

**WDSS Report**

Date: 27/09/96

PB/SKR

Page: 1 / 5

|                 |                  |
|-----------------|------------------|
| <b>Well no:</b> | <b>Operator:</b> |
| <b>35/09-02</b> | <b>HYDRO</b>     |

**Well**

|                   |                                      |               |                            |
|-------------------|--------------------------------------|---------------|----------------------------|
| Coordinates :     | 61° 20' 08.69" N<br>03° 56' 16.59" E | UTM coord. :  | 6800707.8 N<br>550194.35 E |
| License no :      | 153                                  | Permit no :   | 663                        |
| Rig :             | VILDKAT EXPLORER                     | Rig type :    | SEMI-SUB.                  |
| Contractor :      | TRANSNOR RIG AS                      | Elev. KB :    | 25 M                       |
| Bottom hole temp: | 89 °C                                | Water depth : | 367 M                      |
| Spud. date :      | 91.01.01                             | Total depth : | 2885 M                     |
| Compl. date :     | 91.04.03                             | Form. at TD : | BASEMENT                   |
| Spud. class :     | WILDCAT                              | Prod.form. :  |                            |
| Compl. class :    | P&A. GAS/COND.                       |               |                            |
| Seisloca :        | NH 8902 , ROW 816, KOL.<br>1229      |               |                            |

**Licenseses**

- 20.000000 NORSK HYDRO PRODUKSJON AS
- 10.000000 PETROBRAS NORGE A/S
- 12.000000 A/S NORSKE SHELL
- 50.000000 DEN NORSKE STATS OLJESELSKAP A.S
- 8.000000 DEMINEX NORGE AS

**Casing and Leak-off Tests**

| Type      | Casing diam | Depth below KB | Hole diam. | Hole depth below KB | Lot mud eqv. g/cm3 |
|-----------|-------------|----------------|------------|---------------------|--------------------|
| CONDUCTOR | 30          | 477.0          | 36         | 479.0               |                    |
| INTERM.   | 13 3/8      | 1003.0         | 17 1/2     | 1018.0              | 1.37               |
| INTERM.   | 9 5/8       | 1939.0         | 12 1/4     | 1953.0              | 1.40               |
| LINER     | 7           | 2434.0         | 8 1/2      | 2885.0              |                    |

## WDSS Report

Date: 27/09/96

PB/SKR

Page: 2 / 5

|                                    |                                  |
|------------------------------------|----------------------------------|
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|------------------------------------|----------------------------------|

### Conventional Cores

| Core no. | Intervals cored<br>meters | Recovery<br>m | %     |
|----------|---------------------------|---------------|-------|
| 1        | 2110.5 - 2111.2           | 0.7           | 100.0 |
| 2        | 2114.0 - 2142.0           | 28.0          | 100.0 |
| 3        | 2271.0 - 2299.0           | 28.0          | 100.0 |
| 4        | 2299.0 - 2327.0           | 28.0          | 100.0 |
| 5        | 2327.0 - 2350.2           | 23.2          | 100.0 |
| 6        | 2365.0 - 2391.9           | 26.9          | 100.0 |
| 7        | 2393.0 - 2421.0           | 28.0          | 100.0 |
| 8        | 2483.0 - 2520.6           | 37.6          | 100.0 |
| 9        | 2520.6 - 2554.3           | 33.7          | 100.0 |
| 10       | 2621.0 - 2638.6           | 17.6          | 100.0 |
| 11       | 2638.6 - 2665.6           | 27.0          | 100.0 |
| 12       | 2666.0 - 2694.0           | 28.0          | 100.0 |
| 13       | 2694.0 - 2722.2           | 28.2          | 100.0 |
| 14       | 2722.2 - 2759.7           | 37.5          | 100.0 |
| 15       | 2759.7 - 2763.7           | 4.0           | 100.0 |
| 16       | 2764.5 - 2778.2           | 13.7          | 100.0 |
| 17       | 2778.2 - 2784.5           | 6.3           | 100.0 |

