HDN-1X

Conventional Core Analysis for Mærsk Olie og Gas A/S . Well: Halfdan HDN-1X

Core Laboratory; Høier, C.; Springer, N.; Stentoft, N.

GEUS

Copenhagen

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DANMARKS OG GRØNLANDS GEOLOGISKE UNDERSØGELSE RAPPORT 2001/21

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GEUS

Contents

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1. Introduction

By request of Mærsk Olie & Gas A/S, GEUS Core Laboratory has carried out conventional core analysis on the Halfdan well HDN-1X.

The experimental programme was specified by Ms. Pia Hansen. The following analytical programme has been carried out:

- Conventional plug analysis
- Fluid saturation measurements
- Lithological description of plugs

This study is carried out under contract GSC 1418, CWO's 0180. Several preliminary reports have been forwarded to Mærsk Olie & Gas A/S in the time period October 2000 - January 2001.

2. Sampling and analytical procedure

GEUS Core Laboratory received a total of 133 plugs for conventional core analysis covering the interval 6934 – 7056 feet measured depth in the HDN-1X well. Plugs were received from Mærsk Laboratory during October 2000.

2.1 Hot shot analysis on HS plugs

The 12 HS plugs selected for "hot shot" analysis have been re-cleaned and re-measured and are included with the final data as HS plugs.

2.2 Fluid saturation

The following densities were used for the calculation of fluid saturation: 1.035 g/ml for the brine and 0.850 g/ml for the oil.

2.3 Hot Soxhlet cleaning

The plugs were cleaned in methanol and toluene and then dried at 110 °C.

2.4 Conventional core analysis

Conventional core analysis including He-porosity, grain density, gas permeability and Klinkenberg permeability was performed. The permeability was measured using a sleeve pressure of 800 psi.

2.5 Lithological description

The plugs were lithologically described according to the JCR nomenclature, and the description is included with the results in section 5.2.

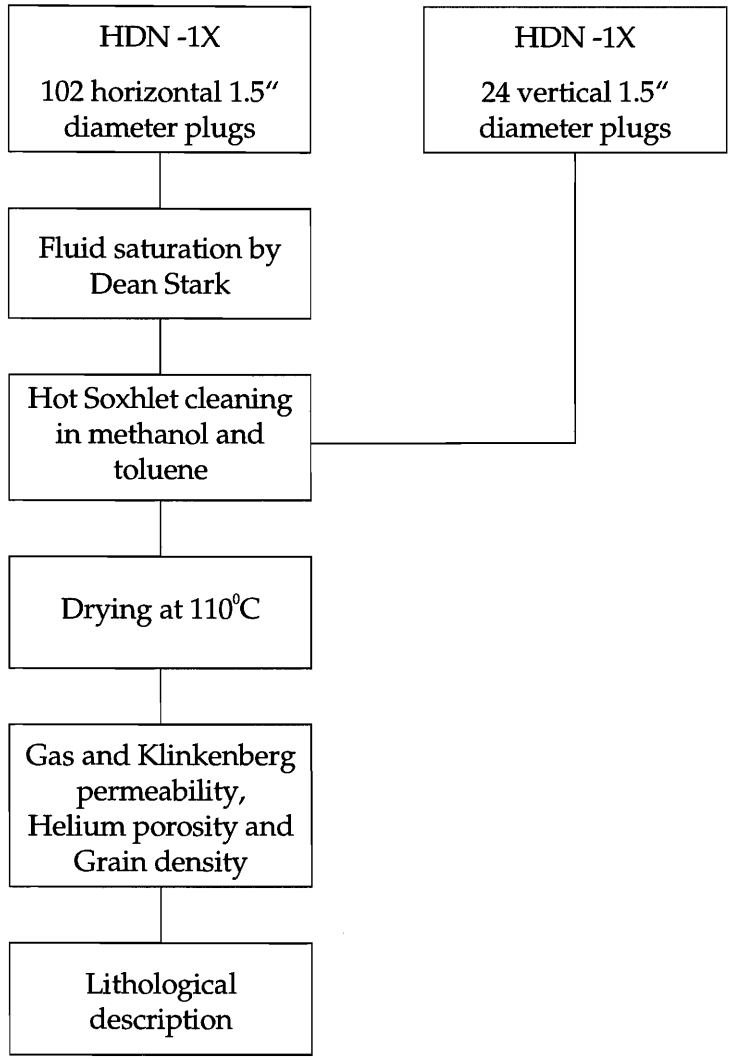
2.6 Selection of SCAL plugs

26 plugs were quality screened by x-ray CT scanning, and a number will later be selected for special core analysis. The 7 plugs for the wettabillity study were excluded from the conventional core analysis program. The selected plugs are listed in the table below.

Table 2.1: Plugs selected for x-ray CT screening.

Wettabillity study		Mercury injection		Resistivity measurements	
Plug no.	Depth (feet)	Plug no.	Depth (feet)	Plug no.	Depth (feet)
2	6935.75	8	6942.25	20	6957.58
19	6955.00	18	6954.17	44	6985.17
38	6978.17	24	6961.58	45	6996.00
48	7000.00	56	7008.67	50	7002.08
64	7017.00	67	7020.42	63	7016.00
78	7033.83	70	7024.67	68	7021.67
92	7050.83	71	7025.33	74	7029.83
-	-	94	7052.83	82	7038.58
-	-	-	-	85	7041.58
-	-	-	-	86	7043.08
-	-	-	-	95	7053.83

3. Flow chart of the analytical procedure



4. Analytical methods

The following is a short description of the methods used by the GEUS Core Laboratory. For a more detailed description of methods, instrumentation and principles of calculation the reader is referred to API recommended practice for core analysis procedure (API RP 40, 1998).

4.1 Conventional cleaning and drying

The samples are placed in a Soxhlet extractor, which continuously soaks and washes the samples with methanol. This process removes water and dissolves salt precipitated in the pore space of the rock. Extraction is terminated when no chloride ions are present in the methanol. Samples containing hydrocarbons are then cleaned in toluene until a clear solution is obtained. Samples are vacuum dried at 90 °C or 110 °C, or they are humidity dried at 60 °C and 40% relative humidity until constant weight occurs, depending on the requirements of the client.

4.2 Gas permeability

The plug is mounted in a Hassler core holder, and a confining pressure of 800 psi applied to the sleeve. The specific permeability to gas is measured by flowing nitrogen gas through a plug of known dimensions at differential pressures between 0 and 1 bar. No back pressure is applied. The readings of the digital gas permeameter are checked regularly by routine measurement of permeable steel reference plugs.

4.3 Klinkenberg permeability (steady state instrument)

The Klinkenberg corrected gas permeability, sometimes termed the equivalent liquid permeability, is calculated from gas permeability measurements performed at 3 different mean pressures in the plug sample.

The plug is mounted in a Hassler core holder, and a confining pressure of 800 psi is applied to the sleeve. Nitrogen gas pressures of 3, 5 and 8 atm. (abs.) are applied at the upstream end of the plug, and the downstream pressure is regulated until a suitable flow is obtained. The differential pressure is kept approx. constant in order to maintain a similar flow regime during the 3 measurements. When a steady state is reached, the upstream pressure, the differential pressure across the plug and the flow reading is recorded. A linear regression of permeability on inverse mean pressure is performed for the 3 measurements, and the intercept on the permeability axis is the Klinkenberg corrected gas permeability. To ensure compatibility with plug data which do not include Klinkenberg corrected gas permeability, a permeability value pertaining to a mean pressure of 1.5 atm. (abs) is calculated from the Klinkenberg regression coefficients. This value is reported as "1.5 P-M permeability" in the core analysis tabulation, and should be comparable to the conventional gas permeability which is measured at the same mean pressure.

Klinkenberg corrected gas permeabilities are only reported down to approx. 0.1 mD on normal routine terms. However, on request measurements can be carried out to a lower limit of 0.01 mD. The performance of the digital gaspermeameter is checked regularly by routine measurements of permeable steel reference plugs.

4.4 He-porosity and grain density

The porosity is measured on cleaned and dried samples. The porosity is determined by subtraction of the measured grain volume and the measured bulk volume. The Helium technique, employing Boyle's Law, is used for grain volume determination, applying a double chambered Helium porosimeter with digital readout, whereas bulk volume is measured by submersion of the plug in a mercury bath using Archimedes principle. Grain density is calculated from the grain volume measurement and the weight of the cleaned and dried sample.

4.5 Fluid saturation determination

The water content of a plug is extracted by Dean Stark distillation with toluene. The water is retained by a condenser, and the amount is directly measured in a calibrated trap. The oil content of the plug is dissolved in the toluene. The quantity of oil is calculated as the difference between the original sample weight and the weight after extraction, corrected for the amount of water recovered. The plug is finally Soxhlet cleaned to remove salt precipitated in the pore space. The porosity is then measured as described above.

The calculation of fluid saturation presumes that the water and oil density is known. If it is unknown, a value is assumed in the final calculation, usually 1.0 g/ml for the brine and 0.85 g/ml for the oil. The percentage of the plug pore volume which is not occupied by either water or oil is the gas saturation.

4.6 Precision of analytical data

The table below gives the precision (= reproducibility) at the 68% level of confidence (+/- 1 standard deviation) for routine core analysis measurements performed at the GEUS Core Laboratory.

Measurement	Range, mD	Precision
Grain density		0.003 g/cc
Porosity		0.1 porosity-%
Gas Permeability	0.001-0.01 0.01-0.1 > 0.1	25% 15% 4%

The precision of the fluid saturation determination depends on the pore volume of the plug. The greater the plug and the greater the porosity of the plug, the better precision is obtained. The following table gives the precision in absolute percent-point.

Porosity	1" x 1.5" plugs	1.5" x 3" plugs
> 20%	5%	1%
10-20%	10%	2%
5-10%	20%	5%
< 5%	> 20%	> 5%

Certain factors might alter the stated precision of the fluid saturation determination. Loss of material during handling of the plug will result in an increase in the calculated oil saturation, and a similar decrease in the calculated gas saturation. This may occur for fragile for loosely consolidated rocks or if the rock contains dissolvable matters like halite. As the lost material usually has a greater density than oil, it may happen that the estimated volume of oil and the measured volume of water all together take up more space than the actual pore volume after cleaning.

5. Results

The results are presented as followed:

- Listed conventional core analysis data.
- Frequency of porosity, grain density, gas permeability, Klinkenberg permeability, water– oil– and gas- saturation.
- Crossplot of porosity vs. gas permeability and Klinkenberg permeability.
- Crossplot of Klinkenberg permeability vs. gas permeability.
- Lithological description.
- Attached corelog plotting gas permeability, 1.5 P-M permeability, Klinkenberg permeability, porosity, grain density, oil- water- and gas saturation vs. depth.
- All measured data is included on a diskette.

The depth conversion data in the table below has been available by Mærsk Olie og gas. The cores were cut from the Maastrichtian Tor formation.

Tops / Contacts	MDRT feet	TVDSS feet
D1/Danian/Ekofisk Fm.	6,815	6,700
GOC	6,848	6,732
D2A	6,872	6,756
D2B	6,910	6,794
M1/Maastrichtian/Tor Fm.	6,930	6,814
OWC	7,060	6,944
M2	7,098	6,982
M3	7,171	7,055
M4+	7,206	7,090
Hod Fm.	7,420	7,304
Campanian	7,480	7,364
TD	7,680	7,564

Table 5.1. Halfdan HDN-1x tops.

