

WELL FILE
WELL FILE

W-00496

AMOCO PRODUCTION COMPANY
Tulsa, Oklahoma
July 30, 1982

82211ART0168

FILE: 341.

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① A. TAASØ - COPY
② RJC

TO: R. L. Young, Amoco Europe

SUBJECT: Core Analysis, Hod 2/11-6 Well, Tor and Hod Formations, Norway, North Sea

This transmits the results of routine core analyses completed by Keplinger Laboratories on cores recovered from the Tor and Hod Formations in the referenced well. The core analyses were requested by B. R. Schlup's letter of January 26, 1982 (File: NO-6051-400-EJS). Samples were selected for analysis from the preserved cores by Ian Ruddy of Amoco Norway.

As indicated in Keplinger's transmittal letter, accurate measurements of oil saturations could not be made because of abnormally high sample weight losses that occurred during the Dean-Stark extraction process. This may be due to actual loss of fine rock particles, rather than chemical dissolution as suggested by Keplinger. In any case, oil saturations for native-state cores have essentially no quantitative value since the cores are flushed with the oil filtrate. The problem of sample disintegration during the cleaning process could probably be eliminated during future analyses of chalk by encasing the core plugs in lead sleeves. Please refer to Research Department Report 82162ART0049 (341.), dated June 11, 1982.

Additional requested special tests for the Hod 2/11-6 cores include the following: (1) imbibition, (2) resistivity, (3) relative permeability, and (4) mercury injection. The Rock Properties Group of Production Research is currently awaiting samples to be selected for these tests by Amoco Norway personnel. Ian Ruddy has submitted cores to Terratek Core Services in Salt Lake City for compressibility tests.

Ted D. Autry

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VJP:rlm
Attachments

cc: A. Bale
M. Bishlawi
J. W. Brice
R. J. Cole
D. D. Fussell
C. E. Konen
B. R. Schlup
E. J. Skandsen

BP AMOCO RECORDS MANAGEMENT AND LIBRARY
Location: NOCS 2/11-6 W45
01014509-1

KEPLINGER LABORATORIES, INC.



A Keplinger Company

July 2, 1982

Amoco Production Company
Research Center
P. O. Box 591
Tulsa, Oklahoma 74102

Attention: Mr. Ian Ruddy

Re: Core Analysis Study
2/11-6 Well
Tor and Hod Formations
Hod Field, Norway
Job Number 82-1561-17

Gentlemen:

This report contains the results of the requested routine analysis on core samples from the 2/11-6 Well, Hod Field, Norway. In addition, effective oil permeabilities were measured on some of the preserved cores.

One inch diameter, native-state core plugs were received from Amoco for use in this project. On a selected group, oil permeabilities were performed before the routine tests. These were measured first due to the fact that some of the test samples were fracturing or disintegrating during the cleaning process, and we were unable to measure air permeabilities. Thus, these measurements insured that we could present a permeability (either for vertical or horizontal samples) for most of the samples submitted. With few exceptions, all the samples were placed in "Dean Stark" type toluene distillation equipment to obtain oil and water saturations.

In many cases, the saturation data indicated liquid saturations that were greater than 100 percent. We feel that in some cases this was due to an inaccurate oil density. But, in general, we think that there was possible chemical dissolution of the core samples during the "Dean Stark" test. This is supported by the fact that we boiled one sample (encased in filter paper) in water and determined a rock weight loss of 0.32 gm. Subtracting this value from the total weight loss of 1.44 gm. for the sample gives a new oil saturation of 28 percent rather than the 60 percent recorded in the table for Sample 47H. The sum of oil and water saturations is now 93.3 percent, a reasonable value.

Therefore, we conclude that, although the water saturations are accurate, the oil saturations in some cases are higher than the actual values. With regard to the reservoir, this is not unexpected, in any event since the cores were drilled with an oil-base mud.

The conditions under which this report is presented are described immediately following the text of this report. We request that the report be used in its entirety if reproductions are to be made. Please contact us if you have any questions, or if we can be of any further service.

Respectfully submitted,

KEPLINGER LABORATORIES, INC.

Keplinger Laboratories, Inc.

JML:mpw

CONDITIONS AND QUALIFICATIONS

Keplinger Laboratories, Inc. will endeavor to provide accurate and reliable laboratory measurements of the cores provided by the client. The results of any core analysis are necessarily affected by the condition in which the core is received and the selection of the samples to be analyzed. In the absence of direction by the client, Keplinger Laboratories, Inc. will utilize their best geological and engineering judgment in selecting the samples to be analyzed. It should be recognized that most cores do not have uniform properties and that selection of truly representative samples is rarely possible. Unless otherwise directed, the samples will normally be selected from the highest quality segments. Thus, use of the properties measured in this report in reservoir calculations could result in an overestimation in reservoir volume and/or deliverability. Keplinger Laboratories, Inc. assumes no responsibility nor offers any guarantee of the productivity or performance of any oil or gas well or hydrocarbon recovery process based upon the data presented in this report.



