

Denne rapport
tilhører



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Returneres etter bruk

REPEATED FORMATION TESTER

RFT - REPORT

WELL 31/3-2

VIKING AND BRENT GROUP



Norsk Hydro

SHS1

P5.14-01

31/3-2

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Høvik, October 1984

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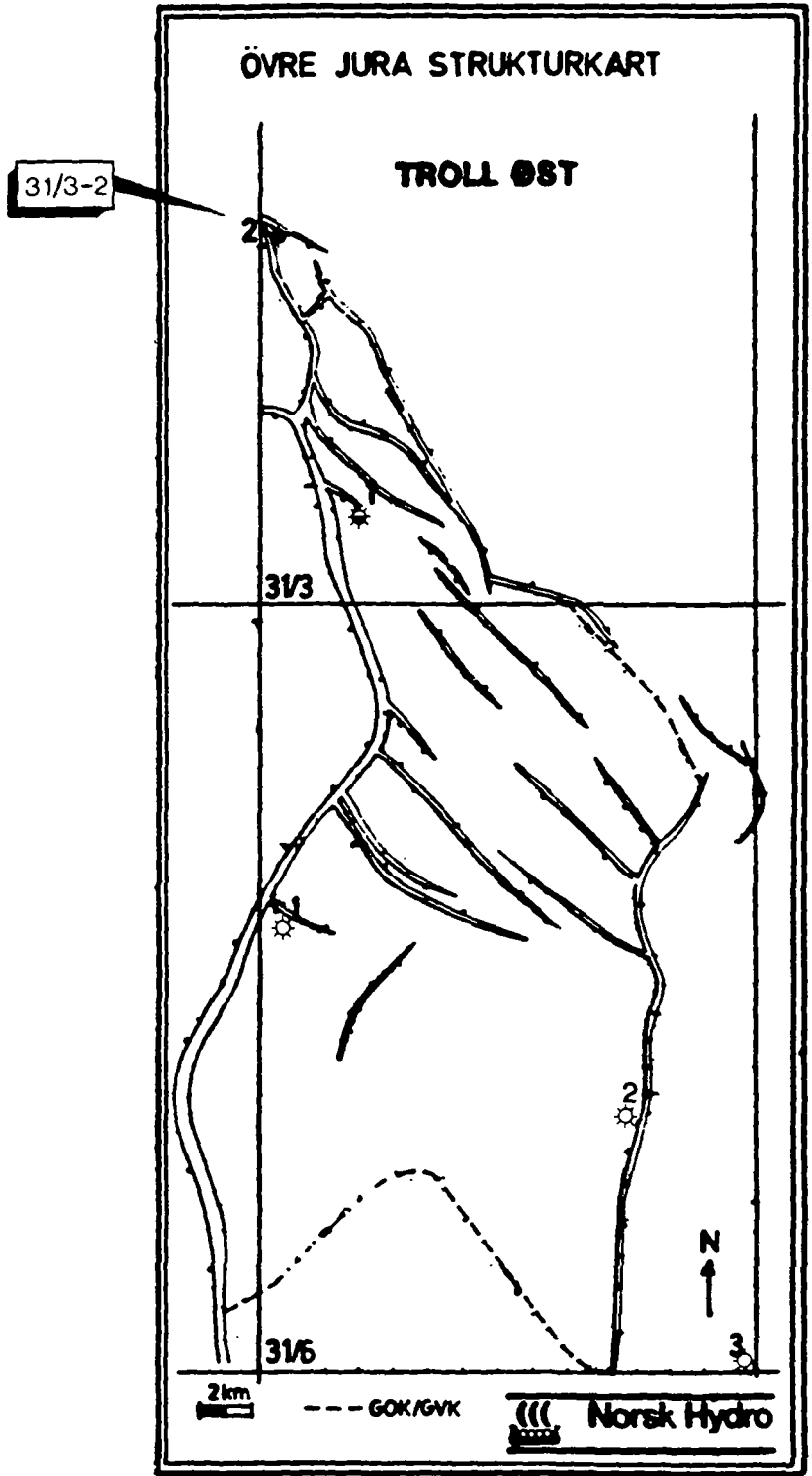
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1. PREFACE

The objective of this report is to present a summary of the data obtained from the Repeated Formation Tester - RFT survey covering the SOGNEFJORD, UPPER HEATHER, FENSFJORD, KROSSFJORD, LOWER HEATHER, TARBERT, NESS, ETIVE and DRAKE Formations, Well 31/3-2. This includes both pressure data for the entire interval and formation fluid sampling in the SOGNEFJORD Formation.