5.1 Conventional core analysis data

GEOLOGICAL SURVEY OF DENMARK AND GREENLAND

GEUS CORE LABORATORY

CORE ANALYSIS TABULATION

Final report

Compiled by C.H.

WELL : HDN-1X

CORE : 1,2

Printed : 22-FEB-01

GENERAL INFORMATION ON THE ANALYSIS

COMPANY	: Maersk Olie og Gas	LOCATION	: Danish North Sea
DEPTH INTERVAL	: 6934.75 - 7055.83	CORE NO.'S	: 1,2
DEPTHS ARE MEASURED FROM KB		ANALYSTS	: MJ,GG,HJL
DEPTHS ARE IN FEET		DATE	: 2202 1
PROGRAM POPE V.5.*		FILE	: HDN_1X

REMARKS :

SAMPLE NO.	DEPTH FEET	PLUG TYPE	GAS PERM mD	1.5 P-M PERM mD	KLINK PERM mD	KLINK CORR. COEF.	POROSITY %	GRAIN DENS. G/CCM	WATER SATUR. %	OIL SATUR. %	GAS SATUR. %	COMMENT
HS1	6934.50	MISC	3.81	3.72	2.40	0.999	31.33	2.711				
1	6934.75	HOR	4.40	4.24	2.74	0.999	30.83	2.713	29	49	22	
1V	6935.42	VERT	3.38	3.27	2.07	1.000	29.26	2.706				
3	6936.67	HOR	3.61	3.51	2.12	0.999	32.48	2.709	22	45	33	
4	6938.00	HOR	4.93	4.71	3.07	0.999	32.74	2.708	30	54	16	
5	6939.42	HOR	3.30	3.11	2.16	0.997	27.85	2.708	31	49	20	
6	6940.33	HOR	2.46	2.31	1.48	0.995	29.61	2.708	30	51	19	
2V	6940.58	VERT	2.32	2.24	1.34	1.000	28.24	2.705				
7	6941.33	HOR	1.37	1.34	0.783	0.999	24.16	2.709	40	37	22	
8	6942.25	HOR	0.755	0.730	0.411	1.000	21.13	2.711	40	45	15	
9	6943.42	HOR	1.27	1.23	0.667	0.999	25.10	2.708	30	49	21	
HS2	6944.42	MISC	1.62	1.60	0.925	0.999	25.82	2.709				
10	6944.58	HOR	1.70	1.61	0.997	0.993	25.21	2.710	38	42	20	
3V	6945.25	VERT	1.23	1.17	0.688	1.000	24.28	2.702				
11	6945.83	HOR	3.42	3.24	2.16	1.000	28.31	2.707	45	41	14	
12	6947.75	HOR	1.93	1.85	1.11	1.000	26.52	2.708	44	43	12	
13	6949.08	HOR	10.4	10.9	8.94	0.992	26.68	2.709	43	48	9	FRACTURE
14	6950.08	HOR	2.63	2.52	1.58	1.000	26.77	2.709	11	82	7	
4V	6950.33	VERT	1.85	1.78	1.02	1.000	28.18	2.705				
15	6951.00	HOR	2.91	2.76	1.89	0.995	28.28	2.708	41	45	15	
16	6952.17	HOR	1.37	1.22	0.848	0.995	26.40	2.709	37	50	12	
17	6953.17	HOR	2.33	2.30	1.40	0.991	28.29	2.706	16	79	6	

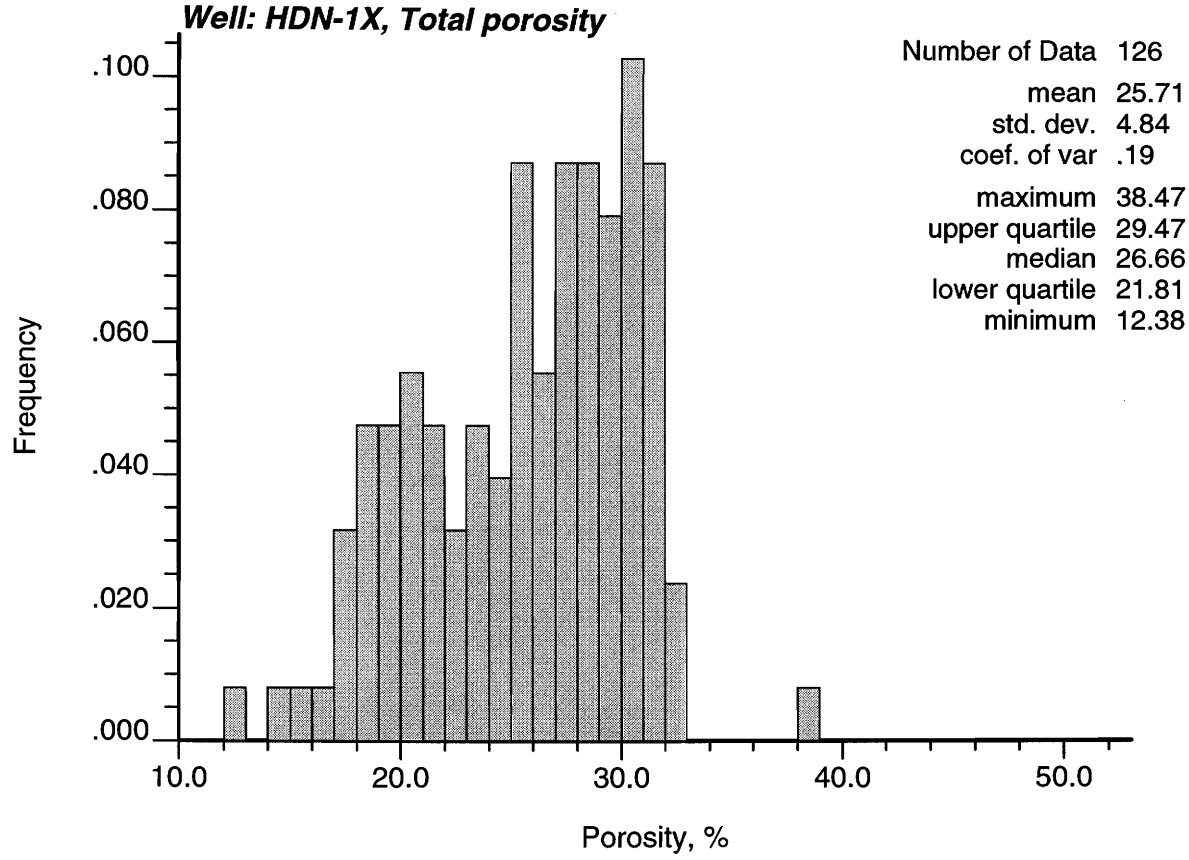
SAMPLE NO.	DEPTH FEET	PLUG TYPE	GAS PERM mD	1.5 P-M PERM mD	KLINK PERM mD	KLINK CORR. COEF.	POROSITY %	GRAIN DENS. G/CCM	WATER SATUR. %	OIL SATUR. %	GAS SATUR. %	COMMENT
18	6954.17	HOR	2.28	2.25	1.25	0.991	30.61	2.707	31	49	20	
HS3	6954.67	MISC	1.75	1.65	0.977	0.999	28.75	2.707				
5V	6954.83	VERT	1.66	1.57	0.924	1.000	27.59	2.702				
20	6957.58	HOR	1.14	1.10	0.620	0.997	25.36	2.709	16	68	16	
21	6958.58	HOR	1.86	1.76	1.03	0.997	30.76	2.714	38	47	16	
22	6959.58	HOR	1.27	1.23	0.675	1.000	25.67	2.713	44	38	18	
6V	6959.83	VERT	0.747	0.715	0.371	0.999	22.66	2.710				
23	6960.58	HOR	2.43	2.38	1.78	0.996	26.63	2.713	53	28	19	
24	6961.58	HOR	1.80	1.75	1.03	1.000	27.13	2.712	42	36	22	
25	6962.58	HOR	1.28	1.29	0.704	1.000	25.70	2.712	47	38	15	
26	6963.75	HOR	2.15	2.02	1.24	0.997	29.27	2.712	44	44	11	
27	6964.75	HOR	2.29	2.23	1.25	1.000	31.79	2.715	23	55	22	
7V	6965.17	VERT	1.22	1.17	0.615	1.000	27.63	2.696				
28	6965.67	HOR	2.55	2.52	1.51	0.999	28.04	2.712	37	49	14	
HS4	6965.83	MISC	1.52	1.46	0.828	1.000	28.17	2.711				
29	6968.08	HOR	2.41	2.33	1.36	0.999	31.10	2.719	34	41	25	
30	6969.08	HOR	1.49	1.45	0.817	0.999	27.90	2.713	52	29	19	
8V	6969.67	VERT	1.80	1.73	0.957	0.999	29.47	2.701				
31	6970.08	HOR	2.42	2.31	1.35	0.999	31.74	2.714	39	33	28	
32	6971.08	HOR	2.20	2.12	1.19	1.000	31.29	2.713	29	50	22	
33	6972.08	HOR	3.18	3.15	2.00	1.000	29.51	2.712	33	57	10	
34	6973.33	HOR	3.75	3.70	2.35	1.000	31.71	2.712	43	52	5	

