

Well no : 31/04-09 Operator : HYDRO

Coordinates : 60 32 02.29 N UTM coord. : 6711042 N  
 03 05 26.92 E 504983 E

Licence no : 55 Permit no : 534

Rig : POLAR PIONEER Rig type : SEMI-SUB.

Contractor : POLAR FRONTIER DRILLING A/S

Bottom hole temperature : deg.C Elev. KB : 23 M

Spud. date : 87.01.23 Water depth : 147 M

Compl. date : 87.03.07 Total depth : 2480 M

Spud. class : APPRAISAL Form. at TD : E.JURASSIC

Compl. class : P&A. OIL DISCOVERY Prod. form :

Seisloca : NH 8501 - 129 SP 610

### LICENSEES

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10.000000 ARCO NORGE A/S  
 5.000000 BP PETROLEUM DEV. OF NORWAY A.S  
 20.000000 ESSO NORGE A.S  
 15.000000 NORSK HYDRO PRODUKSJON A.S  
 50.000000 DEN NORSKE STATS OLJESELSKAP A.S

### CASING AND LEAK-OFF TESTS

Type	Casing diam.	Depth below KB	Hole diam.	Hole depth below KB	Lot mud eqv. g/cm <sup>3</sup>
CONDUCTOR	30	254.0	36	254.0	.
SURF.COND.	13 3/8	949.0	17 1/2	974.0	.
SURF.COND.	13 3/8	974.0	17 1/2	974.0	.
INTERM.	9 5/8	1998.0	12 1/4	2077.0	.
LINER	7	2479.0	8 3/8	2480.0	.

### CONVENTIONAL CORES

Core no.	Intervals cored meters	Recovery		Series
		M	%	
1	1363.0 - 1367.0	0.0	0.0	
2	1367.0 - 1368.0	0.0	0.0	
3	2105.0 - 2106.8	1.8	100.0	LOWER CRETACEOUS
4	2107.0 - 2115.0	8.0	100.0	LOWER CRETACEOUS
5	2115.0 - 2131.0	16.0	100.0	LOWER CRETACEOUS
6	2132.5 - 2151.0	18.5	97.4	UPPER JURASSIC
7	2149.5 - 2164.5	15.0	100.0	UPPER JURASSIC
8	2165.0 - 2177.0	12.0	100.0	UPPER JURASSIC
9	2177.0 - 2195.0	17.9	99.4	CALLOVIAN
10	2194.0 - 2222.0	28.0	100.0	MIDDLE JURASSIC

## MUD PROPERTIES

Depth below KB meter	Mud weight g/cm <sup>3</sup>	Viscosity	Mud type
169.000	1.20	29.0	WATER-BASED
466.000	1.03	99.0	WATER-BASED
849.000	1.20	29.0	WATER-BASED
974.000	1.03	99.0	WATER-BASED
1363.000	1.25	25.0	WATER-BASED
1458.000	1.40	27.0	WATER-BASED
1800.000	1.20	29.0	WATER-BASED
2027.000	1.40	34.0	WATER-BASED
2159.000	1.20	29.0	WATER-BASED
2177.000	1.21	25.0	WATER-BASED
2242.000	1.20	33.0	WATER-BASED
2377.000	1.21	29.0	WATER-BASED
2479.000	1.20	26.0	WATER-BASED

## DRILL STEM TEST

### INTERVALS AND PRESSURES

Test no.	interval meter	Choke size	Pressure (PSI)		
			WHP	BTHP	FFP
1.0	2193.100 - 2208.100	50.8	81.5	3211.0	2945.1
	Test temperature: 90.8	°C			
2.0	2169.600 - 2171.600	12.7	707.5	3166.0	2839.0
	Test temperature: 88.1	°C			

### RECOVERY

Test no.	Oil Sm <sup>3</sup> /d	Gas Sm <sup>3</sup> /d	Oil grav. g/cm <sup>3</sup>	Gas grav. rel. air	GOR m <sup>3</sup> /m <sup>3</sup>
1.0	0	0	0.000	0.000	0
2.0	311	23253	0.875	0.769	75

## DRILL BIT CUTTINGS AND WET SAMPLES

SAMPLE TYPE	INTERVAL BELOW KB	NUMBER OF SAMPLES
Cutting	980-2480	336
Wet Samples	980-2480	210