### Mud

| Depth  | Mud<br>weight | Visc. | Mud type    |
|--------|---------------|-------|-------------|
| 464.0  | 1.20          | 1.0   | WATER BASED |
| 477.0  | 1.20          | 1.0   | WATER BASED |
| 478.0  | 1.05          | 1.0   | WATER BASED |
| 479.0  | 1.05          | 1.0   | WATER BASED |
| 1018.0 | 1.11          | 19.0  | WATER BASED |
| 1018.0 | 1.12          | 19.0  | WATER BASED |
| 1018.0 | 1.05          | 1.0   | WATER BASED |
| 1060.0 | 1.12          | 10.0  | WATER BASED |
| 1297.0 | 1.13          | 11.0  | WATER BASED |
| 1310.0 | 1.14          | 10.0  | WATER BASED |
| 1336.0 | 1.18          | 11.0  | WATER BASED |
| 1646.0 | 1.19          | 8.0   | WATER BASED |
| 1918.0 | 1.20          | 15.0  | WATER BASED |
| 2106.0 | 1.22          | 14.0  | WATER BASED |
| 2111.0 | 1.23          | 15.0  | WATER BASED |
| 3436.0 | 1.22          | 12.0  | WATER BASED |

|                 |                  |
|-----------------|------------------|
| <b>Well no:</b> | <b>Operator:</b> |
| 35/09-02        | HYDRO            |

**Drill Stem Test (intervals and pressures)**

| Test no. | Test interval meter | Choke size | Pressure (psi) WHP | BTHP | FFP |
|----------|---------------------|------------|--------------------|------|-----|
| 1.0      | 2330.0 - 2342.0     | 12.7       | 2094               | 3292 |     |
| 2.0      | 2295.0 - 2310.0     | 25.4       | 1634               | 3321 |     |
| 3.0      | 2187.0 - 2211.0     | 25.4       | 1546               | 3089 |     |
| 4.0      | 2100.0 - 2130.0     | 25.4       | 1723               | 3277 |     |

**Drill Stem Test (recovery)**

| Test no. | Oil Sm3/d | Gas Sm3/d | Oil grav. g/cm3 | Gas grav. rel. air | GOR m3/m3 |
|----------|-----------|-----------|-----------------|--------------------|-----------|
| 1.0      | 289       | 206300    | 0.826           | 0.608              | 714       |
| 2.0      | 206       | 881000    | 0.720           | 0.668              | 4276      |
| 3.0      | 205       | 803000    | 0.732           | 0.664              | 3902      |
| 4.0      | 202       | 954055    | 0.726           | 0.664              | 4717      |

**Drill Bit Cuttings and Wet Samples**

| Sample type | Interval below KB | Number of samples |
|-------------|-------------------|-------------------|
| WET SAMPLES | 1020 - 2885       | 360               |
| CUTTINGS    | 1025 - 2885       | 390               |

**Shallow Gas**

| Interval below KB | Remarks |
|-------------------|---------|
|                   |         |

## WDSS Report

Date: 27/09/96

PB/SKR

Page: 4 / 5

|                 |                  |
|-----------------|------------------|
| <b>Well no:</b> | <b>Operator:</b> |
| <b>35/09-02</b> | <b>HYDRO</b>     |