This report is issued separately, and is a natural supplement to both the Well Testing Report and the Petrophysical Evaluation Report.

2. WELL LOCATION



COORDINATES: 60°52' 11,41" N
03°40' 41,79" E

FIG. 2.1. WELL LOCATION

3. GENERAL DATA

Licence/Well : 085/31/3-2. Norwegian North Sea

Owners : Norsk Hydro/Saga/Statoil

Operators : Norsk Hydro/Saga/Statoil

Field : Troll East

Well Drilled by : Norsk Hydro

Rig : Treasure Seeker

Elevation Depth : 25m RKB - MSL

Water Depth : 340m MSL

Data Spudded : 05.03.84

Date RFT logging: 01. and 02.04.84

Date completed : 30.04.84

Status : Plugged and abandoned

T.D. Driller : 2090.0m RKB

T.D. Logger : 2088.0m RKB

Logging company : Schlumberger, Bergen

Well location shown in Fig. 2.1.

Well Coordinates: 60° 52' 11.41"N
03° 40' 41.79"E

4. REPEATED FORMATION TESTER - RFT. OPERATIONS AND RESULTS

4.1. RFT Summary

A total of four runs were performed covering the SOGNEFJORD, UPPER HEATHER, FENSFJORD, KROSSFJORD, LOWER HEATHER, TARBERT, NESS, ETIVE and DRAKE Formations. Four segregated samples (2 3/4 Gall. and 1 Gall) were taken during the survey.

The objectives of the survey being:

- To obtain reservoir pressures
- To establish fluid gradients and possible contacts
- To obtain reservoir fluid samples.

A listing of temperature corrected formation pressures and hydrostatic pressures vs. depth is found in Appendix 1.

Plots of temperature corrected formation pressures vs. depth are found in figures 1 and 2.

A summary of the sampling is found in 4.3. and appendix 2.

Reference is made to the Norsk Hydro report "PVT-analyse av olje fra Troll, Brønn 31/3-2" for PVT study, performed on one of the segregated samples taken.

4.2. Formation Pressure Survey Conclusion

As indicated on figure 4.1. an oil gradient and a water gradient can be determined for the Sognefjord Formation based upon the formation pressures obtained from the RFT H.P-Gauge, these gradients being:

Oil Gradient 0.0832 bar/m (0.850 g/cc)
Water Gradient 0.1002 bar/m (1.023 g/cc)

The intersection of these gradients gives an approximate Free Water Level:

FWL at 1581 mRKB (1556 mMSL)

The reservoir was penetrated below the gas cap, consequently neither a gas gradient nor a GOC can be established.

From figure 4.2. a water gradient can be determined for the rest of the interval covered during the RFT pressure survey, this gradient being:

Water Gradient 0.1002 bar/m (1.023 g/cc).

The water gradient established for the entire interval covered is within the same pressure regime and is also in good accordance with the aquafier gradients established for other areas in the Troll East Field.

The API gravity of the oil sampled is within the range experienced at Troll West while gradients for oil zones at Troll West have not been presented due to lack of good RFT-data. Consequently no conclusion can be drawn w.r.t. the oil gradient obtained for well 31/3-2.

4.3. Sampling and Transfer Results

All four segregated samples were taken utilizing 2 3/4 gall. and 1 gall. sample chambers.

The sample obtained from run no. 1/4A at 1567.6m was regarded as a good and representative sample. During the transfer of the 1 gall chamber content into PVT sample bottles the bubble point measured for each transfer was decreasing and for this reason it was decided to take another sample of same depth as samples obtained at 1577.8m and 1576m contained mainly filtrate.

Six 675cc bottles, three from run no 1/4A and three from run no. 4/4D has been sent for PVT-analysis. (See separate Norsk Hydro report)

A field result summary for the samples obtained is given in appendix 2.

The content of the 1 gallon chambers, run no. 4A and 4D were transferred offshore into 675cc bottles for PVT analysis. This job was carried out by Stavanger Oil Field Service.