## SHALLOW GAS

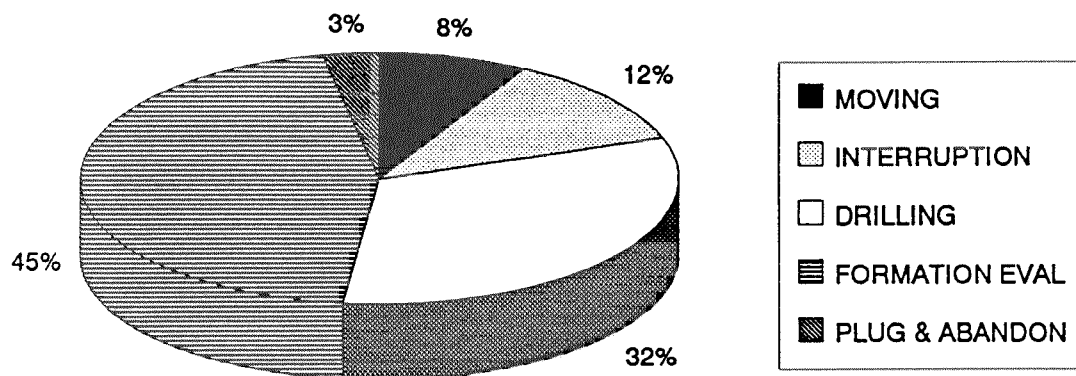
Interval below KB	REMARKS

## AVAILABLE LOGS

LOG TYPE	INTERVALS	1/200	1/500	Div.
DIL LSS GR	166.500 - 1855.500	X	X	
DLL MSFL SDT GR	1998.500 - 2471.500	X	X	
DITE SGR	1998.000 - 2471.000	X	X	
LDL CNL NGT	1998.500 - 2462.500	X		
CDM AP/SHDT MSD	1998.000 - 2472.000	X	X	
SHDT GR	1800.000 - 2472.500	X		
CDM AP/SHDT	1998.000 - 2472.000	X		
RFT HP	2120.000 - 2409.000			
RFT STRAIN	2120.000 - 2409.000			
NGT	1998.000 - 2454.000			
CBL VDL GR	1500.000 - 2388.000	X		
CBL CET	1500.000 - 2388.000	X		
MUD	974.000 - 2480.000			X
VELOCITY	948.000 - 2463.000			X
(VSP, run 2A, 360-2466 m				1 stk.)
(Geogram, synthetic seismogram, 10-20 cm/s				4 stk.)
(Frequency test, 10-20 cm/s				8 stk.)

# DAILY DRILLING REPORT SYSTEM

MAIN OPERATIONS FOR WELL: 31/04-09



Main operation	Minutes	Hrs	% of total
MOVING	5550	92,5	8,20
INTERRUPTION	7980	133,0	11,79
DRILLING	21690	361,5	32,05
FORMATION EVAL	30510	508,5	45,08
PLUG & ABANDON	1950	32,5	2,88
<i>Total</i>	67680	1128,0	100,00

## SUB OPERATIONS FOR WELL: 31/04-09

### MAIN OPERATION: MOVING

Sub operation	Minutes	Hrs	% of total
ANCHOR	5220	87,0	94,05
TRANSIT	330	5,5	5,95
<i>Total</i>	5550	92,5	100,00

### MAIN OPERATION: INTERRUPTION

Sub operation	Minutes	Hrs	% of total
MAINTAIN/REP	4200	70,0	52,63
FISH	1800	30,0	22,56
OTHER	120	2,0	1,50
WAIT	1860	31,0	23,31
<i>Total</i>	7980	133,0	100,00