ROUTINE CORE ANALYSIS TEST RESULTS

AMOCO PRODUCTION COMPANY
2/11-6 WELL
HOD FIELD
TOR AND HOD FORMATIONS
NORWAY

Sample Number	Depth (Meters)	Permeability, (md)		Porosity (Percent)	Saturation Percent Pore Volume		Grain Density (gm/cc)
		Air	Oil		Oil	Water	
1H	3694.1	1.76		33.1	98.0	8.4	2.71
2H	3694.85	*		32.0	93.2	12.0	2.71
3H	3695.1	0.67		32.9	92.3	17.0	2.70**
4H	3695.35	0.29		29.4	80.0	24.5	2.70
5H	3696.6	*		28.8	72.4	31.7	2.70
6H	3702.2	*		32.3	73.1	29.4	2.70
6V	3702.2	1.71		30.4	74.3	31.2	2.70**
7H	3702.4	0.94		29.1	66.7	35.8	2.69
7V	3702.4	0.32		30.5	74.7	29.2	2.69
8H	3702.65	*		31.0	73.3	28.9	2.69**
8H-1	3702.65	*	.074	32.2			2.70
8V	3702.65	0.46		32.2	82.1	22.7	2.70
9H	3702.85	1.53		41.9	81.9	13.4	2.70
9H-1	3702.85	1.05	.41	42.0			2.69
9V	3702.85	3.61		33.8	81.6	22.7	2.70**
10H	3703.1	0.34		32.7	79.9	22.9	2.70
10H-1	3703.1	0.41	.101	33.0			2.70
10V	3703.1	0.50		34.6	89.3	15.9	2.70
11H	3703.35	0.28		32.8	75.1	29.6	2.70
12H	3703.6	0.36		34.4	78.9	23.2	2.69
12V	3703.6	0.33		35.3	78.2	23.8	2.70
13H	3703.85	2.20		34.9	78.8	24.2	2.70**
13V	3703.85	0.38		35.1	76.6	25.1	2.70
14H	3704.1	0.70		34.6	72.7	28.4	2.70**
14H-1	3704.1	0.45	.063	35.3			2.70
14V	3704.1	0.77		34.9	73.5	29.0	2.69**
15H	3704.35	0.26		34.4	72.6	25.4	2.70
15H-1	3704.35	0.25	.058	34.5			2.70
15V	3704.35	0.27		34.3	76.8	24.1	2.69
16H	3705.1	0.45	.132	33.0	81.8	19.3	2.69
16H-1	3705.1	0.38	.072	36.4			2.71
16V	3705.1	0.51	.153	33.0	83.0	18.6	2.70
17H	3705.6	0.36	.087	37.2	77.1	24.1	2.70
17V	3705.6	0.48	.073	33.0	80.5	20.3	2.70

- * Fractured sample, no permeability possible
- ** Sample with possibly closed fractures
- + Stylolitic
- ** Permeabilities not requested



ROUTINE CORE ANALYSIS TEST RESULTS

AMOCO PRODUCTION COMPANY
2/11-6 WELL
TOR AND HOD FORMATIONS
HOD FIELD, NORWAY

Sample Number	Depth (Meters)	Permeability, (md)		Porosity (Percent)	Saturation Percent Pore Volume		Grain Density (gm/cc)
		Air	Oil		Oil	Water	
18H	3705.85	0.60	.133	35.5	84.8	17.4	2.68
18V	3705.85	0.34	.089	35.5	79.4	22.1	2.70
19H	3708.1	1.54	.069	35.7	85.6	17.9	2.70+
19V	3708.1	2.21	.085	37.8	79.4	23.3	2.69+
20H	3708.6	0.54	.080	33.5	80.3	22.6	2.70
21H	3709.6	0.63	.108	33.5	83.3	22.3	2.69**
22H	3710.05	0.15	.0118	13.0	58.7	47.1	2.71**
23H	3710.1	10.1	.182	15.7	60.6	41.5	2.71**
24H	3710.35	*	*	23.8	80.2	27.8	2.70
25H	3716.05	4.16	.331	32.7	81.0	21.5	2.70
26H	3716.35	0.65	.109	30.0	86.8	18.0	2.70
27H	3720.1	0.18	.00767	9.3	72.4	35.5	2.71
27V	3720.1	0.033	<.0001	7.0	43.8	65.3	2.70
28	3693.1	++		33.1	94.7	13.4	2.69
29	3693.6	++		34.6	93.1	13.9	2.69
30	3694.35	++		32.4	92.0	10.2	2.69
31	3695.75	++		30.6	85.8	29.0	2.69
32	3697.4	++		24.2	61.8	50.3	2.67
33	3704.85	++		27.7	95.0	7.0	2.68
34	3708.85	++		31.5	70.4	31.3	2.70
35	3717.35	++		13.2	36.3	66.6	2.72
36	3719.0	++		4.1	Equipment Failure		2.70
37	3722.6	++		10.9	33.9	26.8	2.70
38	3733.2	++		30.1	45.9	29.2	2.68
39	3734.35	++		27.7	19.9	54.1	2.69

