55
20:39:00   1614.0   221.4   85.43
20:40:00   1615.0   221.7   85.31



20:41:00   1616.0   220.6   85.18
20:42:00   1617.0   219.4   85.06
20:43:00   1618.0   217.9   84.93
20:44:00   1619.0   217.6   84.81
20:45:00   1620.0   224.9   84.69
20:46:00   1621.0   231.3   84.57
20:47:00   1622.0   229.9   84.44
20:48:00   1623.0   227.9   84.31
20:49:00   1624.0   226.0   84.18
20:50:00   1625.0   223.8   84.07
20:52:00   1627.0   221.1   83.92
20:56:00   1631.0   210.5   83.68
21:00:00   1635.0   199.7   63.29
21:04:00   1639.0   199.7   63.29
21:08:00   1643.0   199.7   63.29
21:12:00   1647.0   199.7   63.29
21:54:22   1689.4   188.0   63.29
21:56:00   1691.0   193.6   80.96
22:00:00   1695.0   196.4   81.03
22:04:00   1699.0   192.4   80.99
22:08:00   1703.0   191.2   80.94
22:12:00   1707.0   192.3   80.90
22:16:00   1711.0   194.7   80.87
22:20:00   1715.0   198.4   80.82
22:24:00   1719.0   199.5   80.81
22:28:00   1723.0   193.8   80.75
22:32:00   1727.0   197.4   80.67
22:36:00   1731.0   201.9   80.61
```

```
22:56:00   1751.0    198.0     80.41
23:00:00   1755.0    195.6     80.31
23:04:00   1759.0    192.9     80.30
23:08:00   1763.0    194.7     80.29
23:12:00   1767.0    192.5     80.24
23:16:00   1771.0    192.3     80.17
23:20:00   1775.0    192.1     80.14
23:24:00   1779.0    194.1     80.12
23:28:00   1783.0    194.5     80.13
23:32:00   1787.0    190.9     80.11
23:36:00   1791.0    191.7     80.14
23:40:00   1795.0    194.7     80.21
23:44:00   1799.0    196.0     80.15




23:43:00   1803.0    192.7     80.14
23:52:00   1807.0    190.2     80.17
23:56:00   1811.0    189.7     80.16
00:00:00    375.0    189.7     80.14
00:04:00   1819.0    187.0     80.11
00:08:00   1823.0    185.8     80.10
00:12:00   1827.0    187.4     80.09
00:16:00   1831.0    188.3     80.07
00:20:00   1835.0    188.1     80.05
00:24:00   1839.0    170.5      9.19
00:24:28   1839.5    171.2      9.19
00:24:30   1839.5    171.4      9.19
00:24:40   1839.7    171.5      9.19
00:24:50   1839.3    171.4      9.19
00:25:00   1840.0    192.1     80.05
00:25:10   1840.2    191.9     80.05
00:25:20   1840.3    191.9     80.05
00:25:30   1840.5    191.8     80.05
00:25:40   1840.7    191.6     80.05
00:25:50   1840.8    191.2     80.05
00:26:00   1841.0    185.6     62.89
00:26:10   1841.2    185.6     62.89
00:26:20   1841.3    186.3     62.89
00:26:30   1841.5    186.3     62.89
00:26:40   1841.7    186.4     62.89
00:26:50   1841.8    186.2     62.89
00:27:00   1842.0    191.9     80.04
00:27:10   1842.2    192.0     80.04
00:27:20   1842.3    191.8     80.04
```

```
00:32:00   1847.0   185.5   80.01
00:36:00   1851.0   172.8   38.42
00:40:00   1855.0   184.7   79.86
00:44:00   1859.0   193.8   79.86
00:48:00   1863.0   187.6   79.84
00:52:00   1867.0   187.8   79.80
00:56:00   1871.0   187.4   79.78
01:00:00   1875.0   191.5   79.74
01:04:00   1879.0   189.7   79.73
01:08:00   1883.0   190.1   79.75
01:12:00   1887.0   191.1   79.78
01:16:00   1891.0   190.2   79.77
01:20:00   1895.0   192.0   79.70




01:24:00   1899.0   190.6   79.66
01:28:00   1903.0   195.5   79.66
01:32:00   1907.0   191.9   79.64
01:36:00   1911.0   189.4   79.66
01:40:00   1915.0   189.5   79.69
01:44:00   1919.0   188.8   79.70
01:48:00   1923.0   189.6   79.72
01:52:00   1927.0   189.8   79.74
01:56:00   1931.0   188.8   79.76
02:00:00   1935.0   188.3   79.80
02:04:00   1939.0   188.8   79.82
02:08:00   1943.0   189.8   79.82
02:12:00   1947.0   189.5   79.81
02:16:00   1951.0   189.2   79.81
02:20:00   1955.0   189.4   79.81
02:24:00   1959.0   192.0   79.82
02:28:00   1963.0   193.1   79.84
02:32:00   1967.0   192.3   79.86
02:36:00   1971.0   195.8   79.90
02:40:00   1975.0   188.9   79.93
02:44:00   1979.0   190.5   79.98
02:48:00   1983.0   189.2   80.07
02:52:00   1987.0   194.4   80.15
02:56:00   1991.0   190.2   80.21
03:00:00   1995.0   188.4   80.22
03:04:00   1999.0   189.2   80.26
03:08:00   2003.0   188.5   80.30
03:12:00   2007.0   187.5   80.33
03:16:00   2011.0   186.2   80.34
```

```
03:28:00  2023.0  191.0  80.29
03:32:00  2027.0  188.8  80.28
03:36:00  2031.0  190.1  80.30
03:40:00  2035.0  188.3  80.26
03:44:00  2039.0  188.7  80.19
03:48:00  2043.0  191.2  80.13
03:51:20  2046.3  187.7  80.05
03:51:30  2046.5  187.3  80.05
03:51:40  2046.7  187.2  80.05
03:51:50  2046.8  186.9  80.05
03:52:00  2047.0  186.9  80.05
03:52:10  2047.2  186.7  80.05
03:52:20  2047.3  186.4  80.05
03:52:30  2047.5  186.5  80.05



03:52:40  2047.7  186.2  80.05
03:52:50  2047.8  185.2  80.05
03:53:00  2048.0  184.2  79.97
03:53:10  2048.2  183.0  79.97
03:53:20  2048.3  182.2  79.97
03:53:30  2048.5  181.5  79.97
03:53:40  2048.7  181.6  79.97
03:53:50  2048.8  180.8  79.97
03:54:00  2049.0  180.6  79.97
03:54:10  2049.2  180.4  79.97
03:54:20  2049.3  179.9  79.97
03:54:30  2049.5  179.7  79.97
03:54:40  2049.7  179.9  79.97
03:54:50  2049.8  179.7  79.97
03:55:00  2050.0  179.5  79.97
03:55:10  2050.2  179.4  79.97
03:55:20  2050.3  179.4  79.97
03:55:30  2050.5  179.2  79.97
03:55:40  2050.7  179.2  79.97
03:55:50  2050.8  179.2  79.97
03:56:00  2051.0  179.2  79.97
03:56:10  2051.2  179.2  79.97
03:56:20  2051.3  178.9  79.97
03:56:30  2051.5  179.4  79.97
03:56:40  2051.7  178.9  79.97
03:56:50  2051.8  178.0  79.97
03:57:00  2052.0  177.7  79.86
03:57:10  2052.2  177.5  79.86
```

```
03:57:50   2052.8    177.1    79.86
03:58:00   2053.0    177.0    79.86
03:58:10   2053.2    177.0    79.86
03:58:20   2053.3    176.8    79.86
03:58:30   2053.5    176.8    79.86
03:58:40   2053.7    176.8    79.86
03:58:50   2053.8    176.7    79.86
03:59:00   2054.0    176.7    79.86
03:59:10   2054.2    177.0    79.86
03:59:20   2054.3    176.9    79.86
03:59:30   2054.5    176.6    79.86
03:59:40   2054.7    176.7    79.86
03:59:50   2054.8    176.6    79.86
04:00:00   2055.0    176.6    79.86



04:00:10   2055.2    176.4    79.86
04:00:20   2055.3    176.5    79.86
04:00:30   2055.5    176.5    79.86
04:00:40   2055.7    176.5    79.86
04:00:50   2055.8    176.4    79.86
04:01:00   2056.0    176.4    79.73
04:01:10   2056.2    176.3    79.73
04:01:20   2056.3    176.2    79.73
04:01:30   2056.5    176.7    79.73
04:01:40   2056.7    376.2    79.73                    2nd Shut in
04:01:50   2056.8    738.0    79.73
04:02:00   2057.0    976.7    79.71
04:02:10   2057.2   1062.8    79.71
04:02:20   2057.3   1074.9    79.71
04:02:30   2057.5   1076.5    79.71
04:02:40   2057.7   1077.2    79.71
04:02:50   2057.8   1077.6    79.71
04:03:00   2058.0   1077.9    79.65
04:03:11   2058.2   1078.1    79.65
04:03:21   2058.4   1078.3    79.65
04:03:39   2058.7   1078.5    79.65
04:03:42   2058.7   1078.6    79.65
04:03:51   2058.9   1078.6    79.65
04:04:04   2059.1   1078.7    79.50
04:04:10   2059.2   1078.7    79.50
04:04:20   2059.3   1078.8    79.50
04:04:30   2059.5   1078.8    79.50
04:04:40   2059.7   1078.9    79.50
```

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04:05:20   2060.3   1078.9    79.37
04:05:30   2060.5   1078.9    79.37
04:05:40   2060.7   1078.9    79.37
04:05:50   2060.8   1078.9    79.37
04:06:00   2061.0   1078.9    79.27
04:06:10   2061.2   1078.9    79.27
04:06:20   2061.3   1078.9    79.27
04:06:30   2061.5   1078.9    79.27
04:06:40   2061.7   1079.0    79.27
04:06:50   2061.8   1079.0    79.27




04:07:00   2062.0   1078.9    79.21
04:07:10   2062.2   1078.9    79.21
04:07:20   2062.3   1078.9    79.21
04:07:30   2062.5   1079.0    79.21




04:07:40   2062.7   1078.9    79.21
04:07:50   2062.8   1079.0    79.21
04:08:00   2063.0   1079.0    79.21
04:08:10   2063.2   1079.0    79.21
04:08:20   2063.3   1079.0    79.21
04:08:30   2063.5   1079.0    79.21
04:08:40   2063.7   1079.0    79.21
04:08:50   2063.8   1079.0    79.21
04:09:00   2064.0   1079.0    79.23
04:09:10   2064.2   1079.0    79.23
04:09:20   2064.3   1079.0    79.23
04:09:30   2064.5   1079.0    79.23
04:09:40   2064.7   1079.0    79.23
04:09:50   2064.8   1079.0    79.23
04:10:00   2065.0   1079.0    79.29
04:10:10   2065.2   1079.0    79.29
04:10:20   2065.3   1079.0    79.29
04:10:30   2065.5   1079.0    79.29
04:10:40   2065.7   1079.0    79.29
04:10:50   2065.8   1079.0    79.29
04:11:00   2066.0   1079.0    79.37
```

```
04:11:40   2066.7   1079.0   79.37
04:11:50   2066.8   1079.0   79.37
04:12:00   2067.0   1079.1   79.48
04:12:10   2067.2   1079.0   79.48
04:12:20   2067.3   1079.1   79.48
04:12:30   2067.5   1079.1   79.48
04:12:40   2067.7   1079.0   79.48
04:12:50   2067.8   1079.0   79.48
04:13:00   2068.0   1079.1   79.60
04:13:10   2068.2   1079.1   79.60
04:13:20   2068.3   1079.1   79.60
04:13:30   2068.5   1079.1   79.60
04:13:40   2068.7   1079.1   79.60
04:13:50   2068.8   1079.1   79.60
04:14:00   2069.0   1079.1   79.73
04:14:10   2069.2   1079.1   79.73
04:14:20   2069.3   1079.1   79.73
04:14:30   2069.5   1079.1   79.73
04:14:40   2069.7   1079.1   79.73
04:14:50   2069.8   1079.1   79.73
04:15:00   2070.0   1079.1   79.87



04:15:10   2070.2   1079.1   79.87
04:15:20   2070.3   1079.1   79.87
04:15:30   2070.5   1079.1   79.87
04:15:40   2070.7   1079.1   79.87
04:15:50   2070.8   1079.1   79.87
04:16:00   2071.0   1079.1   80.03
04:18:00   2073.0   1079.2   80.35
04:20:00   2075.0   1079.2   80.69
04:22:00   2077.0   1079.3   81.04
04:24:00   2079.0   1079.2   81.41
04:26:00   2081.0   1079.3   81.77
04:23:00   2083.0   1079.3   82.14
04:28:10   2083.2   1079.2   82.14
04:28:20   2083.3   1079.3   82.14
04:28:30   2083.5   1079.2   82.14
04:28:40   2083.7   1079.2   82.14
04:28:50   2083.8   1079.2   82.14
04:29:00   2084.0   1079.3   82.32
04:29:10   2084.2   1079.3   82.32
04:29:20   2084.3   1079.3   82.32
```

```
04:30:11   2085.2   1079.3      82.50
04:30:21   2085.4   1079.2      82.50
04:30:39   2085.7   1079.2      82.50
04:30:41   2085.7   1079.3      82.50
04:30:51   2085.9   1079.2      82.50
04:31:02   2086.0   1079.3      82.69
04:31:10   2086.2   1079.3      82.69
04:31:20   2086.3   1079.3      82.69
04:31:30   2086.5   1079.3      82.69
04:31:40   2086.7   1079.3      82.69
04:31:50   2086.8   1079.3      82.69
04:32:00   2087.0   1079.3      82.86
04:32:10   2087.2   1079.3      82.86
04:32:20   2087.3   1079.3      82.86
04:32:30   2087.5   1079.3      82.86
04:32:40   2087.7   1079.3      82.86
04:32:50   2087.8   1079.2      82.86
04:33:00   2088.0   1079.3      83.04
04:33:10   2088.2   1079.3      83.04
04:33:20   2088.3   1079.3      83.04
04:33:30   2088.5   1079.3      83.04
```

```
04:33:40   2088.7   1079.3      83.04
04:33:50   2088.8   1079.2      83.04
04:34:00   2089.0   1079.3      83.22
04:34:10   2089.2    420.7      83.22
04:34:20   2089.3   1079.3      83.22
04:34:30   2089.5   1079.3      83.22
04:34:40   2089.7   1079.3      83.22
04:34:50   2089.8   1079.3      83.22
04:35:00   2090.0   1079.3      83.40
04:35:10   2090.2   1079.3      83.40
04:35:20   2090.3   1079.3      83.40
04:35:30   2090.5   1079.3      83.40
04:35:40   2090.7   1079.3      83.40
04:35:50   2090.8   1079.3      83.40
04:40:00   2095.0   1079.3      84.27
04:45:00   2100.0   1079.4      85.10
04:50:00   2105.0   1079.4      85.90
04:55:00   2110.0   1079.3      86.65
05:00:00   2115.0   1079.3      87.37
05:05:00   2120.0   1079.4      88.05
```

```
05:14:40   2129.7   1079.4      89.18
05:14:50   2129.8   1079.3      89.18
05:15:00   2130.0   1079.3      89.30
05:15:10   2130.2   1079.4      89.30
05:15:20   2130.3   1079.4      89.30
05:15:30   2130.5   1079.4      89.30
05:15:40   2130.7   1079.4      89.30
05:15:50   2130.8   1079.3      89.30
05:16:00   2131.0   1079.4      89.41
05:16:10   2131.2   1079.3      89.41
05:16:20   2131.3   1079.3      89.41
05:16:30   2131.5   1079.3      89.41
05:16:40   2131.7   1079.3      89.41
05:16:50   2131.8   1079.3      89.41
05:17:00   2132.0   1079.3      89.53
05:17:10   2132.2   1079.4      89.53
05:17:20   2132.3   1079.4      89.53
```

REPORT N° F 81113
JOB N°
INVOICE/SIR.
DATE Dec. 30, 1981

DOWELL
Schlumberger

TECHNICAL REPORT

COMPANY HUDBAY OIL AUSTRALIA WELL BALEEN # 1 FIELD
TEST N° 2 COUNTRY AUSTRALIA

Prepared by the
Reservoir Evaluation Department
of Dowell Schlumberger

Dowell Schlumberger (Western) S.A.

(Incorporated with limited liability in Panama)

Telephone: 451 4319
Cables:
Telex: Orang AA 94215

January 7th, 1982

Dear Sirs,

The enclosed report would reflect a mechanically sound Drill Stem Test during which the tools functioned properly.

Visual inspection of all three charts showed a pressure kick during the Final Shut-In. Formation anomalies are usually not so abrupt in character so that a mechanical response would be suspect. The fact that the pressure surge occurred on all three recorders and at the same time would rule out recorder malfunction. The anomaly noted during the Final Shut-In should be viewed with caution.

The formation exhibited the characteristics of high permeability and damage was calculated. A portion of the damage could be psuedo caused by turbulent flow through the perforations. Well conditions should be reviewed to determine this factor.

Respectfully yours

John F. Viscarde
TECHNICAL DEPARTMENT

8 KINGSCOTE STREET, KEWDALE, W.A. 6105

REPORT Nº F 81113

CONFIRMATION OF REPORT DISTRIBUTION

TO HUDBAY OIL AUSTRALIA

WELL BALEEN 1 FIELD GYPSLAND TEST Nº 2

COUNTRY AUSTRALIA DATE DECEMBER 30, 1981

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.

6 TECHNICAL REPORT (S)

TECHNICAL REPORT (S)

TECHNICAL REPORT (S)

TECHNICAL REPORT (S)

TECHNICAL REPORT (S)

TECHNICAL REPORT (S)

REPORT Nº F 81113

SPECIAL DATA ANALYSIS

HORNER METHOD

RESERVOIR ENGINEERING DATA – GAS TEST

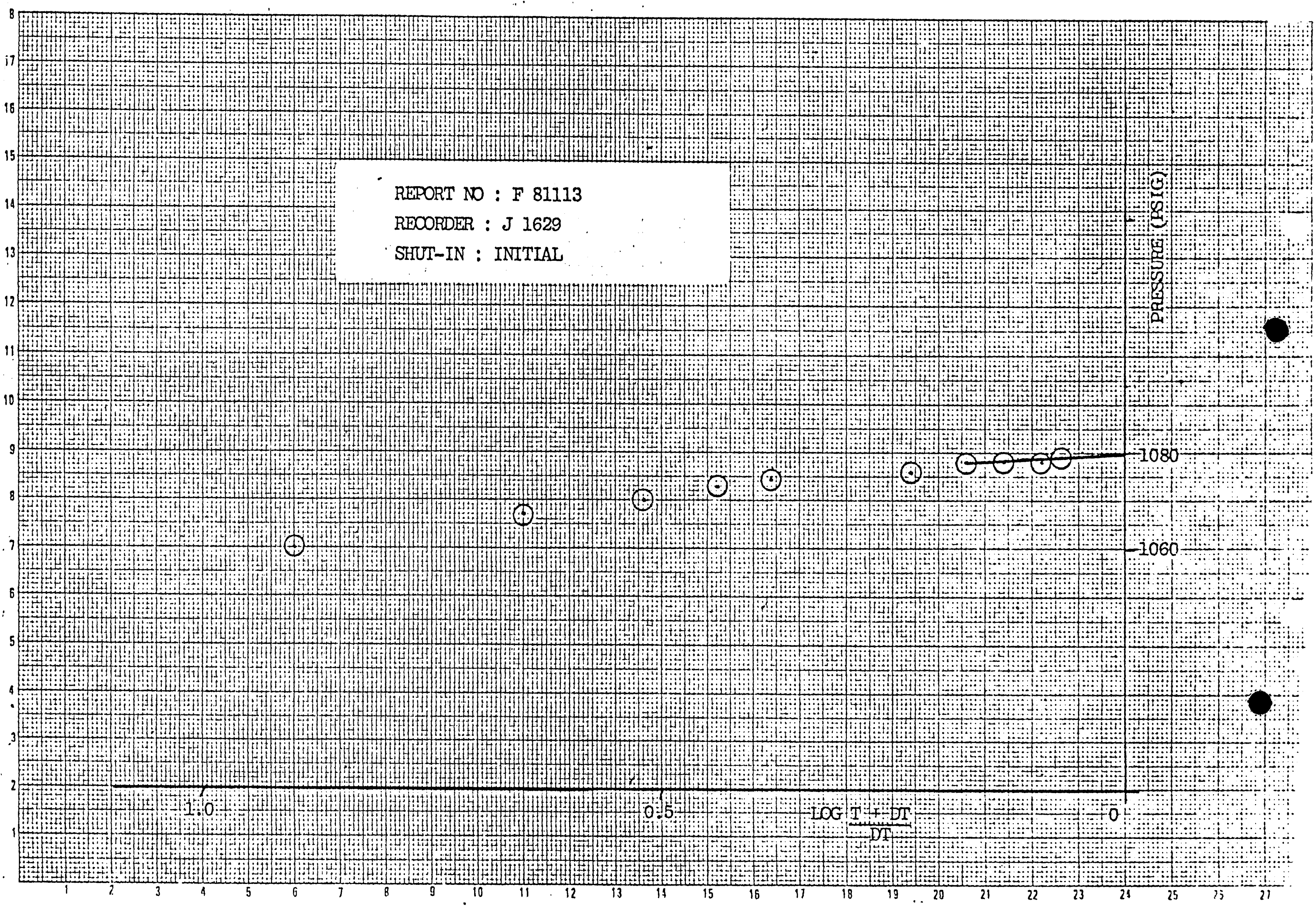
RECORDER N J 1629

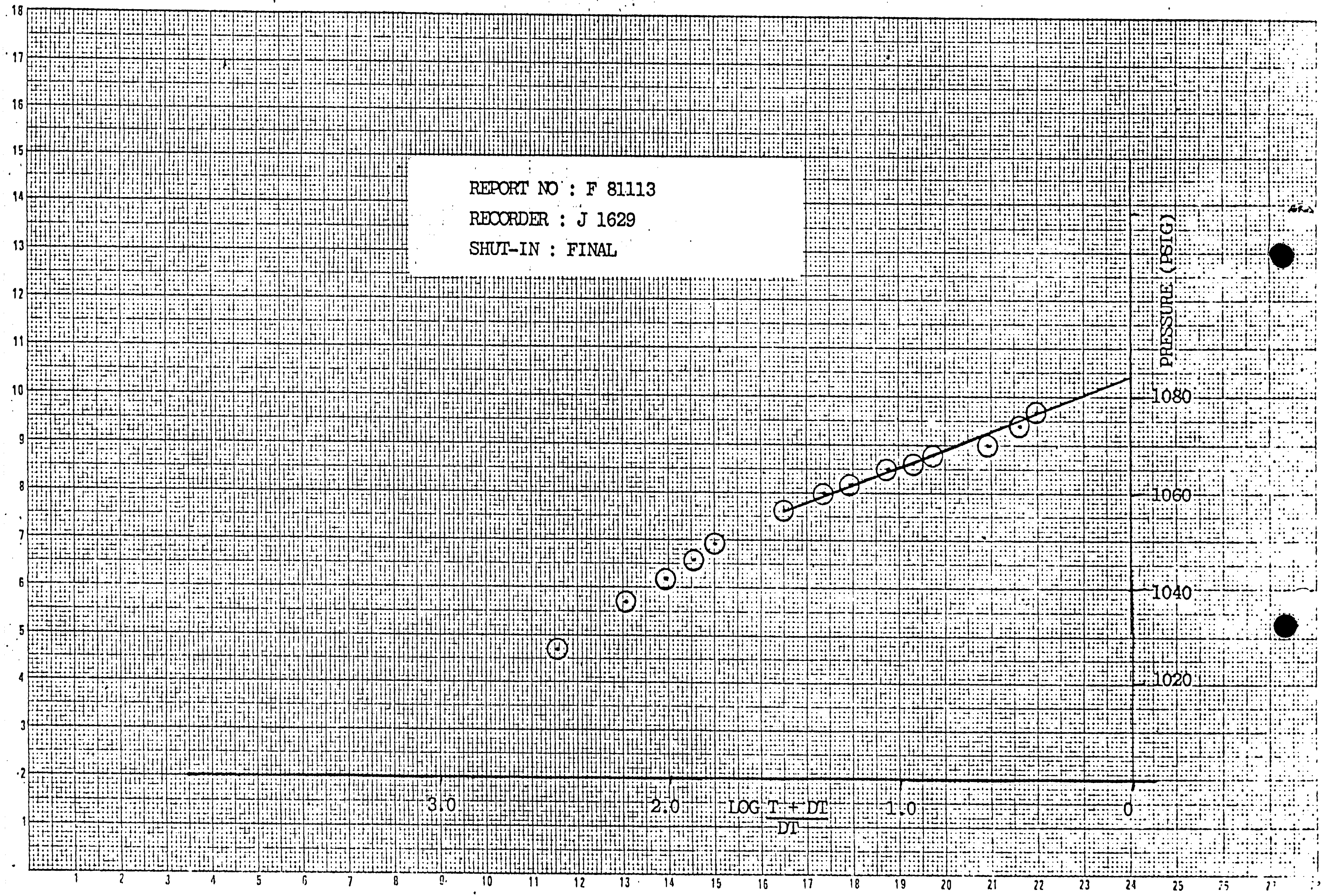
Maximum Reservoir Pressure INITIAL	Po	1080	psig	Flow Rate (gas) 1" CHOKE	Qg	5850	$\frac{\text{MCF}}{\text{day}}$
Damage Ratio	DR	1.8		Flow Rate (equivalent)	Q	13739	$\frac{\text{Bbls}}{\text{day}}$
Transmissibility. (to gas)	$\frac{Kh}{\mu}$	107055	$\frac{\text{Md-ft}}{\text{Cp}}$	Slope of Shut-In Curve FINAL	Mg_1	40831	$\frac{\text{psi}^2}{\text{log cycle}}$
Productive Capacity	Kh	1338	Md-ft	Slope of Shut-In Curve	Mg_2		$\frac{\text{psi}^2}{\text{log cycle}}$
Permeability (to gas)	K	55.8	Md	Gas Specific Gravity		0.6	
Radius of Investigation	ri	465	ft.	Oil Gravity		–	°API
Pressure Gradient		0.55	$\frac{\text{psi}}{\text{ft.}}$	ΔP skin		–	psi

These calculations were based on the following data, either supplied from the well, or obtained from the current technical literature.

Net Productive Interval	h	24	ft	Gas Deviation Factor	Z	0.85	
Porosity	Ø	10	%	Gas viscosity at reservoir conditions.	μ_g	0.0125	cps
Test Temperature	Tr	537	°R	Gas Compressibility	C	1.1×10^{-3}	
Well Bore Radius	rw	3.5	in.	Total Flow Time	T	307	mins.

