

Denne rapport  
tilhører



L&U DOK. SENTER

L. NR. 20084500001

KODE Well 31/2-15 nr.9

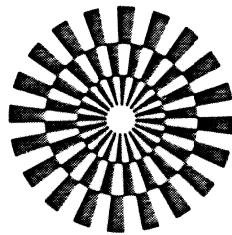
Returneres etter bruk

A/S NORSKE SHELL

ROUTINE CORE ANALYSIS

WELL: 31/2-15

DATE: NOVEMBER 1984



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OF NORWAY A/S



A/S NORSKE SHELL  
ROUTINE CORE ANALYSIS  
WELL: 31/2-15  
DATE: NOVEMBER 1984



## ROUTINE CORE ANALYSIS

### COMMENTS

GENERAL: Core analyses including horizontal and vertical permeability, porosity and grain density have been performed on samples from well 31/2-15 at the depths requested by A/S Norske Shell.

PREPARATION: The samples for analyses were collected by gently drilling with a one inch bore in the horizontal and vertical planes using liquid nitrogen as a cooling agent. The sample plugs were then cut to one inch lengths and mounted while still frozen in Hassler-type holders at a confining sleeve pressure of 15 bar. After thawing, the plugs were cleaned, dried and thus ready for petrophysical analyses.

#### MEASUREMENTS: AIR PERMEABILITY

Standard air permeability,  $k_a$ , was measured by injection of nitrogen gas at a net confining sleeve pressure of 15 bar and then converted empirically to liquid permeability,  $k_l$ , on all samples.

#### POROSITY AND GRAIN DENSITY

Porosity and grain density data were collected only from the horizontal sample plugs. Pore volume was determined by injection of helium gas at a net confining sleeve pressure of 15 bar. After dismounting, grain volume values were determined by a Boyle's law porosimeter using helium. Knowing also the weight of the sample, porosity and grain density were calculated.

ABBREVIATIONS: NPP - no plug possible  
NHPP - no horizontal plug possible  
NVPP - no vertical plug possible  
NMP - no measurement possible

# FINAL REPORT

COMPANY : SHELL  
 WELL : 31/2-15  
 FIELD : 31/2  
 STATE : NORWAY

PAGE: 1

DATE: NOVEMBER 1984

CORE NO.: 1



Plug No.	Depth (meter)	Permeability (mD),		Porosity (%)	Pore saturation	Grain dens.	Formation Description
		horizontal	vertical				
		Ka	Kl			g/cc	
1	1486.00	310	286	32.1		2.69	
2	1486.00	5.0	4.3	14.4		2.80	
3	1486.65	126	113	30.5		2.67	
4	1487.00	111	98.9	28.6		2.69	
5	1487.35	158	142	28.5		2.68	
6	1487.65	316	292	32.5		2.67	
7	1488.00	1115	1062	37.0		2.66	
8	1488.35	171	156	30.3		2.66	
9	1488.65	146	132	26.3		2.70	
10	1489.00	nmp	nmp	nmp			
11	1489.35	35.8	30.8	25.7		2.70	
12	1489.65	1514	1450	33.4		2.67	
13	1490.00	npp					
	1491.60						



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COMPANY : SHELL  
 WELL : 31/2-15  
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CORE NO.: 2 DATE: NOVEMBER 1984

Plug No.	Depth (meter)	Permeability (mD),		Porosity (%)	Pore saturation	Grain dens.	Formation Description
		horizontal	vertical				
		K <sub>a</sub>	K <sub>v</sub>			g/cc	
	1493.00						
14	1493.20	1841	1768	32.1		2.68	
15	1494.50	406	378	30.1		2.70	
16	1495.25	1145	1091	32.9		2.68	
17	1495.60	2008	1930	30.0		2.65	
18	1496.00	5231	5089	33.7		2.66	
19	1496.50	6205	6048	35.2		2.66	
20	1497.10	2883	2786	36.2		2.66	
21	1498.00	7109	6938	35.5		2.66	
22	1498.35	7818	7632	38.4		2.65	
23	1498.65	1452	1389	33.6		2.67	
	1499.80						



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COMPANY : SHELL  
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CORE NO.: 3