### Available Logs

| Log type             | Intervals logged | 1/200 | 1/500 |
|----------------------|------------------|-------|-------|
| AMS                  | 1938.0 - 2866.0  |       |       |
| CALIBRATED SONIC     | 1180.0 - 2880.0  |       |       |
| CBL VDL CCL GR       | 1700.0 - 2372.0  |       |       |
| CDM AP/MSD SHDT      | 1942.0 - 2875.0  |       |       |
| CDR                  | 400.0 - 2885.0   |       |       |
| CET CCL GR           | 1700.0 - 2372.0  |       |       |
| CST GPT              | 1035.0 - 1951.0  |       |       |
| CST GPT              | 1962.0 - 2813.0  |       |       |
| DIL AMS SP GR        | 1938.0 - 2884.0  |       |       |
| DIL BHC GR           | 1000.0 - 1950.0  |       |       |
| DIL DSI SP GR        | 476.0 - 2887.0   |       |       |
| DIL SP GR            | 476.0 - 612.0    |       |       |
| DLL MSFL AMS SP GR   | 2075.0 - 2400.0  |       |       |
| DRILLING DATA PRESS. | 1018.0 - 3885.0  |       |       |
| DSI                  | 1900.0 - 2400.0  |       |       |
| DSI NGL AMS          | 1938.0 - 2872.0  |       |       |
| FMS AMS GR           | 1938.0 - 2887.0  |       |       |
| LDL CNL AMS GR       | 1938.0 - 2877.0  |       |       |
| LDL GR               | 1000.0 - 1934.0  |       |       |
| MUD                  | 1018.0 - 3885.0  |       |       |
| MWD                  | 392.0 - 2885.0   |       |       |
| NGL AMS              | 1938.0 - 2869.0  |       |       |
| RFT HP               | 2103.0 - 2836.0  |       |       |
| RFT HP GR            | 2367.0 - 2369.0  |       |       |

WDSS Report

PB/SKR

Page: 5 / 5

Date: 27/09/96

|                 |  |                  |  |
|-----------------|--|------------------|--|
| <b>Well no:</b> |  | <b>Operator:</b> |  |
| <b>35/09-02</b> |  | <b>HYDRO</b>     |  |

|                      |                |  |  |  |
|----------------------|----------------|--|--|--|
| SYNTHETIC SEISMOGRAM |                |  |  |  |
| TEMPERATURE DATA     | 300.0 - 2900.0 |  |  |  |
| TWO-WAY TRAVEL TIME  | .0 - 2800.0    |  |  |  |
| VSP                  |                |  |  |  |

## Main operations for well: 35/9-2

### Main operation: DRILLING

| Sub operation:  | Minutes:     | Hours:       | % of total:   |
|-----------------|--------------|--------------|---------------|
| BOP ACTIVITIES  | 930          | 15,5         | 3,22          |
| BOP/WELLHEAD EQ | 1710         | 28,5         | 5,93          |
| CASING          | 11670        | 194,5        | 40,44         |
| CIRC/COND       | 150          | 2,5          | 0,52          |
| DRILL           | 10860        | 181,0        | 37,63         |
| OTHER           | 60           | 1,0          | 0,21          |
| REAM            | 270          | 4,5          | 0,94          |
| SURVEY          | 30           | 0,5          | 0,10          |
| TRIP            | 2280         | 38,0         | 7,90          |
| WAIT            | 900          | 15,0         | 3,12          |
| <b>Total</b>    | <b>28860</b> | <b>481,0</b> | <b>100,00</b> |

### Main operation: FORMATION EVAL

| Sub operation: | Minutes:     | Hours:        | % of total:   |
|----------------|--------------|---------------|---------------|
| CIRC SAMPLES   | 510          | 8,5           | 0,71          |
| CIRC/COND      | 870          | 14,5          | 1,22          |
| CORE           | 9180         | 153,0         | 12,82         |
| DST            | 44910        | 748,5         | 62,74         |
| LOG            | 6750         | 112,5         | 9,43          |
| TRIP           | 9330         | 155,5         | 13,03         |
| WAIT           | 30           | 0,5           | 0,04          |
| <b>Total</b>   | <b>71580</b> | <b>1193,0</b> | <b>100,00</b> |

### Main operation: INTERRUPTION

| Sub operation: | Minutes:     | Hours:       | % of total:   |
|----------------|--------------|--------------|---------------|
| FISH           | 3600         | 60,0         | 17,86         |
| MAINTAIN/REP   | 11040        | 184,0        | 54,76         |
| OTHER          | 240          | 4,0          | 1,19          |
| WAIT           | 5280         | 88,0         | 26,19         |
| <b>Total</b>   | <b>20160</b> | <b>336,0</b> | <b>100,00</b> |