The 1 gallon sample obtained from run no. 4A was transferred into 675cc sample bottles as follows:

Bottle no.	Volume (cc)	Bubble point (barg)	Temp. (D.C.)
811092	600	145.21	7.78 ^o C
811080	615	110.80	7.78 ^o C
811078	600	93.25	7.22 ^o C

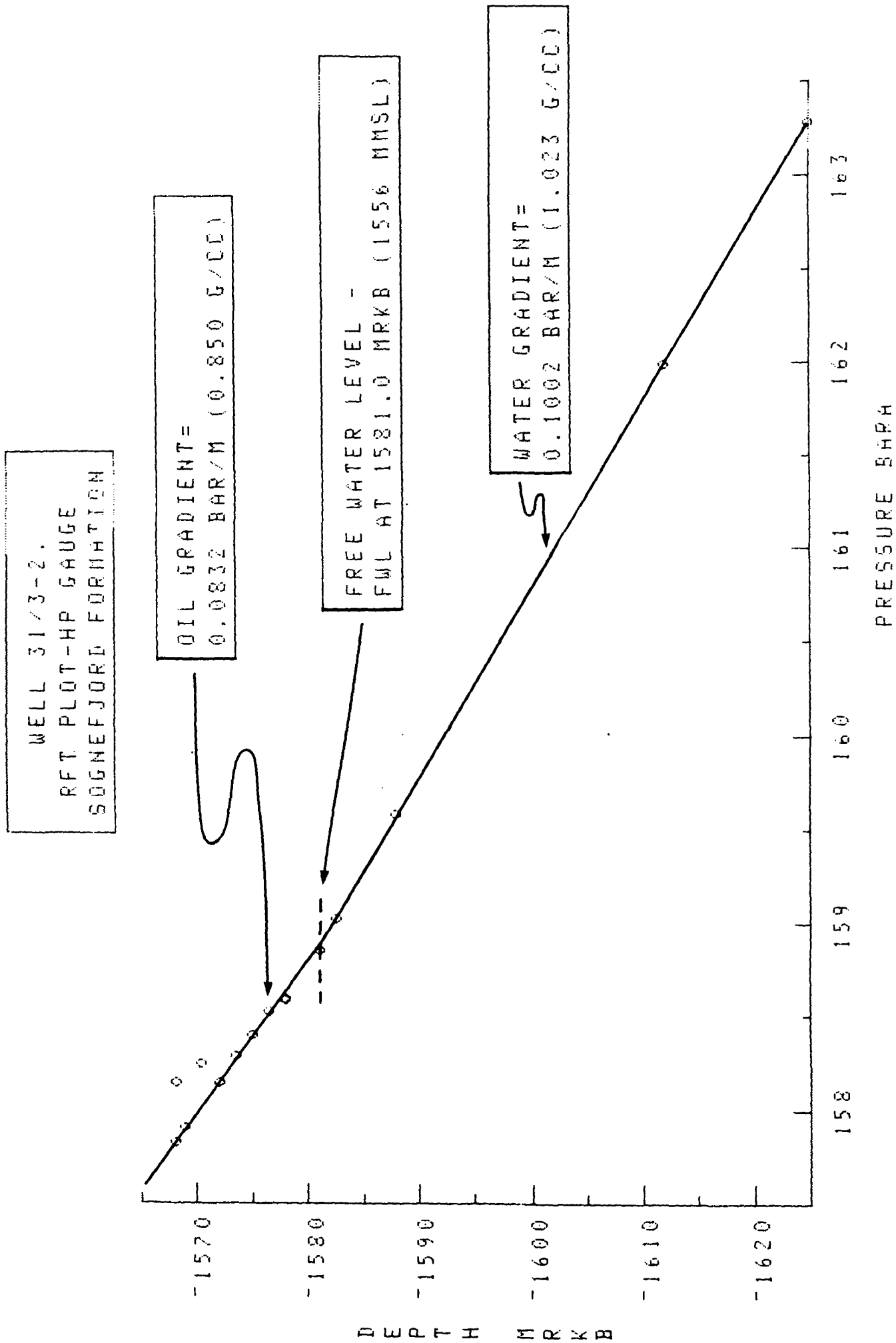
TABLE 4.1

The 1 gallon sample obtained from run No. 4D was transferred into 675cc sample bottles as follows:

Bottle no.	Volume (cc)	Bubble point (barg)	Temp. (D.C.)
811084	600	118.37	6.67 ^o C
810817	555	117.68	6.67 ^o C
811087	605	117.34	6.67 ^o C

TABLE 4.2.