REPORT NO : F 81113
RECORDER : J 1629
SHUT-IN : INITIAL





REPORT NO : F 81113

RECORDER : J 1629

SHUT-IN : FINAL

REPORT Nº F 81113

RECORDER Nº : J 1782 CAPACITY : 4700 PSI DEPTH : 2000.16 FT

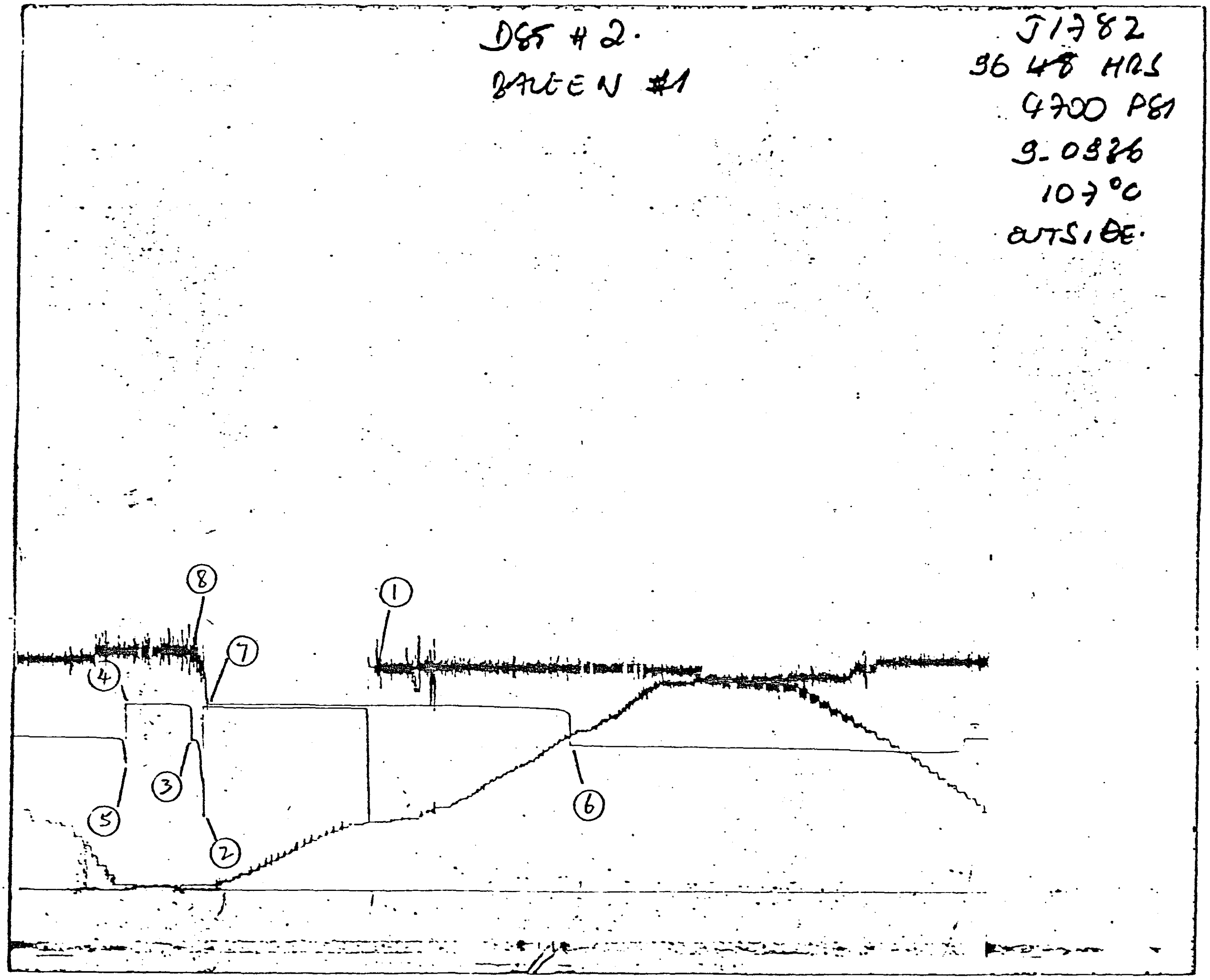
OPENING : OUTSIDE TEMPERATURES : 78 DEG F

CLOCK Nº : 9-0936 CAP: 96 HRS CLOCK TRAVEL : 0.01046 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 Nº F 81113

PRESSURE DATA FOR RECORDER : J 1782

DESCRIPTION	LABEL POINT	PRESSURE (PSI)	TIME GIVEN	TIME COMPUTED
INITIAL HYDROSTATIC	1	1248		
INITIAL FLOW (1)	2	429		
INITIAL FLOW (2)	3	869	6	7
INITIAL SHUT-IN	4	1068	39	38
SECOND FLOW (1)				
SECOND FLOW (2)				
SECOND SHUT-IN				
THIRD FLOW (1)				
THIRD FLOW (2)				
THIRD SHUT-IN				
FINAL FLOW (1)	5	738	0	0
FINAL FLOW (2)	6	841	300	301
FINAL SHUT-IN	7	1068	205	204
FINAL HYDROSTATIC	8	1370		

REMARK :

REPORT Nº F 81113

RECORDER Nº : J 1630 CAPACITY : 2800 PSI DEPTH : 1994.67 FT

OPENING : OUTSIDE TEMPERATURES : 78 DEG F

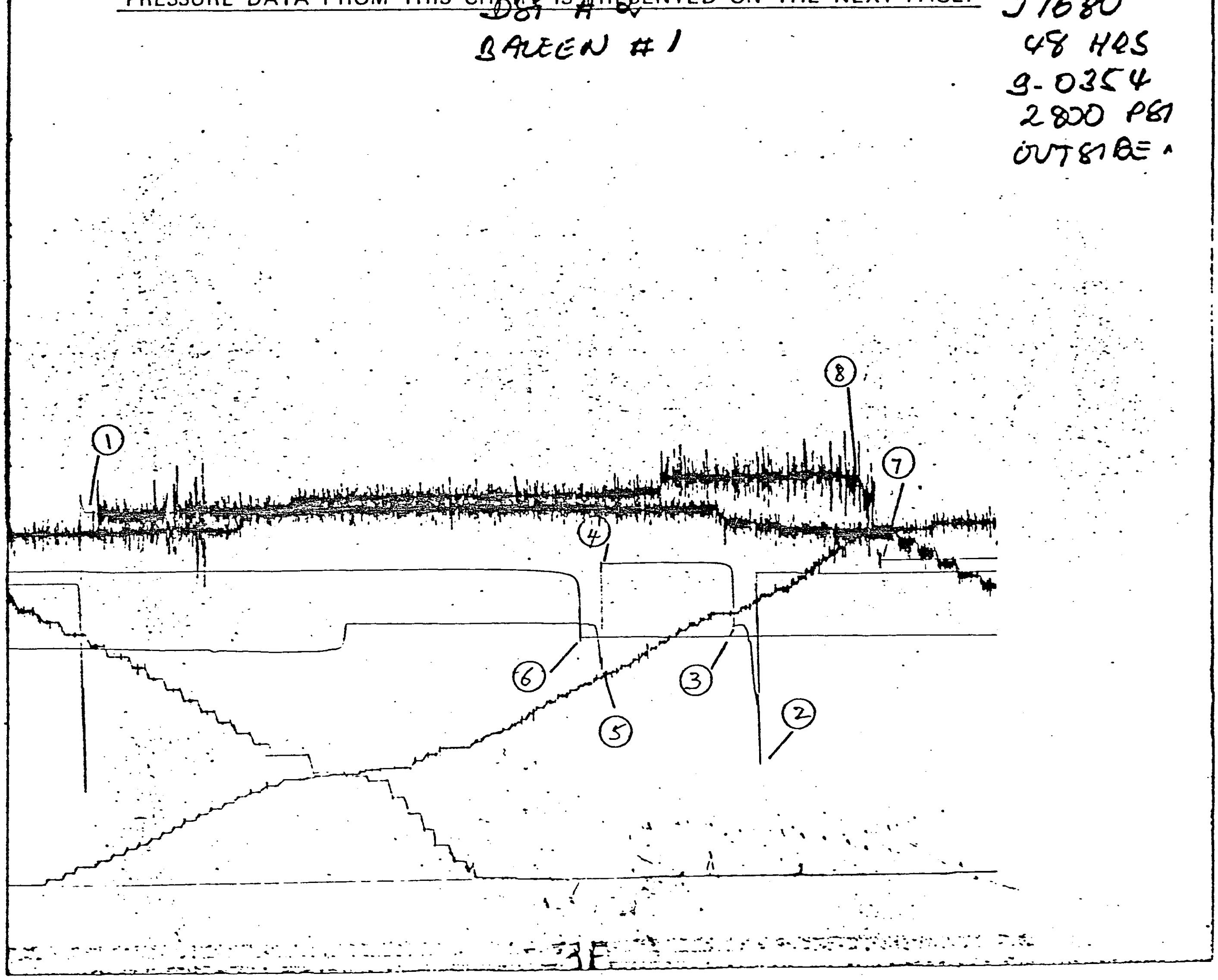
CLOCK Nº : 9-0354 CAP: 48 HRS CLOCK TRAVEL : 0.019684 in/min

CALIBRATION DATA AT M = 570.51964

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	1297		
INITIAL FLOW (1)	2	393		
INITIAL FLOW (2)	3	871	6	7
INITIAL SHUT-IN	4	1096	39	38
SECOND FLOW (1)				
SECOND FLOW (2)				
SECOND SHUT-IN				
THIRD FLOW (1)				
THIRD FLOW (2)				
THIRD SHUT-IN				
FINAL FLOW (1)	5	728	0	0
FINAL FLOW (2)	6	841	300	300
FINAL SHUT-IN	7	1096	205	205
FINAL HYDROSTATIC	8	1355		

REMARK :

RECORDER Nº : J 1629 CAPACITY : 2800 PSI DEPTH : 1974.92 FT

OPENING : INSIDE TEMPERATURES : 77 DEG F

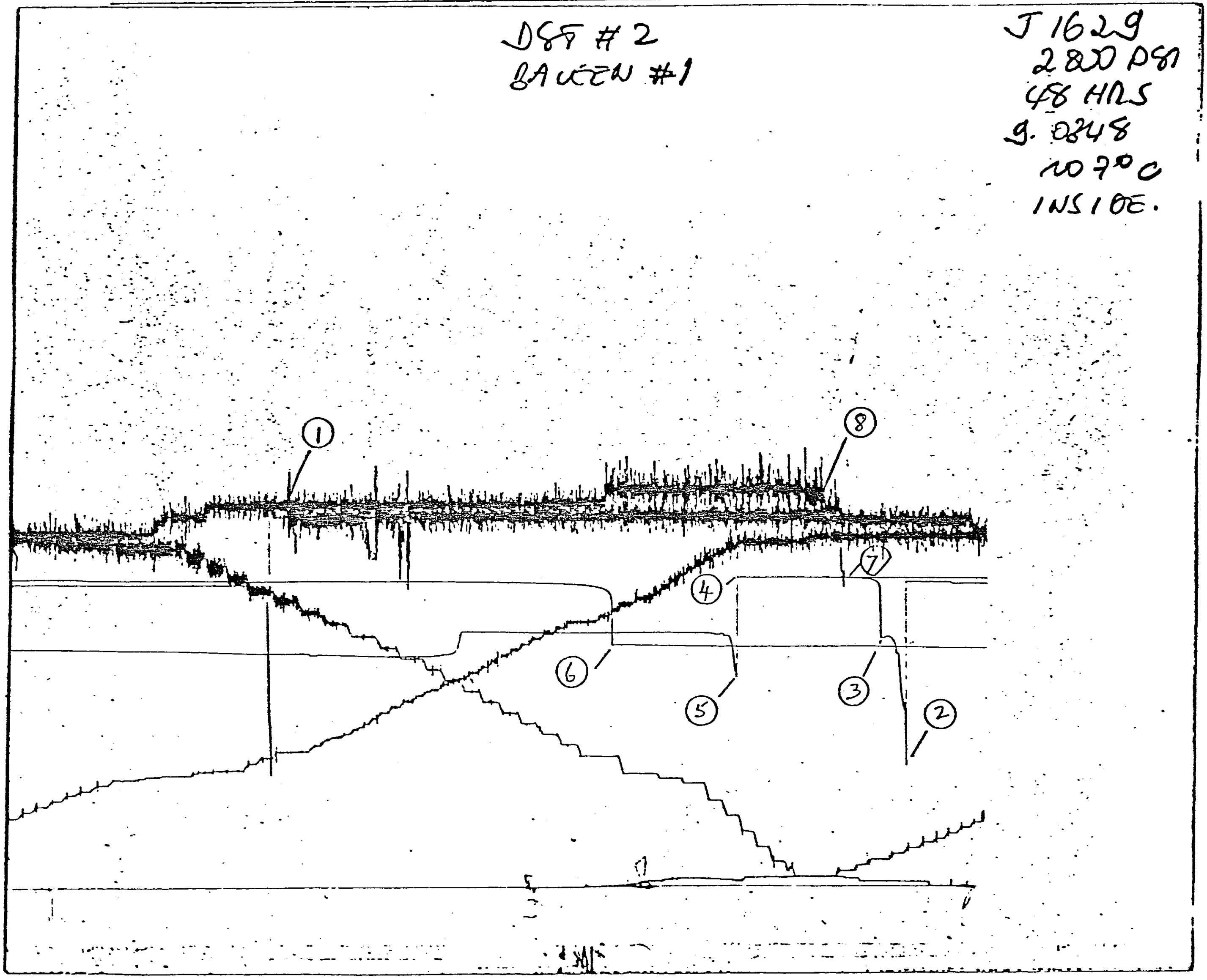
CLOCK Nº : 9-0348 CAP: 48 HRS CLOCK TRAVEL : 0.021705 in/min

CALIBRATION DATA AT M = 559.24843

A = 1.08641

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

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



REPORT Nº F 81113

PRESSURE DATA FOR RECORDER : J 1629

DESCRIPTION	LABEL POINT	PRESSURE (PSI)	TIME GIVEN	TIME COMPUTED
INITIAL HYDROSTATIC	1	1334		
INITIAL FLOW (1)	2	426		
INITIAL FLOW (2)	3	866	6	7
INITIAL SHUT-IN	4	1079	39	39
SECOND FLOW (1)				
SECOND FLOW (2)				
SECOND SHUT-IN				
THIRD FLOW (1)				
THIRD FLOW (2)				
THIRD SHUT-IN				
FINAL FLOW (1)	5	734	0	0
FINAL FLOW (2)	6	847	300	300
FINAL SHUT-IN	7	1077	025	203
FINAL HYDROSTATIC	8	1358		

REMARK :

[redacted]

PRESSURE DATA FOR RECORDER : J 1629

LABEL POINT	ΔT (mins)	PRESSURE (PSI)	$\frac{T + \Delta T}{\Delta T}$	LOG	Pw − Pf (PSI)	COMMENTS
1		1334				INITIAL HYDROSTATIC
2	0	426				INITIAL FLOW (1)
	3	818				
3	7	866				INITIAL FLOW (2)
3	0	866				START SHUT-IN
	1	1060	8.00	0.90	194	T = 7
	2	1067	4.50	0.65	201	
	3	1070	3.33	0.52	204	
	4	1073	2.75	0.44	206	
	5	1074	2.40	0.38	207	
	10	1076	1.70	0.23	210	
	15	1078	1.47	0.17	212	
	20	1078	1.35	0.13	212	
	30	1078	1.23	0.09	212	
4	39	1079	1.18	0.07	213	FINAL SHUT-IN
5	0	734				FINAL FLOW (1)
	20	889				
	40	889				
	60	892				
	80	812				
	100	811				
	150	827				
	200	833				
	250	840				
6	300	847				FINAL FLOW (2)
6	0	847				START SHUT-IN
	1	1027	308.00	2.49	180	T = 307
	2	1037	154.50	2.19	190	
	3	1042	103.33	2.01	195	
	4	1046	77.75	1.89	199	
	5	1049	62.40	1.80	202	
	10	1056	31.70	1.50	209	
	15	1060	21.47	1.33	213	

PRESSURE DATA FOR RECORDER : J 1629

LABEL POINT	ΔT (mins)	PRESSURE (PSI)	$\frac{T + \Delta T}{\Delta T}$	LOG	Pw – Pf (PSI)	COMMENTS
	20	1062	16.35	1.21	215	
	30	1065	11.23	1.05	218	
	40	1066	8.68	0.94	219	
	50	1068	7.14	0.85	221	
	100	1070	4.07	0.61	223	
	150	1074	3.05	0.48	227	
7	203	1077	2.51	0.40	230	FINAL SHUT-IN
8		1358				FINAL HYDROSTATIC

DOWELL Schlumberger

Formation Testing Field Report

Report No. F 81113

WELL IDENTIFICATION

Company : HUDBAY OIL AUSTRALIA Well No : BALEEN 1 Test No. : 2

Field : GYPSLAND Location : BASS STRAIT Country : AUSTRALIA

Tested Interval : From 2017.78 Ft. to 2042.16 Ft. 24.38

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 : LOWER CRETALEOUS Description : SANDSTONE, SHALE, MINOR COAL

Net Productive Interval : 24 ft. Estimated Porosity : POOR %

Total Depth : 2386.4 ft. Depths measured from : RKTB Elevation : 29.35 ft.

Open Hole Size : 8½ in. Rat Hole Size : in., from ft.

Casing Size : 9-5/8 in. 40 lbs/ft. Liner Size : 7 in., 29 lbs/ft. from 1417.27 ft

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

MUD DATA

Mud Type : POLYMER Weight :

Viscosity : 38 Water Loss 7 cc Mud Resistivity at °F

Filtrate Resistivity : at °F ; Chloride ppm :

INSTRUMENT AND CHART DATA

Recorder No.		J 1782	J 1630	J 1629	SPRO
Capacity (psig)		4700	2800	2800	10000
Depth		2000.16	1994.67	1974.92	1933.59
Inside/Outside		OUTSIDE	OUTSIDE	INSIDE	
Above/Below valve					
Clock No.		9-0936	9-0354	9-0348	
Capacity (hrs.)		96 HRS	48 HRS	48 HRS	
Temperature		78 DEG F	78 DEG F	77 DEG F	
Initial Hydrostatic Pressure					
Pre-flow	(1) Start Pressure				
	(2) Finish Pressure	CHARTS TO BE READ AT STATION			
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 : on On Location at : on

Started Operations at 00 : 00 on 26.11.81 Finished Operations at 06 : 00 on 27.11.81

Off Location at : on Return Station at : on Mileage

Comments : COULD NOT OVERRISE PCT / RIG PUMP NOT GOING ABOVE 2000 PSI (COST PRIME). TOOLS WORKED OK.

Station : AUS SIR No. : 61653 - 61654 Date : 27.11.81

Customer Tester CH ROUX Customer

Surface Data

Report No. F 81113

Customer: HUDBAY OIL AUSTRALIA **Well No:** BALEEN 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: 648 M ~~XX~~ Set at:	26.11.81	08	30		
Opened Tool: (Annulus pressure 1016.3 psi)	"	10	00		
STRONG BLOW (MUD)					
		10	02	480	½"
		10	04	797	½"
CLOSE TOOL FOR FIRST SHUT-IN		10	06		
OPEN PCT FOR SECOND FLOW		10	45		
GAS RATE ± 3.8 MMCFD		10	55	630	½"
		12	00	210	1"
CLOSE PCT FOR FINAL SHUT-IN		15	45		
Reverse Circulation Started (Pump pressure 500 psig)		18	40		
Reverse Circulation Finished		19	00		
Pulled Packer Loose/~~Pulled Out of Retainer~~		19	10		
Cushion Type: NONE Amount bbls; Length ft; Pressure psi				Bottom Choke	1"

RECOVERY DATA

	Recovery Description	Feet	Bbls	% Oil	% Water	% Other
1	½ CHOKE 4.03 MMSCFD 646 PSI					
2						
3	1" CHOKE 5.85 MMSCFD 242 PSI					
4						
5						
6						

	Oil-API Gravity	Gas Gravity	G.O.R.	Resistivity	Chlorides
1	° at °F	0.578		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 81113

Customer: HUDBAY OIL AUSTRALIA **Well No.:** BALEEN 1 **Test No.:** 2

SAMPLE CHAMBER RECOVERY DATA

Sampler Drained
On Location ☒
Elsewhere ☐
Name : ________
Address : ________

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 85 psi.

EQUIPMENT SEQUENCE

Components (including D.P. and D.C.)	Type	O.D. (in)	I.D. (in)	Length	Depth
BULL NOSE 3½ FH BOX	JOHNSTON	4¾	2¼	0.20	
RECORDER CARRIER J 1782 3½ FH	J 200	"	1½	1.80	
RECORDER CARRIER J 1630 3½ FH	J 200	"	1½	1.80	
PERF. ANCHORS 3½ FH	JOHNSTON	"	2¼	6.10	
X O 2-7/8 EUE X 3½ FH	"	"	"	0.32	
POSITEST 6-5/8 - 7 7-5/8 29	"	5.83	2.0	0.67	647.43
W / OY PASS	"	5.83	2.0	0.41	
X O 3½ FH X 2-7/8 IF	"	4¾	2¼	0.33	
SAFETY JOINT 3½ FH	BOWEN	4¾	2-7/8	0.60	
TR 63 HYDRAULIC JAR 3½ FH	JOHNSTON	4¾	1½	2.35	
RECORDER CARRIER J 1629 3½ FH	J 200	4¾	1½	1.80	
MFE/HRT ACME BOX X 3½ FH PIN	JOHNSTON	5	1-3/8	2.80	
PCT ACME BOX X 3½ FH PIN	"	4¾	1	4.66	
X O ACME PIN X 3½ FH PIN	"	4¾	2¼		
SPRO BARREL ACME BOX / BOX	"	4¾	2¼		
LIFTING SUB 3½ FH BOX X ACME PIN	"	3½	2¼		
X O 3½ IF BOX X 3½ FH PIN	"	4¾	2¼	2,69	
DRILL COLLAR 3½ IF (X1)	–	4¾	2¼	9,46	
PUMP OUT SUB 3½ IF	JOHNSTON	4¾	2¼	0.36	
DRILL COLLAR 3½ IF (X 2)	–	4¾	2¼	18.30	
PUMP OUT SUB 3½ IF	JOHNSTON	4¾	2¼	0.36	
DRILL COLLAR 3½ IF (X15)	–	4¾	2¼	139.99	
SLIP JOINT 3½ IF	JOHNSTON	4¾	2¼	7.16	
SLIP JOINT 3½ IF	"	4¾	2¼	8.68	
DRILL COLLAR 3½ IF (X3)	–	4¾	2¼	28.31	
X O 3½ PH 6 X 3½ IF	–	4¾	2.6	0.20	
TUBING	–	3½	2.6	359.77	
X O 4½ ACME PIN X 3½ PH 6 PIN	–	4¼	2¼	0.20	
FLUTE HANGER 4½ ACME BOX / BOX	–			0.80	
SLICK JOINT 4½ ACME PIN / PIN		5		1.80	
E2 TREE 4½ ACME BOX / BOX	FLOPETROL			2.44	
SAVER SUB 4½ ACME BOX / PIN				0.26	
SPACER SUB 4½ ACME BOX / PIN				1.52	
X O 4½ IF BOX X 4½ ACME PIN				0.33	
HWDP (2 STANDS) 4½ IF BOX X PIN	PETRONAS	5	4.276	56.71	
X O SUB 6½ ACME PIN X 4½ IF					
FLOW HEAD	FLOPETROL				
STICK UP APPROX. 4.86 M					
SPRO DEPTH APPROX. 630.13 M					
Total Drill Pipe					
Total Drill Collar					

Comments: ________

DOWELL Schlumbe

Formation Evaluation D [illegible]

To be completed by Customer Representative

Report No. F 81113

Customer : HUDBAY OIL AUSTRALIA **Well No. :** BALEEN 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 : ______