### MAIN OPERATION: DRILLING

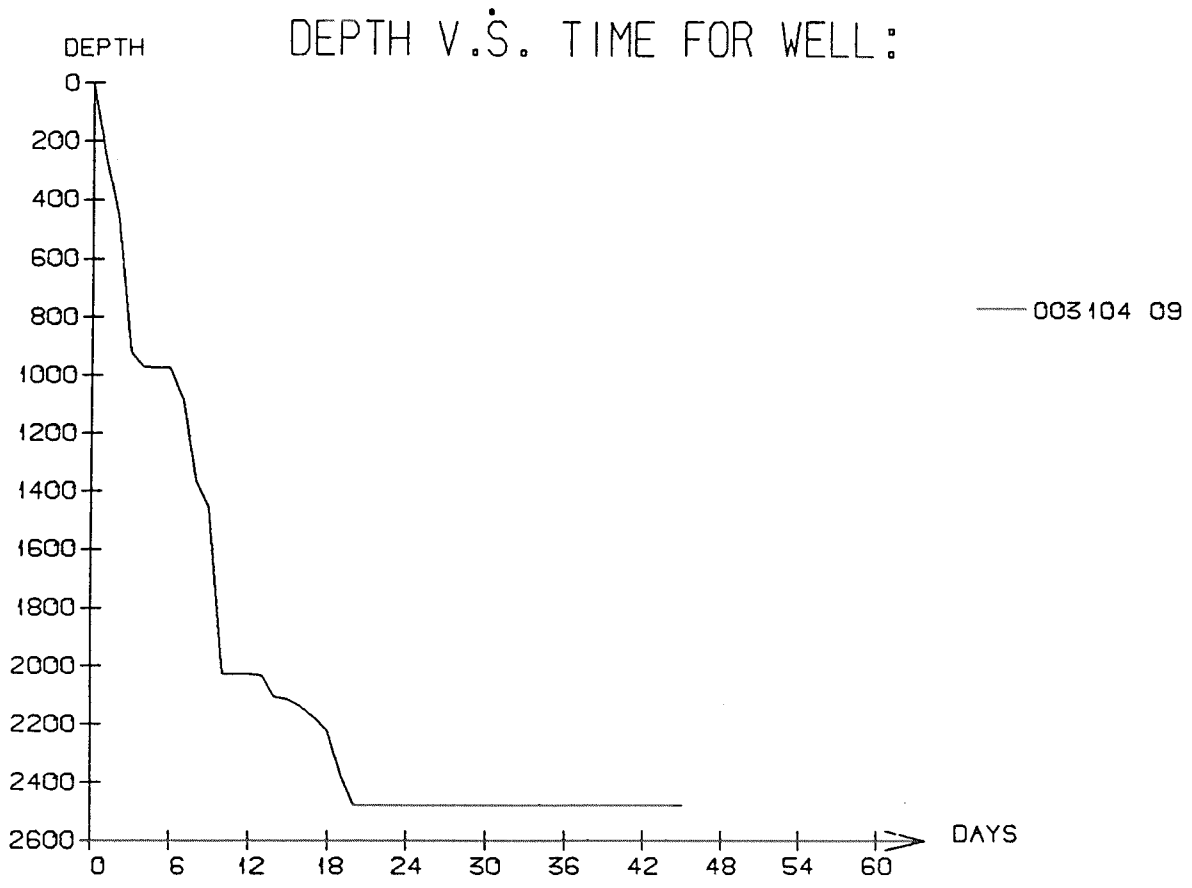
Sub operation	Minutes	Hrs	% of total
TRIP	3090	51,5	14,25
DRILL	7290	121,5	33,61
CIRC/COND	480	8,0	2,21
CASING	8370	139,5	38,59
REAM	270	4,5	1,24
BOP/WELLHEAD EQ	1560	26,0	7,19
BOP ACTIVITIES	630	10,5	2,90
<i>Total</i>	21690	361,5	100,00

### MAIN OPERATION: FORMATION EVAL

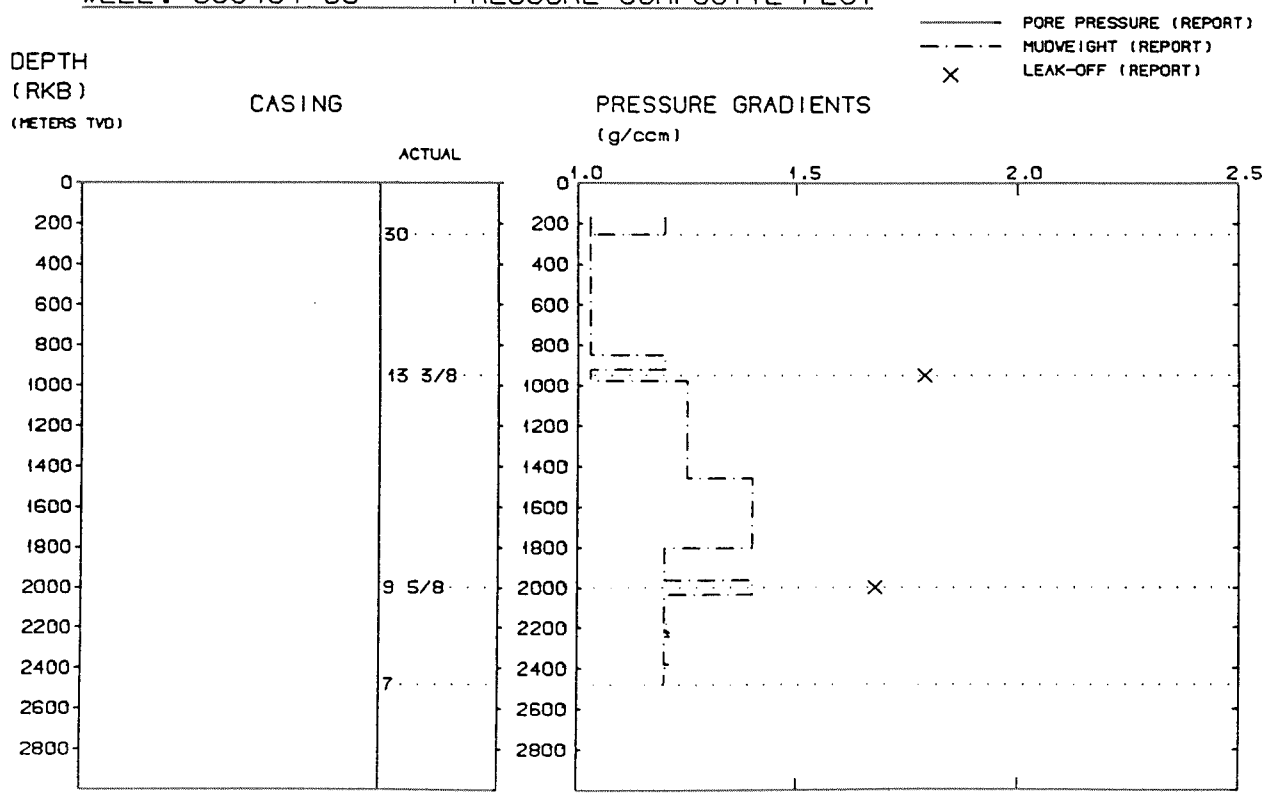
Sub operation	Minutes	Hrs	% of total
CIRC/COND	210	3,5	0,69
TRIP	3510	58,5	11,50
CORE	3930	65,5	12,88
LOG	2670	44,5	8,75
CIRC SAMPLES	90	1,5	0,29
WAIT	30	0,5	0,10
RFT/FIT	870	14,5	2,85
DST	19200	320,0	62,93
<i>Total</i>	30510	508,5	100,00