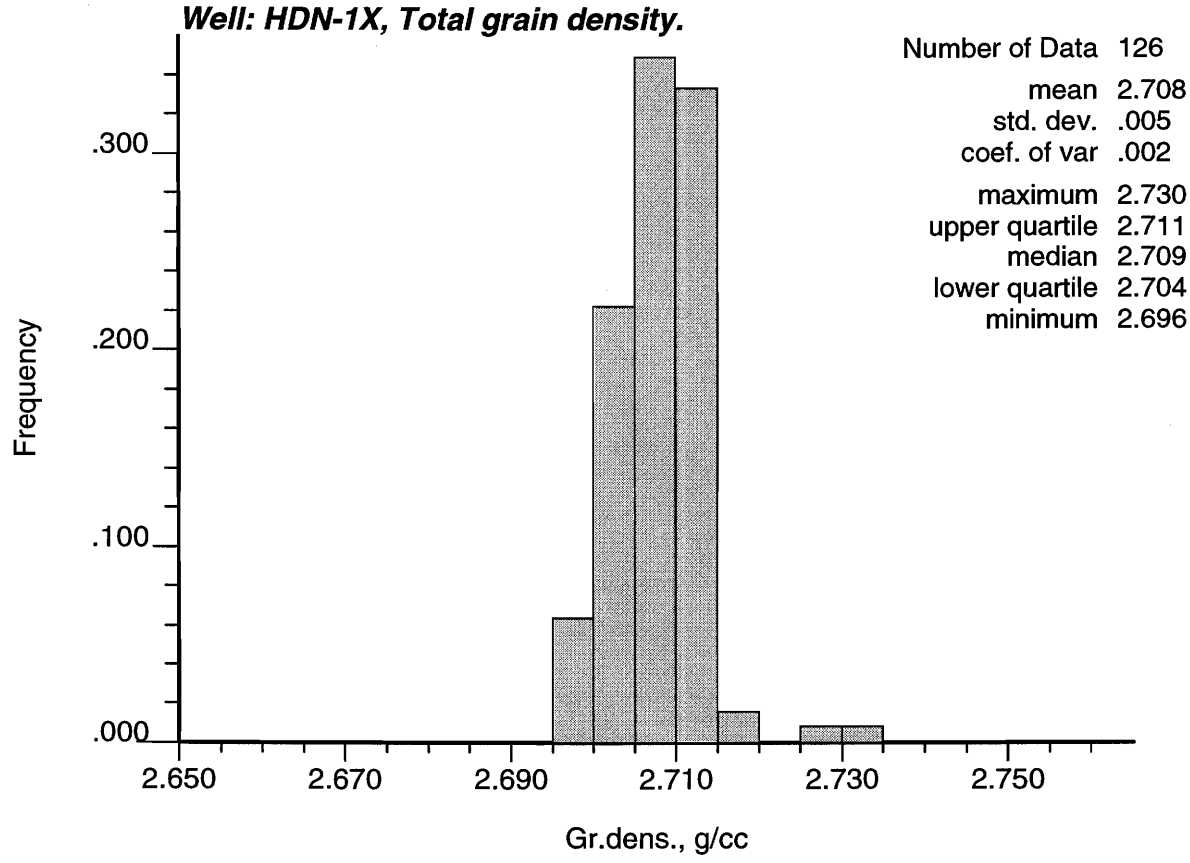
SAMPLE NO.	DEPTH FEET	PLUG TYPE	GAS PERM mD	1.5 P-M PERM mD	KLINK PERM mD	KLINK CORR. COEF.	POROSITY %	GRAIN DENS. G/CCM	WATER SATUR. %	OIL SATUR. %	GAS SATUR. %	COMMENT
9V	6974.42	VERT	2.35	2.25	1.36	0.999	30.79	2.697				
35	6974.57	HOR	2.77	2.66	1.63	1.000	30.60	2.714	37	50	13	
HS5	6975.25	MISC	2.23	2.18	1.31	0.999	30.06	2.709				
36	6975.83	HOR	2.51	2.43	1.41	1.000	31.86	2.714	32	67	1	
37	6977.00	HOR	2.75	2.64	1.69	0.990	30.50	2.711	40	50	11	
39	6979.17	HOR	3.93	3.91	2.40	1.000	30.99	2.712	44	53	3	
10V	6979.58	VERT	1.56	1.49	0.825	1.000	27.89	2.706				
40	6980.17	HOR	3.58	3.65	2.26	1.000	29.05	2.712	59	37	3	
41	6981.17	HOR	2.97	2.92	1.69	1.000	30.28	2.697	53	37	9	
42	6982.58	HOR	2.71	2.61	1.59	0.999	31.71	2.705	47	52	2	
43	6983.58	HOR	14.8	16.4	11.5	0.989	31.14	2.700	57	38	5	FRACTURE
11V	6984.58	VERT	2.09	1.98	1.12	0.999	30.52	2.700				
HS6	6985.00	MISC	4.21	4.13	2.69	0.998	30.88	2.706				
44	6985.17	HOR	3.05	2.99	1.82	0.998	38.47	2.700	22	27	50	
HS7	6995.33	MISC	2.30	2.27	1.32	1.000	29.47	2.711				
45	6996.00	HOR	3.13	3.10	1.96	0.999	29.34	2.705	37	57	6	
46	6997.58	HOR	5.54	5.50	3.97	0.999	31.53	2.702	45	48	7	
12V	6997.75	VERT					30.87	2.730				
47	6998.75	HOR	25.7	28.0	19.4	0.972	32.83	2.702	34	54	12	FRACTURE
49	7001.17	HOR	1.43	1.42	0.781	1.000	26.64	2.729	55	33	12	
50	7002.08	HOR	2.66	2.48	1.62	1.000	31.56	2.706	58	27	15	
13V	7002.42	VERT	1.33	1.30	0.702	0.999	25.65	2.700				

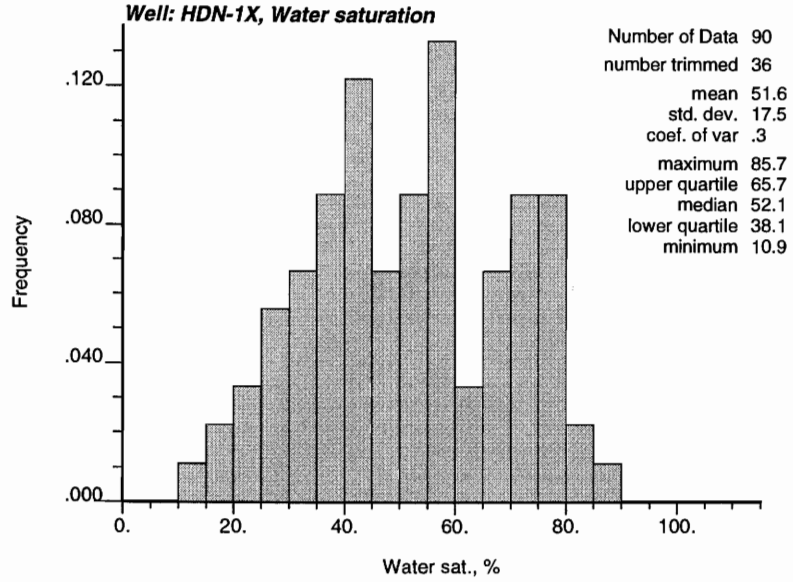
SAMPLE NO.	DEPTH FEET	PLUG TYPE	GAS PERM mD	1.5 P-M PERM mD	KLINK PERM mD	KLINK CORR. COEF.	POROSITY %	GRAIN DENS. G/CCM	WATER SATUR. %	OIL SATUR. %	GAS SATUR. %	COMMENT
51	7003.00	HOR	2.91	2.80	1.88	1.000	28.30	2.700	45	52	3	
52	7004.00	HOR	1.69	1.61	0.935	1.000	27.69	2.707	60	31	10	
14V	7005.00	VERT	2.93	2.84	1.76	1.000	30.64	2.705				
53	7005.67	HOR	1.55	1.49	0.824	1.000	28.10	2.704	57	28	15	
HS8	7006.25	MISC	1.63	1.58	0.855	0.998	29.29	2.709				
54	7006.67	HOR	1.96	1.88	1.05	0.998	27.97	2.702	59	21	20	
55	7007.75	HOR	1.81	1.80	0.974	1.000	24.52	2.705	72	18	9	
56	7008.67	HOR	1.22	1.17	0.669	0.993	25.44	2.703	58	25	16	
57	7009.67	HOR	0.733	0.702	0.392	1.000	23.04	2.703	70	15	15	
58	7010.67	HOR	1.30	1.26	0.716	1.000	25.57	2.702	46	24	30	
15V	7011.50	VERT	1.32	1.27	0.668	1.000	25.56	2.705				
59	7011.67	HOR	1.37	1.31	0.767	0.997	24.73	2.704	73	16	11	
60	7012.75	HOR	1.77	1.68	0.951	0.999	27.86	2.704	60	25	15	
61	7014.00	HOR	1.72	1.66	0.934	1.000	27.77	2.704	52	24	24	
62	7015.00	HOR	1.92	1.88	1.06	0.999	29.03	2.702	53	26	22	
HS9	7015.67	MISC	2.05	1.94	1.19	0.999	28.43	2.711				
63	7016.00	HOR	1.96	1.88	1.20	1.000	27.10	2.701	64	24	12	
16V	7016.42	VERT	2.10	2.07	1.22	0.999	26.71	2.703				
65	7018.42	HOR	0.363	0.349	0.196	0.998	15.52	2.711	65	32	3	
66	7019.42	HOR	1.29	1.25	0.694	1.000	25.97	2.702	50	28	22	
67	7020.42	HOR	0.815	0.834	0.460	0.998	19.30	2.709	44	24	32	
17V	7021.42	VERT	0.510	0.500	0.243	1.000	16.15	2.700				

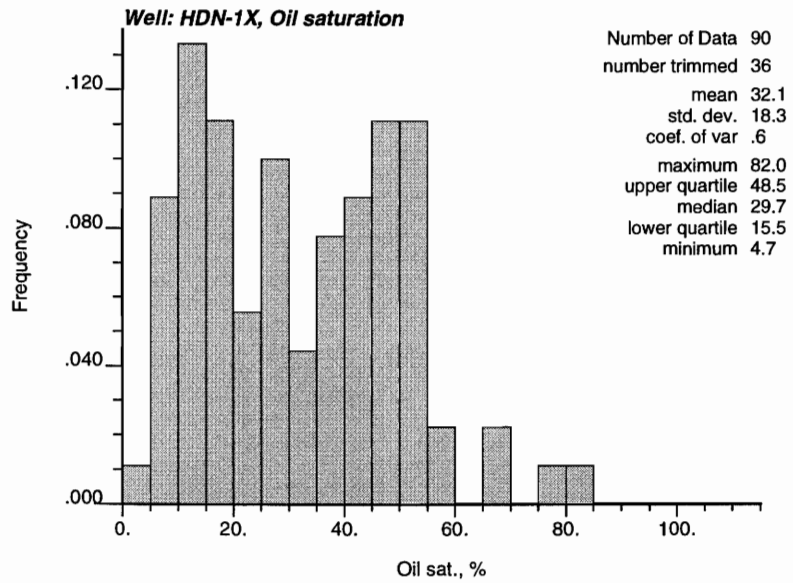
SAMPLE NO.	DEPTH FEET	PLUG TYPE	GAS PERM mD	1.5 P-M PERM mD	KLINK PERM mD	KLINK CORR. COEF.	POROSITY %	GRAIN DENS. G/CCM	WATER SATUR. %	OIL SATUR. %	GAS SATUR. %	COMMENT
68	7021.67	HOR	0.151	0.148	0.070	0.999	12.38	2.709	63	16	22	
69	7023.67	HOR	6.13	7.16	4.61	0.982	18.23	2.707	66	14	19	
70	7024.67	HOR	4.22	4.38	3.41	1.000	14.38	2.709	71	10	19	
18V	7025.33	VERT	0.306	0.309	0.141	0.999	17.54	2.709				
HS10	7025.67	MISC	0.983	0.927	0.525	0.999	20.37	2.710				
71	7026.25	HOR	1.92	1.83	1.35	0.996	18.14	2.714	50	16	34	
72	7027.67	HOR	0.460	0.453	0.218	0.999	17.91	2.710	75	7	18	
73	7028.67	HOR	3.33	3.29	2.66	0.998	17.48	2.712	77	7	16	
19V	7029.17	VERT	0.757	0.731	0.374	1.000	22.33	2.703				
74	7029.83	HOR	0.560	0.543	0.275	1.000	18.51	2.712	71	11	18	
75	7030.83	HOR	0.898	0.838	0.527	0.986	20.47	2.712	75	10	15	
76	7031.83	HOR	2.44	2.42	2.01	0.982	18.80	2.715	77	10	12	
77	7032.83	HOR	1.25	1.25	0.786	0.958	22.73	2.710	71	11	18	
20V	7034.75	VERT	1.05	1.05	0.572	1.000	21.88	2.701				
79	7034.83	HOR	0.847	0.853	0.448	1.000	23.34	2.710	86	8	6	
HS11	7036.08	MISC	0.436	0.414	0.204	1.000	19.56	2.711				
80	7036.25	HOR	1.19	1.92	0.483	0.963	21.81	2.711	60	18	22	
81	7037.58	HOR	0.983	0.973	0.550	1.000	21.75	2.711	59	18	23	
21V	7038.33	VERT	0.924	0.900	0.441	0.998	19.65	2.705				
82	7038.58	HOR	0.961	0.938	0.505	0.999	22.90	2.711	65	17	18	
83	7039.67	HOR	3.30	3.60	2.18	0.998	21.34	2.711	72	11	17	
84	7040.67	HOR	3.26	3.16	2.34	0.995	21.48	2.710	75	10	14	