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.

```
                    DOWELL SCHLUMBERGER
                    *******************

                      SURFACE
                      PRESSURE
                      READ
                      OUT
                      ********

               COMPANY                   HUDBAY AUSTRALIA

               WELL                      BALEEN #1

               TEST                       #2

               DEPTH                     647mt

               PRESS/TEMP GAUGE          FLOPETROL #81205

               GAUGE CAPACITY            10000 psia

               GAUGE DEPTH               588.7 mt


      TIME      DEL T   PRESSURE  TEMPERATURE   T+DEL T   LOG(T+DEL T)   PRESSURE    COMMENTS
    HR:MN:SE     MIN       PSI     DEGREES F     DEL T      ( DEL T )      DIFF
    --------   -----   --------   ----------   -------   ------------   --------    --------

    09:55:00             1016.4     107.50
    09:55:39             1016.4     107.50
    09:55:40             1016.4     107.50
    09:55:50             1016.4     107.50
    09:56:00             1016.4     107.58
    09:56:10             1016.5     107.58
    09:56:20             1016.4     107.58
    09:56:30             1016.4     107.58
    09:56:40             1016.5     107.58
    09:56:50             1016.4     107.58
    09:57:00             1016.5     107.65
    09:57:10             1016.5     107.65
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09:57:40              1016.5    107.65





09:57:50              1016.5    107.65
09:58:00              1016.5    107.71
09:58:10              1016.5    107.71
09:58:20              1016.5    107.71
09:58:30              1016.5    107.71
09:58:40              1016.5    107.71
09:58:50              1016.5    107.71
09:59:00              1016.5    107.75
09:59:10              1016.8    107.75
09:59:20              1017.1    107.75
09:59:30              1017.4    107.75
09:59:40              1017.4    107.75
09:59:50              1017.4    107.75
10:00:00       0.0     225.6    107.79
10:00:10       0.2     412.6    107.79
10:00:20       0.3     461.8    107.79
10:00:30       0.5     476.8    107.79
10:00:40       0.7     476.3    107.79
10:00:50       0.8     491.9    107.79
10:01:00       1.0     504.9    107.88
10:01:10       1.2     537.5    107.88
10:01:20       1.3     581.1    107.88
10:01:30       1.5     629.9    107.88
10:01:40       1.7     676.8    107.88
10:01:50       1.8     723.0    107.88
10:02:00       2.0     757.5    108.03
10:02:10       2.2     755.3    108.03
10:02:20       2.3     749.7    108.03
10:02:30       2.5     760.7    108.03
10:02:40       2.7     774.9    108.03
10:02:50       2.8     787.5    108.03
10:03:00       3.0     798.6    108.13
10:03:10       3.2     806.0    108.13
10:03:20       3.3     813.4    108.13
10:03:30       3.5     817.9    108.13
10:03:40       3.7     819.8    108.13
10:03:50       3.8     820.0    108.13
10:04:00       4.0     819.6    108.21
10:04:10       4.2     819.5    108.21
10:04:20       4.3     818.0    108.21
10:04:30       4.5     817.4    108.21
10:04:40       4.7     815.8    108.21
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10:05:10	5.2	808.9	108.26			
10:05:20	5.3	805.7	108.26			
10:05:30	5.5	804.6	108.26			
10:05:40	5.7	804.1	108.26			
10:05:50	5.8	802.7	108.26			
10:06:00	6.0	802.2	108.30			
10:06:10	6.2	801.6	108.30			
10:06:20	6.3	800.3	108.30			
10:06:30	6.5	799.6	108.30			
10:06:40	6.7	797.2	108.30			
10:06:50	6.8	998.3	108.30			
10:07:00	0.2	1038.9	108.29	42.000	1.6232	41
10:07:10	0.3	1046.8	108.29	21.500	1.3324	49
10:07:20	0.5	1051.0	108.29	14.667	1.1663	53
10:07:30	0.7	1053.5	108.29	11.250	1.0512	55
10:07:40	0.8	1055.6	108.29	9.200	0.9638	57
10:07:50	1.0	1057.5	108.29	7.833	0.8939	59
10:08:02	1.2	1059.1	108.17	6.694	0.8257	61
10:08:11	1.4	1060.2	108.17	6.062	0.7826	62
10:08:21	1.5	1061.3	108.17	5.505	0.7408	63
10:08:31	1.7	1062.2	108.17	5.059	0.7041	64
10:08:42	1.9	1063.2	108.17	4.661	0.6685	65
10:08:51	2.0	1063.8	108.17	4.388	0.6423	66
10:09:00	2.2	1064.4	107.96	4.154	0.6185	66
10:09:10	2.3	1065.0	107.96	3.929	0.5942	67
10:09:20	2.5	1065.6	107.96	3.733	0.5721	67
10:09:30	2.7	1066.1	107.96	3.563	0.5518	68
10:09:40	2.8	1066.6	107.96	3.412	0.5330	68
10:09:50	3.0	1067.0	107.96	3.278	0.5156	69
10:10:00	3.2	1067.3	107.76	3.158	0.4994	69
10:10:10	3.3	1067.6	107.76	3.050	0.4843	69
10:10:20	3.5	1067.9	107.76	2.952	0.4702	70
10:10:30	3.7	1068.2	107.76	2.864	0.4569	70
10:10:40	3.8	1068.5	107.76	2.783	0.4445	70
10:10:50	4.0	1068.7	107.76	2.708	0.4327	70
10:11:00	4.2	1068.8	107.57	2.640	0.4216	70
10:11:10	4.3	1069.0	107.57	2.577	0.4111	71
10:11:20	4.5	1069.2	107.57	2.519	0.4011	71
10:11:30	4.7	1069.4	107.57	2.464	0.3917	71
10:11:40	4.8	1069.6	107.57	2.414	0.3827	71
10:11:50	5.0	1069.8	107.57	2.367	0.3741	71
			107.43	2.323	0.3660	72

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10:12:40     5.8   1070.4    107.43      2.171      0.3367       72


10:12:50     6.0   1070.5    107.43      2.139      0.3302       72
10:13:00     6.2   1070.5    107.32      2.108      0.3239       72
10:13:10     6.3   1070.7    107.32      2.079      0.3178       72
10:13:20     6.5   1070.8    107.32      2.051      0.3120       73
10:13:30     6.7   1070.9    107.32      2.025      0.3064       73
10:13:40     6.8   1071.0    107.32      2.000      0.3010       73
10:13:50     7.0   1071.0    107.32      1.976      0.2958       73
10:14:00     7.2   1071.1    107.26      1.953      0.2908       73
10:14:10     7.3   1071.2    107.26      1.932      0.2860       73
10:14:20     7.5   1071.3    107.26      1.911      0.2813       73
10:14:30     7.7   1071.3    107.26      1.891      0.2768       73
10:14:40     7.8   1071.4    107.26      1.872      0.2724       73
10:14:50     8.0   1071.5    107.26      1.854      0.2681       73
10:15:00     8.2   1071.5    107.22      1.837      0.2640       73
10:15:10     8.3   1071.6    107.22      1.820      0.2601       73
10:15:20     8.5   1071.6    107.22      1.804      0.2562       73
10:15:30     8.7   1071.7    107.22      1.788      0.2525       73
10:15:40     8.8   1071.7    107.22      1.774      0.2489       73
10:15:50     9.0   1071.8    107.22      1.759      0.2453       74
10:16:00     9.2   1071.8    107.20      1.745      0.2419       74
10:16:10     9.3   1071.9    107.20      1.732      0.2386       74
10:16:20     9.5   1071.9    107.20      1.719      0.2354       74
10:16:30     9.7   1072.0    107.20      1.707      0.2322       74
10:16:40     9.8   1072.0    107.20      1.695      0.2291       74
10:16:50    10.0   1072.0    107.20      1.683      0.2262       74
10:17:00    10.2   1072.1    107.20      1.672      0.2233       74
10:17:10    10.3   1072.2    107.20      1.661      0.2204       74
10:17:20    10.5   1072.2    107.20      1.651      0.2177       74
10:17:30    10.7   1072.2    107.20      1.641      0.2150       74
10:17:40    10.8   1072.3    107.20      1.631      0.2124       74
10:17:50    11.0   1072.3    107.20      1.621      0.2098       74
10:18:00    11.2   1072.3    107.20      1.612      0.2073       74
10:18:10    11.3   1072.4    107.20      1.603      0.2049       74

10:18:20    11.5   1072.4    107.20      1.594      0.2025       74
10:18:30    11.7   1072.4    107.20      1.586      0.2002       74
10:18:40    11.8   1072.5    107.20      1.577      0.1980       74
10:18:50    12.0   1072.5    107.20      1.569      0.1957       74
10:19:00    12.2   1072.5    107.21      1.562      0.1936       74
10:19:10    12.3   1072.6    107.21      1.554      0.1915       74
10:19:20    12.5   1072.6    107.21      1.547      0.1894       74
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10:19:50	13.0	1072.7	107.21	1.520	0.1835	74
10:20:00	13.2	1072.7	107.22	1.519	0.1816	74
10:20:10	13.3	1072.7	107.22	1.513	0.1797	74
10:20:20	13.5	1072.7	107.22	1.506	0.1779	74
10:20:30	13.7	1072.8	107.22	1.500	0.1761	74
10:20:40	13.8	1072.8	107.22	1.494	0.1743	74
10:20:50	14.0	1072.8	107.22	1.488	0.1726	75
10:21:00	14.2	1072.8	107.23	1.482	0.1710	75
10:21:10	14.3	1072.9	107.23	1.477	0.1693	75
10:21:20	14.5	1072.9	107.23	1.471	0.1677	75
10:21:30	14.7	1072.9	107.23	1.466	0.1661	75
10:21:40	14.8	1072.9	107.23	1.461	0.1646	75
10:21:50	15.0	1073.0	107.23	1.456	0.1630	75
10:22:00	15.2	1072.9	107.25	1.451	0.1615	75
10:22:10	15.3	1073.0	107.25	1.446	0.1601	75
10:22:20	15.5	1073.0	107.25	1.441	0.1586	75
10:22:30	15.7	1073.0	107.25	1.436	0.1572	75
10:22:40	15.8	1073.0	107.25	1.432	0.1558	75
10:22:50	16.0	1073.0	107.25	1.427	0.1544	75
10:23:00	16.2	1072.5	106.11	1.423	0.1531	74
10:24:00	17.2	1073.2	107.29	1.398	0.1455	75
10:25:00	18.2	1073.2	107.31	1.376	0.1387	75
10:30:00	23.2	1073.5	107.41	1.295	0.1123	75
10:31:40	24.8	1073.6	107.45	1.275	0.1056	75
10:31:50	25.0	1073.6	107.45	1.273	0.1049	75
10:32:00	25.2	1073.6	107.48	1.272	0.1043	75
10:32:10	25.3	1073.6	107.48	1.270	0.1037	75
10:32:20	25.5	1073.6	107.48	1.268	0.1031	75
10:32:30	25.7	1073.6	107.48	1.266	0.1025	75
10:32:40	25.8	1073.6	107.48	1.265	0.1019	75
10:32:50	26.0	1073.7	107.48	1.263	0.1013	75
10:33:00	26.2	1073.6	107.50	1.261	0.1008	75
10:33:10	26.3	1073.7	107.50	1.259	0.1002	75
10:33:20	26.5	1073.6	107.50	1.258	0.0996	75
10:33:30	26.7	1073.6	107.50	1.256	0.0991	75
10:33:40	26.8	1073.7	107.50	1.255	0.0985	75
10:33:50	27.0	1073.6	107.50	1.253	0.0980	75
10:34:00	27.2	1073.7	107.52	1.252	0.0974	75
10:34:10	27.3	1073.6	107.52	1.250	0.0969	75
10:34:20	27.5	1073.7	107.52	1.248	0.0964	75
10:34:30	27.7	1073.7	107.52	1.247	0.0959	75
10:34:40	27.8	1073.7	107.52	1.246	0.0953	75

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10:35:30    28.7   1073.7   107.54    1.238    0.0929     75
10:35:40    28.8   1073.7   107.54    1.237    0.0924     75
10:35:50    29.0   1073.7   107.54    1.236    0.0919     75
10:36:00    29.2   1073.7   107.56    1.234    0.0914     75
10:36:10    29.3   1073.7   107.56    1.233    0.0909     75
10:36:20    29.5   1073.7   107.56    1.232    0.0905     75
10:36:30    29.7   1073.7   107.56    1.230    0.0900     75
10:37:00    30.2   1073.8   107.58    1.227    0.0887     75
10:38:00    31.2   1072.7   105.30    1.219    0.0861     74
10:39:00    32.2   1073.8   107.62    1.212    0.0837     75
10:40:00    33.2   1073.8   107.64    1.206    0.0814     76
10:41:00    34.2   1073.8   107.66    1.200    0.0792     76
10:42:00    35.2   1073.9   107.67    1.194    0.0771     76
10:43:00    36.2   1073.9   107.69    1.189    0.0752     76
10:44:00    37.2   1073.9   107.70    1.184    0.0733     76
10:44:59    38.1   1073.9   107.71    1.179    0.0716     76
10:45:02    38.2   1073.9   107.71    1.179    0.0715     76
10:45:10    38.3   1073.9   107.71    1.178    0.0712     76
10:45:20    38.5   1013.5   107.71    1.177    0.0710     15
10:45:30    38.7    685.1   107.71    1.177    0.0707   -313
10:45:40     0.2    585.7   107.71
10:45:50     0.3    596.7   107.71
10:46:00     0.5    595.2   107.70
10:46:10     0.7    632.7   107.70
10:46:20     0.8    680.9   107.70
10:46:30     1.0    714.6   107.70
10:46:40     1.2    743.6   107.70
10:46:50     1.3    767.6   107.70
10:47:00     1.5    785.4   107.44
10:47:10     1.7    800.6   107.44
10:47:20     1.8    810.9   107.44
10:47:30     2.0    818.3   107.44
10:47:40     2.2    823.2   107.44
10:47:50     2.3    825.6   107.44
10:48:00     2.5    826.0   107.08
10:48:10     2.7    825.9   107.08
10:48:20     2.8    825.3   107.08
10:48:30     3.0    824.2   107.08
10:48:40     3.2    822.9   107.08
10:48:50     3.3    821.8   107.08
10:49:00     3.5    817.7   106.81
10:49:10     3.7    815.6   106.81
```

10:49:40	4.2	813.0	106.81
10:49:50	4.3	811.7	106.81
10:50:00	4.5	807.1	106.64
10:50:10	4.7	808.2	106.64
10:50:20	4.8	800.8	106.64
10:50:30	5.0	801.9	106.64
10:50:40	5.2	803.2	106.64
10:50:50	5.3	805.2	106.64
10:51:00	5.5	805.6	106.51
10:51:10	5.7	806.6	106.51
10:51:20	5.8	809.1	106.51
10:51:30	6.0	811.1	106.51
10:51:40	6.2	813.3	106.51
10:51:50	6.3	815.0	106.51
10:52:00	6.5	815.9	106.39
10:52:10	6.7	816.5	106.39
10:52:20	6.8	817.3	106.39
10:52:30	7.0	817.7	106.39
10:52:40	7.2	818.0	106.39
10:52:50	7.3	818.2	106.39
10:53:00	7.5	818.1	106.28
10:53:10	7.7	818.3	106.28
10:53:20	7.8	818.1	106.28
10:53:30	8.0	817.9	106.28
10:53:40	8.2	817.8	106.28
10:53:50	8.3	818.1	106.28
10:54:00	8.5	818.0	106.16
10:54:10	8.7	817.5	106.16
10:54:20	8.8	817.2	106.16
10:54:30	9.0	816.7	106.16
10:54:40	9.2	816.0	106.16
10:54:50	9.3	816.3	106.16
10:55:01	9.5	816.7	106.05
10:55:10	9.7	816.1	106.05
10:55:20	9.8	815.8	106.05
10:55:30	10.0	815.8	106.05
10:55:40	10.2	815.3	106.05
10:55:50	10.3	815.5	106.05
10:56:00	10.5	785.1	24.71
10:56:10	10.7	784.7	24.71
10:56:20	10.8	784.8	24.71
10:56:30	11.0	784.5	24.71

```
10:57:10     11.7     814.4     105.81
10:57:20     11.8     814.4     105.81
10:57:30     12.0     813.9     105.81
```

```
10:57:40     12.2     814.3     105.81
10:57:50     12.3     813.8     105.81
10:58:00     12.5     813.1     105.68
10:58:10     12.7     812.6     105.68
10:58:20     12.8     812.3     105.68
10:58:30     13.0     811.9     105.68
10:58:40     13.2     811.8     105.68
10:58:50     13.3     811.3     105.68
10:59:00     13.5     811.0     105.55
10:59:10     13.7     811.1     105.55
10:59:20     13.8     811.2     105.55
10:59:30     14.0     810.7     105.55
10:59:40     14.2     811.8     105.55
10:59:50     14.3     813.3     105.55
11:00:00     14.5     814.4     105.41
11:00:10     14.7     815.3     105.41
11:00:20     14.8     815.8     105.41
11:00:30     15.0     816.5     105.41
11:00:40     15.2     816.9     105.41
11:00:50     15.3     817.3     105.41
11:01:00     15.5     817.6     105.28
11:01:10     15.7     817.9     105.28
11:01:20     15.8     818.1     105.28
11:01:30     16.0     818.2     105.28
11:01:40     16.2     818.4     105.28
11:01:50     16.3     818.0     105.28
11:02:00     16.5     817.8     105.16
11:02:10     16.7     817.7     105.16
11:02:20     16.8     817.7     105.16
11:02:30     17.0     817.6     105.16
11:02:40     17.2     817.3     105.16
11:02:50     17.3     817.0     105.16
11:03:00     17.5     817.1     105.05
11:03:10     17.7     816.7     105.05
11:03:20     17.8     817.0     105.05
11:03:30     18.0     816.9     105.05
11:03:40     18.2     817.0     105.05
11:03:50     18.3     816.9     105.05
11:04:00     18.5     816.9     104.96
```

```
11:04:40   19.2   817.0   104.96
11:04:50   19.3   817.0   104.96
11:05:01   19.5   817.0   104.87
```

```
11:05:10   19.7   817.1   104.87
11:05:20   19.8   817.0   104.87
11:05:30   20.0   817.0   104.87
11:05:40   20.2   816.9   104.87
11:05:50   20.3   816.6   104.87
11:06:00   20.5   816.8   104.80
11:06:10   20.7   816.9   104.80
11:06:20   20.8   816.9   104.80
11:06:30   21.0   816.7   104.80
11:06:40   21.2   816.6   104.80
11:06:50   21.3   816.3   104.80
11:07:00   21.5   816.0   103.60
11:07:10   21.7   816.2   103.60
11:07:20   21.8   815.9   103.60
11:07:30   22.0   815.8   103.60
11:07:40   22.2   816.0   103.60
11:07:50   22.3   815.9   103.60
11:08:00   22.5   816.3   104.67
11:08:10   22.7   816.4   104.67
11:08:20   22.8   816.3   104.67
11:08:30   23.0   816.3   104.67
11:08:40   23.2   816.2   104.67
11:08:50   23.3   816.2   104.67
11:09:00   23.5   816.2   104.60
11:09:10   23.7   816.2   104.60
11:09:20   23.8   816.2   104.60
11:09:30   24.0   816.3   104.60
11:09:40   24.2   815.7   104.60
11:09:50   24.3   816.0   104.60
11:10:00   24.5   815.3   103.42
11:10:10   24.7   815.4   103.42
11:10:20   24.8   815.3   103.42
11:10:30   25.0   815.0   103.42
11:10:40   25.2   814.9   103.42
11:10:50   25.3   815.0   103.42
11:11:00   25.5   815.5   104.50
11:11:10   25.7   815.3   104.50
11:11:20   25.8   815.3   104.50
11:11:30   26.0   815.3   104.50
11:11:40   26.2   815.3   104.50
```

11:12:10	26.7	813.8	102.21
11:12:20	26.8	813.8	102.21
11:12:30	27.0	813.7	102.21

11:12:40	27.2	813.5	102.21
11:12:50	27.3	813.5	102.21
11:13:00	27.5	814.4	104.40
11:13:10	27.7	814.4	104.40
11:13:20	27.8	814.2	104.40
11:13:30	28.0	814.1	104.40
11:13:40	28.2	813.9	104.40
11:13:50	28.3	813.8	104.40

11:14:00	28.5	813.3	103.23
11:14:10	28.7	813.1	103.23
11:14:20	28.8	813.1	103.23
11:14:30	29.0	813.2	103.23
11:14:40	29.2	813.5	103.23
11:14:50	29.3	813.9	103.23
11:15:00	29.5	814.8	104.31
11:15:10	29.7	815.3	104.31
11:15:20	29.8	815.3	104.31
11:15:30	30.0	815.4	104.31
11:15:40	30.2	815.5	104.31
11:15:50	30.3	815.6	104.31
11:16:00	30.5	815.7	104.27
11:16:10	30.7	815.6	104.27
11:16:20	30.8	815.5	104.27
11:16:30	31.0	815.5	104.27
11:17:00	31.5	815.3	104.24
11:18:00	32.5	814.8	104.20
11:19:00	33.5	814.4	104.18
11:20:00	34.5	813.9	104.15
11:21:00	35.5	813.9	104.12
11:22:00	36.5	813.9	104.09
11:23:00	37.5	813.8	104.07
11:24:00	38.5	813.2	104.04
11:25:00	39.5	813.2	104.02
11:26:00	40.5	813.3	103.99
11:27:00	41.5	813.3	103.97
11:28:00	42.5	813.4	103.95

11:33:00	47.5	813.4	103.89
11:34:00	48.5	813.6	103.88
11:35:00	49.5	814.1	103.87
11:36:00	50.5	814.3	103.86
11:37:00	51.5	814.2	103.86
11:38:00	52.5	813.7	101.63
11:39:00	53.5	814.8	103.85
11:40:00	54.5	814.7	103.85
11:41:00	55.5	813.5	101.62
11:42:00	56.5	814.9	103.85
11:43:00	57.5	814.8	103.85
11:44:00	58.5	814.9	103.85
11:45:00	59.5	815.4	103.85
11:46:00	60.5	815.7	103.85
11:47:00	61.5	815.8	103.86
11:48:00	62.5	815.8	103.86
11:49:00	63.5	815.9	103.87
11:50:00	64.5	816.2	103.88
11:51:00	65.5	816.4	103.88
11:52:00	66.5	816.3	103.89
11:53:00	67.5	816.4	103.89
11:54:00	68.5	816.6	103.90
11:55:00	69.5	816.7	103.91
11:56:00	70.5	817.0	103.91
11:57:00	71.5	817.4	103.92
11:58:00	72.5	817.6	103.93
11:59:00	73.5	817.7	103.94
12:00:00	74.5	808.7	103.95
12:01:00	75.5	725.4	103.95
12:02:00	76.5	662.7	103.87
12:03:00	77.5	655.3	103.53
12:04:00	78.5	651.9	102.98
12:05:00	79.5	654.9	102.33
12:06:00	80.5	650.2	101.70
12:07:00	81.5	645.5	100.02
12:08:00	82.5	643.4	99.50
12:09:00	83.5	642.7	100.12
12:10:00	84.5	640.8	99.70
12:11:00	85.5	641.3	99.33
12:12:00	86.5	640.8	99.01
12:13:00	87.5	640.9	98.73
12:14:00	88.5	640.8	97.41

```
12:17:00    91.5   642.8    97.93
12:18:00    92.5   642.5    96.74
12:20:00    94.5   644.4    97.69
12:22:00    96.5   645.6    97.52
12:24:00    98.5   646.5    97.39
12:26:00   100.5   646.9    97.31




12:28:00   102.5  $$$$$$$   97.24
12:30:00   104.5  $$$$$$$   97.01
12:32:06   106.6  $$$$$$$   34.34
12:33:20   107.8   648.9    96.58
00:00:10   495.3   656.1    96.80    1.603    0.2049    -75
00:00:20   495.5   656.3    96.80    1.603    0.2049    -74
00:00:30   495.7   656.1    96.80    1.603    0.2048    -75
12:44:18  1259.5   656.0    96.80    1.237    0.0924    -75
12:44:26  1259.6   650.5    96.91    1.237    0.0924    -80   FLOPET. GAUGE JUMPED AHEAD 48H
12:44:30  1259.7   650.0    96.91    1.237    0.0924    -81
12:44:40  1259.8   649.8    96.91    1.237    0.0924    -81
12:44:50  1260.0   649.5    96.91    1.237    0.0924    -81
12:45:03  1260.2   649.6    96.94    1.237    0.0924    -81
12:50:00  1265.2   651.6    96.98    1.236    0.0920    -79
12:55:00  1270.2   652.3    97.04    1.235    0.0917    -78
13:00:00  1275.2   655.3    97.08    1.234    0.0914    -75
13:05:00  1280.2   657.8    97.18    1.233    0.0911    -73
13:10:00  1285.2   659.7    97.29    1.232    0.0908    -71
13:15:00  1290.2   661.4    97.40    1.231    0.0904    -69
13:20:00  1295.2   662.7    97.50    1.231    0.0901    -68
13:25:00  1300.2   663.8    97.59    1.230    0.0898    -67
13:30:00  1305.2   662.7    97.67    1.229    0.0895    -68
13:35:00  1310.2   662.6    97.71    1.228    0.0892    -68
13:52:34  1327.7   665.2    97.71    1.225    0.0881    -65
13:53:29  1328.7   642.8    34.35    1.225    0.0881    -88
13:53:37  1328.8   665.7    97.54    1.225    0.0881    -65
13:53:40  1328.8   665.8    97.54    1.225    0.0881    -65
13:53:50  1329.0   665.9    97.54    1.225    0.0880    -65
13:54:00  1329.2   666.1    97.56    1.225    0.0880    -65
13:54:10  1329.3   666.0    97.56    1.225    0.0880    -65
13:54:20  1329.5   666.4    97.56    1.225    0.0880    -64
13:54:30  1329.7   666.3    97.56    1.225    0.0880    -64
13:54:40  1329.8   666.5    97.56    1.225    0.0880    -64
13:54:50  1330.0   666.1    97.56    1.225    0.0880    -65
13:55:00  1330.2   666.2    97.61    1.225    0.0880    -64
                                     1.225    0.0880    -65
```

```
14:20:00  1355.2   665.6    97.91    1.220    0.0865    -65
14:21:49  1357.0   652.7    60.21    1.220    0.0864    -78
14:21:50  1357.0   652.7    60.21    1.220    0.0864    -78
14:22:02  1357.2  $$$$$$$   37.91    1.220    0.0864  $$$$$
14:22:22  1357.5  -663.1    37.91    1.220    0.0864  -1394



14:22:30  1357.7   642.0    37.91    1.220    0.0864    -89
14:22:40  1357.8   643.4    37.91    1.220    0.0863    -87
14:22:50  1358.0   644.1    37.91    1.220    0.0863    -87
14:23:00  1358.2   666.3    97.63    1.220    0.0863    -64
14:23:10  1358.3   666.4    97.63    1.220    0.0863    -64
14:25:00  1360.2   667.4    97.63    1.220    0.0862    -63
14:30:00  1365.2   667.0    97.78    1.219    0.0859    -64
14:35:00  1370.2   669.9    97.94    1.218    0.0856    -61
14:40:00  1375.2   670.3    98.03    1.217    0.0854    -60
14:45:00  1380.2   669.0    98.11    1.216    0.0851    -62
14:50:00  1385.2   668.2    98.14    1.216    0.0848    -63
14:55:00  1390.2   667.4    98.13    1.215    0.0845    -63
15:00:00  1395.2   666.9    98.09    1.214    0.0842    -64
15:05:00  1400.2   667.4    98.05    1.213    0.0840    -63
15:10:00  1405.2   667.4    98.04    1.213    0.0837    -63
15:15:00  1410.2  $$$$$$$   98.04    1.212    0.0834  $$$$$
15:20:00  1415.2   667.6    98.05    1.211    0.0832    -63
15:25:00  1420.2   669.3    98.07    1.210    0.0829    -61
15:28:38  1423.8   669.4    98.08    1.210    0.0827    -61
15:28:46  1423.9   669.5    98.09    1.210    0.0827    -61
15:28:50  1424.0   669.0    98.09    1.210    0.0827    -62
15:29:00  1424.2   668.9    98.09    1.210    0.0827    -62
15:29:10  1424.3   669.4    98.09    1.210    0.0827    -61
15:29:20  1424.5   669.2    98.09    1.210    0.0827    -62
15:29:30  1424.7   669.3    98.09    1.210    0.0827    -61
15:29:40  1424.8   669.4    98.09    1.210    0.0826    -61
15:29:50  1425.0   669.4    98.09    1.210    0.0826    -61
15:30:00  1425.2   669.8    98.08    1.210    0.0826    -61
15:30:10  1425.3   669.7    98.08    1.210    0.0826    -61
15:30:20  1425.5   669.3    98.08    1.210    0.0826    -61
15:30:30  1425.7   669.4    98.08    1.209    0.0826    -61
15:30:40  1425.8   669.3    98.08    1.209    0.0826    -61
15:30:50  1426.0   669.2    98.08    1.209    0.0826    -61
15:31:00  1426.2   669.2    98.08    1.209    0.0826    -61
15:31:10  1426.3   669.4    98.08    1.209    0.0826    -61
15:31:20  1426.5   669.5    98.08    1.209    0.0826    -61
15:31:30  1426.7   669.5    98.08    1.209    0.0826    -61
```

```
15:32:00   1427.2   669.1   98.07   1.209   0.0825   -62
15:32:10   1427.3   669.3   98.07   1.209   0.0825   -61
15:32:20   1427.5   669.1   98.07   1.209   0.0825   -62
15:32:30   1427.7   669.3   98.07   1.209   0.0825   -61
15:32:40   1427.8   669.7   98.07   1.209   0.0825   -61
15:32:50   1428.0   669.6   98.07   1.209   0.0825   -61




15:33:00   1428.2   669.5   98.07   1.209   0.0825   -61
15:33:10   1428.3   669.7   98.07   1.209   0.0825   -61
15:33:20   1428.5   669.9   98.07   1.209   0.0825   -61
15:33:30   1428.7   669.7   98.07   1.209   0.0824   -61
15:33:40   1428.8   669.5   98.07   1.209   0.0824   -61
15:33:50   1429.0   669.9   98.07   1.209   0.0824   -61
15:34:00   1429.2   670.1   98.07   1.209   0.0824   -61
15:34:10   1429.3   670.4   98.07   1.209   0.0824   -60
15:34:20   1429.5   670.1   98.07   1.209   0.0824   -61
15:34:30   1429.7   670.1   98.07   1.209   0.0824   -61
15:34:40   1429.8   669.9   98.07   1.209   0.0824   -61
15:34:50   1430.0   669.7   98.07   1.209   0.0824   -61
15:35:00   1430.2   669.4   98.07   1.209   0.0824   -61
15:35:10   1430.3   669.2   98.07   1.209   0.0824   -61
15:35:20   1430.5   669.1   98.07   1.209   0.0823   -62
15:35:30   1430.7   669.2   98.07   1.209   0.0823   -61
15:35:40   1430.8   669.3   98.07   1.209   0.0823   -61
15:35:50   1431.0   669.6   98.07   1.209   0.0823   -61
15:36:00   1431.2   669.6   98.07   1.209   0.0823   -61
15:36:10   1431.3   669.6   98.07   1.209   0.0823   -61
15:36:20   1431.5   669.7   98.07   1.209   0.0823   -61
15:36:30   1431.7   669.6   98.07   1.209   0.0823   -61
15:36:40   1431.8   669.5   98.07   1.209   0.0823   -61
15:36:50   1432.0   670.0   98.07   1.209   0.0823   -61
15:37:00   1432.2   670.0   98.07   1.209   0.0823   -61
15:37:10   1432.3   670.1   98.07   1.209   0.0823   -61
15:37:20   1432.5   670.2   98.07   1.208   0.0822   -60
15:37:30   1432.7   670.0   98.07   1.208   0.0822   -61
15:37:40   1432.8   670.7   98.07   1.208   0.0822   -60
15:37:50   1433.0   670.7   98.07   1.208   0.0822   -60
15:38:00   1433.2   670.5   98.07   1.208   0.0822   -60
15:38:10   1433.3   670.8   98.07   1.208   0.0822   -60
15:38:20   1433.5   670.8   98.07   1.208   0.0822   -60
15:38:30   1433.7   670.9   98.07   1.208   0.0822   -60
15:38:40   1433.8   670.3   98.07   1.208   0.0822   -60
                                                     -60
```

```
15:39:30  1434.7   670.4   98.07   1.208   0.0821   -60
15:39:40  1434.8   670.6   98.07   1.208   0.0821   -60
15:39:50  1435.0   670.2   98.07   1.208   0.0821   -61
15:40:00  1435.2   670.5   98.08   1.208   0.0821   -60
15:40:10  1435.3   670.2   98.08   1.208   0.0821   -61
15:40:20  1435.5   670.6   98.08   1.208   0.0821   -60



15:40:30  1435.7   670.5   98.08   1.208   0.0821   -60
15:40:40  1435.8   670.2   98.08   1.208   0.0821   -61
15:40:50  1436.0   670.5   98.08   1.208   0.0821   -60
15:41:00  1436.2   669.8   98.09   1.208   0.0821   -61
15:41:10  1436.3   670.2   98.09   1.208   0.0820   -60
15:41:20  1436.5   670.3   98.09   1.208   0.0820   -60
15:41:30  1436.7   670.1   98.09   1.208   0.0820   -61
15:41:40  1436.8   670.3   98.09   1.208   0.0820   -60
15:41:50  1437.0   670.1   98.09   1.208   0.0820   -61
15:42:00  1437.2   670.2   98.09   1.208   0.0820   -61
15:42:10  1437.3   670.4   98.09   1.208   0.0820   -60
15:42:20  1437.5   670.3   98.09   1.208   0.0820   -60
15:42:30  1437.7   670.4   98.09   1.208   0.0820   -60
15:42:40  1437.8   670.6   98.09   1.208   0.0820   -60
15:42:50  1438.0   670.2   98.09   1.208   0.0820   -61
15:43:00  1438.2   670.0   98.09   1.208   0.0819   -61
15:43:10  1438.3   669.9   98.09   1.208   0.0819   -61
15:43:20  1438.5   669.7   98.09   1.208   0.0819   -61
15:43:30  1438.7   669.7   98.09   1.208   0.0819   -61
15:43:40  1438.8   669.9   98.09   1.208   0.0819   -61
15:43:50  1439.0   670.2   98.09   1.208   0.0819   -61
15:44:00  1439.2   670.2   98.09   1.208   0.0819   -60
15:44:10  1439.3   670.1   98.09   1.208   0.0819   -61
15:44:20  1439.5   670.5   98.09   1.207   0.0819   -60
15:44:30  1439.7   671.2   98.09   1.207   0.0819   -59
15:44:40  1439.8   671.8   98.09   1.207   0.0819   -59
15:44:50  1440.0   730.7   98.09   1.207   0.0819     0   2ND SHUT IN
15:45:00  1440.2   980.7   98.09   1.207   0.0818   250
15:45:10  1440.3   997.8   98.09   1.207   0.0818   267
15:45:20  1440.5  1006.0   98.09   1.207   0.0818   275
15:45:30  1440.7  1011.7   98.09   1.207   0.0818   281
15:45:40  1440.8  1015.5   98.09   1.207   0.0818   285
15:45:50  1441.0  1018.7   98.09   1.207   0.0818   288
15:46:00  1441.2  1021.5   97.99   1.207   0.0818   291
15:46:10  1441.3  1023.9   97.99   1.207   0.0818   293
15:46:20  1441.5  1026.1   97.99   1.207   0.0818   295
15:46:30  1441.7  1028.1   97.99   1.207
```