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ROUTINE CORE ANALYSIS TEST RESULTS

AMOCO PRODUCTION COMPANY
2/11-6 WELL
TOR AND HOD FORMATIONS
HOD FIELD, NORWAY

Sample Number	Depth (Meters)	Permeability, (md)		Porosity (Percent)	Saturation Percent Pore Volume		Grain Density (gm/cc)
		Air	Oil		Oil	Water	
40	3734.85	++		28.1	14.9	46.9	2.69
41	3736.1	++		29.4	42.9	32.8	2.69
42	3737.6	++		34.4	55.1	26.6	2.69
43	3738.3	++		32.7	27.2	45.8	2.71
44	3739.35	++		37.9	62.2	21.8	2.67
45H	3705.0	0.46	.147	38.9	83.7	13.4	2.71
46H	3717.85	*	*	13.6	45.3	66.7	2.71
47H	3720.35	0.013	<.0001	8.2	60.0	65.3	2.71
48H	3720.7	0.0023	<.0001	5.8	63.9	55.3	2.71
49H	3721.1	0.00040	<.0001	4.8	Equipment Failure		2.71
49V	3721.1	0.002	<.0001	4.9			2.71
50H	3721.35	0.0001	<.0001	4.0	21.7	90.2	2.70
50V	3721.35	0.0008	<.0001				
51H	3721.7	0.0012	<.0001	5.1	40.2	87.7	2.71
51V	3721.7	0.0007	<.0001	4.5			2.71
52H	3721.85	0.0014	<.0001	4.8	58.6	66.4	2.71
52V	3721.85	0.17	.117	5.4			2.72
53H	3722.0	0.0076	<.0001	5.6	33.3	87.6	2.71
53V	3720.0	0.001	<.0001	4.8			2.71
54H	3722.35	0.58	.112	23.9	79.1	27.6	2.70
54V	3722.35	0.045	.0090	10.7			2.71
55H	3723.1	*	*	27.2	87.9	21.1	2.70
56H	3724.8	*	*	32.5	94.8	17.9	2.70
56V	3724.8	*	.41	28.0			2.71
57H	3725.1	0.58	.221	24.3	88.6	18.1	2.71
57V	3725.1	0.56	.24	24.9			2.71
58H	3725.5	*	*	23.3	91.2	16.2	2.70
58V	3725.5	0.48	.17	23.3			2.70
59H	3725.6	0.83	.213	30.4	88.4	15.9	2.70
59V	3725.6	0.58	.23	26.8			2.70
60H	3726.1	1.62	.438	33.6	86.5	18.0	2.70
60V	3726.1	*	.39	33.0			2.70

- * Fractured sample, no permeability possible
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ROUTINE CORE ANALYSIS TEST RESULTSAMOCO PRODUCTION COMPANY
2/11-6 WELL
TOR AND HOD FORMATIONS
HOD FIELD, NORWAY

Sample Number	Depth (Meters)	Permeability, (md)		Porosity (Percent)	Saturation Percent Pore Volume		Grain Density (gm/cc)
		Air	Oil		Oil	Water	
61H	3726.6	*	*	32.3	89.7	25.3	2.68
61V	3726.6	*	.17	29.8			2.70
62H	3727.0	0.55	.215	27.0	87.2	17.4	2.71
63H	3727.5	0.43	.111	27.0	84.8	19.1	2.70
63V	3727.5	0.53	.17	27.8			2.70
64H	3727.75	*	*	27.0	96.8	20.9	2.68
64V	3727.75	*	.36	28.6			
65H	3728.5	0.52	.122	27.5	83.3	21.0	2.71
65V	3728.5	0.54	.15	29.1			2.70
66H	3733.35	0.24	.038	32.1	75.2	29.1	2.70
66V	3733.35	0.24	.049	30.9			2.70
67H	3733.6	*	.070	32.2	71.1	31.8	2.71
68H	3734.1	*	.023	31.3	75.6	31.8	2.70
69H	3735.1	1.00	.061	33.1	82.1	22.6	2.71
70H	3736.35	0.27	.0084	37.1	85.9	18.9	2.70
71H	3738.85	0.64	.129	38.4	85.1	18.6	2.69
71V	3738.85	0.36	.036	35.7			2.69

- * Fractured sample, no permeability possible
- ** Sample with possible closed fractures
- + Stylolitic
- ++ Permeabilities not requested