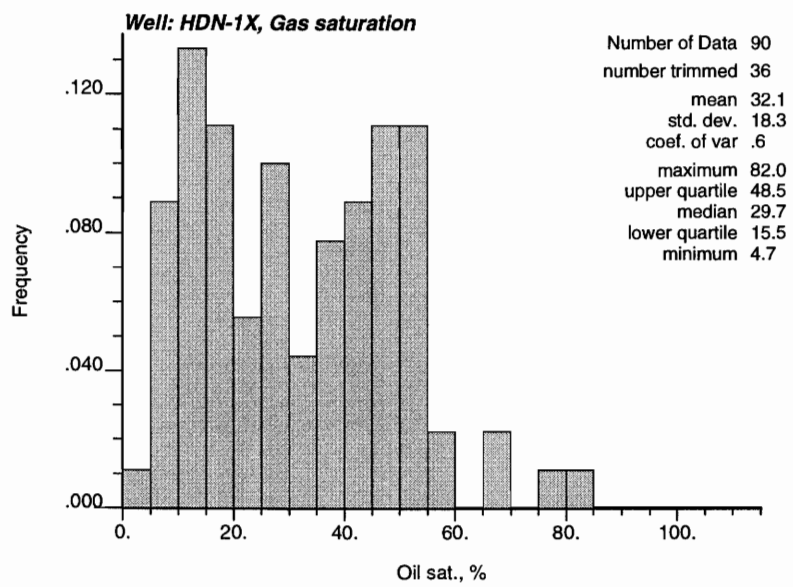
SAMPLE NO.	DEPTH FEET	PLUG TYPE	GAS PERM mD	1.5 P-M PERM mD	KLINK PERM mD	KLINK CORR. COEF.	POROSITY %	GRAIN DENS. G/CCM	WATER SATUR. %	OIL SATUR. %	GAS SATUR. %	COMMENT
85	7041.58	HOR	0.732	0.696	0.364	1.000	20.69	2.711	72	13	15	
86	7043.08	HOR	0.845	0.819	0.515	1.000	17.10	2.710	80	9	10	
87	7044.08	HOR	0.821	0.842	0.415	0.998	20.69	2.709	58	17	25	
22V	7044.42	VERT	0.911	0.878	0.486	0.999	19.76	2.703				
88	7045.08	HOR	0.993	0.962	0.640	0.999	18.11	2.710	78	5	16	
HS12	7045.92	MISC	0.835	0.780	0.485	0.997	19.43	2.709				
89	7046.00	HOR	1.02	0.978	0.512	0.999	20.33	2.707	57	15	28	
23V	7048.42	VERT	0.610	0.608	0.300	1.000	18.29	2.703				
90	7048.50	HOR	1.35	1.32	0.742	1.000	20.77	2.709	80	7	14	
91	7049.50	HOR	0.648	0.626	0.330	1.000	19.78	2.707	65	11	24	
93	7051.83	HOR	0.806	0.788	0.415	1.000	20.32	2.705	75	9	16	
94	7052.83	HOR	0.957	0.936	0.490	1.000	23.64	2.709	81	5	15	
24V	7053.83	VERT	1.73	1.68	0.982	1.000	23.06	2.703				
95	7053.83	HOR	1.28	1.25	0.714	0.998	23.04	2.708	66	15	19	
96	7054.83	HOR	2.48	2.53	1.60	1.000	23.36	2.708	69	11	20	
97	7055.83	HOR	1.96	1.90	1.19	0.997	24.97	2.708	70	11	18	

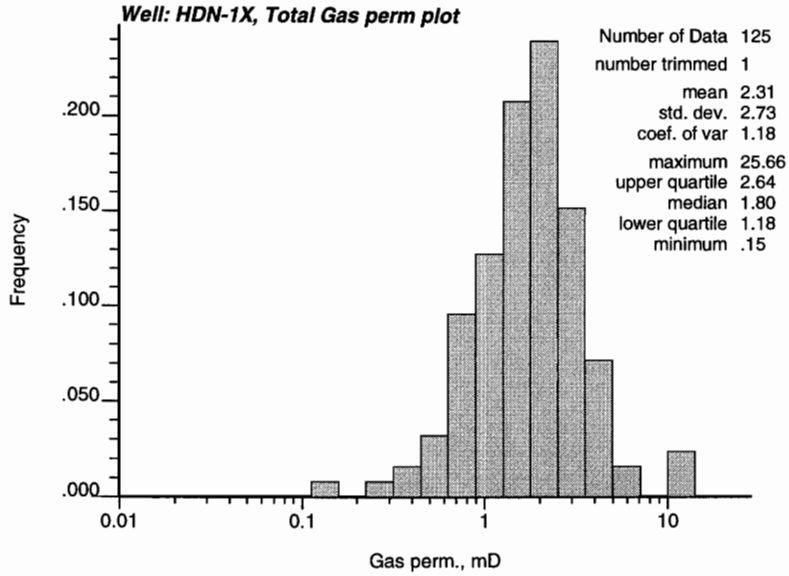

Well: HDN-1X, Total porosity
Number of Data 126
mean 25.71
std. dev. 4.84
coef. of var .19
maximum 38.47
upper quartile 29.47
median 26.66
lower quartile 21.81
minimum 12.38
Frequency
.100
.080
.060
.040
.020
.000
10.0
20.0
30.0
40.0
50.0
Porosity, %

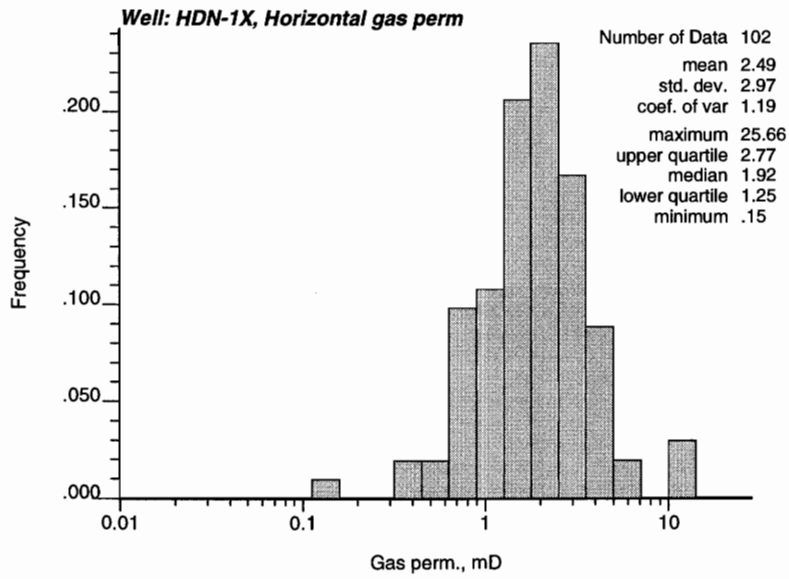

Well: HDN-1X, Total grain density.
Number of Data 126
mean 2.708
std. dev. .005
coef. of var .002
maximum 2.730
upper quartile 2.711
median 2.709
lower quartile 2.704
minimum 2.696
Frequency
.300
.200
.100
.000
2.650
2.670
2.690
2.710
2.730
2.750
Gr.dens., g/cc

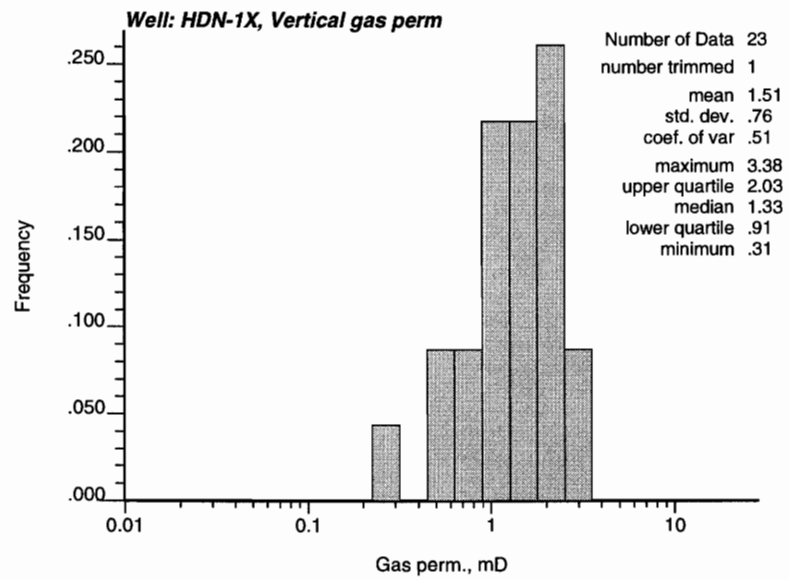

Well: HDN-1X, Water saturation
Number of Data 90
number trimmed 36
mean 51.6
std. dev. 17.5
coef. of var .3
maximum 85.7
upper quartile 65.7
median 52.1
lower quartile 38.1
minimum 10.9
Frequency
.120
.080
.040
.000
0.
20.
40.
60.
80.
100.
Water sat., %

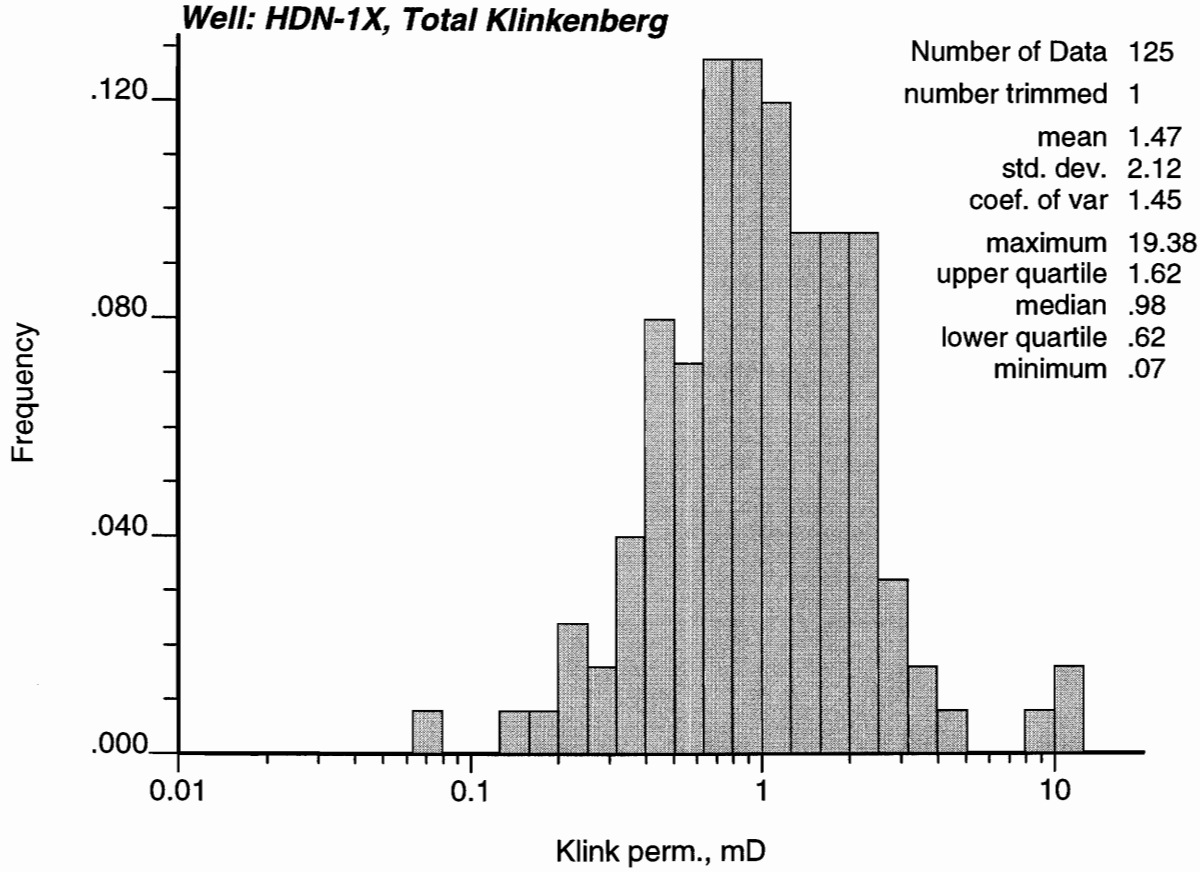

Well: HDN-1X, Oil saturation
Number of Data 90
number trimmed 36
mean 32.1
std. dev. 18.3
coef. of var .6
maximum 82.0
upper quartile 48.5
median 29.7
lower quartile 15.5
minimum 4.7
Frequency
.120
.080
.040
.000
0.
20.
40.
60.
80.
100.
Oil sat., %