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15:47:01  1442.2  1033.0   97.55   1.207   0.0817   302
15:47:14  1442.4  1033.8   97.55   1.207   0.0817   303
15:47:21  1442.5  1035.4   97.55   1.207   0.0817   305
15:47:34  1442.7  1036.4   97.55   1.207   0.0817   306
15:47:40  1442.8  1037.5   97.55   1.207   0.0817   307
15:47:50  1443.0  1038.2   97.55   1.207   0.0817   307



15:48:00  1443.2  1038.7   97.00   1.207   0.0817   308
15:48:10  1443.3  1039.5   97.00   1.207   0.0817   309
15:48:20  1443.5  1040.2   97.00   1.207   0.0817   310
15:48:30  1443.7  1040.9   97.00   1.207   0.0817   310
15:48:40  1443.8  1041.5   97.00   1.207   0.0817   311
15:48:50  1444.0  1042.0   97.00   1.207   0.0816   311
15:49:00  1444.2  1042.4   96.55   1.207   0.0816   312
15:49:10  1444.3  1042.9   96.55   1.207   0.0816   312
15:49:20  1444.5  1043.4   96.55   1.207   0.0816   313
15:49:30  1444.7  1043.9   96.55   1.207   0.0816   313
15:49:40  1444.8  1044.3   96.55   1.207   0.0816   314
15:49:50  1445.0  1044.7   96.55   1.207   0.0816   314
15:50:00  1445.2  1045.0   96.22   1.207   0.0816   314
15:50:10  1445.3  1045.3   96.22   1.207   0.0816   315
15:50:20  1445.5  1045.7   96.22   1.207   0.0816   315
15:50:30  1445.7  1046.1   96.22   1.207   0.0816   315
15:50:40  1445.8  1046.4   96.22   1.207   0.0816   316
15:50:50  1446.0  1046.7   96.22   1.207   0.0815   316
15:51:00  1446.2  1047.0   95.99   1.207   0.0815   316
15:51:10  1446.3  1047.2   95.99   1.206   0.0815   317
15:51:20  1446.5  1047.5   95.99   1.206   0.0815   317
15:51:30  1446.7  1047.8   95.99   1.206   0.0815   317
15:51:40  1446.8  1048.1   95.99   1.206   0.0815   317
15:51:50  1447.0  1048.4   95.99   1.206   0.0815   318
15:52:00  1447.2  1048.5   95.85   1.206   0.0815   318
15:52:10  1447.3  1048.8   95.85   1.206   0.0815   318
15:52:20  1447.5  1049.0   95.85   1.206   0.0815   318
15:52:30  1447.7  1049.3   95.85   1.206   0.0815   319
15:52:40  1447.8  1049.5   95.85   1.206   0.0815   319
15:52:50  1448.0  1049.7   95.85   1.206   0.0814   319
15:53:00  1448.2  1049.8   95.77   1.206   0.0814   319
15:53:10  1448.3  1050.1   95.77   1.206   0.0814   319
15:53:20  1448.5  1050.3   95.77   1.206   0.0814   320
15:53:30  1448.7  1050.5   95.77   1.206   0.0814   320
15:53:40  1448.8  1050.6   95.77   1.206   0.0814   320
15:53:50  1449.0  1050.8   95.77   1.206   0.0814   320
15:54:00  1449.2  1050.9   95.75   1.206
```

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15:54:30   1449.7   1051.5   95.75   1.206   0.0814   321
15:54:40   1449.8   1051.7   95.75   1.206   0.0813   321
15:54:50   1450.0   1051.8   95.75   1.206   0.0813   321
15:55:00   1450.2   1051.9   95.77   1.206   0.0813   321
15:55:10   1450.3   1052.1   95.77   1.206   0.0813   321
15:55:20   1450.5   1052.2   95.77   1.206   0.0813   322



15:55:30   1450.7   1052.4   95.77   1.206   0.0813   322
15:55:40   1450.8   1052.5   95.77   1.206   0.0813   322
15:55:50   1451.0   1052.7   95.77   1.206   0.0813   322
15:56:00   1451.2   1052.8   95.82   1.206   0.0813   322
15:56:10   1451.3   1052.9   95.82   1.206   0.0813   322
15:56:20   1451.5   1053.0   95.82   1.206   0.0813   322
15:56:30   1451.7   1053.1   95.82   1.206   0.0813   322
15:56:40   1451.8   1053.3   95.82   1.206   0.0812   323
15:56:50   1452.0   1053.4   95.82   1.206   0.0812   323
15:57:00   1452.2   1053.5   95.89   1.206   0.0812   323
15:57:10   1452.3   1053.7   95.89   1.206   0.0812   323
15:57:20   1452.5   1053.8   95.89   1.206   0.0812   323
15:57:30   1452.7   1053.9   95.89   1.206   0.0812   323
15:57:40   1452.8   1054.0   95.89   1.206   0.0812   323
15:57:50   1453.0   1054.0   95.89   1.206   0.0812   323
15:58:00   1453.2   1054.2   95.97   1.206   0.0812   323
15:58:10   1453.3   1054.3   95.97   1.206   0.0812   324
15:58:20   1453.5   1054.4   95.97   1.205   0.0812   324
15:58:30   1453.7   1054.5   95.97   1.205   0.0812   324
15:58:40   1453.8   1054.6   95.97   1.205   0.0811   324
15:58:50   1454.0   1054.7   95.97   1.205   0.0811   324
15:59:00   1454.2   1054.8   96.07   1.205   0.0811   324
15:59:10   1454.3   1054.9   96.07   1.205   0.0811   324
15:59:20   1454.5   1055.0   96.07   1.205   0.0811   324
15:59:30   1454.7   1055.1   96.07   1.205   0.0811   324
15:59:40   1454.8   1055.2   96.07   1.205   0.0811   324
15:59:50   1455.0   1055.2   96.07   1.205   0.0811   325
16:00:00   1455.2   1055.3   96.18   1.205   0.0811   325
16:00:10   1455.3   1055.4   96.18   1.205   0.0811   325
16:00:20   1455.5   1055.5   96.18   1.205   0.0811   325
16:00:30   1455.7   1055.6   96.18   1.205   0.0811   325
16:00:40   1455.8   1055.7   96.18   1.205   0.0810   325
16:00:50   1456.0   1055.8   96.18   1.205   0.0810   325
16:01:00   1456.2   1055.8   96.30   1.205   0.0810   325
16:01:10   1456.3   1056.0   96.30   1.205   0.0810   325
16:01:20   1456.5   1056.0   96.30   1.205   0.0810   325
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16:02:00   1457.2   1056.3     96.42     1.205     0.0810     326
16:02:10   1457.3   1056.4     96.42     1.205     0.0810     326
16:02:20   1457.5   1056.5     96.42     1.205     0.0810     326
16:02:30   1457.7   1056.6     96.42     1.205     0.0809     326
16:02:40   1457.8   1056.6     96.42     1.205     0.0809     326
16:02:50   1458.0   1056.7     96.42     1.205     0.0809     326



16:03:00   1458.2   1056.8     96.55     1.205     0.0809     326
16:03:10   1458.3   1056.9     96.55     1.205     0.0809     326
16:03:20   1458.5   1056.9     96.55     1.205     0.0809     326
16:03:30   1458.7   1057.0     96.55     1.205     0.0809     326
16:03:40   1458.8   1057.1     96.55     1.205     0.0809     326
16:03:50   1459.0   1057.1     96.55     1.205     0.0809     326
16:04:00   1459.2   1057.2     96.68     1.205     0.0809     326
16:04:10   1459.3   1057.3     96.68     1.205     0.0809     327
16:04:20   1459.5   1057.3     96.68     1.205     0.0809     327
16:04:30   1459.7   1057.4     96.68     1.205     0.0808     327
16:04:40   1459.8   1057.4     96.68     1.205     0.0808     327
16:04:50   1460.0   1057.5     96.68     1.205     0.0808     327
16:05:00   1460.2   1057.6     96.82     1.205     0.0808     327
16:05:10   1460.3   1057.6     96.82     1.205     0.0808     327
16:05:20   1460.5   1057.7     96.82     1.204     0.0808     327
16:05:30   1460.7   1057.7     96.82     1.204     0.0808     327
16:05:40   1460.8   1057.8     96.82     1.204     0.0808     327
16:05:50   1461.0   1057.8     96.82     1.204     0.0808     327
16:06:00   1461.2   1057.9     96.96     1.204     0.0808     327
16:06:10   1461.3   1058.0     96.96     1.204     0.0808     327
16:06:20   1461.5   1058.0     96.96     1.204     0.0808     327
16:06:30   1461.7   1058.1     96.96     1.204     0.0807     327
16:06:40   1461.8   1058.1     96.96     1.204     0.0807     327
16:06:50   1462.0   1058.2     96.96     1.204     0.0807     327
16:07:00   1462.2   1058.2     97.11     1.204     0.0807     328
16:07:10   1462.3   1058.3     97.11     1.204     0.0807     328
16:07:20   1462.5   1058.4     97.11     1.204     0.0807     328
16:07:30   1462.7   1058.4     97.11     1.204     0.0807     328
16:07:40   1462.8   1058.5     97.11     1.204     0.0807     328
16:07:50   1463.0   1058.5     97.11     1.204     0.0807     328
16:08:00   1463.2   1058.6     97.26     1.204     0.0807     328
16:08:10   1463.3   1058.6     97.26     1.204     0.0807     328
16:08:20   1463.5   1058.7     97.26     1.204     0.0807     328
16:08:30   1463.7   1058.7     97.26     1.204     0.0806     328
16:08:40   1463.8   1058.7     97.26     1.204     0.0806     328
16:08:50   1464.0   1058.8     97.26     1.204     0.0806     328
```

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16:09:30   1464.7   1059.0    97.41    1.204    0.0806    328
16:09:40   1464.8   1059.1    97.41    1.204    0.0806    328
16:09:50   1465.0   1059.1    97.41    1.204    0.0806    328
16:10:00   1465.2   1059.2    97.56    1.204    0.0806    328
16:10:10   1465.3   1059.2    97.56    1.204    0.0806    329
16:10:20   1465.5   1059.3    97.56    1.204    0.0806    329




16:10:30   1465.7   1059.3    97.56    1.204    0.0805    329
16:10:40   1465.8   1059.4    97.56    1.204    0.0805    329
16:10:50   1466.0   1059.4    97.56    1.204    0.0805    329
16:11:00   1466.2   1059.5    97.70    1.204    0.0805    329
16:11:10   1466.3   1059.5    97.70    1.204    0.0805    329
16:11:20   1466.5   1059.5    97.70    1.204    0.0805    329
16:11:30   1466.7   1059.6    97.70    1.204    0.0805    329
16:11:40   1466.8   1059.6    97.70    1.204    0.0805    329
16:11:50   1467.0   1059.7    97.70    1.204    0.0805    329
16:12:00   1467.2   1059.7    97.84    1.204    0.0805    329
16:12:10   1467.3   1059.7    97.84    1.204    0.0805    329
16:12:20   1467.5   1059.8    97.84    1.204    0.0805    329
16:12:30   1467.7   1059.8    97.84    1.203    0.0804    329
16:12:40   1467.8   1059.8    97.84    1.203    0.0804    329
16:12:50   1468.0   1059.9    97.84    1.203    0.0804    329
16:13:00   1468.2   1059.9    97.98    1.203    0.0804    329
16:13:10   1468.3   1060.0    97.98    1.203    0.0804    329
16:13:20   1468.5   1060.0    97.98    1.203    0.0804    329
16:13:30   1468.7   1060.1    97.98    1.203    0.0804    329
16:13:40   1468.8   1060.1    97.98    1.203    0.0804    329
16:13:50   1469.0   1060.1    97.98    1.203    0.0804    329
16:14:00   1469.2   1060.2    98.12    1.203    0.0804    329
16:14:10   1469.3   1060.2    98.12    1.203    0.0804    330
16:14:20   1469.5   1060.3    98.12    1.203    0.0804    330
16:14:30   1469.7   1060.3    98.12    1.203    0.0803    330
16:14:40   1469.8   1060.3    98.12    1.203    0.0803    330
16:14:50   1470.0   1060.4    98.12    1.203    0.0803    330
16:15:00   1470.2   1060.4    98.25    1.203    0.0803    330
16:15:10   1470.3   1060.5    98.25    1.203    0.0803    330
16:15:20   1470.5   1060.4    98.25    1.203    0.0803    330
16:15:30   1470.7   1060.5    98.25    1.203    0.0803    330
16:15:40   1470.8   1060.5    98.25    1.203    0.0803    330
16:15:50   1471.0   1060.6    98.25    1.203    0.0803    330
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16:16:50   1472.0   1060.7    98.37    1.203    0.0802    330
16:17:00   1472.2   1060.8    98.50    1.203    0.0802    330
16:17:10   1472.3   1060.8    98.50    1.203    0.0802    330
16:17:20   1472.5   1060.8    98.50    1.203    0.0802    330
16:17:30   1472.7   1060.8    98.50    1.203    0.0802    330
16:17:40   1472.8   1060.9    98.50    1.203    0.0802    330
16:17:50   1473.0   1060.9    98.50    1.203    0.0802    330