### Main operation: MOVING

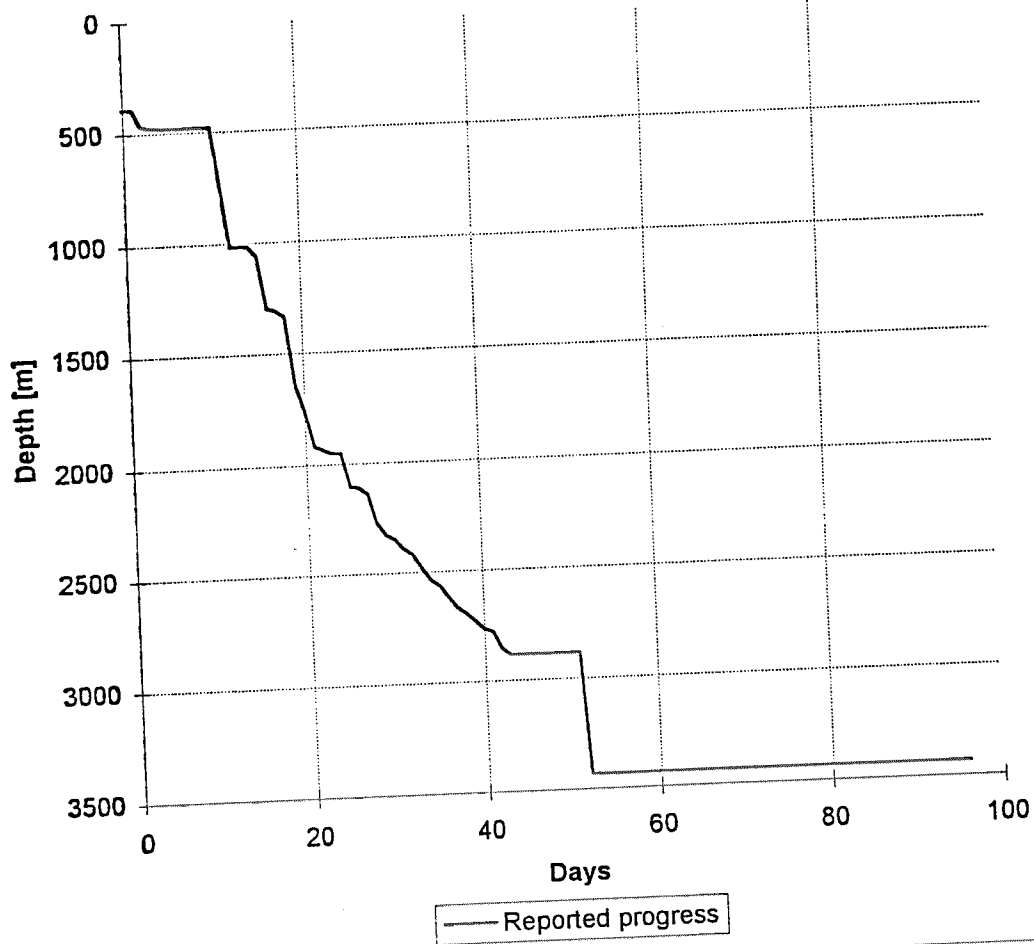
| Sub operation: | Minutes:    | Hours:      | % of total:   |
|----------------|-------------|-------------|---------------|
| ANCHOR         | 3240        | 54,0        | 58,06         |
| TRANSIT        | 2340        | 39,0        | 41,94         |
| <b>Total</b>   | <b>5580</b> | <b>93,0</b> | <b>100,00</b> |