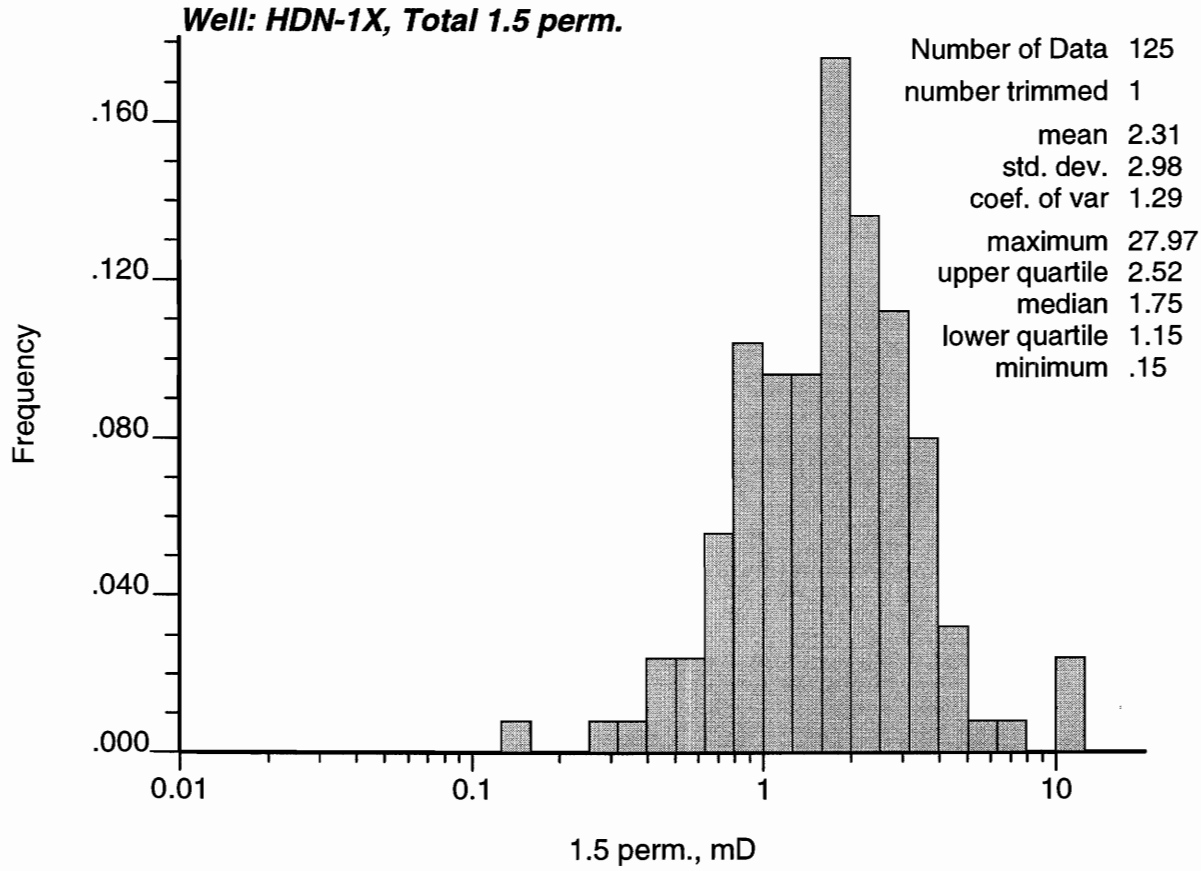

Well: HDN-1X, Gas saturation
Number of Data 90
number trimmed 36
mean 32.1
std. dev. 18.3
coef. of var .6
maximum 82.0
upper quartile 48.5
median 29.7
lower quartile 15.5
minimum 4.7
Frequency
.120
.080
.040
.000
0.
20.
40.
60.
80.
100.
Oil sat., %

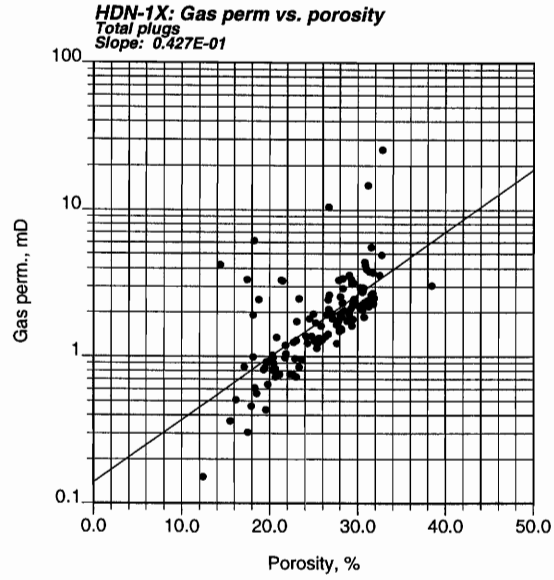

Well: HDN-1X, Total Gas perm plot
Number of Data 125
number trimmed 1
mean 2.31
std. dev. 2.73
coef. of var 1.18
maximum 25.66
upper quartile 2.64
median 1.80
lower quartile 1.18
minimum .15
Frequency
.200
.150
.100
.050
.000
0.01
0.1
1
10
Gas perm., mD


Well: HDN-1X, Horizontal gas perm
Number of Data 102
mean 2.49
std. dev. 2.97
coef. of var 1.19
maximum 25.66
upper quartile 2.77
median 1.92
lower quartile 1.25
minimum .15
Frequency
.200
.150
.100
.050
.000
0.01
0.1
1
10
Gas perm., mD


Well: HDN-1X, Vertical gas perm
Number of Data 23
number trimmed 1
mean 1.51
std. dev. .76
coef. of var .51
maximum 3.38
upper quartile 2.03
median 1.33
lower quartile .91
minimum .31
Frequency
.250
.200
.150
.100
.050
.000
0.01
0.1
1
10
Gas perm., mD


Well: HDN-1X, Total Klinkenberg
Number of Data 125
number trimmed 1
mean 1.47
std. dev. 2.12
coef. of var 1.45
maximum 19.38
upper quartile 1.62
median .98
lower quartile .62
minimum .07
Frequency
.120
.080
.040
.000
0.01
0.1
1
10
Klink perm., mD


Well: HDN-1X, Total 1.5 perm.
Number of Data 125
number trimmed 1
mean 2.31
std. dev. 2.98
coef. of var 1.29
maximum 27.97
upper quartile 2.52
median 1.75
lower quartile 1.15
minimum .15
Frequency
.160
.120
.080
.040
.000
0.01
0.1
1
10
1.5 perm., mD



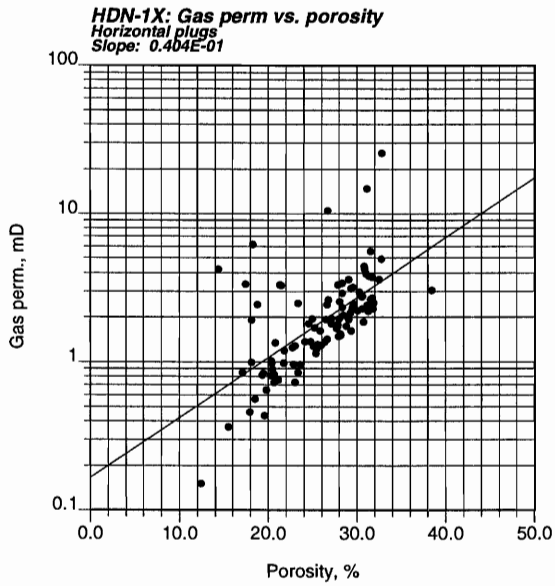
Number of data 125
Number plotted 125
Number trimmed 1

X Variable:
arith. mean 25.670
std. dev. 4.835

Y Variable:
geom. mean 1.729
std. dev. 2.046

Correlation 0.664
Rank correlation 0.701

Regression:
intercept 0.139
slope 0.427E-01



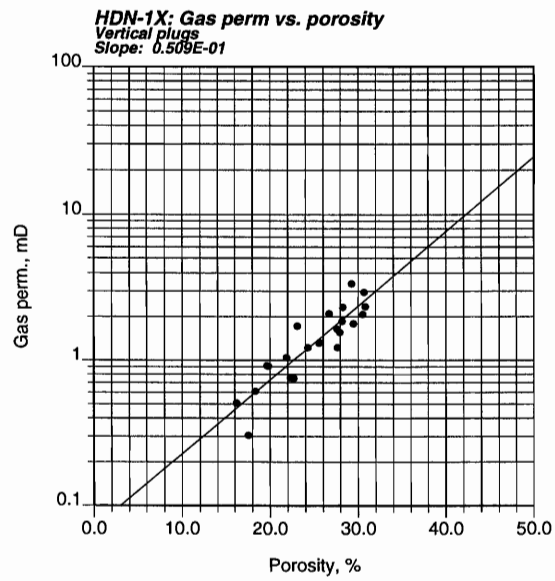
Number of data 102
Number plotted 102

X Variable:
arith. mean 25.833
std. dev. 4.916

Y Variable:
geom. mean 1.843
std. dev. 2.073

Correlation 0.628
Rank correlation 0.661

Regression:
intercept 0.166
slope 0.404E-01



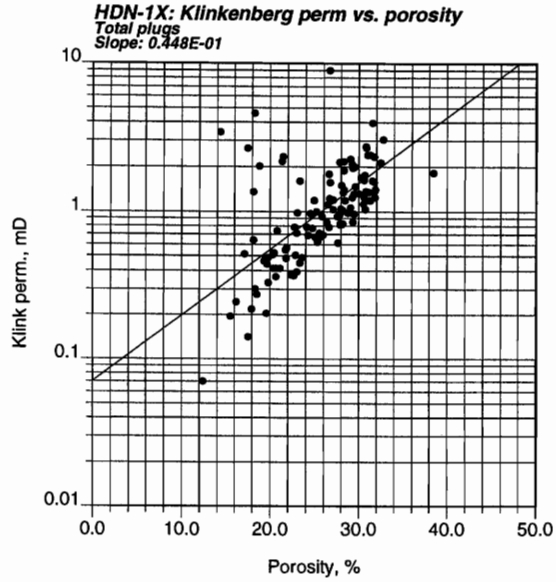
Number of data 23
Number plotted 23
Number trimmed 1