16:18:00   1473.2   1061.0    98.63    1.203    0.0802    330
16:18:10   1473.3   1061.0    98.63    1.203    0.0802    330
16:18:20   1473.5   1061.1    98.63    1.203    0.0802    330
16:18:30   1473.7   1061.1    98.63    1.203    0.0801    330
16:18:40   1473.8   1061.1    98.63    1.203    0.0801    330
16:18:50   1474.0   1061.1    98.63    1.203    0.0801    330
16:19:00   1474.2   1061.1    98.75    1.203    0.0801    331
16:19:10   1474.3   1061.2    98.75    1.203    0.0801    331
16:19:20   1474.5   1061.3    98.75    1.203    0.0801    331
16:19:30   1474.7   1061.3    98.75    1.203    0.0801    331
16:19:40   1474.8   1061.3    98.75    1.203    0.0801    331
16:19:50   1475.0   1061.3    98.75    1.202    0.0801    331
16:20:00   1475.2   1061.4    98.86    1.202    0.0801    331
16:20:10   1475.3   1061.4    98.86    1.202    0.0801    331
16:20:20   1475.5   1061.4    98.86    1.202    0.0801    331
16:20:30   1475.7   1061.4    98.86    1.202    0.0800    331
16:20:40   1475.8   1061.5    98.86    1.202    0.0800    331
16:20:50   1476.0   1061.5    98.86    1.202    0.0800    331
16:21:00   1476.2   1061.5    98.97    1.202    0.0800    331
16:21:10   1476.3   1061.6    98.97    1.202    0.0800    331
16:21:20   1476.5   1061.6    98.97    1.202    0.0800    331
16:21:30   1476.7   1061.6    98.97    1.202    0.0800    331
16:21:40   1476.8   1061.6    98.97    1.202    0.0800    331
16:21:50   1477.0   1061.6    98.97    1.202    0.0800    331
16:22:00   1477.2   1061.7    99.08    1.202    0.0800    331
16:22:10   1477.3   1061.7    99.08    1.202    0.0800    331
16:22:20   1477.5   1061.8    99.08    1.202    0.0799    331
16:22:30   1477.7   1061.7    99.08    1.202    0.0799    331
16:22:40   1477.8   1061.7    99.08    1.202    0.0799    331
16:22:50   1478.0   1061.8    99.08    1.202    0.0799    331
16:23:00   1478.2   1061.8    99.19    1.202    0.0799    331
16:23:10   1478.3   1061.9    99.19    1.202    0.0799    331
16:23:20   1478.5   1061.9    99.19    1.202    0.0799    331
16:23:30   1478.7   1061.9    99.19    1.202    0.0799    331
16:23:40   1478.8   1061.9    99.19    1.202    0.0799    331
```

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16:24:20   1479.5   1062.0    99.29    1.202    0.0798    331
16:24:30   1479.7   1062.0    99.29    1.202    0.0798    331
16:24:40   1479.8   1062.1    99.29    1.202    0.0798    331
16:24:50   1480.0   1062.1    99.29    1.202    0.0798    331
16:25:00   1480.2   1062.1    99.39    1.202    0.0798    331
16:25:10   1480.3   1062.2    99.39    1.202    0.0798    331
16:25:20   1480.5   1062.2    99.39    1.202    0.0798    331

16:25:30   1480.7   1062.2    99.39    1.202    0.0798    331
16:25:40   1480.8   1062.3    99.39    1.202    0.0798    332
16:25:50   1481.0   1062.2    99.39    1.202    0.0798    332
16:26:00   1481.2   1062.3    99.48    1.202    0.0798    332
16:26:10   1481.3   1062.3    99.48    1.202    0.0798    332
16:26:20   1481.5   1062.3    99.48    1.202    0.0798    332
16:26:30   1481.7   1062.4    99.48    1.202    0.0798    332
16:26:40   1481.8   1062.4    99.48    1.202    0.0797    332
16:26:50   1482.0   1062.4    99.48    1.202    0.0797    332
16:27:00   1482.2   1062.4    99.58    1.202    0.0797    332
16:27:10   1482.3   1062.4    99.58    1.201    0.0797    332
16:27:20   1482.5   1062.5    99.58    1.201    0.0797    332
16:27:30   1482.7   1062.5    99.58    1.201    0.0797    332
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    17:48:00   1563.2   1067.7   103.88      1.191      0.0759      337
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    17:51:00   1566.2   1067.8   103.97      1.191      0.0758      337
    17:52:00   1567.2   1067.9   104.00      1.191      0.0758      337
    17:53:00   1568.2   1067.9   104.03      1.190      0.0757      337
    17:54:00   1569.2   1067.9   104.06      1.190      0.0757      337
    17:55:00   1570.2   1067.9   104.08      1.190      0.0756      337
    17:56:00   1571.2   1068.0   104.11      1.190      0.0756      337
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    17:58:00   1573.2   1068.1   104.16      1.190      0.0755      337
    17:59:00   1574.2   1068.1   104.18      1.190      0.0754      337
    18:00:00   1575.2   1068.1   104.20      1.190      0.0754      337

   SUMMARY OF RESULTS
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APPENDIX A3 POSITIONING REPORT

BALEEN-1

RIG POSITIONING REPORT

Submitted By: K.H. Sit,
GEOPHYSICIST.

Supervised By: A.J. Ferworn,
CHIEF GEOPHYSICIST

November, 1981.

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INTRODUCTION

The Baleen-1 positioning survey was conducted between 30th October and 5th November, 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 Satellite receiver - (JMR-4).
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 licenced surveyor contracted from Navigation Australia was on board during the Baleen-1 positioning to verify Decca's readings.

A HOAL Geophysicist was also on board to supervise the survey.

Independent reports will be submitted by Navigation Australia and Decca Survey Australia.

PROPOSED RIG LOCATION

The proposed rig location for Baleen-1 was shotpoint 300, line GB81-31.

The co-ordinates for the position were:-

Latitude	038°	00'	36.01"	S
Longitude	148°	26'	08.74"	E

UTM co-ordinates from Central Merridian 147°

5792088.0 metres North
0626042.5 metres East

The following base stations were used for the survey:-

	Easting	Northing
Mt. Cann	674487.5	5831332.7
Raymond	640921.4	5824777.0
Jemmy	584670.0	5806793.0
Nowa Nowa	596073.9	5827551.6

The distances to the proposed Baleen-1 well from the base stations were:-

Mt. Cann	62359 metres
Raymond	35924 metres
Jemmy	43920 metres
Nowa Nowa	46445 metres

ANCHOR PATTERN AND BUOYS

Using the given bow heading of 230°, anchor line bearings, and anchor cable and chain length of 457.2 metres, the positions of the anchor buoys were determined graphically.

The following table lists the positions:

Anchor Buoy No.	Bearing	Easting	Northing
1	260°	625544.5	5791993
2	290°	625575.5	5792225
3	350°	626007.5	5792576
4	20°	626250.5	5792551
5	80°	626542.5	5792182
6	110°	626512.5	5791940
7	290°	626070.5	5791603
8	200°	625827.5	5791631
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 coloured pennant was attached to the top. These were anchored by two 1 metre steel rails weighing approximately 68 kgm each. 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 24 metres.

DAILY LOG

Thursday 29th October

2300 hrs.	Hong Sit and Rod Keene of Navigation Australia departed Perth.

Friday 30th October

0500 est.	Arrived Melbourne Airport.
0600 hrs.	Driving to Bairnsdale.
1030 hrs.	Arrived at Bairnsdale.
1245 hrs.	Departed Bairnsdale by helicopter
1255 hrs.	Arrived on rig "Petromar North Sea".
1415 hrs.	On board supply boat "Yardie Creek"

Saturday 31st October

0945 hrs.	Alongside Esso "Tuna" platform for position checks
1025 hrs.	Departed "Tuna" platform
1130 - 1355 hrs.	Checking Fathometer sections
1645 hrs.	At anchor off Marlow

Sunday 1st November

0700 hrs.	En route to "Baleen" location
0830 - 1030 hrs.	Laying buoy pattern
1030 - 1200 hrs.	Checking Pattern
1330 hrs.	En route Pt. Welshpool

Monday 2nd November

0130 hrs.	Arrived Pt. Welshpool
1300 hrs.	R. Keene Navigation Australia, J. Duncan Decca Surveys, H. Sit Hudbay departed Pt. Welshpool by vehicle for Bairnsdale.
0500 hrs.	Arrive Bairnsdale
0645 hrs.	Depart by helicopter for rig
0655 hrs.	Arrive "Petromar North Sea"
1200 hrs.	Equipment arrives on helicopter

Monday 2nd November

1200 - 1500 hrs.	Erecting Trisponder radio and Satellite receiver on bridge of rig. Awaiting movement of rig.

CONCLUSIONS AND RECOMMENDATIONS

The Baleen-1 well positioning was completed satisfactorily, however there were certain difficulties:

1. Insufficient weight was attached to the buoy anchors and they were subsequently swept out of position by up to 6 kilometres. No extra weights were available on board; only 5 buoys were finally dropped to allow extra weights to be applied.

2. Two lengths of railing line approximately 1 metre in length were used during the survey. It is recommended in future that at least four pieces be used.

All personnel involved in the survey performed extremely well and high professional standards were maintained by the positioning crews from Decca and Navigation Australia.

SURVEY NET VERIFICATION AND SURVEY CHECKS

Esso's "Tuna" platform was chosen to check the Trisponder Survey net. Due to the heavy seas it was not possible to get too close alongside the "Tuna". However, three fixes were taken approximately 40 metres from the co-ordinated position. These fixes resulted in differences of approximately 20 metres west and 10 metres north from the true position.

Two seabed topographic features on lines GB81-37 and GB81-40 were also used 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" these two seismic lines proved to be very satisfactory as the features appeared within 20 metres of the proposed location.

The Anchor buoys were layed at the "Baleen" location on Sunday 1 November between the hours 0830 and 1030. The co-ordinates of the buoys were checked soon after the last buoy was down. The moonpool buoy had to be re-positioned as it was found to be approximately 120 metres out of position.

The supply boat "Yardie Creek" then sailed to Port Welshpool, to allow one set of Trisponder equipment to be placed on board the "Petromar North Sea". This enabled the rig position to be constantly monitored when mooring onto the location.

The "Yardie Creek" returned on 2nd November to the Baleen location. All anchor buoys were out of position by up to six kilometres due to insufficient weights attached to the buoys. All buoys except one were recovered and relayed on a new heading of 210° (requested by the drilling superintendent). Only buoys No. 1, 3, 5, 8 and the moonpool were layed in order to allow extra weights to be attached to the buoys and a check made between the hours 1420 and 1510 confirmed that all the buoys were within 50 metres of the proposed location.

FINAL POSITIONING

The "Petromar North Sea" departed the "West Seahorse" location at 1400, Tuesday 3rd November. It arrived on "Baleen" location at 2000 and the first anchor, no. 5, was dropped at 2135. At 1225, Wednesday 4th November, the last anchor was dropped. Trisponder signals were extremely good throughout.

FINAL POSITION

The final position of the Baleen No.1 well is:

Latitude	038°	00'	36.630"	SOUTH
Longitude	148°	26'	08.400"	EAST

UTM Co-ordinates from 147° Central Merridian

Northing	5792068 metres
Easting	626032 metres

The stem is 23 metres at a bearing of 207.7° from the proposed location.

Final distances to the Baleen No.1 well from the base stations are:

Mt. Cann	62350 metres
Raymond	35913 metres
Jemmy	43919 metres
Mt. Nowa Nowa	46441 metres

The JMR-4 Satellite Doppler observations were taken on board the rig to check the Baleen-1 location established by the Trisponder observations. The satellite positions after 4 passes was:

Latitude	038°	00'	36.582"
Longitude	148°	26'	08.239"

Tuesday 3rd November

	Awaiting movement of rig.
1430 hrs.	"Petromar North Sea" departed West Seahorse location
1900 hrs.	Arrived "Baleen" location
2035 hrs.	Dropped 1st anchor

Wednesday 4th November

1225 hrs.	Last anchor in location
1625 hrs.	Rig on location and all anchors tensioned up
	Final location fixes commenced

Thursday 5th November

0640 hrs.	Final fix taken
0735 hrs.	Keene, Duncan, Sit departed rig by helicopter to Bairnsdale
0755 hrs.	Arrive Bairnsdale
0810 hrs.	Depart Bairnsdale by light aircraft for Melbourne airport
0920 hrs.	Arrives Melbourne
0925 est.	Depart Melbourne
1130 est.	Arrive Perth.

3.0 GEOLOGY

(Pages 23 - 43)

3.0 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.

The initial exploration in the offshore Gippsland Basin was by the Bureau of Mineral Resources, for whom a regional gravity and aeromagnetic survey was conducted 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 been drilled in the basin resulting in the discovery of recoverable reserves of 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 Exploration Permits Vic/P-1 and Vic/P-8, held respectively by Esso-BHP and a consortium headed by BOC Australia. The area now covered by Vic/P-11 was gazetted in December 1976 and applications for the permit were invited. 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. Detailed mapping, incorporating data from the GB81 survey, Beach Petroleum's GB79 Seismic Survey and trade data from Esso's G80A Seismic Survey, defined several prospects.

3.2 Geological Setting

3.2.1 Regional Setting

The Baleen 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 2). 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 2)

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 palaeotopographic 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 extentions of the east-west trending Foster Fault and the antithetic, east-west trending Rosedale Fault System. In the Baleen area the latter is known to be a reverse fault superimposed upon an older normal fault within the Lower Cretaceous, and has a throw of up to 160 metres. 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 late Eocene to early Oligocene.

Numerous northwest-southeast, basin-forming normal faults have been recognized within the Central Deep. The general trend of these faults is approximately parallel to that of the faults in the neighbouring Bass Basin.

The major hydrocarbon-bearing anticlinal 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 discussed in Section 3.2.3. The main hydrocarbon traps in the Vic/P-11 Permit were formed as a result of this same shearing stress, by arching associated with reverse movement superimposed upon older normal faults.

3.2.3 Geological Evolution and Regional Stratigraphy (Figure 15)

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 separation 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 consist 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 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.

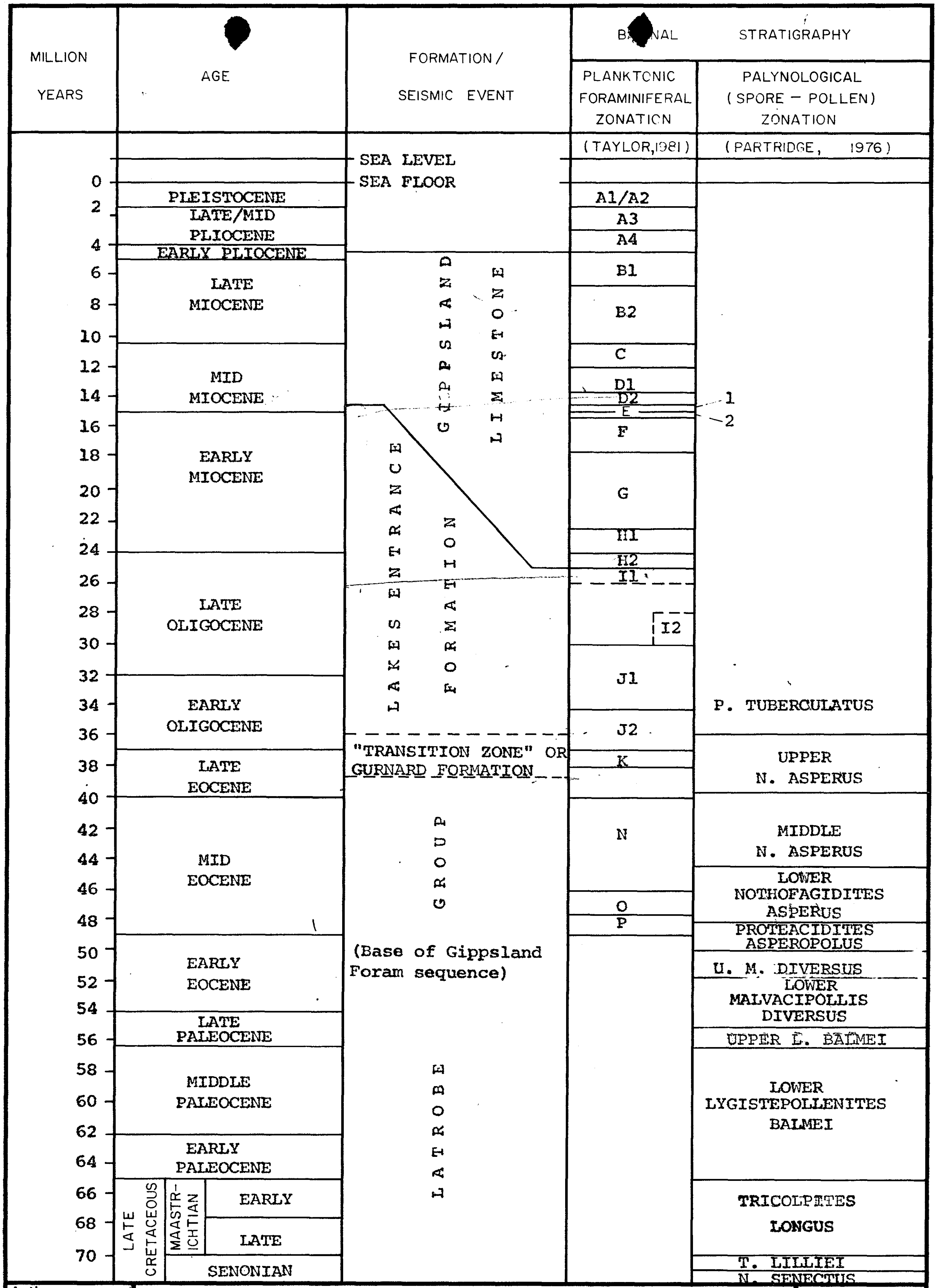
The Lower Cretaceous Strzelecki Group sediments are unconformably overlain by up to 5,000 metres of fluviatile and lacustrine Latrobe Group sediments. Upper Cretaceous sedimentation tended to be superimposed on the underlying Strzelecki Group with the deposition of shales, minor coals and poorly sorted sandstones in a fluviatile environment. In the early Senonian, approximately 85 million years B.P., the Lord Howe Rise Plate separated, 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 resulted 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 marked 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 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, in part, due to a change in provenance related to the widespread deposition onshore of volcanics during the Upper Eocene wrenching episode.

Sealevel 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. 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	**Hudbay Oil (Australia) Ltd.**	Scale:
Drawn: A. Clark	OFFSHORE GIPPSLAND BASIN	
Date: April 1982	**REGIONAL STATIGRAPHIC COLUMN**	Drawing Nº A4-GL-490

Figure 15

3.3 Stratigraphy

A sedimentary section ranging in age from Lower Cretaceous to Recent was penetrated in Baleen No.1 (Figure 16).

Age determinations are based upon palaeontological and palynological studies of sidewall cores (Appendices B1 & B2). The boundaries of individual units were established by using the age determinations in conjunction with lithological data, from the microscopic examination of drill cuttings and sidewall cores, and wireline log interpretations. Time-rock subdivisions were placed midway between sidewall core points, unless more accurate subdivisions were made possible by log response or cuttings lithology.

Owing to the standard practice of not installing a marine riser until after the setting of the 20 inch casing, no samples were recovered from the seabed to 209 metres.

The stratigraphy encountered in the well is described below. All depths quoted are below the Rotary Table, which is 9.45 metres above Mean Spring Low Water.

Lower Cretaceous (1030 - 707 metres)

Undifferentiated sandstones, siltstones and claystones typify the Lower Cretaceous at Baleen No.1. All lithologies have high matrix contents and grain-sizes are generally very fine to fine. Minor coal seams occur at 930 metres and silicified bands occur within the more coarse lithologies. Wireline log evidence indicates the possibility of a weathered zone between 850 and 707 metres. The appearance of Coptospora paradoxa confirms the presence of non-marine Strzelecki Group sediments at 709 metres and the unconformity is interpreted at 707 metres.

Str gp

Upper Eocene (707 - 653 metres)

Latrobe gp

The unconformity at 707 metres marks the base of the Upper Eocene sediments and represents the onset of a marine transgression of the area. Poor yields prevented reasonable palaeontological age determinations within this interval but palynological examination indicated nothing older than the Middle N. asperus zone. Lithologically, the interval consists of two iron oxide/carbonate rich, sandstone-siltstone bands separated by a glauconitic and micaceous claystone-siltstone-sandstone sequence (Appendix B3).

Upper Eocene (653 - 638.5 metres)

[illegible]

The Latest Eocene is represented by a continuance of the glauconitic claystones, with an increasing amount of calcareous material. Zone K planktonic foraminifera were recognized, with plant micro fossil assemblages more confidently assigned to the Late N. asperus zone. The interval was deposited in water depths of less than 10 metres, probably in an estuarine entrance.

Lower Oligocene (638.5 - 627 metres)

[illegible]

The interval consists of a sequence of glauconitic claystone with minor calcilutite and calcisiltite. This has been assigned to Taylor's Zone J, and is thought to have been deposited in an inner shelf environment in water depths of about 10-40 metres. An unconformity marks the top of this zone.

[illegible] Fm

Latest Oligocene to Lower Miocene (627 - 545 metres)

This section consists of interbedded calcisiltite and claystone with skeletal fragments but has been separated from the overlying interval on the basis of planktonic foraminifera. Above approximately 604 metres, the unit was assigned to Zone H-1 and was apparently deposited in water depths of about 200 metres in a mid shelf canyon. Between about 627 metres and 604 metres, the unit was assigned to Zone H, and is believed to have been deposited on an upper slope fan in water depths of 200-300 metres.

Lower Miocene (545 - 447 metres)

transition zone

A decrease in the proportion of clay and finely divided carbonate material over skeletal fragments brought a gradation over this interval from calcisiltites and calcareous claystones to skeletal calcarenite. This is indicative of decreased water depths in the area of deposition from about 200 metres to 40 metres. Planktonic foraminifera from Zones G to F were recognized, and a mid shelf canyon is believed the most likely environment of deposition.

Middle Miocene (447 - 343 metres)

Gipps L's

Above 447 metres the Middle Miocene again consists of dominantly very coarse skeletal fragments with minor calcisiltite and calcilutite. The section is believed to have been deposited in a canyon head environment, in water depths of about 40 metres, and contained planktonic foraminifera from Zones E to D.

Middle Miocene to Recent (343 - 225 metres)

The upper section of the Gippsland Limestone was represented in Baleen No.1 by skeletal calcarenite with minor calcisiltite and calcilutite. Faunal types recognized included corals, echinoids, pelecypods, bryozoans and forams. Such an assemblage indicates deposition in an inner continental shelf environment, in water depths of about 10-40 metres, and corresponds to Planktonic Foraminiferal Zones C to A of Taylor (in prep.).

STRATIGRAPHY	PLA[illegible]TONIC FORAM ZONE	PALYNOLOGICAL (SPORE - POLLEN)	DRILL DEPTH (metres)	SUBSEA DEPTH (metres)	EVENT	PALAEO DEPOSITIONAL ENVIRONMENT
	Taylor, (1981)	Partridge, (1976)				
			9.45	0	SEA LEVEL	
			64.3	54.9	SEA FLOOR	
RECENT TO MIDDLE MIOCENE	A TO C					INNER SHELF 10-40 METRES
			343	333.5	TRANSITIONAL	
MIDDLE MIOCENE	D TO E					CANYON HEAD 40 METRES
			447	437.5	TRANSITIONAL	
LOWER MIOCENE	F					MID SHELF CANYON 40-200 METRES
			519	509.5		
	G					
			545	535.5	TRANSITIONAL	
LOWER MIOCENE	H-1					SHELF EDGE CANYON ≈200 METRES
			604.5	595	TRANSITIONAL	
LOWER MIOCENE TO UPPER OLIGOCENE	H-2					UPPER SLOPE FAN 200-300 METRES
			627	617.5	UNCONFORMITY	
LOWER OLIGOCENE	J-1					INNER SHELF 10-40 METRES
			638.5	629		
UPPER EOCENE	K	LATE N. ASPERUS	Gurn			NEAR SHORE <10 METRES
			654.5	645		
	?	MIDDLE TO LATE N. ASPERUS				
			707	697.5	UNCONFORMITY	
LOWER CRETACEOUS ALBIAN		COPTOSPORA PARADOXA			STRZELECKI GROUP	NON MARINE
			729	719.5		
		INDETERMINATE				
			806	796.5		
ALBIAN		COPTOSPORA PARADOXA				
			847.5	838		
		INDETERMINATE				
			1030	1020.5	TOTAL DEPTH	

Author:
M. Battrick

Drawn by:
T. Cole

Hudbay Oil (Australia) Ltd.

BALEEN - 1

STRATIGRAPHIC TABLE

Date:
July, 1982

Drawing Nº
A4-GL-582

Figure 16

3.4 Structure

Baleen No.1 was drilled on the southern side of a major east-west, high angle reverse fault which is upthrown to the south, i.e. towards the centre of the basin. Reverse movement, associated with wrenching along a pre-existing, normal, down-to-the-basin fault trend, caused arching into the fault and thereby formed the northern boundary of the structure.

The normal fault trend formed during Upper Jurassic to Lower Cretaceous times, with further growth continuing during the Upper Cretaceous and Lower Tertiary. The reverse movement is believed to have been associated with the wrench faulting which took place during the Upper Eocene to Lower Oligocene.

The Baleen structure consists of two culminations separated by a minor saddle, with closure extending over 10 kilometres in an east-west direction. Closure has been mapped at two horizons, designated "Top Latrobe" and "Top Strzelecki".

A high resolution dipmeter was run over the interval from 566-1029 metres. Interpretation of the dipmeter data was enhanced by the use of a Cluster-Pooled Arrow Plot, Cyberdip and a Geodip run over selected intervals. The dipmeter data have been divided into different intervals, based on the magnitude and direction of the recorded dips, as follows:

570 - 597 m : Dips ranged between 5-30°, with a southerly orientation.

598 - 604 m : 3-8°, northeasterly orientation; possible transition zone.

604 - 609 m : 3-6°, southerly orientation.

611 - 639 m : 14-34°, north-northeasterly orientation; dip readings sparse.

640 - 658 m : No reliable trends.

658 - 700 m : 9-40°, general south-westerly orientation; readings widely spaced.

700 - 750 m : Extremely low frequency of readings; southerly trend.

750 - 778 m : 8-25°, south-easterly orientation.

778 - 790 m : No reliable readings.

790 - 898 m : 6-26°, mainly between east and south.

903 - 957 m : 5-36°, orientation poorly defined, between northeast-southwest, dominantly easterly.

959 - 962 m : 17-30°, north-westerly orientation.

966 - 1031 m (T.D.): 3-22°, between northwest-south; averaging 10° easterly.

Below 750 metres, the Cyberdip and Cluster dipmeter logs show evidence of a structural dip component of between 6-12° to the south and east. Due to the low frequency of readings above 750 metres a structural component was not removed prior to processing the Geodip log.

3.5 Predicted vs Actual Depth to Seismic Marker

Several seismic events were recognized in Baleen No.1 and well data has shown these to be related to significant lithological changes and age boundaries. The recorded data is listed in the following table. Further information can be found in Enclosures 3 and 4, and Figure 17.

Horizon Identification - Baleen-1

Horizon	Predicted Depth*	Actual Depth	Two-way Time (sec)
Sea Floor	53 m	54.9 m	0.073
"Top Latrobe"	617 m	617.5 m	0.619
Top Iron Nodule Band	N/A	644.0 m	0.645
"Top Strzelecki"	747 m	697.5 m	0.696
Near Base "Weathered Zone"	N/A	840.5 m	0.825
Total Depth	1000 m	1020.5 m	0.922

kb - 9.45m.

* Note: Depths quoted in this table are subsea.

The event identified as "Top Latrobe" and predicted at 613 metres subsea was encountered at 644 metres. It corresponded with the top of an iron nodule band. The "Top Strzelecki" horizon was predicted at 747 metres subsea but was encountered at 697.5 metres.

PE903910

This is an enclosure indicator page.
The enclosure PE903910 is enclosed within the container PE902682 at this location in this document.

The enclosure PE903910 has the following characteristics:
ITEM_BARCODE = PE903910
CONTAINER_BARCODE = PE902682
NAME = Baleen 1 predicted and actual section
BASIN = GIPPSLAND
PERMIT = VIC/P11
TYPE = WELL
SUBTYPE = STRAT_COLUMN
DESCRIPTION = Baleen 1 Predicted and Actual Section. Figure 17 from WCR
REMARKS =
DATE_CREATED = 30/06/82
DATE_RECEIVED = 13/09/82
W_NO = W759
WELL_NAME = Baleen-1
CONTRACTOR = Hudbay Oil (Australia) Ltdq
CLIENT_OP_CO = Hudbay Oil (Australia) Ltd

(Inserted by DNRE - Vic Govt Mines Dept)

3.6 Porosity and Permeability

Porosities for Baleen No.1 have been estimated by microscopic examination of drill cuttings and wireline log interpretation (Appendix B4).

The three hydrocarbon bearing intervals, 660-672m, 672-696m and 696-707m, have average log-derived porosities of 30%, 26% and 25% respectively. From 660-696 metres, the sediments were fine-grained, poorly-sorted mixtures of clay minerals, quartz silt and fine quartz sand, with gluaconite and limonite (Appendix B3). RFT's and a Drill Stem Test over the interval 662-670m, confirmed that the interval had suspected formation damage and indicated a formation permeability of only 56 md.

The zone from 696-707 m, contained coarse sand with less clay and silt-sized material than the overlying interval and calculations based on a DST over this interval indicated a formation permeability of 747 md. Extremely high skin effects were observed due to formation damage.

Log derived porosities below 707 metres averaged 20% within the Strzelecki Group sediments (Appendix B4). These are regarded as being high considering the argillaceous matrix of RFT's also indicate that the formation is tight and that the Strzelecki Group doesn't form a reservoir unit at the Baleen-1 location. However where the permeability within these sediments is better developed, it will be a valid secondary target.

3.7 Hydrocarbon Indications

3.7.1 Summary