### Main operation: PLUG & ABANDON

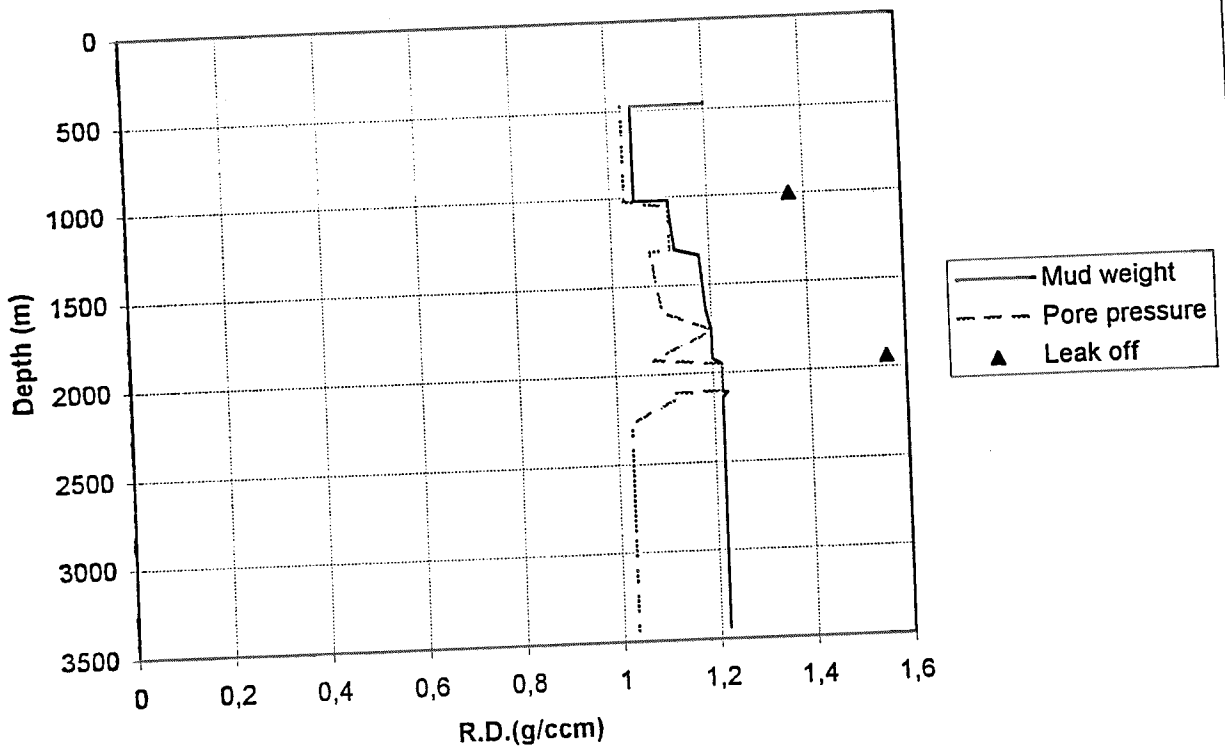
| Sub operation:  | Minutes:    | Hours:       | % of total:   |
|-----------------|-------------|--------------|---------------|
| CEMENT PLUG     | 420         | 7,0          | 6,51          |
| CIRC/COND       | 420         | 7,0          | 6,51          |
| CUT             | 960         | 16,0         | 14,88         |
| EQUIP RECOVERY  | 3000        | 50,0         | 46,51         |
| MECHANICAL PLUG | 180         | 3,0          | 2,79          |
| OTHER           | 210         | 3,5          | 3,26          |
| PERFORATE       | 150         | 2,5          | 2,33          |
| SQUEEZE         | 150         | 2,5          | 2,33          |
| TRIP            | 960         | 16,0         | 14,88         |
| <b>Total</b>    | <b>6450</b> | <b>107,5</b> | <b>100,00</b> |

Total time used:  Hours

Depth vs time for well: 35/9-2



Composite plot for well: 35/9-2



# Well History 35/9-2

## General:

Well 35/9-2 was designed to drill on the A-Structure in block 35/9 which is located in the northern part of the Horda Platform, in the footwall of the Sogn Graben boundary fault system. At the Brent Formation level, the block is cut by an *en echelon*, right-stepping set of major NE-SW trending transfer faults. The faults are splaying from and linking the terminations of large N-S striking faults which approximately coincide with the eastern and western block boundaries. The faults are in the order of 500 m.