X Variable:
arith. mean 24.946
std. dev. 4.383

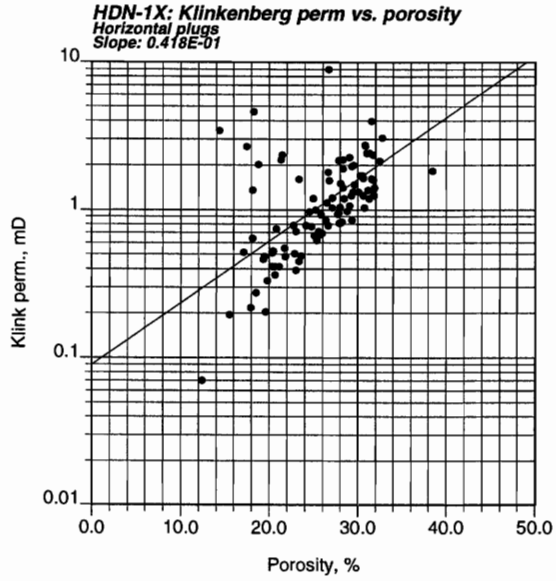
Y Variable:
geom. mean 1.304
std. dev. 1.774

Correlation 0.896
Rank correlation 0.900

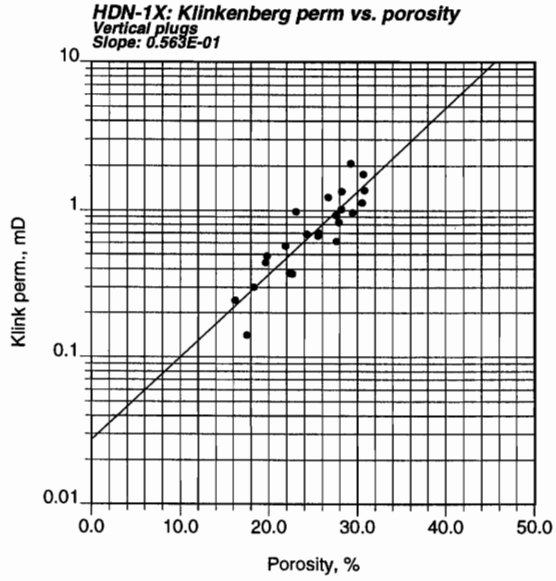
Regression:
intercept 0.702E-01
slope 0.509E-01



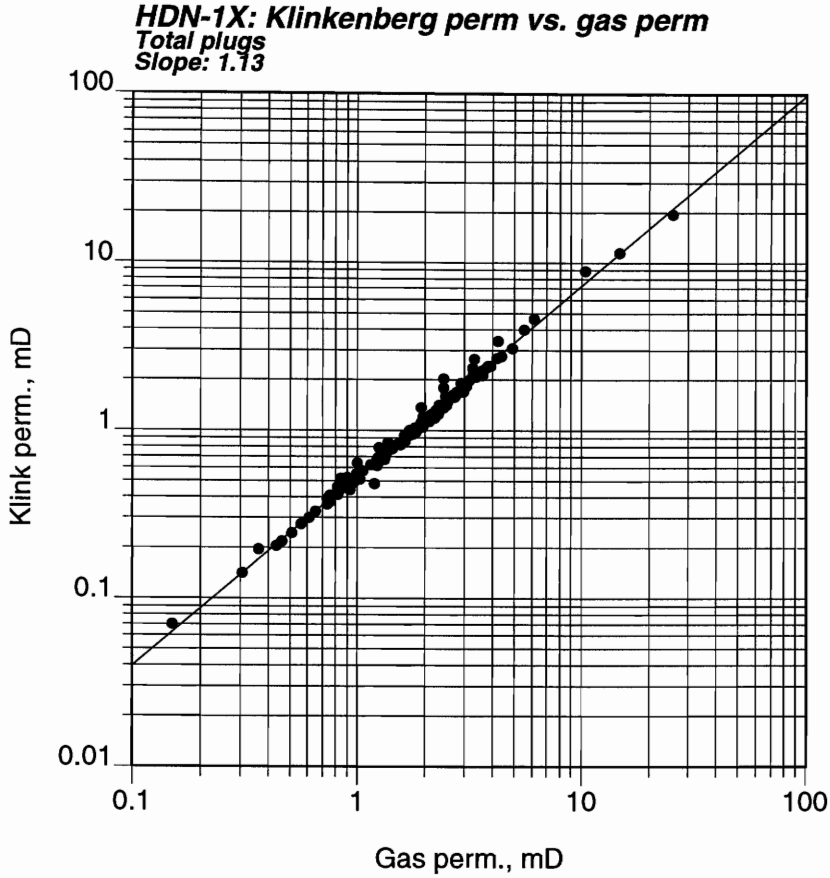
Number of data	125
Number plotted	123
Number trimmed	1
X Variable:	
arith. mean	25.670
std. dev.	4.835
Y Variable:	
geom. mean	0.994
std. dev.	2.257
Correlation	0.613
Rank correlation	0.661
Regression:	
intercept	0.702E-01
slope	0.448E-01



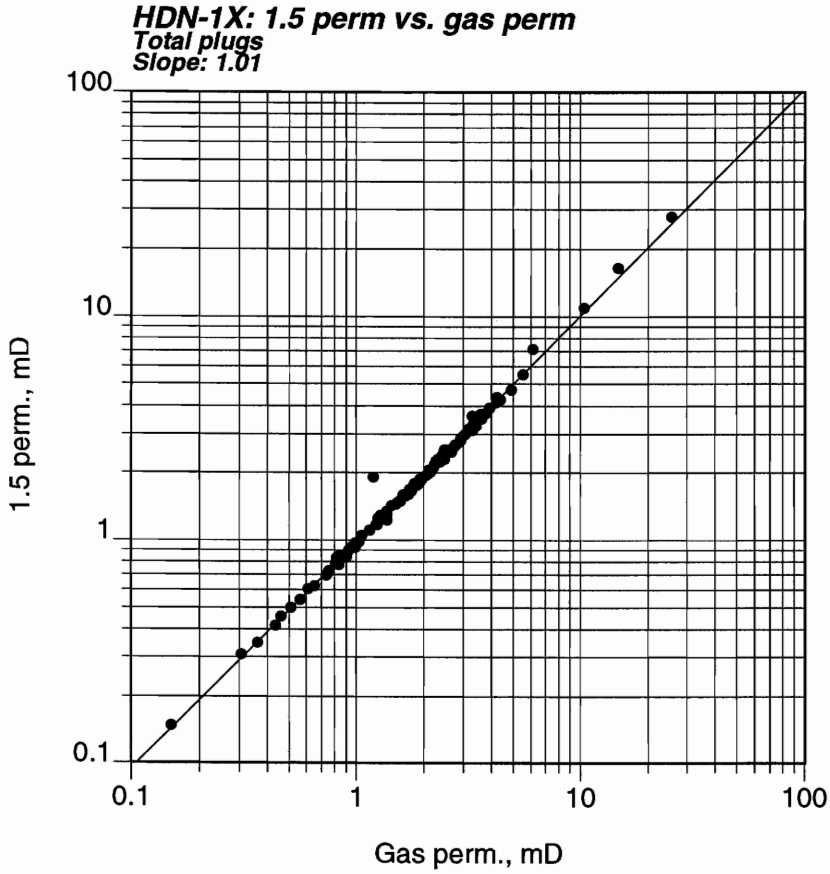
Number of data	102
Number plotted	100
X Variable:	
arith. mean	25.833
std. dev.	4.916
Y Variable:	
geom. mean	1.077
std. dev.	2.286
Correlation	0.572
Rank correlation	0.613
Regression:	
intercept	0.899E-01
slope	0.418E-01



Number of data	23
Number plotted	23
Number trimmed	1
X Variable:	
arith. mean	24.946
std. dev.	4.383
Y Variable:	
geom. mean	0.695
std. dev.	1.901
Correlation	0.885
Rank correlation	0.889
Regression:	
intercept	0.274E-01
slope	0.563E-01



Number of data	125
Number plotted	125
Number trimmed	1
X Variable:	
geom. mean	1.729
std. dev.	2.046
Y Variable:	
geom. mean	0.994
std. dev.	2.257
Correlation	0.995
Rank correlation	0.994
Regression:	
intercept	0.535
slope	1.13



Number of data	125
Number plotted	125
Number trimmed	1
X Variable:	
geom. mean	1.729
std. dev.	2.046
Y Variable:	
geom. mean	1.693
std. dev.	2.070
Correlation	0.997
Rank correlation	0.994
Regression:	
intercept	0.972
slope	1.01

5.2 Lithological description

The plug description sheet is made in accordance with the description system given in: Crabtree, B., Fritsen, A., Mandzuich, K., Moe, Aa., Rasmussen, F.O., Siemers, T. Søiland, G. & Tirsgaard, H., 1996: Description and Classification of Chalks – North Sea Central Graben. Joint Chalk Research Phase IV, July 1996. Norwegian Petroleum Directorate (NPD), Stavanger.

The following additional abbreviations are intended to be used in the comment column of the plug description sheet.

Rock colour

blk	=	black
br	=	brown
gn	=	green
gy	=	grey
ol	=	olive
rd	=	red
wh	=	white
owh	=	off-white
vl-	=	very light
l-	=	light, e.g. lgy = light grey
ml-	=	medium light
m-	=	medium
md-	=	medium dark
d-	=	dark
-sh	=	-ish, e.g. brsh = brownish
var	=	varicoloured

Miscellaneous

amp	=	amplitude of stylolite
art	=	artificial(-ly)
art F	=	artificially induced fracture
bio tex	=	bioturbate texture
Btn	=	thin-bedded
Cl	=	low consolidation
Cm	=	medium consolidation
Chi	=	high degree of consolidation
Ggl	=	glauconite grains
GIn	=	*Inoceramus* fragments
Gph	=	phosphorite grains
ids	=	indistinct(-ly)
ira	=	insoluble residue accumulation
leo	=	leopard structure
mic	=	micro
mic S	=	microstylolite, almost invisible with the naked eye
mou	=	mould(-s) from Gsk
mot	=	mottled
rep	=	replaced by
S	=	stylolite
slg	=	slight(-ly)
Ss	=	solution seam
Ssh	=	high density of solution seams
Ssl	=	low density of solution seams
TCh	=	*Chondrites* trace fossil
TPl	=	*Planolites* trace fossil
TTe	=	*Teichichnus* trace fossil
TTh	=	*Thalassinoides* trace fossil
TTr	=	*Trichichnus* trace fossil
TZo	=	*Zoophycos* trace fossil

JCR plug description scheme

Sheet no.: 1

Well:HDN-1X | Field: Halfdan | Geologist: NIS

Plug size Ø = 1.5"