Interpretations of wireline logs indicated three hydrocarbon-bearing zones in Baleen No.1: these were between 660-672 m, 672-696 m and 696-707 m. Drill Stem Tests of the upper and lower zones produced dry gas from each zone.

3.7.2 Hydrocarbon Indications 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 gas chromatography. Monitoring commenced at 225 metres, in the 12-1/4" hole.

The following table summarizes the gas readings observed during drilling:

Range of Gas Readings

Depth (m)	Total Gas	Pet. Vap.	C_1	C_2	C_3	iC_4	nC_4	C_5
225-460	0	0	0	0	0	0	0	0
460-525	Tr-2	0	20-600	0	0	0	0	0
525-640	2-22	0-Tr	400-5300	0-20	0-10	0-30	0-Tr	0
640-653	20-100	Tr-1	400-8950	Tr	Tr	0-30	Tr	0
654.5	500+	1+	(Gas trap indicated - sample not analysed)					
655-665	(No readings after gas kick)							
665-745	3-44	0-Tr	375-13222	0	0	0-20	0	0
745-1030 (T.D.)	Tr-12	0-Tr	20-1790	0	0	0-39	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.
3) C_1 - C_5 are given in ppm.
4) Gas chromatograph malfunction was responsible for the loss of some higher hydrocarbon records, i.e. C_3, iC_4 and C_5.

Fluorescence from Drill Cuttings

Examination of drill cuttings showed traces of fluorescence at 605-610 metres and between 650-725 metres. The fluorescence was described on claystones as being spotty yellow or yellow-white with fast, green-white or creamy white solvent fluorescence, with similar indications described on sandstones below 700 metres.

All samples were contaminated to some degree of petroleum derivatives, notably diesel fuel, from the drill water which was supplied to the Exlog unit.

Oil Staining/Free Oil

Possible light brown staining was observed on siltstones from 670-675 metres.

3.7.3 Sidewall Cores

Isolated specks of dull, gold fluorescence were observed in nine of the sidewall cores, the highest being at 623.0 metres and the lowest at 927.0 metres. In all cases the samples produced either no solvent fluorescence or extremely pale solvent fluorescence.

Further details are given in Appendix B5.

3.7.4 Further Indications

DST-1 over the interval 700-706 metres flowed dry gas at rates up to 1.8 MMcf/D through a 1" choke. DST-2 over the interval 662-670 metres flowed dry gas at rates up to 6.3 MMcf/D through a 1" choke. Section 2.5 of this report summarizes the testing programme. Analyses of the gas samples can be found in Appendix B6.

3.8 Contributions to Geological Knowledge

1. It is interpreted that a faster rate of sedimentation occurred during the basal Miocene at Baleen than at the Flathead and Lakes Entrance locations. Sedimentation occurred in palaeo water depths of 200-300 metres and is interpreted as part of a marine canyon complex.

2. The lack of significant Oligocene section indicates a hiatus of some 5 million years during the Oligocene at the Baleen location.

3. The Upper Eocene sequence has been interpreted as marine with petrological variations coincident with sea level fluctuations during the Upper Eocene. It is therefore proposed that no Latrobe Group sediments were penetrated.

Poor geology

4. The Baleen No.1 well confirmed the presence of suitable reservoir rocks within the "marine transgressive unit". Porosities decreased with depth from 30-20% over the interval 660-707 metres which constituted the hydrocarbon zone.

5. Production tests confirmed the presence of hydrocarbons, with DST's flowing dry gas at rates of up to 6.3 MMcf/d and formation permeabilities in excess of 800 md.

6. Abnormally high skin effects were observed during the production tests at Baleen-1 due to formation damage. Flow rates in excess of 20 MMcf/d are anticipated if formation damage is kept to a minimum.

7. Palynological studies of sidewall cores at Baleen dated the upper section of the Strzelecki Group to be of Albian age (Lower Cretaceous). This is amongst the youngest Strzelecki Group sediments penetrated in the Gippsland Basin.

8. Although the Strzelecki Group sediments at Baleen-1 were tight they would be considered as a valid target if permeabilities were better developed.

4.0 WELL DATA

4.1 Formation Sampling

A standard "Alpha" unit from Exploration Logging Australia Inc. was used for the 1981-82 Gippsland Basin drilling programme. Exlog personnel provided continuous monitoring of ditch gas and mud pit levels, and recorded the following parameters, together with ditch gas, every 5 metres : gas chromatography, calcimetry, blendor gas analyses and mud weight in and out. Corrected drilling exponent calculations were also performed every 5 metres in shaly intervals, but are not considered reliable due to a faulty motion compensator on the drilling vessel. A Drill Monitor System panel provided continuous readings of engineering/drilling parameters, which were noted every 5 metres.

Washed and dried cuttings samples were collected in 5 metre (minimum) compilations from below the base of the 20" casing shoe, at 209m, to the Total Depth at 1030m. Hudbay and Exlog geologists maintained separate lithological logs (see Enclosures 5 & 6 and Appendix B7).

400g unwashed, 15m composite samples were bagged from below the 20" casing shoe and 100g unwashed, 15m composite samples were taken from below the 9-5/8" casing shoe, at 564m. The former were submitted for palynological study; the latter were sealed with preservation in cans and submitted for geochemical analysis.

4.2 Coring Programme

4.2.1 Conventional Cores

No conventional cores were cut in Baleen No.1.

4.2.2 Sidewall Cores

Summary

Suite 1 (09/11/81)
Interval Shot : 230.0 - 551.7 metres
Shots Attempted : 30
Cores Recovered : 30
Bullets Empty : Nil
Bullets Misfired : Nil
Bullets Lost : Nil

Suite 2 (18/11/81)
Interval Shot : 566.0 - 1030.0 metres
Shots Attempted : 60
Cores Recovered : 52
Bullets Empty : 4
Bullets Lost : 4
Bullets Misfired : Nil

Total : 90 Shots 82 Recovered

BALEEN — 1.

4.3 Wireline Logs and Wireline Sampling

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

Suite	Date	Logs	Interval (m)	Remarks
1	09/11/81	FDC-GR (1:200 & 1:500)	208.0 - 575.3	
		DIT-BHC-GR (1:200 & 1:500)	208.5 - 573.5	Recorded GR to 65 m
		CST (1:200)	230.0 - 551.7	
2	17/11/81	FDC-CNL-GR (1:200 & 1:500)	566.0 -1030.0	
		DLL-MSFL-GR (1:200 & 1:500)	566.0 -1025.0	
		BHC-GR (1:200 & 1:500)	566.0 -1025.0	
		HDT (1:200)	566.0 -1029.0	
	18/11/81	RFT-GR	661.0 - 998.5	5K gauges used in pressure test, halve all pressures.
		CST (1:200)	581.0 -1014.1	Two runs of the CST were made.
	21/11/81	CBL-VDL (1:200)	440.0 - 718.5	
	23/11/81	Perforation Record (1:200)	700.0 - 706.0	
	27/11/81	Bridge Plug Setting Record (1:200)	634 - 652.0	

Additional Services

Date	Logs	Interval (m)
17/11/81	Cyberlook (1:200)	566.0 -1029.0
05/12/81	Continuous Dipmeter (Cluster with Dipmean) (1:200 & 1:500)	567 -1029.0
17/11/81	Cyberdip (1:100)	566.0 -1029.0
	Geodip (1:20)	625-725, 910-1000

Refer to Appendix B4 for further details and interpretation of the logs.

A Velocity Survey and Synthetic seismogram were run by Seismic Services Limited (Enclosures 3 & 4).

Repeat Formation Tests (RFT's)

Fourteen RFT's were attempted in Baleen No.1: eight were pressure tests, the remainder were for sampling. No hydrocarbons were recovered, but a small amount of mud was recovered in three of the tests. Further details of the RFT's and a discussion of the results are presented in Appendix B4.

5.0 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.

APPENDIX B1 PALAEONTOLOGY REPORT

FORAMINIFERAL SEQUENCE
in BALEEN #1

For:- HUDBAY OIL (AUSTRALIA) LTD.

January 14th, 1982

Paltech Report
1982/01

PALTECH PTY LTD
MARINE MICROPALEONTOLOGISTS
SYDNEY NEW SOUTH WALES
MIDLAND WESTERN AUSTRALIA

THE FORAMINIFERAL SEQUENCE

IN BALEEN #1

Fifty six samples from BALEEN #1 were examined for foraminiferal content although only fifty five side wall cores were examined (see footnote ¶). The following sequence was interpreted :-

Sidewall Cores Depth(m)	Approx. E-log Unit Boundary	Age	Zone*	Paleoenvironment
230.0 to 332.6		Pliocene to Mid Miocene	A to C	Inner Continental shelf (∿10-40m)
	Transitional			
353.7 to 435.2		Mid Miocene	D to E	Canyon Head (∿40m)
	Transitional			
458.0 to 538.0		Early Miocene	F to G	Mid shelf canyon (40-200m)
	Transitional			
551.7.0 to 597.0		Early Miocene	H-1	Shelf edge canyon (∿200m)
	Transitional			
612.0 to 627.0¶		Early Miocene	H	Upper slope fan (200-300m)
	∿∿∿627.0∿∿∿			
627.0¶ to 632.0		Oligocene	J	Inner shelf (10-40m)
	638.5			
640.0 to 651.0		Late Eocene	K	Estuarine entrance >10m
	657.0 to 662.0			
658.0 to 698.0		?	No plank. forams found	Deltaic/Estuarine
	base of sequence examined			

*Planktonic foraminiferal zonation after Taylor in prep.

¶SWC at 627 treated as two distinct samples as initial perusal showed two distinct lithologies, so it was split axially.

A list of side wall cores studied is shown on Tables I & 2. Planktonic foraminiferal content varied; being sporadic in the deltaic / estuarine sediments and consistantly diagnostic in the Early Miocene, but preservation precluded positive identification in some Mid Miocene samples from 458.0 to 332.6m.

Tables I & II (herein) detail the record summarised on page 1. A correlation diagram, Figure 1, is included, as is a micropaleontological data sheet, which shows the interpreted reliability of the planktonic zone determinations.

CORRELATION OF BALEEN #1 with ADJACENT WELLS and LAKES ENTRANCE

The fence diagram, Figure 1, demonstrates marked differences between Baleen and the other sequences in both biostratigraphic and approximate paleobathymetric correlations, in that: -

1) Oligocene sedimentation is poorly represented when compared with Flathead and the on shore sequence at Lakes Entrance. Thus the Oligocene hiatus, common to many Gippsland off shore sequences is indicated in Baleen. The Baleen hiatus represents a period of some 5 million years.

2) A paleodepth discrepancy is evident at the base of the Miocene (zone H) with Baleen sedimentation having occurred on the upper continental slope (estimated depths between 200 & 300m), whilst sedimentation in other sequences was on the inner continental shelf (approximately 40m). Structural adjustment during the late Oligocene was probably responsible for both the biostratigraphic hiatus and the paleobathymetric differences. Erosion was also evident with recycled Eo/Oligocene foraminifera being recorded in the basal Miocene samples in Baleen (refer Tables I & II). It is also noted that the Eo/Oligocene faunas in all sections, including Baleen, were of estuarine to inner shelf origin (∿0-40m).

3) There was a much higher accumulation rate in Baleen during the basal Miocene (Zone H) when compared with the other sections. These basal Miocene, proximal Carbonate turbidites, in Baleen, effectively filled the Oligocene depression created between 30 and 25 million years. Paleobathymetric equilibrium was achieved between sections (on Figure 1) by the Early/ Mid Miocene boundary (Zones F/E) at 15 million years.

NOTES and EXPLANATORY REFERENCES

1) LAKES ENTRANCE OIL SHAFT: Biostratigraphic sequence, shown on Figure 1, was adapted from Jenkins, D.G, 1960 - Planktonic foraminifera from the Lakes Entrance oil shaft, Victoria, Australia. *Micropaleontology, 6(4); 345-371.* Additional data below 367m and above 65m was gathered from wells and outcrop in immediate vicinity and is lodged in *Paltech* files.

2) PREVIOUS WELLS DRILLED ADJACENT TO BALEEN AND WHALE on VIC/P11. Data shown on Figure 1 regarding FLATHEAD #1 is from *Paltech* files. However GANNET #1 and ALBATROSS #1 were precluded from correlation because of poor quality data, as the only samples available and examined were ditch cuttings.

3) PALEOBATHYMETRIC INTERPRETATIONS were derived from the distribution of depth sensitive, benthonic foraminifera (listed on Table II) recorded in *Paltech* files with collaboration from:- HAYWARD, B.W. & BUZAS, M.A., 1979- Taxonomy and paleoecology of early Miocene benthic foraminifera of Northern New Zealand and the North Tasman Sea. *Smithsonian Contribs. to Paleobiology 36;* and references cited therein.

MICROPALEONTOLOGICAL DATA SHEET

BASIN: GIPPSLAND ELEVATION: KB: 9.8m GL: 54.9m

WELL NAME: BALEEN # 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										
		A_4						275.6	1			
MIOCENE	LATE	B_1	287.0	0				298.4	1			
		B_2	308.2	1				308.2	1			
		C	321.2	1				332.6	1			
	MIDDLE	D_1	353.3*	1								
		D_2										
		E_1										
		E_2										
	EARLY	F	469.0*	0				514.0	1			
		G	524.0	1				538.0	1			
		H_1	551.7	1				623.0	1	618.0	0	
OLIGOCENE	LATE	H_2	627.0¶					627.0¶	1			
		I_1										
		I_2										
	EARLY	J_1	627.0¶	1				632.0	1			
		J_2										
EOCENE		K	646.0	1				646.0	1			
		Pre-K										

COMMENTS: * Interval from 469.0 to 366.0 can only be designated as E/D; being impossible to subdivide biostratigraphically due to poor preservation caused initially by canyon deposition & subsequent redistribution of carbonate and silica. This interval is represented by nine SWCs.

¶ SWC at 627 sampled across a disconformity between J-1 and H-2, thus sampling the widespread Gippsland late Oligocene hiatus. The higher sample contains a mixed fauna of recycled J with H-2.

CONFIDENCE RATING:

O:	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: 4/1/1982.

DATA REVISED BY: DATE:

SIDEWALL CORE Depth in metres	PLANKTONIC FORAMINIFERA																																									PLANKTONIC FORAMINIFERAL ASSEMBLAGE		AGE
	G'ina angiporoides	*G'ina linaperta*	*G'alia gemma*	*G'ina labiacrassata*	*G'ina praebulloides*	*G'alia nana*	*G'ina euapertura*	*G'ina woodi woodi*	*G'alia continuosa*	*G'ina woodi connecta*	*G'quad dehiscens*	*Cat. dissimilis*	*G'quad advena*	*G'alia bella*	*G'alia zealandica*	*G'oides trilobus*	*G'alia praescitula*	*G'quad altispira*	*G'oides bisphericus*	Globigerinid indet	*G'ina bulloides*	*G'ina ciperoensis*	*G'oides rubra*	*G'alia miozea miozea*	*G'alia praemenardii*	*G'alia conica*	*G'ina decoraperta*	*Orb. universa*	*Praeorb glomerosa*	*G'alia mayeri*	*G'alia miotumida*	*G'alia scitula*	*G'alia miozea conoidea*	*G'alia acostaensis*	*G'elloides aequilateralis*	*G'alia conomiozea*	*G'ina falconensis*	*G'ina nepenthes*	*G'alia sphericomiozea*	*G'alia puncticulata*	*G'oides sacculifer*	ZONE	Depth at Base	
230.0→																				D																								
241.4→																				D								°																
253.8→																				D																								PLIOCENE
264.4→																					°						°	°						°								A		
275.6→																x					x						x	°						°		°	x		°	x	°	A-4	275.6	
287.0→																x					x						x	x			°		x	x	°	°	x	°	°					
298.4→																x		°			x						x	x			°		x	°		x	x					B-1	298.4	
308.2→																°					x							D					°	°	°							B-2	308.2	LATE MIOCENE
321.2→											°										°						°			°			°											
332.6→								°								°					°				°			°		°	°	°										C	332.6	
344.0→								°								°											°															?		
353.7→																°			°					°	°		°	°	°													D-1	353.7	
366.0→																°		°	°	D																								
378.5→																				D																								MID
390.0→																				D							?															?		
405.6→																				D																								
412.0→											°													°		°																		
420.0→																°									°																	E/D		MIOCENE
435.2→																°			°	D	°																							
446.6→																				D																						?		
458.0→																				D																							458.0	
469.0→								x		°	°			°		x	°		°		x	°	°	°																				? — ? — ?
476.0→																				D																								
481.6→								°		°	°		°			°		x	°		°																							
493.0→																?			?	D																								
503.4→																?			?	D																						F		
514.0→								x	°	?				°		°	°		°																								514.0	EARLY
524.0→								x		x	°					°	°	°																										
538.0→								x		°						°																										G	538.0	
551.7→					x			x	°	x	x	°		°																														
581.0→								°		°	°																																	
584.9→					x			x		x	°	°																																MIOCENE
590.0→					x			x	°	x	x	°	°	°	°																													
597.0→					x			x	°	x	x	°	x	°																														
601.0→								°		°																																H-1		
612.0→					x			x	°	°	x	°	°	°	°																													
618.0→					x			x	°	x	x		°	°	°																													
623.0→						°		x	°	°	°	°																															623.0	
627.0*→	r	r			°	°	m	°	°																																	H-2	627.0¶	late Oligocene
627.0*→	°			°	°	°	°																																					
632.0→	°			°	°	°																																				J-1	632.0	early Oligocene
640.0→	No planktonics seen																																									?K?	640.0	
646.0→	°	°	°																																							K	646.0	LATE EOCENE
651.0→	°																																									?K?	651.0	
658.0→																																												? — ? — ?
659.0→																																												
672.0→																																												
675.0→																																												
678.0→																																										?		? ?
680.0→	NO PLANKTONICS SEEN																																											
683.0→																																												
685.0→																																												
688.0→																																												
690.0→																																												
693.0→																																												
698.0→																																												

KEY:
° <20 specimens
x >20 specimens
D Dominant >60% of assemblage
r recycled Eo/Oliogcene specimens
m mixture of recycled & fresh specimens

* SWC at 627 contains two distinct assemblages.

¶SWC at 627 sampled across disconformity between J-1 & H-2, with upper portion containing mixed J & H-2 fauna.

TABLE 1: PLANKTONIC FORAMINIFERAL DISTRIBUTION - BALEEN # 1.

PALTECH REPORT 1982/01

PE900815

This is an enclosure indicator page.
The enclosure PE900815 is enclosed within the container PE902682 at this location in this document.

The enclosure PE900815 has the following characteristics:

ITEM_BARCODE = PE900815
CONTAINER_BARCODE = PE902682
NAME = Foraminifera Distribution Table
BASIN = GIPPSLAND
PERMIT = VIC/P11
TYPE = WELL
SUBTYPE = DIAGRAM
DESCRIPTION = Significant Benthonic Foraminiferal Distribution, Residue Lithology and Paleoenvironmental Assessment, Baleen-1
REMARKS =
DATE_CREATED = 14/01/1982
DATE_RECEIVED =
W_NO = W759
WELL_NAME = BALEEN-1
CONTRACTOR = PALTECH PTY LTD
CLIENT_OP_CO = HUDBAY OIL

(Inserted by DNRE - Vic Govt Mines Dept)

APPENDIX B2 PALYNOLOGY REPORT

BALEEN NO. 1 WELL

Palynological Examination and Kerogen Typing of Sidewall Cores

by

W.K. Harris

PALYNOLOGICAL REPORT

Client	:	Hudbay Oil (Australia) Ltd.
Study	:	Baleen No. 1 Well, Gippsland Basin.
Aims	:	Determination of age and distribution of kerogen types and spore colour.

INTRODUCTION

Thirty nine sidewall cores from Baleen No. 1 Well drilled in the Gippsland Basin at Lat. 38°0'36.63"S, Long. 148°28'8.4"E in Vic. P-11 were processed by normal palynological procedures.

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

OBSERVATIONS AND INTERPRETATION

A. Biostratigraphy

Table 1 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.

Several 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 are generally well preserved but assemblages were often not very diverse limiting the biostratigraphic precision.

1. Early Cretaceous 709 to 1014m

Assemblages from this section of the well were generally well preserved but many samples yielded only very sparse or poorly diversified assemblages. Between 878m and 1014.1m there is little diversity in the assemblages and ~~nothing in particular~~ that can be used for precise biostratigraphic assignment. The species recorded are consistent with an Early Cretaceous age but their range is often much greater.

An assemblage at 840.1m records the first appearance of Coptospora paradoxa marking the base of the zone of Coptospora paradoxa. The assemblages at this point became more diversified although low yields predominate. Between 745 and 795m yields are low and assemblages are poorly diversified. The Coptospora paradoxa asemblage reappears at 723m and the top of the Cretaceous section appears to still in this zone at 709m.

BALEEN NO. 1 WELL

TABLE 1

SUMMARY OF BIOSTRATIGRAPHY AND AGE

DEPTH IN METRES	BIOSTRATIGRAPHIC UNIT	AGE
640	Late N. asperus	Late Eocene
646	Late N. asperus	Late Eocene
651	Late N. asperus	Late Eocene
658	Middle-Late N. asperus	Late Eocene
659	Middle-Late N. asperus	Late Eocene
672	Middle-Late N. asperus	Late Eocene
675	Middle-Late N. asperus	Late Eocene
678	Middle-Late N. asperus	Late Eocene
680	Middle-Late N. asperus	Late Eocene
683	Middle-Late N. asperus	Late Eocene
685	Middle-Late N. asperus	Late Eocene
688	Middle-Late N. asperus	Late Eocene
690	Middle-Late N. asperus	Late Eocene
693	No older Middle N. asperus	?Late Eocene
698	No older Middle N. asperus	?Late Eocene
709	Coptospora paradoxa	Albian
723	Coptospora paradoxa	Albian
735	Barren	-
745	Indeterminate	Early Cretaceous
751	Indeterminate	Early Cretaceous
765	Indeterminate	Early Cretaceous
774	Indeterminate	Early Cretaceous
784	Barren	-
795	Indeterminate	Early Cretaceous
817.9	Coptospora paradoxa	Albian
830	Coptospora paradoxa	Albian
840	Coptospora paradoxa	Albian
855	Barren	-
878	Indeterminate	Early Cretaceous
918	Indeterminate	Early Cretaceous
927	Indeterminate	Early Cretaceous
941	Indeterminate	Early Cretaceous
946.9	Indeterminate	Early Cretaceous
958	Indeterminate	Early Cretaceous
967	Indeterminate	Early Cretaceous
973	Indeterminate	Early Cretaceous
982	Indeterminate	Early Cretaceous
998	Indeterminate	Early Cretaceous
1014.1	Indeterminate	Early Cretaceous

BALEEN NO. 1 WELL

TABLE II

DISTRIBUTION OF CRETACEOUS SPECIES

Depth in metres	1014.1m	998	982	973	967	958	946.9	941	927	918	878	840.1	830	817.9	795	774	765	751	745	723	709
Baculatisporites comaumensis	X											X	X	X	X		X		X	X	X
Classopollis sp.	X																			X	
Cyathidites australis	X		X	X		X	X	X	X	X	X	X	X	X		X	X	X	X	X	X
Gleicheniidites	X																				
Kraeuselisporites sp.	X																				
Podocarpidites	X	X	X			X	X		X		X	X	X	X	X	X	X	X	X		X
Ceratosporites equalis		X		X				X	X					X						X	
Falcisporites australis			X	X	X				X	X		X		X	X			X		X	X
Ginkgocyadophytus sp.			X							X				X			X			X	
Lycopodiumsporites austroclavatidites				X	X				X				X	X						X	X
Microcachryidites antarcticus									X		X	X		X						X	X
Sestrosporites pseudoalveolatus									X												
Stereisporites antiquasporites									X		X	X	X	X		X					
Aequitriradites spinulosus												X	X							X	
Coptospora paradoxa												X		X							
Balmeisporites holodictyus												X									
Cicatricosisporites australiensis													X	X							
Neoraistrickia truncata													X								
Araucariacites australis														X							
Crybelosporites striatus														X						X	X
Dictyophyllidites mortoni														X						X	
Foveosporites canalis														X							
Foraminisporis sp.														X							
Pilosisporites grandis														X							
Podosporites microsaccatus														X							X
Stereisporites pocockii														X		X				X	
Cingutriletes clavus																X				X	
Cicatricosisporites ludbrooki																				X	
Densoisporites velatus																				X	
Leptolepidites major																				X	
L. verrucatus																				X	
Podosporites																				X	
Vitreisporites pallidus																				X	
Aratrisporites sp.																				X	
Foraminisporis dailyi aff.																					X
Gieicheniidites circinidites																					X

BALEEN NO. 1 WELL

TABLE III

DISTRIBUTION OF TERTIARY SPECIES

Depth in metres	698	693	690	688	685	683	680	678	675	672	659	658	651	646	640
Baculatisporites comaumensis	X						X				X	X		X	
Baculatisporites disconformis	X														
Cupanieidites orthoteichus	X	X						X	X						
Cyathidites splendens aff.	X														
C. australis	X	X				X	X	X	X	X	X	X		X	
Gleicheniidites circinidites	X						X								X
Haloragacidites harrisii	X	X	X	X	X	X	X	X	X		X	X	X		X
Haloragacidites sp.	X														
Helciporites astrus	X														
Hystrichosphaeridium sp.	X														
Kuylisporites waterbolki	X								X						
Laevigatosporites major	X														
Lygistepollenites florinii	X	X				X		X	X				X		
Malvacipollis diversus	X	X				X	X		X		X	X	X		
Myrtaceidites parvus/mesonesus	X		X				X		X						
Nothofagidites brachyspinulosus	X	X				X	X	X		X	X				
Nothofagidites emarcidus/heterus	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Nothofagidites falcatus	X		X			X			X		X				X
Nothofagidites flemingii	X						X		X		X		X	X	
Phyllocladidites mawsonii	X	X	X	X	X	X	X		X	X	X	X	X	X	
Podocarpidites sp	X	X	X				X	X	X		X	X			X
Proteacidites parvus	X	X													
Rugulatisporites mallatus aff.	X					X		X							
R. trophus	X														
Sapotaceoidaepollenites rotundus	X											X			
Simplicepollis meridianus	X					X		X							
Spinidinium sp.	X		X								X				
Triletes tuberculiformis	X		X								X				
Tricolporites geranoides aff.	X														
Verrucosisporites cristatus	X					X									
Dacrycarpites australiensis		X													
Lycopodiumsporites sp.		X													
Matonisporites ornamentalis		X										X			X
Microcachyridites antarcticus		X												X	
Parvisaccites catastus		X													X
Periporopollenites demarcatus		X									X				
Periporopollenites vesicus		X	X												
Podosporites microsaccatus		X													
Proteacidites latrobensis		X													
Paralecaniella indentata		X		X				X				X			
Operculodinium sp.		X					X								
Deflandrea phosphoritica		X													
Corrudinium incompositum		X													
Proteacidites pachypolus		X				X	X		X						
Santalumidites cainozoicus		X				X	X			X					

Depth in metres	698	693	690	688	685	683	680	678	675	672	659	658	651	646	640
Stereisporites (Tripunctisporis) punctatus		X													
Thalassiphora pelagica			X												
Deflandrea heterophylycta			X												
Operculodinium centrocarpum			X									X	X	X	X
Proteacidites sp				X			X			X		X			X
Laevigatosporites ovatus						X						X			
Tricolpites thomasii						X	X				X				
Verrucosisporites kopukuensis						X			X	X					
Gonyaulacoid cyst						X									
Dryptopollenites semilunatus							X								
Nothofagidites deminutus							X			X	X			X	
Proteacidites annularis							X								
Tricolpites phillipsii							X		X						
Cyclopsiella sp.							X								
Spiniferites adelaidensis							X								
Spiniferites ramosus							X				X		X	X	X
Areosphaeridium sp.							X	X					X	X	
Proteacidites adenanthoides								X							
Phthanoperidinium comatum								X							
Krauselisporites sp.									X						
Proteacidites incurvatus									X						
Tricolporites adelaidensis									X					X	
Tricolporites sphaerica									X						
Dictyophyllidites sp.										X					X