### MAIN OPERATION: PLUG & ABANDON

Sub operation	Minutes	Hrs	% of total
TRIP	1110	18,5	56,92
CIRC/COND	30	0,5	1,54
CEMENT PLUG	120	2,0	6,15
SQUEEZE	270	4,5	13,85
CUT	180	3,0	9,23
EQUIP RECOVERY	240	4,0	12,31
<i>Total</i>	1950	32,5	100,00



### WELL: 003104 09      PRESSURE COMPOSITE PLOT



## Well History 31/4-9.

### GENERAL:

Well 31/4-9 was designed as an appraisal well for the Fensfjord Formation, and the main objectives was as follows:

- 1) verify the seismic interpretation, establish the OWC and confirm reservoir trends, hydrocarbon column and reserve potential on the east flank of the structure.
- 2) gather reservoir information from the waterzone through coring and testing.
- 3) obtain information for reservoir modelling in the reservoir.

TD was prognosed to come in at 2500 m RKB ie. 70 m into the Dunlin Group.

### OPERATIONS:

Appraisal well 31/4-9 was spudded by Polar Frontier Drilling semi-submersible rig Polar Pioneer 23 January 1987, and completed 7 March 1987 at a depth of 2480 m RKB in rocks of Early Jurassic age.

The Fensfjord reservoir came in at 2168,5 m RKB, and the Oil/Water Contact was encountered at 2172 m RKB in the Fensfjord Formation. An attempt to take two cores in the Tertiary claystones failed. Another 8 cores were cut in the Heather- and Fensfjord Formations.

The well was plugged and abandoned as an oil discovery.

### TESTING:

Two DST-tests were performed in this well.

# GEOLOGICAL TOPS

WELL: 31/4-9

	Depth m (RKB)
<i>Nordland Group</i>	170,0
<i>Utsira Fm</i>	685,0
<i>Hordaland Group</i>	846,0
<i>Rogaland Group</i>	1793,0
<i>Balder Fm</i>	1793,0
<i>Sele Fm</i>	1852,0
<i>Lista Fm</i>	1892,0
<i>Shetland Group</i>	2043,0
<i>Tryggvason Fm</i>	2043,0
<i>Bodøks Fm</i>	2082,0
<i>Cromer Knoll Group</i>	2093,0
<i>Viking Group</i>	2102,0
<i>Draupne Fm</i>	2102,0
<i>Heather Fm</i>	2118,0
<i>Fensfjord Fm</i>	2169,0
<i>Heather Fm</i>	2240,0
<i>Brent Group</i>	2368,0
<i>Ness Fm</i>	2368,0
<i>Etive Fm</i>	2398,0
<i>Dunlin Group</i>	2411,0
<i>Drake Fm</i>	2411,0
<i>TD. (DD)</i>	2480,0