			Depositional fabric									Composition									Stratification									Deformation structures						Bioturbation				Hardness					Stylolites				Secondary minerals						Fractures							Comments
			Rock type									Matrix			Grains						Bedding				Lamination											Trace fossils																											
Plug	Core depth	Lithotype	M	Mf	Mc	Wf	Wc	Pf	Pc	Gf	Gc	Ch	Arl	Arh	Gn	Gsh	Gch	Gsk	Gct	Go	Bn	Btn	Bm	Btk	Ln	Lpl	Lun	Lx	Lg	Dn	Dfl	Dfh	Dcl	Dch	Ds	Tn	Tl	Tm	Th	Hvs	Hs	Hm	Hh	Hvh	Sn	Sl	Sm	Sh	Mn	Mca	Mpy	Mdo	Msi	Mo	Fn	Fo	Fm	Fhl	Fhh	Fs	Plug	
no.	m/ft.		1	2	3	4	5	6	7	8	9	1	2	3	1	2	3	4	5	6	1	2	3	4	1	2	3	4	5	1	2	3	4	5	6	1	2	3	4	1	2	3	4	5	1	2	3	4	1	2	3	4	5	6	1	2	3	4	5	6	no.	
HS1	6934.50	MaMu	1									1			1						1				1					1						1					2				1								5						5		HS1	owh
1	6934.75	MaMu	1									1			1						1				1					1						1						3				2			1									4		6	1	owh, 1S, art F
1V	6935.42	MaMu	1									1			1						1				1					1						1					2							4	1										5		1V	owh, 3S
3	6936.67	MaMu	1									1			1						1				1					1						1					2				1				1										5		3	owh
4	3938.00	MaMu	1									1			1						1				1					1						1					2						3		1										5	6	4	owh, 2S, art F
5	6939.42	MaMu	1									1			1						1				1					1						1						3						4	1										5		5	owh, 3S, art F
6	6940.33	MaMu	1									1			1						1				1					1						1						3					3		1										5		6	owh, 2S
2V	6940.58	MaMu	1									1			1						1				1					1						1						3			1				1										5		2V	owh
7	6941.33	MaMu	1									1			1						1				1					1						1							4			2					3								5		7	owh, 1S, art F
8	6942.25	MaMu	1									1						4			1				1					1						1							4					4	1										5		8	owh, 4S
9	6943.42	MaMu	1									1						4			1				1					1						1							4		1				1										5		9	owh
HS2	6944.42	MaMu	1									1						4			1				1					1						1							4		1				1									4			HS2	owh
10	6944.58	MaMu	1									1						4			1				1					1						1							4				3		1										5	6	10	owh, 2S
3V	6945.25	MaMu	1									1			1						1				1					1						1							4					4	1										5		3V	owh, 3S
11	6945.83	MaMu	1									1			1						1				1					1						1							4					4			3								5	6	11	owh, 3S
12	6947.75	MaMu		2								1						4			1				1					1						1							4			2					3								5		12	owh, 1S
13	6949.08	MaMu	1									1						4			1				1					1						1							4			2			1										5		13	owh, 1S, art F
14	6950.08	MaMu	1									1			1						1				1					1						1							4			2			1										5		14	owh, 1S, art F
4V	6950.33	MaMu	1									1						4			1				1					1						1							4		1				1										5		4V	owh
15	6951.00	MaMu	1									1						4			1				1					1						1							4				3		1										5		15	owh, 2S
16	6952.17	BuMaMu	1									1						4			1				1					1								3					4					4	1										5		16	owh, 4S, TZo
17	6953.17	BuMaMu	1									1			1						1				1					1								3					4				3		1										5	6	17	owh-lgy, 2S, art F
18	6954.17	MaMu	1									1			1						1				1					1							2					3			1						3								5		18	owh, TZo
HS3	6954.67	MaMu	1									1			1						1				1					1						1							4		1						3							4			HS3	owh
5V	6954.83	MaMu	1									1			1						1				1					1							2					3				2			1									4			5V	owh,1S
20	6955.25	MaMu	1									1			1						1				1					1						1							4		1						3							4			20	owh
21	6957.58	MaMu	1									1			1						1				1					1							2					3				2					3								5		21	owh-lgy, 1S
22	6958.58	MaMu	1									1			1						1				1					1							2					3			1						3								5		22	owh
6V	6959.83	MaMu	1									1			1						1				1					1							2						4			2			1										5		6V	owh, 1S
23	6960.58	MaMu	1									1			1						1				1					1						1						3						4	1										5		23	owh,4S
24	6961.58	MaMu	1									1			1						1				1					1						1						3			1				1										5		24	owh
25	6962.58	MaMu	1									1			1						1				1					1						1						3				2			1										5		25	owh, 1S
26	6963.75	MaMu	1									1			1						1				1					1						1					2					2			1										5		26	owh, 1S, art F
27	6964.75	MaMu	1									1			1						1				1					1						1					2				1				1										5		27	owh
7V	6965.17	MaMu	1									1			1						1				1					1						1						3				2			1										5		7V	owh-lgy, 1S
28	6965.67	MaMu	1									1			1						1				1					1							2					3					3		1										5		28	owh-lgy, 2S

JCR plug description scheme — Sheet no.: 2

Well:HDN-1X — Field: Halfdan — Geologist:NIS

Plug size Ø = 1.5"

			Depositional fabric									Composition									Stratification									Deformation structures						Bioturbation				Hardness					Stylolites				Secondary minerals						Fractures							Comments
			Rock type									Matrix			Grains						Bedding				Lamination											Trace fossils																										
Plug	Core depth	Lithotype	M	Mf	Mc	Wf	Wc	Pf	Pc	Gf	Gc	Ch	Arl	Arh	Gn	Gsh	Gch	Gsk	Gct	Go	Bn	Btn	Bm	Btk	Ln	Lpl	Lun	Lx	Lg	Dn	Dfl	Dfh	Dcl	Dch	Ds	Tn	Tl	Tm	Th	Hvs	Hs	Hm	Hh	Hvh	Sn	Sl	Sm	Sh	Mn	Mca	Mpy	Mdo	Msi	Mo	Fn	Fo	Fm	Fhl	Fhh	Fs	Plug	
no.	m/ft.		1	2	3	4	5	6	7	8	9	1	2	3	1	2	3	4	5	6	1	2	3	4	1	2	3	4	5	1	2	3	4	5	6	1	2	3	4	1	2	3	4	5	1	2	3	4	1	2	3	4	5	6	1	2	3	4	5	6	no.	
HS4	6965.83	MaMu	1									1						4			1				1					1							2						4			2			1										5		HS4	owh,1S
29	6968.08	MaMu	1									1			1						1				1					1						1						3				2					3							4			29	owh-lgy, 1S, mot
30	6969.08	MaMu	1									1			1						1				1					1						1						3				2			1										5		30	owh, 1S
8V	6969.67	MaMu	1									1						4			1				1					1							2					3					3		1										5		8V	owh, 2S
31	6970.08	MaMu	1									1			1						1				1					1						1						3			1				1										5		31	owh
32	6971.08	MaMu	1									1			1						1				1					1							2					3			1				1										5		32	owh
33	6972.08	BuMaMu	1									1			1						1				1					1								3				3				2			1										5		33	owh-lgy, 1S, TZo
34	6973.33	MaMu	1									1			1						1				1					1							2				2	3						4	1									4			34	owh, 3S
9V	6974.42	BuMaMu	1									1			1						1				1					1								3				3					3		1										5		9V	owh, 2S, 1 art F
35	6974.67	MaMu	1									1			1						1				1					1							2					3				2			1										5		35	owh, 1S
HS5	6975.25	MaMu	1									1			1						1				1					1							2					3					3		1									4			HS5	owh, 2S
36	6975.83	MaMu	1									1						4			1				1					1							2					3				2			1										5		36	owh, 1S, TCh
37	6977.00	MaMu	1									1			1						1				1					1							2					3					3		1										5		37	owh, 2S, art F
39	6979.17	MaMu	1									1			1						1				1					1							2					3					3				3								5	6	39	owh, 2S
10V	6979.58	MaMu	1									1			1						1				1					1						1							4			2					3								5		10V	owh, 1 mic S
40	6980.57	MaMu	1									1			1						1				1					1						1						3						4	1										5	6	40	owh, 3S
41	6981.17	MaMu	1									1						4			1				1					1							2						4			2			1									4		6	41	owh, 1 mic S
42	6982.58	MaMu	1									1			1						1				1					1							2					3						4	1										5		42	owh, 3S
43	6983.58	MaMu	1									1			1						1				1					1							2					3						4	1									4		6	43	owh, 3 mic S, TZo
11V	6984.58	MaMu	1									1			1						1				1					1							2					3						4			3								5		11V	owh, 4 mic S
HS6	6985.00	BuMaMu	1									1			1						1				1					1								3				3						4	1										5	6	HS6	owh, 6 mic S
44	6985.17	BuMaMu	1									1			1						1				1					1								3				3						4	1										5		44	owh, 3S
HS7	6995.33	MaMu	1									1			1						1				1					1							2						4				3		1										5		HS7	owh, 2S, TCh
45	6996.00	MaMu	1									1			1						1				1					1						1						3					3				3							4			45	owh, 2 mic S, art F
46	6997.58	MaMu	1									1			1						1				1					1							2					3					3		1									4		6	46	owh, 2S, art F
12V	6997.75	MaMu	1									1			1						1				1					1						1						3			1				1									4			12V	owh, art F
47	6998.75	MaMu	1									1			1						1				1					1							2					3					3		1									4		6	47	owh, 2S, art F
49	7001.17	MaMu	1									1			1						1				1					1						1						3	4		1						3		5						5		49	owh
50	7002.08	MaMu		2								1						4			1				1					1						1						3			1				1										5		50	owh
13V	7002.42	MaMu		2								1						4			1				1					1						1							4			2			1										5		13V	owh, 1S
51	7003.00	MaMu		2								1						4			1				1					1						1							4				3				3		5						5		51	owh, 2 S, Gln
52	7004.00	MaMu	1									1						4			1				1					1						1							4			2					3		5						5		52	owh, 1S
14V	7005.00	MaMu	1									1						4			1				1					1							2					3			1						3		5					4			14V	owh, TCh, art F
53	7005.67	MaMu	1									1			1						1				1					1						1						3			1						3								5		53	owh
HS8	7006.25	MaMu	1									1			1						1				1					1						1							4		1				1										5		HS8	owh
54	7006.67	MaMu	1									1			1						1				1					1						1						3				2					3								5		54	owh, 1 mic S

JCR plug description scheme

Well:HDN-1X | Field: Halfdan | Sheet no.: 3

Plug size Ø = 1.5" | Geologist: NIS

Plug no.	Core depth m/ft.	Lithotype	Depositional fabric: Rock type M 1	Mf 2	Mc 3	Wf 4	Wc 5	Pf 6	Pc 7	Gf 8	Gc 9	Composition: Matrix Ch 1	Arl 2	Arh 3	Grains Gn 1	Gsh 2	Gch 3	Gsk 4	Gct 5	Go 6
55	7007.75	MaMu	1									1			1					
56	7008.67	MaMu	1									1			1					
57	7009.67	MaMu	1									1						4		
58	7010.67	MaMu	1									1						4		
15V	7011.50	MaMu	1									1			1					
59	7011.67	MaMu	1									1						4		
60	7012.75	MaMu	1									1						4		
61	7014.00	MaMu	1									1						4		
62	7015.00	MaMu		2								1						4		
HS9	7015.67	MaMu		2								1						4		
63	7016.00	MaMu		2								1						4		
16V	7016.42	MaMu	1									1						4		
65	7018.42	MaMu	1									1						4		
66	7019.42	MaMu	1									1						4		
67	7020.42.	MaWa				4						1						4		
17V	7021.42	MaWa				4						1						4		
68	7021.67	MaMu		2								1						4		
69	7023.67	MaMu		2								1						4		
70	7024.67	MaMu		2								1						4		
18V	7025.33	MaMu		2								1						4		
HS10	7025.67	MaMu		2								1						4		
71	7026.25	MaMu	1									1						4		
72	7027.67	MaMu	1									1						4		
73	7028.67	MaMu	1									1						4		
19V	7029.17	MaMu	1									1			1					
74	7029.83	MaMu	1									1			1					
75	7030.83	MaMu	1									1			1					
76	7031.83	MaMu	1									1			1					
77	7032.83	MaMu	1									1			1					
20V	7034.75	MaMu		2								1						4		
79	7034.83	MaMu	1									1			1					
HS11	7036.08	MaMu	1									1			1					
80	7036.25	MaMu	1									1						4		
81	7037.58	MaMu	1									1						4		
21V	7038.33	MaMu	1									1			1					
82	7038.58	MaMu	1									1			1					