Proteacidites obscurus											X				
Araucariacites australis												X			
Stereisporites antiquasporites												X			
Tricolporites sp.												X			
Spiniferites spp.												X			
Impagidinium victorianum												X	X		
Spiniferites pseudofurcatus												X			
Vozzhennikovia extensa												X			
Impletosphaeridium sp.													X		
Hystrichokolpoma rigaudae														X	
Areosphaeridium pectineforme														X	X
Herkosporites elliottii															X
Camarozonosporites sp.															X
Nothofagidites asperus															X

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

2. Eocene 640 to 698m

Although assemblages from this section of the well were well preserved the samples yielded in general very low quantities of organic matter with concomittant poor diversity.

Notwithstanding these features all assemblages can be assigned to the Nothofagidites asperus zone and some refinement can be made within this. Assemblages from 698 and 693m are certainly no older than Middle N. asperus zone but could be younger. The low diversity of Proteacidites spp. would tend to favour the younger age but with low diversity assemblages this assignment may be questioned. Dinoflagellates are uncommon in the sample at 698m but indicate some marine influence. Dinoflagellate assemblages become more diverse at 693m and the remainder of the samples to 640m have an increasingly stronger marine influence attesting to marine transgression in the Late Eocene.

The age of samples up to 658m is Late Eocene but their low yields and poor diversity precludes more precise biostratigraphic determination. The general appearance of the assemblages however would favour to younger assignment. From 651 - 640m the assemblages are more confidently assigned to the Late N. asperus zone from dinoflagellate evidence which includes the dominance of Spiniferites spp. and Areosphaeridium pectiniforme. The very common occurrence of dinoflagellates in these samples is indicative of open marine probably near shore sedimentation.

There would appear to be no significant breaks in the Eocene section of the well and the entire sequence was deposited under the influence of a late Eocene transgression.

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.

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 than1%.

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 connatation. 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 contribute to hydrocarbon generation whereas at a TAI of 2, only amorphogenforms liquid hydrocarbons. The upper boundary defining the oil window is at a TAI ofapproximately 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 throughout this unit are characterised by high melanogen with only one exception (e.g. 878m) where amorphogen becomes a significant component. If this section was mature for the genration of hydrocarbons if would yield dominantly gas with minor amounts of condensate.

Spore colour throughout is consistant at about 2 and cannot be considered to be mature especially when the kerogens are dominated by melanogen. 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 amorphogen which appears as finely divided organic matter.

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 matterof a favourable nature to be considered as a potential source rock for the generation of hydrocarbons.

BALEEN NO. 1 WELL

TABLE V

DISTRIBUTION OF KEROGEN TYPES AND SPORE COLOUR

DEPTH (m)	TAI	TOM	PHYROGEN %	AMOR. %	HYLOGEN %	MELANOGEN %
640	-	very low	*Tr	95		5
646	-	very low		95	Tr	5
651	**N.D.	very low		90	Tr	10
658	N.D.	very low		60	Tr	40
659	N.D.	very low		90	Tr	10
672	N.D.	very low		60	Tr	40
675	N.D.	very low	Tr	90	Tr	10
678	1+	very low	5	70	5	25
680	N.D.	very low	5	80	Tr	15
683	1+	very low	25	40	5	30
685	1+	very low	Tr	60	Tr	40
688	1+	very low	Tr	70	Tr	30
690	1+	very low	Tr	60	Tr	40
693	1+	very low	Tr	70	Tr	30
698	1+	low	Tr	60	Tr	40
709.0	2	very low	10	-	10	80
723	2+	very low	30	-	10	60
735	N.D.	very low	-	-	-	100
745	N.D.	very low	10	-	Tr	90
751	N.D.	very low	5	-	Tr	95
765	N.D.	very low	5	-	Tr	95
774	2	very low	5	-	Tr	95
784	N.D.	barren	-	-	-	100
795	2	very low	10	Tr	10	80
817.9	2	low	30	Tr	20	50
830	2	very low	20	-	10	70
840.1	2	low	25	-	15	50
855	N.D.	barren	-	-	-	-
878	2+	very low	10	60	Tr	30
918	2	low	5	-	5	90
927	2	low	15	-	5	80
941	N.D.	very low	10	-	Tr	90
946	2+	very low	10	-	Tr	90
958	N.D.	very low	5	-	Tr	95
956	2	very low	10	-	Tr	90
973.0	N.D.	low	20	Tr	10	70
982	N.D.	low	5	-	5	90
998	2-	low	30	-	10	60
1014	N.D.	very low	5	-	5	90

* Tr indicates "trace"

** N.D. indicates "not determined"

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W.K. Harris
Consulting Geologist

16 July 1982

APPENDIX B3 PETROLOGY REPORT

Special Core Analysis Study

for

HUDBAY OIL, LTD. (AUSTRALIA)

No. 1 Baleen Well

7501 STEMMONS FREEWAY BO[illegible]547 DALLAS, TEXAS 75247 · 214/631-8270

CORE LABORATORIES, INC.
Special Core Analysis

February 22, 1982

Hudbay Oil, Ltd. (Australia)
256 Adelaide Terrace
P. O. Box 6124
Hay Street East
Perth, Western Australia 6000

Attention: Mr. J. W. Roestenburg

Subject: Combination Petrographic Studies
No. 1 Baleen Well
File Number: SCAL-308-81471

Gentlemen:

On December 1, 1981, seven core samples from the subject well were received by the Special Core Analysis Department of Core Laboratories, Inc., at Dallas, Texas, with a request by a representative of Core Laboratories International, Ltd., in Singapore for Combination Petrographic Studies. Damage in transit, however, permitted examination of only three of the samples. These examinations consisted of Petrographic Analysis by Thin Section, Mineral Content Determinations by X-ray Diffraction and Scanning Electron Microscope (SEM) observations. Results of these analyses are presented herein.

A portion of each of the submitted samples was prepared for thin section analysis and examined with a polarized light microscope. Thin section descriptions appear on Pages 1 through 3.

Additional portions of each of the samples were prepared for X-ray diffraction analyses. As requested, the whole rock and clay-sized (less than 4 microns in diameter) fractions were analyzed separately using monochromatic CuKα radiation. Results of these analyses appear on Page 4.

Another portion of each of the samples was prepared for SEM examination by creating freshly broken surfaces and coating these surfaces with a thin (750Å) film of gold-palladium. A discussion of the features observed by SEM appears on Pages 5 and 6.

Net clay values for the samples from 662 meters, 702 meters, and 705 meters were found to be 11.3 percent, 12.4 percent and 14.4 percent, respectively. Predominant among the clay minerals identified in each sample is kaolinite. Lesser amounts of illite clay were also identified in each sample. Production problems associated with these clays include a possible "mobile fines" reduction of permeability resulting from high flow rates, and a significant development of microporosity leading to high irreducible water saturations. Although a detrital matrix morphology is indicated in SEM photomicrographs, problems associated with these clay minerals should be minimized. Hydrochloric (HCl) acid or HCl/hydroflouric (HF) acid treatments could have a positive effect; however, the presence of iron-rich dolomite, siderite and pyrite in these samples requires the addition of an iron-chelating agent (e.g., citric acid) and an oxygen scavenger to inhibit formation damage by gelatinous ferric hydroxide. The significant content of montmorillonite identified in the sample from 662 meters reflects substantial contamination by drilling mud infiltrate, and does not pose a problem to production.

It has been a pleasure performing these analyses on behalf of Hudbay Oil, Ltd. (Australia). Should any questions arise, or if we can be of further assistance, please do not hesitate to contact us.

Very truly yours,

Core Laboratories, Inc.

John A. Koerner

John A. Koerner, Laboratory Supervisor
Special Core Analysis

JAK:SRO:md
7cc. - Addressee

CORE LABORATORIES, INC.
Petroleum Reservoir Engineering
DALLAS, TEXAS 75247

Petrographic Analysis by Thin Section

Hudbay Oil, Ltd.
No. 1 Balleen Well

Depth, meters: 662

Very fine sandstone: quartz arenite

This sample is a moderately sorted, moderately packed quartz arenite. It consists of 73 percent quartz, 9 percent clay, 7 percent pyrite, 4 percent mica, 3 percent rock fragments, 2 percent goethite-limonite, and 2 percent organic material. Grain roundness varies from angular to subrounded while grain shapes vary from elongate to subequant and average 0.09mm in diameter. Grain contacts are tangential, planar, or concavo-convex.

Monocrystalline quartz exhibiting straight or undulose extinction is the major framework grain. Microlite inclusions of zircon and apatite are common in the quartz crystals. Minor vacuolization of quartz grains is also noted. Polycrystalline quartz with sutured subcrystal contacts and undulose extinction is rare. The lithic portion consists primarily of muscovite and biotite which are occasionally bent around framework grains. Microcrystalline chert grains are present in minor amounts. Glauconite pellets, although rare in occurrence, have been partially replaced by subhedral to euhedral pyrite. Clay clasts have also been replaced by pyrite. Pyroxene, zircon, collophane, glauconite, leucoxene, ilmonite, and apatite occur in trace amounts. Cementation is primarily by grain-coating and pore-filling detrital clays. Euhedral to subhedral and framboidal pyrite and goethite-limonite act as substantial pore-filling cements. Glauconite pellets and clay clasts have suffered the effects of post-depositional compaction and consequently are often deformed around stable framework grains. Hematite and microcrystalline quartz are minor cementing agents.

Primary intergranular porosity accounts for approximately 2 percent of this sample.

All percentages were obtained by point count.

Petrographic Analysis by Thin Section

Hudbay Oil, Ltd.
No. 1 Baleen Well

Depth, meters: 702

Fine sandstone: iron-rich quartz arenite

This sample is a moderately sorted, moderately packed iron-rich quartz arenite which consists of 37 percent quartz, 25 percent siderite, 25 percent goethite, 6 percent detrital clay, 3 percent feldspar, 2 percent organic material, and 2 percent mica. Grain roundness varies from angular to subrounded while grain shapes vary from elongate to subequant. Grain sizes average 0.12mm in diameter. Grain contacts are either tangential or planar.

The predominant framework grain, monocrystalline quartz, exhibits straight or undulose extinction and contains occasional microlitic inclusions of apatite and zircon. Muscovite and biotite often show evidence of post-depositional compaction and consequently are deformed around stable framework grains. Albite-twinned plagioclase represents the feldspar portion of this sample and alteration to sericite and clay is common. In addition, etching along cleavage traces is noted. Traces of hornblende, dolomite, hematite, and glauconite are present.

Cementation is primarily by equal amounts of siderite and goethite. Occasionally euhedral to subhedral siderite rhombs and geothite, which often replaces glauconite pellets, are present as pore-filling and grain-coating cements. Detrital clay is present as a grain-coating cement.

Primary intergranular porosity accounts for approximately 3 percent of this sample.

All percentages were obtained by point count.

Petrographic Analysis by Thin Section

Hudbay Oil, Ltd.
No. 1 Balleen Well

Depth, meters: 705

Coarse sandstone: slightly metamorphosed quartz wacke

This sample is a poorly sorted, loosely packed quartz wacke. It consists of 29 percent quartz framework grains, 50 percent sericitized polycrystalline quartz matrix, 16 percent clay, and 5 percent pyrite. Grain roundness varies from angular to subrounded while grain shapes vary from elongate to subequant. Grain sizes range from 0.2mm to 6.1mm in diameter. Grain contacts, although rare due to the high percentage of matrix material, are tangential or planar.

Monocrystalline quartz exhibiting strongly undulose extinction and containing occasional microlite inclusions of apatite and zircon is the predominant framework grain. Polycrystalline quartz grains with sutured subcrystalline contacts and strongly undulose extinction are not as abundant as monocrystalline quartz grains. Many of the quartz grains are stretched and aligned with respect to a common plane, a product of slight metamorphus. Pyroxene, zircon, ilmenite, leucoxene, and tourmaline are found in trace amounts.

Cementation is primarily by a matrix composed of sericitized polycrystalline quartz which appears to be encroaching upon quartz framework grains. This matrix accounts for the greatest loss in porosity of this sample. Detrital clay, detected by the overall "dirty" appearance of the matrix (in plane-polorized light) further reduces porosity. Isolated patches of large (up to 1.7mm), skeletal pyrite crystals have partially replaced framework grains and also serve as a minor cement.

Primary intergranular porosity, due to the abundance of matrix material, is less than 1 percent.

All percentages were obtained by point count.

Mineral Content Determination

(by X-ray Diffraction)

Hudbay Oil, Ltd.
No. 1 Baleen Well

Sample Depth, Meters:	662		702		705	
Particle Size of Sample Fraction:	Whole Rock	Clay	Whole Rock	Clay	Whole Rock	Clay
Estimate of Net Percent Clay Minerals:	11.3		12.4		14.4	
Mineral	**Percent of Sample Analyzed**					
Quartz	86		42		81	
Feldspars	Trace		5		Trace	
Dolomite(Fe-Rich)	-		1		-	
Siderite	1		19		Trace	
Pyrite	2		-		5	
Barite	*		-		Trace	
Goethite	-		21		-	
Kaolinite	5	47	8	66	12	86
Illite/Mica	3	23	4	34	2	14
Montmorillonite	3	30	-	-	-	-

*Significant barite from drilling mud contamination

Scanning Electron Microscope Study

Hudbay Oil, Ltd.
No. 1 Balleen Well

Depth, meters: 662

The sample from 662 meters is a dark gray, loosely consolidated, very fine grain sandstone. Photomicrograph A1(100X) shows a moderately packed aggregate of very fine sand and silt grains cemented by siderite and a matrix of detrital clay. Primary intergranular porosity, viewed in photomicrographs B1(600X) and C1(700X), has been reduced by the cements such that only microporosity associated with the matrix material is significant. A more detailed examination of the matrix material, provided by photomicrographs B2(3000X) and C2(3500X), reveals a poorly defined morphology which suggests a primarily detrital origin. In addition, photomicrograph B1(600X) shows framboidal pyrite.

Depth, meters: 702

The sample from 702 meters is a brown, loosely consolidated, very fine grain sandstone. Photomicrograph A1(100X) shows a moderately packed aggregate of very fine sand and silt grains cemented by a matrix of detrital clay, crystalline siderite and minor amounts of dolomite. Although the cements have greatly reduced primary intergranular porosity, photomicrographs B1(600X) and C1(700X) suggest significant microporosity associated with the matrix material. Photomicrographs B2(3000X) and C2(3500X) provide a more detailed examination of the matrix material, revealing the poorly defined morphology of detrital clay. In addition, finely crystalline rhombohedrons of dolomite are also present.

Scanning Electron Microscope Study

Hudbay Oil, Ltd.
No. 1 Balleen Well

Depth, meters: 705

The sample from 705 meters is a light gray, loosely consolidated, very fine grain sandstone. Photomicrograph A1(100X) shows a moderately packed aggregate of very fine sand and silt grains cemented by a detrital clay matrix and minor amounts of siderite. Primary intergranular porosity, viewed in photomicrographs B1(700X) and C1(800X), has been reduced such that only microporosity associated with the matrix material is significant. Photomicrographs B2(3500X) and C2(4000X) provide a more detailed view of the matrix material and reveal a poorly defined morphology suggesting a primarily detrital origin.

APPENDIX B4 WIRELINE LOG INTERPRETATION

(REFER TO ATTACHED REPORT)

APPENDIX B5 LOG OF CORES

[illegible] Tile

Mr.G.T.Meldrum
Hudbay Oil (Australia) Ltd,
256 Adelaide Terrace
Perth

2 Rowan Place
Woodlands 6018
16 December,1981.

Dear Greg,

Baleen # 1; Side Wall Cores

enclosed herein are the lithological descriptions of the side wall cores from Baleen # 1 as requested in your letter of November 27. The samples are of unconsolidated sand but because of the tight packing of grains and crystals there is virtually no intergranular pore space to be measured.We have not pursued the identity of the clays or carbonate by X-ray diffraction since this would involve a lengthy investigation that seems unwarranted in the circumstances.

Invoices for this work are enclosed.

Yours sincerely,

R G Brown B. W. Logan

R.G.Brown
B. W.Logan
Geologists

BALEEN No.1 - LOG OF SAMPLES

Description of Cuttings Samples

All depths quoted are below the Rotary Table, which is 9.45 metres above Mean Spring Low Water and 64.35 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 209 metres R.T. to Total Depth at 1030 metres.

225 - 295 metres (70 metres)	Calcarenite, skeletal, glauconitic below 280 m, white to dark yellow orange to olive grey, very fine to granular, dominantly fine (forams) and granular (skeletal fragments), poorly sorted, angular to rounded, 15-30% calcite silt, 10-25% micrite, trace-5% clay minerals, trace-5% glauconite, 0-trace pyrite, unconsolidated to moderately hard, fair to very good intergranular porosity, trace intraskeletal porosity.
295 - 500 metres (205 metres)	Calcarenite, skeletal, light grey to medium dark grey, very fine to granular, dominantly granular and very coarse, poorly sorted, angular to rounded, 10-30% calcite silt, trace-25% micrite, 0-10% clay minerals, trace quartz silt, trace quartz grains, trace glauconite, 0-trace pyrite, 0-trace chlorite, unconsolidated to soft, fair to very good intergranular porosity.
500 - 577 metres (77 metres)	Calcisiltite, skeletal, light grey to dark grey to dark greenish grey, 15-45% skeletal fragments (decreasing with depth), very fine to granular, dominantly medium, poorly sorted, angular to rounded, 5-15% micrite, 5-10% clay minerals, trace-5% calcite cement, trace pyrite, 0-trace glauconite, 0-trace chlorite, soft to moderately hard, nil to poor intergranular porosity. Interbedded with 5-35% Claystone, medium dark grey to olive black, 10-15% micrite, 5-20% calcite silt,

	0-5% skeletal fragments, trace pyrite, moderately hard, nil porosity.
577 - 635 metres (58 metres)	Claystone, calcareous, light green grey to olive black, 5-30% skeletal fragments (fine to granular, dominantly coarse, poorly to moderately sorted), 15-20% calcite silt, 5-15% micrite, trace-5% glauconite, trace pyrite, trace chlorite, soft to moderately hard. With 5-65% (maximum between 590-605m) Calcisiltite, skeletal, light green grey to medium greenish grey, 25-30% skeletal fragments (dominantly coarse, moderately sorted), 5-10% micrite, 5-15% clay minerals, soft to moderately hard, trace intergranular porosity.
635 - 690 metres (55 metres)	Claystone, glauconitic, calcisiltitic in part, light green grey to greyish olive, 10-40% glauconite, limonitic in part, 5% skeletal fragments, 15-20% calcite silt, 5-10% micrite, trace pyrite, trace chlorite, very soft to soft. With 10-35% Sandstone, silty in part, glauconitic, clear to light grey to greyish brown, very fine to medium grained, dominantly very fine and fine (size increasing with depth), subangular to subrounded, moderately sorted, 15-25% quartz silt, 10-15% glauconite, trace-10% dolomite, soft to hard, trace-10% intergranular porosity. And below 660 m, trace-5% Sandstone, clear to white to light grey, coarse to granular, dominantly very coarse, subangular to rounded, well sorted, unconsolidated. Note: glauconite oxidised to limonite granules below below 645 m.
690 - 700 metres (10 metres)	Claystone, glauconitic, as between 635-690 m.

With 30-40% Sandstone, glauconitic, clear to greyish brown, very fine to medium, dominantly medium, subangular to subrounded, moderately sorted, 10% quartz silt, 10% glauconite, 5% dolomite, soft to moderately hard, 5-10% intergranular porosity.

And 20-40% Sandstone, coarse to granular as between 660-690 m.

(percentage of claystone and fine sandstone decreasing; coarse, unconsolidated sand increasing from 690-700m).

700 - 705 metres
(5 metres)

Sandstone, coarse to granular, as between 660-690m.

With 15% Claystone, glauconitic, as between 635-690m.

705 - 730 metres
(25 metres)

Sandstone, clear to white to light grey, very fine to granular, dominantly very coarse (at 705m) decreasing to dominantly medium below 715 m, subangular to rounded, poorly to moderately sorted, 5% glauconite, trace pyrite, 0-trace calcite cement, unconsolidated, very good porosity

With (below 710 m), 20-35% Siltstone, argillaceous in part, dark grey to greenish grey to medium bluish grey, 15-20% clay minerals, trace-10% pyrite, 0-5% chlorite, hard to very hard.

730 - 830 metres
(100 metres)

Sandstone, argillaceous in part, clear to white to light grey, very fine to granular, dominantly medium, subangular to subrounded, poorly to moderately sorted, 5-25% kaolin-type clay minerals below 765 m, trace-5% glauconite, trace pyrite, trace skeletal fragments, 0-trace calcite cement, trace carbonaceous material (below 740m), unconsolidated to very soft, poor to very good intergranular porosity.

With 30-45% Siltstone, argillaceous in part, as between 705-730m.

And below 740m, 5-30% Claystone, skeletal in part, olive grey to dark grey to dark green grey, 10-20% skeletal fragments, trace-10% quartz silt, trace pyrite, trace chlorite, trace brown mica (very coarse biotite flakes).

And below 760m, 15-40% Siltstone, arenaceous, light brown to light grey, 35-45% quartz grains, (very fine to fine, dominantly very fine), trace brown mica (very coarse flakes), 5-15% clay minerals, trace pyrite, very soft to soft, trace porosity.

And between 760-780m, and 815-825m, 5-20% Coal, brownish black, soft to moderately hard.

830 - 880 metres
(50 metres)

Sandstone, argillaceous in part, clear to white to light grey to light brown, very fine to granular, dominantly medium, subangular to rounded, poorly to moderately sorted, 5-20% "white" clay minerals (? kaolin), 10-15% quartz silt, trace glauconite, trace pyrite, trace skeletal fragments, trace carbonaceous material and (below 855 m) trace lithic fragments, fair to very good intergranular porosity.

With 30-45% Siltstone, dark grey to greenish grey to brown to orange pink, 10-15% clay minerals, trace-5% pyrite, trace chlorite, moderately hard to hard.

And trace-15% Claystone, as between 730-830m.

And above 740m, 10-15% Siltstone, arenaceous, as between 730-830m.

880 - 925 metres
(45 metres)

Sandstone, argillaceous in part, generally as between 830-880m, with trace feldspar.

With 30-45% Siltstone, as between 830-880m.

And 0-5% increasing to 25% at 925m Claystone, olive grey to dark grey to dark green grey, trace-10% skeletal fragments, very fine to fine, trace-15% quartz silt, trace of pyrite, chlorite and brown mica, soft.

925 - 955 metres
(30 metres)

Sandstone, argillaceous in part, between 880-925m, with trace lithic fragments below 930 m, trace to poor porosity.

With 20-40% Siltstone as between 830-880m.

And 5-40% (dominant between 930-935m) Coal, black, vitreous, high rank at 935m.

And 15-50% (dominant between 940-945m) Claystone, silty in part, as between 880-925m.

955 - 1030 metres
(75 metres)

Sandstone, argillaceous in part, clear to white to light grey to orange, very fine to granular, dominantly medium, subangular to rounded, 10-20% white clay minerals (? kaolin), trace-10% quartz silt, trace glauconite, trace pyrite, trace skeletal fragments, 0-trace carbonaceous material, trace feldspar, rare trace lithic fragments, unconsoldiated to very soft (see note below), fair to good intergranular porosity.

With 30-45% Siltstone, as between 830-880m.

And nil-20% Claystone, silty in part as between 880-925m.

Also nil-20% Coal, as between 925-955m.

NOTE: Below 900 m, cuttings show unconsolidated quartz and siltstone pieces (plus minor claystone and coal), with very little white clay. However chips taken from top shaker show more clay matrix (20% ± ?) and vary from very soft, when wet, to moderately hard or friable when dry. Hence porosity is thought to be much less than indicated from study of cuttings samples.

APPENDIX B6 GEOCHEMICAL ANALYSES

GEOCHEMICAL ANALYSIS OF GAS SAMPLES A-8526 AND A-11939 FROM BALEEN #1

G.W. WOODHOUSE

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

February, 1982

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RESULTS

RESULTS

COMPOSITIONAL ANALYSIS

Component	A-11939 (by volume)	A-8526 (by volume)
Methane	95.8%	95.6%
Ethane	0.16%	0.13%
Propane	8ppm	11ppm
Butanes	3ppm	7ppm
Pentanes	2ppm	2ppm
Carbon Dioxide	0.02%	0.02%
Nitrogen	4.00%	4.20%

ISOTOPE ANALYSIS

Sample	$\delta^{13}C$ (PDB)
A-8526	$-49.8^{o}/oo$
A-11939	$-45.3^{o}/oo$

COMMENTS AND CONCLUSIONS

COMMENTS AND CONCLUSIONS

GENERAL

Two cylinders (#A-8526 and #A-11939) of gas from the Baleen #1 exploration well were provided for geochemical analysis. Firstly, the C_1-C_5 hydrocarbon composition of each gas was determined by gas chromatography using a Chromosorb 102 column and a flame ionization detector (FID). Secondly, the relative proportions of nitrogen, carbon dioxide and ethane in the samples was determined by gas chromatography using a Chromosorb 102 column and a thermal conductivity detector (TCD). Since the proportion of ethane was measured in both analyses and the relative detector responses of all of the analysed gases is known the relative proportion by volume of each of the components was able to be calculated. Finally, the stable carbon isotope ratio of each of the gases was measured using an MS-20 stable isotope mass spectrometer.

We have reason to believe that the determination of the proportion of methane in dry gases such as these Baleen samples is most accurately carried out using a TCD detector rather than an FID detector. Unfortunately, at the time of these analyses we did not have a column suitable for this type of analysis but we are in the process of rectifying this problem for future analyses.

GAS COMPOSITION

The compositional analysis data clearly shows that the two gases are similar in composition and further that they are very dry and contain a moderately high proportion 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 Baleen #1 gases are typical of gas associated with oil generation. However, this type of gas usually has an abundant C_2+ component whereas the Baleen gas has a very small C_2+ fraction. Therefore to explain the isotope ratio and the hydrocarbon composition of Baleen gas it is necessary to suggest that this gas is a mixture of dry bacterial methane and dry thermal gas.