FIGURE 1



RUN NO/ TEST NO	DEPTH MRKB	PHI BARA	PF BARA	PHA BARA	REMARKS
4A/1	1567.5	189.068	-	189.054	SEAL FAILURE
4A/2	1567.6	189.095	158.154	189.095	1'ST SEGREGATED SAMPLE
4B/1	1567.5	188.951	-	189.040	SEAL FAILURE
4B/2	1567.6	188.992	157.837	189.006	VERY GOOD PERM.
4B/3	1568.5	189.095	157.913	189.109	VERY GOOD PERM.
4B/4	1570.0	189.281	158.257	189.288	SUPERCHARGING
4B/5	1571.5	189.467	158.154	189.494	VERY GOOD PERM.
4B/6	1573.0	189.673	158.292	189.680	GOOD PERM.
4B/7	1574.5	189.852	158.409	189.852	VERY GOOD PERM.
4B/8	1576.0	190.052	158.539	190.052	VERY GOOD PERM.
4B/9	1577.5	190.183	158.608	190.196	GOOD PERM.
4B/10	1577.5	190.183	158.594	190.190	GOOD PERM.
4B/11	1580.5	190.523	158.863	190.534	GOOD PERM.
4B/12	1582.0	190.733	159.035	190.733	VERY GOOD PERM.
4B/13	1587.5	191.359	159.592	191.373	VERY GOOD PERM.
4B/14	1511.5	194.209	161.994	194.209	VERY GOOD PERM.
4B/15	1624.5	195.750	163.295	195.764	VERY GOOD PERM.
4B/16	1674.5	201.675	168.312	201.724	VERY GOOD PERM.
4B/17	1695.0	204.119	170.356	204.153	VERY GOOD PERM.
4B/18	1725.5	207.732	173.418	207.725	VERY GOOD PERM.
4B/19	1577.8	190.616	158.973	190.190	2'ND SEGREGATED SAMPLE
4C/1	1725.5	207.649	173.404	207.670	VERY GOOD PERM.
4C/2	1772.5	213.230	178.098	213.237	VERY GOOD PERM.
4C/3	1798.0	216.238	130.630	216.238	VERY GOOD PERM.
4C/4	1834.5	220.560	134.292	220.580	VERY GOOD PERM.
4C/5	1852.75	222.734	186.109	222.734	VERY GOOD PERM.
4C/6	1839.0	227.022	189.742	227.042	VERY GOOD PERM.
4C/7	1908.5	229.327	191.697	229.362	VERY GOOD PERM.
4C/8	1969.0	236.519	197.994	236.553	LOW PERM.
4C/9	1975.0	237.248	198.489	237.276	LOW TO GOOD PERM.
4C/10	1932.5	238.157	199.232	238.170	GOOD PERM.
4C/11	2022.0	242.788	-	242.836	POOR PERM.
4C/12	2021.8	242.781	203.176	242.788	GOOD PERM.
4C/13	1576.0	190.713	159.193	190.176	3'RD SEGREGATED SAMPLE
4D/1	1567.6	188.375	157.810	188.916	4'TH SEGREGATED SAMPLE

NOTES:

1. ALL PRESSURE RECORDINGS ARE FROM HP-GAUGE AND CONSEQUENTLY NO PRESSURE / TEMPERATURE CORRECTIONS HAVE TO BE APPLIED.
2. MUDFILTRATE (PIT) : 55000 PPM (CL)
3. PHI = INITIAL HYDROSTATIC PRESSURE
PF = FORMATION PRESSURE
PHA = HYDROSTATIC PRESSURE AFTER TEST
4. MAX RECORDED DOWNHOLE TEMP.: 69.2 DC.

SAMPLING - FIELD MEASUREMENTS

Sampling no./Run no.	1/4A	2/4B	3/4C	4/4D
<u>1st sample</u>				
Depth (mRKB)	1567.6	1577.8	1576.0	1567.6
Chamber vol (Gal)	2 3/4	2 3/4	2 3/4	2 3/4
Filling time (min)	24	19	31	21
P _{opening} (barg)	113.55	13.76	0	103.23
Gas volume (SCM)	0.392	Trace	NIL	0.430
Oil volume (liters)	6.1	Trace	NIL	7.75
Oil gravity (°API)	28 45°F	N/M	N/A	27.5 44°F

Remarks:

<u>2nd sample</u>				
Depth (mRKB)	a/a	a/a	a/a	a/a
Chamber no.	*	+	+	*
Chamber vol. (gal)	1	1	1	1
Filling time (min)	12.5	13	12	11
P _{opening} (barg)	97.79	0	3.44	92.91
P _{bubble} (barg)	137.64	N/A	N/A	122.50

Remarks: * See table 4.1. and 4.2
 + Sample transferred into 5 ltr. containers

Salinity of mud 55000 ppm

APPENDIX 2