Two domains, eastern and western, can be distinguished in the block at the top Brent structural level, separated from each other by a gentle NNW- plunging syncline which passes through the NW blocks corner. The western domain, constituting the western, NE inclined, limb of the syncline, is cut by several N-S to NNW-SSE trending faults, thrown up several tens of metres both to the east and the west. The eastern domain, in which wells 35/9-1 and 35/9-2 are located, occupies some 2/3 of the block area. It corresponds to a westerly inclined eastern limb of the syncline. The primary objectives of the well were to:

- 1) explore hydrocarbon type and content in Late Jurassic reservoirs.
- 2) establish a water gradient in the Middle- Early Jurassic reservoir.
- 3) test new formations in the Late Jurassic.
- 4) test new formations in the Early Jurassic/Triassic?.
- 5) if possible, penetrate the Late Jurassic reservoir around a possible gas/water contact.

The secondary objectives of the well were to:

- i) establish a water gradient in the Late Jurassic.
- ii) confirm the seismic interpretation.
- iii) provide new geological information.

The total depth of the well was prognosed to 2830m RKB, which is approximately 30 m into the Caledonian basement.

## Operations:

Wildcat well 35/9-2 was spudded by the semi-submersible rig Vildkat Explorer 1 January 1991 and completed 3 April 1991 at a depth of 2885 m RKB in the Caledonian basement. Due to hole angle problems, the well had to be re-spudded twice before drilling proceeded. No shallow gas or boulders were observed while drilling. In order to penetrate the target within the given tolerances, a kickoff was made at 1039 m RKB so that a sufficient angle build-up could be obtained. The well encountered oil and gas bearing sandstones in the Late Jurassic reservoirs of the Viking Group. The Middle and Early Jurassic formations were encountered and found water bearing. A total of the 9 cores were cut in the Viking Group. 3 cores were cut in the Brent Group and 5 in the Dunlin Group. The gas/oil contact is placed at 2324 m RKB, but oil/water contact was not seen. Oil down to 2341 m RKB in the Fensfjord "C" Formation, and net pay zone is calculated to 13.13 m. Net pay in the gas zone is calculated to 171.26 m. The best reservoir sand is found in the Sognefjord Formation. The well was permanently plugged and abandoned as a gas and condensate well.

## Testing:

Four DST tests were performed in this well.



# Geological Tops.

## Well:.35/9-2

|                       | Depth m (RKB). |
|-----------------------|----------------|
| Nordland Group        | 392.0          |
| Hordaland Group       | 573.0          |
| Grid Fm               | 573.0          |
| Rogaland Group        | 658.0          |
| Balder Fm             | 658.0          |
| Sele Fm               | 692.0          |
| Lista Fm              | 785.0          |
| Våle Fm               | 1281.0         |
| Shetland Group        | 1305.0         |
| Jorsalfare Fm         | 1305.0         |
| Kyrre Fm              | 1385.0         |
| Tryggvason Fm         | 1888.0         |
| Cromer Knoll Group    | 2016.0         |
| Åsgard Fm             | 2016.0         |
| Viking Group          | 2057.5         |
| Draupne Fm            | 2057.5         |
| Sognefjord Fm         | 2099.0         |
| Heather Fm            | 2132.0         |
| Fensfjord "D" Fm      | 2188.0         |
| Fensfjord "C" Fm      | 2246.5         |
| Fensfjord "B" Fm      | 2367.0         |
| Fensfjord "A" Fm      | 2481.0         |
| Heather Fm            | 2512.0         |
| Brent Group           | 2615.0         |
| Ness Fm               | 2615.0         |
| Oseberg/Rannoch/Etive | 2639.5         |
| Dunlin Group          | 2680.0         |
| Statfjord.Fm          | 2754.0         |
| Basement              | 2856.0         |
| T.D.                  | 2885.0         |