Plug no.	Stratification: Bedding Bn 1	Btn 2	Bm 3	Btk 4	Lamination Ln 1	Lpl 2	Lun 3	Lx 4	Lg 5	Deformation structures Dn 1	Dfl 2	Dfh 3	Dcl 4	Dch 5	Ds 6	Bioturbation: Trace fossils Tn 1	Tl 2	Tm 3	Th 4
55	1				1					1							2		
56	1				1					1						1			
57	1				1					1						1			
58	1				1					1						1			
15V	1				1					1						1			
59	1				1					1						1			
60	1				1					1						1			
61	1				1					1						1			
62	1				1					1						1			
HS9	1				1					1						1			
63	1				1					1						1			
16V	1				1					1						1			
65	1				1					1						1			
66	1				1					1						1			
67	1				1					1						1			
17V	1				1					1						1			
68	1				1					1						1			
69	1				1					1						1			
70	1				1					1						1			
18V	1				1					1						1			
HS10	1				1					1						1			
71	1				1					1						1			
72	1				1					1						1			
73	1				1					1						1			
19V	1				1					1						1			
74	1				1					1						1			
75	1				1					1						1			
76	1				1					1						1			
77	1				1					1						1			
20V	1				1					1						1			
79	1				1					1						1			
HS11	1				1					1						1			
80	1				1					1						1			
81	1				1					1						1			
21V	1				1					1						1			
82	1				1											1			

Plug no.	Hardness Hvs 1	Hs 2	Hm 3	Hh 4	Hvh 5	Stylolites Sn 1	Sl 2	Sm 3	Sh 4	Secondary minerals Mn 1	Mca 2	Mpy 3	Mdo 4	Msi 5	Mo 6	Fractures Fn 1	Fo 2	Fm 3	Fhl 4	Fhh 5	Fs 6	Plug no.	Comments
55				4				3		1										5	6	55	owh, 2S, TZo
56				4				3		1										5		56	owh, 2S
57				4		1						3								5		57	owh
58				4		1				1										5		58	owh
15V				4				3		1										5		15V	owh, 2S
59				4			2			1										5		59	owh, 1S
60			3				2					3								5		60	owh, 1S
61			3			1				1										5		61	owh
62			3			1						3							4			62	owh
HS9			3			1				1									4			HS9	owh
63			3	4				3		1									4			63	owh, 2S
16V				4					4			3								5		16V	owh, 3S, art F
65					5	1						3		5						5		65	owh
66				4		1				1										5		66	owh
67					5	1				1										5		67	owh, Gln
17V					5	1						3				1						17V	owh, Gln
68					5	1						3				1						68	owh-var
69				4				3		1											6	69	owh, 2S, Gln
70					5			3				3				1						70	owh, 2S
18V					5	1						3								5		18V	owh, ids mot
HS10				4	5	1						3							4			HS10	owh
71				4					4					5		1						71	owh, 1S, 2mic S
72					5	1				1						1						72	owh
73					5			3				3				1						73	owh, 2S, art F
19V					5		2			1						1						19V	owh, 1S
74					5			3		1											6	74	owh, 2S
75					5			3				3		5							6	75	owh, 2S
76					5			3				3									6	76	owh, 1S, 1 mic S
77					5		2			1										5	6	77	owh, 1S
20V					5				4	1											6	20V	owh, 4S
79				4			2			1						1						79	owh, 1 mic S
HS11					5	1				1						1						HS11	owh, ids mot
80					5		2			1						1						80	owh, 1 mic S
81					5		2					3								5		81	owh, 1S
21V					5				4	1						1						21V	owh, 3S, art F
82					5		2			1										5		82	owh, 1S

JCR plug description scheme

Sheet no.: 4

Well:HDN-1X | Field: Halfdan | Geologist: NIS

Plug size Ø = 1.5"

			Depositional fabric									Composition									Stratification									Deformation structures						Bioturbation				Hardness					Stylolites				Secondary minerals						Fractures							Comments
			Rock type									Matrix			Grains						Bedding				Lamination											Trace fossils																										
Plug	Core depth	Lithotype	M	Mf	Mc	Wf	Wc	Pf	Pc	Gf	Gc	Ch	Arl	Arh	Gn	Gsh	Gch	Gsk	Gct	Go	Bn	Btn	Bm	Btk	Ln	Lpl	Lun	Lx	Lg	Dn	Dfl	Dfh	Dcl	Dch	Ds	Tn	Tl	Tm	Th	Hvs	Hs	Hm	Hh	Hvh	Sn	Sl	Sm	Sh	Mn	Mca	Mpy	Mdo	Msl	Mo	Fn	Fo	Fm	Fhl	Fhh	Fs	Plug	
no.	m/ft.		1	2	3	4	5	6	7	8	9	1	2	3	1	2	3	4	5	6	1	2	3	4	1	2	3	4	5	1	2	3	4	5	6	1	2	3	4	1	2	3	4	5	1	2	3	4	1	2	3	4	5	6	1	2	3	4	5	6	no.	
83	7039.67	MaMu	1									1			1						1				1					1						1								5				4	1											6	83	owh, 3S
84	7040.67	MaMu	1									1						4			1				1					1						1								5				4			3									6	84	owh-lgy, 3S
85	7041.58	MaMu	1									1						4			1				1					1						1								5		2							5		1						85	owh-lgy, 1S
86	7043.08	MaMu	1									1						4			1				1					1						1								5		2					3									6	86	owh, 1 mic S
87	7044.08	MaMu	1									1						4			1				1					1						1								5	1				1						1						87	owh
22V	7044.42	MaMu	1									1						4			1				1					1						1								5			3		1										5	6	22V	owh, 2mic S, Gln
88	7045.08	MaMu	1									1			1						1				1					1						1								5			3		1											6	88	owh, 2S
HS12	7045.92	MaMu	1									1			1						1				1					1						1							4				3		1											6	HS12	owh, 2S
89	7046.00	MaMu	1									1						4			1				1					1						1								5	1						3				1						89	owh, Gln
23V	7048.42	MaMu	1									1						4			1				1					1						1								5				4			3				1						23V	owh, 3S, art F
90	7048.50	MaMu	1									1						4			1				1					1						1								5				4	1											6	90	owh, 3S, Gln
91	7049.50	MaMu	1									1						4			1				1					1						1								5	1				1						1						91	owh, Gln
93	7051.83	MaMu	1									1						4			1				1					1						1								5				4			3				1						93	owh, 5S / mic S, Gln
94	7052.83	MaMu	1									1						4			1				1					1						1								5		2			1										5		94	owh, 1S
24V	7053.83	MaMu	1									1						4			1				1					1						1								5			3		1									4			24V	owh, 2S, art F
95	7053.83	MaMu	1									1						4			1				1					1						1								5				4	1									4			95	owh, 3S, Gln
96	7054.83	MaMu	1									1						4			1				1					1						1								5				4	1						1						96	owh, 4S, Gln
97	7055.83	MaMu	1									1						4			1				1					1						1							4					4	1						1						97	owh, 4S / mic S

Well: HDN-1X
Core: 1 & 2

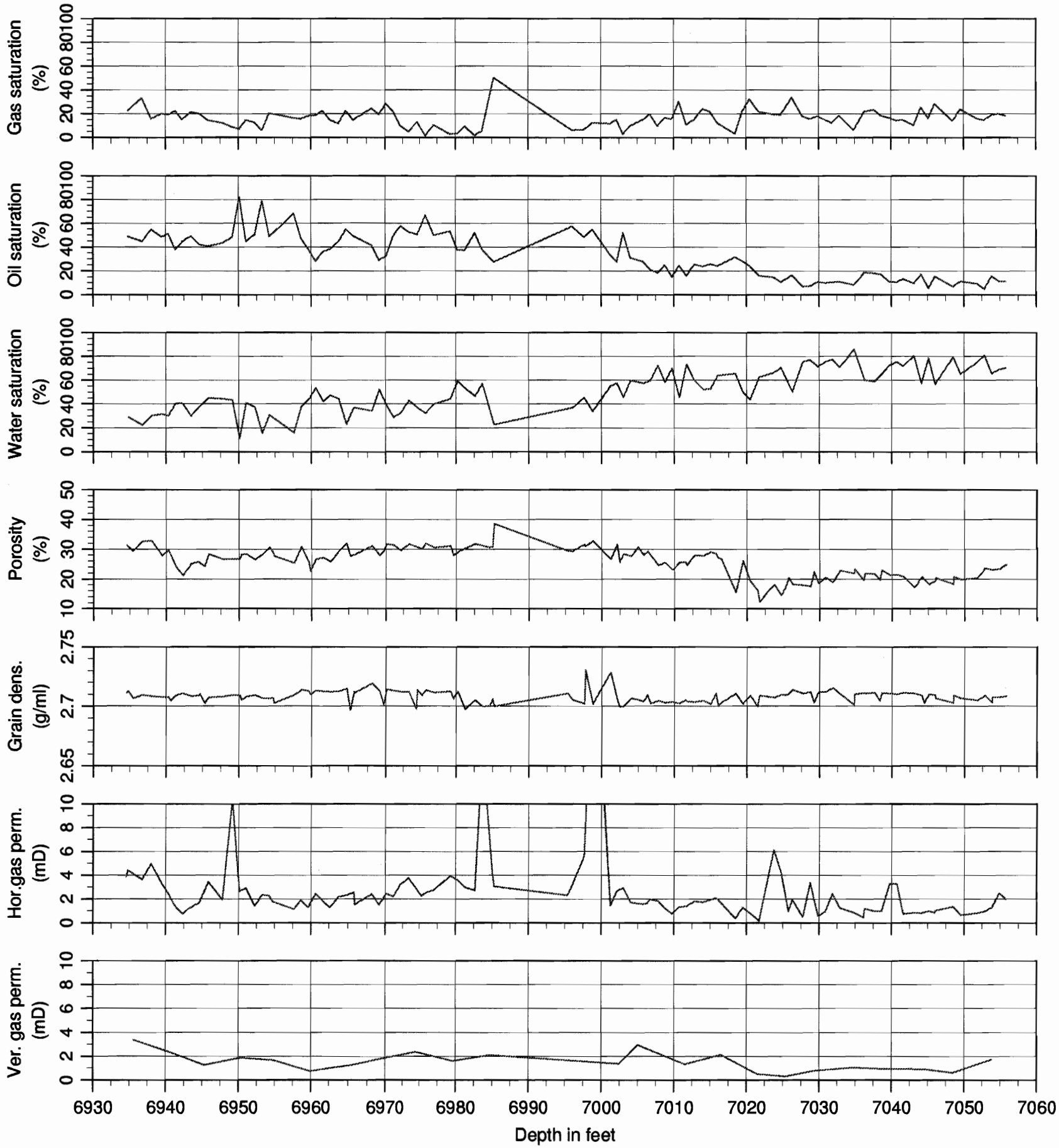
Core log

Depth vs.
- Gas saturation
- Oil saturation
- Water saturation
- Porosity
- Grain density
- Hor. gas perm.
- Ver. gas perm.

Scale 1:200

Legend

Maastrichtian



GEUS Core Analysis Laboratory, 22-FEB-01