It should be noted that more tenuous explanations such as migration effects could account for the observed hydrocarbon and isotopic composition of these gas samples.

GAS AND FUEL CORPORATION OF VICTORIA
SCIENTIFIC SERVICES DEPARTMENT

SPECIAL TEST REPORT

Requested by Hudbay Oil (Aust.) Pty. Ltd. Sample Book No. 811179

Date Received 11th December, 1981

Material Natural Gas Job No. 248

Query Analysis on Baleen No 1 Report No. 81/786/AN

Origin of Sample Sampling bottles Serial Nos. A11954 (DST #2), A11977 (DST #1)

REPORT

<u>ANALYSIS OF SAMPLING BOTTLE SERIAL NO. A11954.</u>

COMPONENTS	MOLAR CONCENTRATION
Methane	97.9 ± 0.2 percent
Ethane	0.10 ± 0.01 percent
Propane	14 ± 2 ppm
iso Butane	5 ± 2 ppm
normal Butane	less than 2 ppm
neo Pentane	11 ± 2 ppm
iso Pentane	less than 2 ppm
normal Pentane	less than 2 ppm
Heavier Hydrocarbons	96 ± 4 ppm
Oxygen plus Argon	0.04 ± 0.01 percent
Nitrogen	1.87 ± 0.02 percent
Carbon Dioxide	0.13 ± 0.01 percent
Helium	30 ± 10 ppm

A sulphur compound boiling in the range 120 - 160°C (carbon disulphide, ethyl mercaptan or dimethyl sulphide) was found to be present at < 0.2 mgm/m^3 as sulphur. Hydrogen sulphide was not detected (detection limit 5 ppm).

A second sample, sampling bottle Serial No.A11977, was found to be at atmospheric pressure. An oxygen analysis of 7.1 percent indicated air contamination. Lack of sample pressure prevented further analysis.

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Chemist I. STRUDWICK Date 11/12/81

Checked Laboratory

23/25/4561

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GAS AND FUEL CORPORATION OF VICTORIA
SCIENTIFIC SERVICES DEPARTMENT

SPECIAL TEST REPORT

Requested by **Hudbay Oil (Aust) Pty. Ltd.**
Date Received 21/12/81
Material Natural Gas

Query Analysis

Origin of Sample Baleen Field Well No. 1

Sample Book No. 81/1209
Job No. 250
Report No. 82/9/AN

REPORT

Please type only within the lines

Please type only within the lines

Analysis of Cylinder A - 8526

Component	Mole Concentration
Methane	96.8 % ± 0.2
Ethane	0.09 % ± 0.01
Propane	25 p.p.m ± 2
iso-Butane	4 p.p.m ± 1
n-Butane	4 p.p.m ± 1
neo-Pentane	4 p.p.m ± 1
iso-Pentane	5 p.p.m ± 1
n-Pentane	5 p.p.m ± 1
Higher Hydrocarbons	100 p.p.m ± 10
Carbon Dioxide	0.18% ± 0.01
Nitrogen	2.67 % ± 0.05
Oxygen + Argon	0.24 % ± 0.01
Helium	30 p.p.m ± 10
Pressure in cylinder	Approximately 15 lb/in^2

Distribution: Mr. D. R. McDonald, Hudbay Oil (Aust) Pty.Ltd

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Chemist C. Rudolph
Checked

Date 22/12/81
Laboratory

23/25/4561

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

WATER ANALYSIS REPORT FORM

Sample No. 1

Sampled By Schlumberger

Date Sampled

Analysed By Analabs

Field Gippsland Basin

Type of Well Wildcat

Formation

Well Designation Baleen #1

Source of Water Sample RFT#1
(ie. DST, RFT etc.)

Depth Interval (metres) 470.3

CHEMICAL ANALYSIS

JOB REF 82.0 01 22331

Ionic Species		Concentration	
		mg/litre	me/litre
CATIONIC	Sodium	3800	165.22
	Calcium	19100	955
	Magnesium	165	13.75
	Barium	6.3	
	Iron	1.5	
ANIONIC	Chloride	58078	1636
	Sulphate	500	10.42
	Carbonate	< 0.3	
	Bicarbonate	414.8	6.8

Sulphur Concentration (as H_2S) 25.6 mg/litre

OTHER PROPERTIES

pH (at 60°F) 7.23 mg / 1

Specific Gravity (60°F/60°F) 1.0737 mg / 1

Resistivity (ohm-metres) 117760

Refractive Index (at 60°F)

Drawing No. A4-DR-404

Hudbay Oil (Australia) Ltd.

Subsidiary of Hudson's Bay Oil & Gas Company Ltd

WATER ANALYSIS REPORT FORM

Sample No. 2

Sampled By Schlumberger

Date Sampled

Analysed By ANALABS

Field Gippsland Basin

Type of Well Wildcat

Formation

Well Designation Baleen #1

Source of Water Sample (ie. DST, RFT etc.) RFT #1

Depth Interval (metres) 463

CHEMICAL ANALYSIS

JOB REF 82.0 01 22331

	Ionic Species	Concentration	
		mg/litre	me/litre
CATIONIC	Sodium	6100	265.22
	Calcium	40000	2000
	Magnesium	320	26.67
	Barium	9.3	
	Iron	8	
ANIONIC	Chloride	115162	3244
	Sulphate	900	18.75
	Carbonate	< 0.3	
	Bicarbonate	217.16	3.56

Sulphur Concentration (as H_2S) 18.4 mg/litre

OTHER PROPERTIES

pH (at 60°F) 6.81 mg / 1

Specific Gravity (60°F/60°F) 1.1429 mg / 1

Resistivity (ohm-metres) 235520

Refractive Index (at 60°F)

Drawing No. A4-DR-404

APPENDIX B7 LOG OF SAMPLES

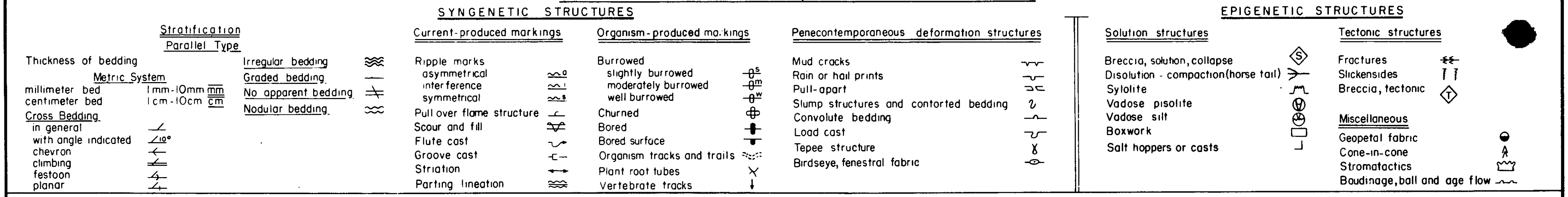
Hudbay Oil (Australia) Ltd.
Subsidiary of Hudson's Bay Oil and Gas Company Limited

SIDEWALL CORE DESCRIPTIONS

WELL: BALEEN-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 & %			
230.0	5.5	Skeletal CALCISILTITE	Pale olv - lt olv gry	10	15	Tr	50	Tr	25		VF-G	F-M						SR-R	P	VS	-	G Tr				–	No Fluor, no solv Fluor but oil but oil bubbles with HCl indicates contamination SK - mainly forams
241.4	4.5	Skeletal Argillaceous CALCISILTITE	Olv gry	25	20	Tr	35	Tr	20		VF-M	VF-F						A-R	P	S	g Tr	G Tr				Clay "lumps"	Oil bubbles with HCl in most s[illegible]es below due to contaimination
253.8	5.5	Argillaceous Calcisiltite	Lt olv gry - olv gry	30	20	Tr	30		15				C Tr						P	M	g Tr	G 5				–	Trace min Fluor
264.4	5.0	Argillaceous Calcisiltitic CALCARENITE	Lt olv gry - olv gry	20	20		20		40		VF-C	F						SA-R	M	M	-	G Tr				–	
275.6	3.5	Calcareous CLAYSTONE	Olv gry - dk grnsh gry	40	15	Tr	30		10		VF-M	VF							M	M	-	G 5				–	
287.0	4.5	Argillaceous CALCARENITE	Olv gry - dk grnsh gry	25	20	Tr	20		30		VF-M	VF							M	S-M	g Tr	G 5				–	
298.4	5.5	Argillaceous CACISILTITE	Lt olv gry - olv gry	25	15	Tr	45		15		VF-C	F							M	S-M	g Tr	G Tr	Ce Tr			–	White spotted appearance
308.2	5.0	Calcisiltitic CALCARENITE	Olv gry - dk grnsh gry	15	10	Tr	20		55		VF-G	F-M						A-R	M	S-M	g 10	G Tr				–	Spotted appearance
321.2	5.0	Argillaceous CALCARENITE	Grnsh gry - dk grnsh gry	25	15		25		35		VF-G	F-M						A-R	P	S-M	g 5-10	G Tr				–	Spotted appearance larger skeletal fragments
332.6	5.0	Argillaceous CALCARENITE	Gnsh gry - dk grnsh gry	25	10		10		55		VF-G	M						A-R	P	S-M	g 5-10	G 5	Ce Tr			–	Large skeletal fragements

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
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: BALEEN-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 & %			
344.0	5.2	Argillaceous CALCARENITE	Lt olv gry - grnsh gry	20	10	Tr	30		30		VF-G	M	C-5					A-SR	P	M	g 15-20	G 5			-		Mineral Fluor only
353.7	5.0	Argillaceous CALCARENITE	Olv grn	30	15	Tr	20		30		VF-G	F	C-5					A-SR	P	S-M	g 5-10				-		Wh streaky & bands of skeletal [illegible]gs & ct cement giving min Fluor
366.0	5.0	CALCARENITE	Lt olv gry - grnsh gry	10	15	Tr	20	Tr	55		VF-G	M						A-R	P	S	g 15-20	G Tr	Ce Tr		-	-	
378.5	3.7	Calciruditic CALCARENITE	Lt grnsh gry - grnsh gry	5	10		10		60		F-G	VC	C-15					A-R	P	M-H	g 10-15	G Tr			-	-	
390.0	4.5	Argillaceous CALCARENITE	Grnsh gry - dk grnsh gry	35	15	Tr	10	Tr	40		VF-G	M	C Tr					A-SR	P	M	g Tr	G Tr	Ce Tr		-	-	
405.6	4.7	Calcarenitic CALCISILTITE	Lt grnsh gry - grnsh gry	Tr	20	Tr	50		30		VF-G	F	C Tr					A-SR	P	S	g 5	G Tr?	Ce Tr		-	-	
412.0	3.7	Argillaceous Calcisiltitic CALCARENITE	Lt olv gry	25	15	Tr	30	Tr	30		VF-G	M						A-R	P	M-H	g Tr				-	-	
420.0	5.2	Argillaceous CALCARENITE	Olv gry - olv blk	30	10		15		40		VF-G	M	C-5					A-SR	P	S-M	g Tr	Cc Tr			-		
435.2	4.7	Argillaceous CALCARENITE	Grnsh gry - dk grnsh gry	30	15	Tr	25	Tr	30		VF-G	F	C Tr					A-SA	P	M	g Tr						
446.6	5.2	Calcarenitic Argillaceous CALCISILTITE	Lt olv gry - olv gry	25	10		35		25		VF-VC	M	C-5					A-SR	P	M-H	g Tr	Py Tr	G Tr				Mineral Fluor

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 Ⓢ
- 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
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Full details described under supplementary data

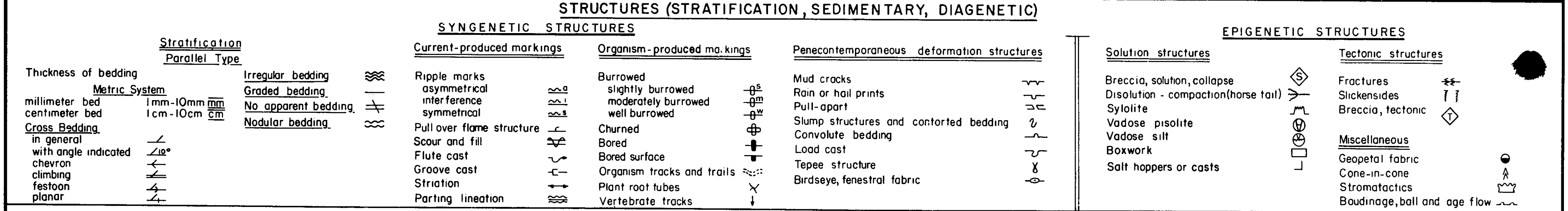
Hudbay Oil (Australia) Ltd.
Subsidiary of Hudson's Bay Oil and Gas Company Limited

SIDEWALL CORE DESCRIPTIONS

WELL: **BALEEN-1**

DEPTH (metres)	RECOVERY (centimetres)	ROCK TYPE	COLOUR	CLAY SIZE %		SILT SIZE %		GRAINS					CEMENT		DIAGENESIS			ROUNDING	SORTING	HARDNESS	POROSITY TYPE & %	ACCESSORIES			HYDROCARBONS	SEDIMENTARY STRUCTURES	SUPPLEMENTARY DATA
								TYPE & %			SIZE																
				CLAY MINERALS	MICRITE	QUARTZ	CALCITE	QUARTZ	SKELETAL	CALCITE	RANGE	DOMINANT	TYPE & %	TYPE & %	TYPE	%	TEXTURE					TYPE & %	TYPE & %	TYPE & %			
458.0	5.5	CALCARENITE	Grnsh gry - olv gry	20	20	Tr	20		40		VF-G	M						A-R	P	M	g 5	G tr				–	Min Fluor
469.0	5.5	Calcareous CLAYSTONE	Olv gry - olv blk	45	10		20		15		VF-M	F	C 10						M	M-H	g 5	Py Tr					Min Fluor - Parallel orientati[illegible] skeletal frag & calcite
476.0	2.5	Argillaceous CALCISILTITE	Lt olv gry - olv gry	25	25	5	35		10		VF-M	VF							M	S	g Tr						
481.6	5.5	Calcareous CLAYSTONE	Olv gry - olv blk	40	25		10		15		VF-M	F	C 10						M	M	g Tr						White steaks of calcite cement
493.0	5.0	Argillaceous CALCILUTITE	Grnsh gry - dk grnsh gry	20	50		20		10		VF-M	VF							M	M	g Tr						Slight Min Fluor
503.4	3.5	CALCISILTITE	Grnsh gry - lt bluish gry	15	25		40		15		VF-M	VF	C 5						M	M-H	-						Min Fluor only
514	5.0	Calcareous CLAYSTONE	Olv gry - dk grnsh gry	55	20		15		Tr		VF-M	VF	C 10							M-H	g Nil Tr						
524.0	5.1	Calcareous CLAYSTONE	Olv gry - olv blk	60	5		20		10		VF-M	F	C 5							M							Speckled appearance wh specks = skeletal frags
538.0	4.8	Calcareous CLAYSTONE	Olv gry - olv blk	70	10		10		10		VF-M	VF								M							No Fluor or solv Fluor, but a few "oil bubbles" in HCl contamination
551.7	2.8	Argillaceous CALCISILTITE	Olv gry - lt olv gry	30	15		45		10		F-C	M								S-M							No Fluor or solv Fluor, but a few "oil bubbles" in HCl contamination

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

SIDEWALL CORE DESCRIPTIONS

WELL: BALEEN-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 & %			
581.0	4.0	Argillaceous CALCILUTITE	Grn-bl - olv grn gry	30	60		5			5	C-VC	VC								M	-				-	≠	Mnr concentration of calcite grains in indistinct bands
584.9	2.5	Argillaceous CALCILUTITE	Grn gry - gry wh	20	70		Tr			10	C-VC	C			X	Tr				M	-				-	≠	Calcite grains forming in irregular bands
590.0	4.2	Calcilutitic CLAYSTONE	Dk gry grn	60	30		5		5	Tr										M	-	Py Tr	Gl Tr		-	⊕	Fossil fragments evident
597.0	4.8	Calcilutitic CLAYSTONE	Olv grn - dk olv gry	50	30		10		10	Tr										M	-	Py Tr			-	⊕ ≠	
601.0	5.0	Calcilutitic CLAYSTONE	Olv grn - gry grn	55	30		10		5											M	-	Py Tr			-	≋	Fossils internally replaced by pyrite
612.0	4.0	MUD FILTRATE																									Contains "O" ring and other contaminants
618.0	4.7	Calcilutitic CLAYSTONE	Dk olv grn	80	20		Tr		Tr	Tr										M	-	Py Tr			-	≠	Fossil cast internally replaced by clay minerals
623.0	5.0	Calcilutitic CLAYSTONE	Dk gry	80	20		Tr		Tr	Tr										M	-	Py Tr			*		A. One isolated dull yel gold speck of Fluor B. Nil
627.0	4.6	Calcilutitic CLAYSTONE	Dk gry grn	70	20		Tr		10	Tr										S	-	Py Tr	Gl Tr		-	⊕	Mineral fluor
632.0	3.0	MUD FILTRATE																								-	

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

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  - slightly burrowed s
  - moderately burrowed m
  - well burrowed w
- Churned ⊕
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- Bored surface
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EPIGENETIC STRUCTURES

Solution structures

- Breccia, solution, collapse Ⓢ
- Disolution - compaction(horse tail)
- Sylolite
- Vadose pisolite
- Vadose silt
- Boxwork □
- Salt hoppers or casts

Tectonic structures

- Fractures
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- Breccia, tectonic Ⓣ

Miscellaneous

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HYDROCARBONS

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Full details described under supplementary data

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

SIDEWALL CORE DESCRIPTIONS

WELL: BALEEN-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 & %			
640.0	4.6	Calcisiltitic Calcilutitic CLAYSTONE	Dk brn - brnsh red	45	20		30			Tr										M	-	Gl 5	Py Tr		*	≠	A. One isolated speck -dull yel gold Glauc Agg v coarse, occ Limonite nodules
646.0	4.6	CLAYSTONE	Dk gry	90	10															S	-		Py Tr		-	≠	
651.0	4.8	CLAYSTONE	Dk gry	90	10															S	-	Gl Tr	Py Tr		-	≠	
658.0	4.5	Nodular Limonitic SILTSTONE	Dk red brn - v dk brn	20		20					C-VC	C			Fe	60	Nd		P	S	-	-	Py Tr		-	≠	Limonite nodules are grains, can be crushed; yel Fe stain in acid
659.0	5.0	Limonitic SANDSTONE	Dk ferr red brn	30		20					M-C	M			Fe	50	Nd		W-M	S	g P				-	≠	Limonitic nodules are grains; Yel Fe stain in acid
662.0	4.1	Limonitic SILTSTONE	Dk brn	30		40									Fe	20	**			S	-			Mc 10	-	≠	Ferruginisation - causes platelets of lim mat - yel stain after Fe
665.0	4.6	SANDSTONE	Dk reddish brn	10		10		70			VF-F	VF			Fe	Tr			W	S	g P	Gl Tr		Mc 10	-	≠	No nodules
668.0	4.3	SANDSTONE	Dk reddish brn	10		10		75			VF-F	VF			Fe	Tr		A-SA	W	S	g P	Gl Tr		Mc 5	-	≠	Sample Flushed with drilling fluids
670.0	5.1	SANDSTONE	Dk reddish brn	5		5		80			VF-F	VF			Fe	Tr		A-SA	W	S	g P	Gl 5		Mc 5	-	≠	Sample flushed
672.0	2.7	SANDSTONE	Dk reddish brn	10		10		70			VF-F	VF			Fe	Tr		A-SA	W	S	g P	Gl 5		Mc 5	-	≠	Pore throats choked - some gas re-after inundation in water to break up

STRUCTURES (STRATIFICATION, SEDIMENTARY, DIAGENETIC)

SYNGENETIC STRUCTURES

Stratification

Parallel Type

Thickness of bedding

Metric System
- millimeter bed 1mm-10mm mm
- centimeter bed 1cm-10cm cm

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- in general
- with angle indicated 10°
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  - asymmetrical
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- 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
- Stromotactics
- 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: **BALEEN-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 & %			
675.0	5.0	SANDSTONE	Dk reddish brn	10		10		75			VF-F	VF			Fe	Tr		A-SA	W	S	g VP	Gl 5	Mc Tr			≠	Yel Fe stain in acid Pore throats choked - some gas released
678.0	4.2	Silty SANDSTONE	Dk reddish brn	10		20		70			VF-F	VF			Fe	Tr		A-SA	W	S	g VP	Gl Tr	Mc Tr		*	≠	A. V mnr tr (one speck) dull gold Fluor B. Nil Yel Fe stain after acidisation
680.0	5.1	Arenaceous Argillaceous SILTSTONE	Dk brn	20		50		25			VF	VF			Fe	Tr				S		Gl 5	Mc Tr	Py Tr		≠	
683.0	4.6	Argillaceous Silty SANDSTONE	Dk brn	20		25		45			VF	VF			Fe	Tr		A	W	S	g VP	Gl 5	Mc 5			≠	
685.0	4.5	Argillaceous Arenaceous SILTSTONE	Dk brn-brn	30		40		25			VF	VF			Fe	Tr		A	W	S			Mc 5			≠	Grain size and shape applicable to quartz grains only
688.0	2.5	Argillaceous SANDSTONE	Brn- dk brn- lt brn	20		10		70			VF	VF			Fe	Tr		A	W	S	g VP	Gl Tr	Mc Tr	Lf Tr		≠	Flushed
690.0	3.4	Silty Argillaceous SANDSTONE	Brn - dk brn - occ lt brn	25		20		45			VF-F	VF			Fe	Tr		A	W	S		Gl Tr	Mc 10	Lf Tr		≠	Flushed
693.0	4.5	Silty SANDSTONE	Brnsh - reddish brn	5		30		60			VF-G	VF			Fe	Tr		A-SA	W	S		Gl Tr	Mc 5	Lf Tr		≠	Mnr dull yel gold Fluor on two isolated specks. Nil Occ v coarse quartz grains
696.0		NO RECOVERY																								-	
698.0	4.5	Silty SANDSTONE	Brn - dk brn	10		20		70			VF-VC	VF						A-SA	W	S		Gl Tr	Mc Tr	Cc Tr	*	≠	A. Isolated specks (2) -dull yel Fluor occ v coarse quartz grains Flushed?

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

SIDEWALL CORE DESCRIPTIONS

WELL: BALEEN-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 & %			
700.0	2.8	Argillaceous SANDSTONE	Wh-crmy off wh - v lt gry	25		15		55			VF-G	VF						SA-SR	P	M	g P			Lf 5		≠	Intergranular voids filled with Kaolin clays
702.0	2.5	SANDSTONE	Dk brn - brn	15		10		75			VF-F	VF			Fe	Tr		A	M	S	g P	Gl Tr		Mc Tr	*	≠	Some doubt as to correct depth for this sample
705.0	2.8	Silty SANDSTONE	Wh - off wh - crm	5		20		70			VF-G	VF						SA-SR	P	S	g P		Py 5			≠	A. V mnr tr - dull yel gold B. Nil
709.0	1.0	MUDFILTRATE																									
723.0	5.2	CLAYSTONE	Med dk gry - dk gry	100																M	-					ʃʃ ≠	Smooth surfaces - possibly slicken sides
735.0	4.5	Argillaceous SILTSTONE	Med dk gry - gry-off wh	50		50														H	-					≈ ∠	V low angle cross beds - not distinct
745.0	3.0	MUDFILTRATE																									
751.0	4.2	CLAYSTONE	Med gry - lt gry	100																H	-				*	≠	A. One isolated speck of dull gold Fluor B. Nil
765.0	4.3	Argillaceous SILTSTONE	Med gry - lt gry	50		50														H	-			Cc Tr		ξξ ≋ ∠	Dk brn lignitic material in fractures
774.0	3.0	Silty SANDSTONE	Lt gry - med gry	10		30		60			VF	VF						A	W	M	g P			Cc Tr		ξξ ≠	Lignitic material in fractures

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	θs
moderately burrowed	θm
well burrowed	θw
Churned	
Bored	
Bored surface	
Organism tracks and trails	
Plant root tubes	X
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	ξξ
Slickensides	ʃʃ
Breccia, tectonic	◇T

Miscellaneous

Geopetal fabric	◒
Cone-in-cone	
Stromatactics	
Boudinage, ball and age flow	

Abbreviations

GRAIN SIZE

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F	Fine
M	Medium
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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
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POROSITY

g	Intergranular
v	Vugular
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ACCESSORIES

Py	Pyrite
Mc	Mica
Ch	Chert
Cc	Lignite / Coal
Hm	Heavy minerals
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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: BALEEN-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 & %			
784.0	3.2	SANDSTONE	Med gry - off wh grn	5		5		85			VF-M	F						SA-SR	M	S	g fr	Py 5	Gl Tr	Cc Tr		≠	Pore throats blocked with finer fractions
795.0	5.2	SANDSTONE	Lt gry - med dk gry	10		5		85			VF-M	F						SA-SR	M	S	g fr	Py Tr		Cc Tr		≠	
813.0		NO RECOVERY																									
817.9	3.7	SANDSTONE	Med lt gry - gry	15		5		80			VF-F	VF								H	g VP		Lf Tr	Cc Tr		∠ mm	
830.0	3.2	Silty Claystone	Med gry - dk gry	80		20														H	-					≠	
840.1	3.0	Argillaceous SANDSTONE	Med gry - gry	20		10		70			VF-F	VF						SA-A	W	M	g P		Lf Tr	Cc Tr		≠	
855.0	3.6	SANDSTONE	Dk gry - wh	5				95			VF-M	F						A-SR	P	H	g P		Lf Tr			≠	Kaolin - after feldspar?
867.0		NO RECOVERY																								—	
878.0	2.3	CLAYSTONE	Med gry - grn gry	100																S	-			Cc Tr	✱		Quartz grains in Fracs only together w/lig Mats Brn C + Blk C - Fluor here
905.0		NO RECOVERY																									

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 f-.
- 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

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- VF Very Fine
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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
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POROSITY
- g Intergranular
- v Vugular
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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

SIDEWALL CORE DESCRIPTIONS

WELL: BALEEN-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 & %			
918.0	2.2	Argillaceous SILTSTONE	Dk gry - gry	25		75		Tr												S	-			Cc Tr		≠	
927.0	3.5	Argillaceous SILTSTONE	Dk gry - gry blk	40		60														H	-				*	≠	A. Isolated speck of dull gold [illegible]or B. Nil
941.0	2.6	SILTSTONE	Lt gry - med gry	10		90														H	-					≠	
946.9	3.8	Argillaceous SILTSTONE	Lt gry - med gry	25		75		Tr												M	-					≠	
958.0	2.5	Arenaceous SILTSTONE	Med gry - gry wh	5		50		45			VF-M	F						A-SA	P	M	g VP		Lf Tr	Cc Tr		mm	Fine band of Sltst across core
967.0	3.1	Argillaceous SANDSTONE	Med gry - gry wh	25		10		65			VF-F	VF						A	W	S	g P					≋ ∠	Very thin planar beds
973.0	3.2	Argillaceous Silty SANDSTONE	Med gry-wh - dk gry	30		20		50			VF	VF						A	W	S	g P					≠	
982.0	2.7	Argillaceous SANDSTONE	Med gry - gry wh	20		10		70			VF-F	VF						A	W	S	g P					≠	
998.0	2.3	Silty SANDSTONE	Gry - med gry wh	Tr		20		80			VF-F	F						A	W	S	g P					≠	
1014.1	4.0	Silty SANDSTONE	Gry- wh	Tr		20		80			VF-F	F						A	W	S	g P					≠	

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
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- 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
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- Boudinage, ball and age flow

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DIAGENESIS
- D Dolomitization
- Q Silicification
- X Recrystallization
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- M Moderate
- W Well
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- U Unconsolidated
- VS Very Soft
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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

Baleen #1; 683.0 m

As for Baleen #1; 688.0 m; somewhat more micaceous and less calcareous.

Baleen #1; 678.0 m

Brown, unconsolidated, very fine grained, micaceous quartz sand; mottled with 0.2 mm to 2 mm patches and wisps that are more micaceous and possibly also contain plant fibre. Components; detrital quartz, 0.05 to 0.1 mm angular to very angular grains, 70%; mica flakes, tabular, 0.05 to 0.1 mm, 20%; glauconite grains, 0.05 mm, green, 5%; (?) authigenic feldspar, 2%. All grains are tightly packed with embayed and distorted mica flakes occupying interareas in a framework of quartz, so that there is no effective intergranular void space.

Baleen #1; 659.0 m

Brown, unconsolidated, micaceous, glauconitic quartz sand and sideritic carbonate. The sample consists of a patchy mosaic of these two lithotypes. The quartz sand is fine- to medium-grained, with 0.1 to 1 mm glauconite pellets and mica flakes in tightly packed arrays. Euhedral rhomboid siderite crystals 0.1 mm, form tightly packed aggregates.

Baleen #1; 693.0m

Brown, unconsolidated,very fine grained, calcareous, glauconitic and micaceous, quartz sand. Components: detrital quartz grains, angular to very angular, 0.05 to 0.1 mm, 60 to 70%; mica, red-brown, 0.05 to 0.1 mm flakes, 10 to 20%; glauconite pellets, green-brown to brown, rounded to ovoid bodies, 0.1 to 0.3 mm diam., 10 to 15%; feldspar, euhedral grains, 0.05 to 0.1 mm, 5 to 10%; calcite crystals, poikilotopic, 0.1 mm, 5%. All grains and crystals are tightly packed with embayed and distorted mica, glauconite and carbonate occupying interareas between detrital quartz grains, so that there is no intergranular void space. Quartz to quartz contacts are usually lined with thin mica plates, so that interlocking growth is prevented. Feldspar (? albite) appears to be authigenic growing from carbonate and mica.

Baleen #1; 688.0 m

Brown, fine- to very fine grained, micaceous, glauconitic and calcareous, quartz sand. Components: detrital quartz, 0.08 to 0.1 mm angular to very angular grains, 50%; glauconitic pellets, brown to black, 0.1 to 0.3 mm ovoid to rounded blebs, 20 to 30%; mica flakes 10%; ferroan calcite crystals 0.01 to 0.1 mm. All grains and crystals are tightly packed with embayed and distorted mica and glauconite occupying interareas between detrital quartz grains. Carbonate material also occupies intergranular space and occurs as crystal aggregates 0.1 to 0.5 mm in size.

PE601371

This is an enclosure indicator page.
The enclosure PE601371 is enclosed within the container PE902682 at this location in this document.

The enclosure PE601371 has the following characteristics:

ITEM_BARCODE = PE601371
CONTAINER_BARCODE = PE902682
NAME = Airgun Well Velocity Survey & Calibrated Log Data
BASIN = GIPPSLAND
PERMIT =
TYPE = WELL
SUBTYPE = VELOCITY_CHART
DESCRIPTION = Airgun Well Velocity Survey & Calibrated Log Data
REMARKS =
DATE_CREATED = 17/11/1981
DATE_RECEIVED = 13/09/1982
W_NO = W759
WELL_NAME = Baleen-1
CONTRACTOR = Seismograph Service (England) Ltd.
CLIENT_OP_CO = Hudbay Oil Ltd

(Inserted by DNRE - Vic Govt Mines Dept)

PE601372

This is an enclosure indicator page.
The enclosure PE601372 is enclosed within the
container PE902682 at this location in this
document.

The enclosure PE601372 has the following characteristics:

ITEM_BARCODE = PE601372
CONTAINER_BARCODE = PE902682
NAME = Wellsite Lithology Log
BASIN = GIPPSLAND
PERMIT =
TYPE = WELL
SUBTYPE = WELL_LOG
DESCRIPTION = Wellsite Lithology Log (enclosure 5 of WCR) for Baleen-1
REMARKS =
DATE_CREATED = 30/11/1981
DATE_RECEIVED = 13/09/1982
W_NO = W759
WELL_NAME = Baleen-1
CONTRACTOR = Hudbay Oil Ltd
CLIENT_OP_CO = Hudbay Oil Ltd

(Inserted by DNRE - Vic Govt Mines Dept)

PE601373

This is an enclosure indicator page.
The enclosure PE601373 is enclosed within the container PE902682 at this location in this document.

The enclosure PE601373 has the following characteristics:
ITEM_BARCODE = PE601373
CONTAINER_BARCODE = PE902682
NAME = Velocity Log Linear Time Scale
BASIN = GIPPSLAND
PERMIT =
TYPE = WELL
SUBTYPE = WELL_LOG
DESCRIPTION = Velocity Log Linear Time Scale (enclosure 4 of WCR) for Baleen-1
REMARKS =
DATE_CREATED = 09/11/1981
DATE_RECEIVED = 13/09/1982
W_NO = W759
WELL_NAME = Baleen-1
CONTRACTOR = SEISMOGRAPH SERVICE (ENGLAND) LTD.
CLIENT_OP_CO = Hudbay Oil Ltd

(Inserted by DNRE - Vic Govt Mines Dept)

PE601374

This is an enclosure indicator page.
The enclosure PE601374 is enclosed within the container PE902682 at this location in this document.

The enclosure PE601374 has the following characteristics:

ITEM_BARCODE = PE601374
CONTAINER_BARCODE = PE902682
NAME = Composite Well Log
BASIN = GIPPSLAND
PERMIT =
TYPE = WELL
SUBTYPE = COMPOSITE_LOG
DESCRIPTION = Composite Well Log (enclosure 1 of WCR) for Baleen-1
REMARKS =
DATE_CREATED = 30/11/1981
DATE_RECEIVED = 13/09/1982
W_NO = W759
WELL_NAME = Baleen-1
CONTRACTOR = Hudbay Oil Ltd
CLIENT_OP_CO = Hudbay Oil Ltd

(Inserted by DNRE - Vic Govt Mines Dept)

PE601375

This is an enclosure indicator page.
The enclosure PE601375 is enclosed within the container PE902682 at this location in this document.

The enclosure PE601375 has the following characteristics:

ITEM_BARCODE = PE601375
CONTAINER_BARCODE = PE902682
NAME = Exlog Formation Evaluation Log (Mud Log)
BASIN = GIPPSLAND
PERMIT =
TYPE = WELL
SUBTYPE = MUD_LOG
DESCRIPTION = Exlog Formation Evaluation Log (Mud Log --enclosure 6 of WCR) for Baleen-1
REMARKS =
DATE_CREATED = 16/11/1981
DATE_RECEIVED = 13/09/1982
W_NO = W759
WELL_NAME = Baleen-1
CONTRACTOR = EXLOG
CLIENT_OP_CO = Hudbay Oil Ltd

(Inserted by DNRE - Vic Govt Mines Dept)

PE902683

This is an enclosure indicator page.
The enclosure PE902683 is enclosed within the container PE902682 at this location in this document.

The enclosure PE902683 has the following characteristics:

ITEM_BARCODE = PE902683
CONTAINER_BARCODE = PE902682
NAME = Geophysical Time Map Near Top Latrobe Horizon
BASIN = GIPPSLAND
PERMIT =
TYPE = SEISMIC
SUBTYPE = HRZN_CONTR_MAP
DESCRIPTION = Geophysical Time Map Near Top Latrobe Horizon (Enclosure 2 of WCR) for Baleen-1
REMARKS =
DATE_CREATED = 31/05/1981
DATE_RECEIVED = 13/09/1982
W_NO = W759
WELL_NAME = Baleen-1
CONTRACTOR = SEISMOGRAPH SERVICE (ENGLAND) LTD.
CLIENT_OP_CO = Hudbay Oil Ltd

(Inserted by DNRE - Vic Govt Mines Dept)