Plug No.	Depth (meter)	Permeability (mD),		Porosity (%)	Pore saturation	Grain dens.	Formation Description
		horizontal	vertical				
		K <sub>a</sub>	K <sub>v</sub>				
24	1501.00	542	508	33.3		2.70	
25	1501.45	266	245	31.0		2.70	
	1501.65		220				
	1501.90		201				



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COMPANY : SHELL  
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Plug No.	Depth (meter)	Permeability (mD), vertical		Porosity (%) He	Pore saturation		Grain dens. g/cc	Formation Description
		K <sub>a</sub>	K <sub>l</sub>		S <sub>o</sub>	S <sub>w</sub>		
	1503.00							
26	1503.35	231	211	32.1			2.73	
27	1503.65	221	202	31.2			2.66	
28	1504.00	430	401	33.6			2.65	
29	1504.35	394	367	33.3			2.66	
30	1504.65	285	262	33.4			2.68	
31	1505.00	387	360	33.6			2.69	
32	1505.35	209	191	32.1			2.68	
33	1505.65	365	339	33.0			2.69	
34	1506.00	194	177	32.1	1.3		2.69	
35	1506.35	155	140	32.2			2.69	
36	1506.65	46.3	40.2	28.1			2.67	
37	1507.00	35.2	30.3	23.3			2.61	
38	1507.35	3.6	3.0	14.2			2.77	
	1507.50							

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COMPANY : SHELL  
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CORE NO.: 5



Plug No.	Depth (meter)	Permeability (mD), vertical		Porosity (%) He	Pore saturation S <sub>o</sub>	Grain dens. g/cc	Formation Description
		K <sub>a</sub>	K <sub>l</sub>				
39	1510.00			30.8		2.68	
40	1510.00	120	108	32.9		2.70	
41	1510.35	1806	1733	33.1		2.67	
42	1510.65	3891	3773	31.9		2.63	
43	1511.00	1134	1080	31.5		2.65	
44	1511.35	687	648	29.3		2.69	
45	1511.65	49.1	42.2	33.8		2.65	
46	1512.00	437	407	33.3		2.65	
47	1512.35	424	396	31.6		2.65	
48	1512.65	98.2	86.9	30.8		2.65	
49	1513.00	132	118	30.8		2.66	
50	1513.35	112	99.6	31.1		2.66	
51	1513.65	182	165	28.9		2.68	
52	1514.00	121	108	30.3		2.67	
53	1514.35	122	109	30.8		2.65	
54	1514.65	70.6	61.8	29.8		2.66	
55	1515.00	278	256	33.5		2.66	
56	1515.35	359	333	32.3		2.67	
57	1515.65	76.0	67.2	29.3		2.66	
58	1516.00	285	263	32.3	66.5	2.67	
	1516.35	363	337	32.3	58.3	2.67	
	1516.50					2.66	





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Plug No.	Depth (meter)	Permeability (mD),		Porosity (%)	Pore saturation	Grain dens.	Formation Description
		horizontal K <sub>a</sub>	vertical K <sub>v</sub>				
59	1516.50						
60	1516.65	984	935	32.3		2.65	
61	1517.00	3599	3487	31.8		2.67	
62	1517.35	6869	6702	31.8		2.70	
63	1517.65	7868	7686	32.4		2.68	
64	1518.00	9203	9003	32.4		2.69	
65	1518.35	16544	16257	30.8		2.67	
66	1518.65	16599	16311	31.8		2.68	
67	1519.00	14196	13934	34.6	6309	2.66	
68	1520.00	11581	11351	31.7	6470	2.67	
	1520.35	6791	6626	36.1		2.68	
	1520.50						

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COMPANY : SHELL  
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CORE NO.: 7

Plug No.	Depth (meter)	Permeability (mD), vertical		Porosity (%) He	Sum. So	Pore saturation Sw	Grain dens. g/cc	Formation Description
		Ka	Kl					
	1520.50							
69	1521.10	9249	9048	38.5			2.66	
70	1521.35	6174	6018	30.9			2.66	
71	1521.65	5934	5782	36.1			2.66	
72	1522.00	4681	4550	27.1			2.66	
73	1522.35	10807	10587	28.4			2.66	
74	1522.65	6947	6780	33.1			2.67	
75	1523.00	npp						
76	1523.35	13496	13242	38.1			2.65	
77	1523.65	npp						
78	1524.00	npp		nmp			2.65	
79	1524.35	8107	7923	32.2			2.65	
80	1524.65	6969	6801	37.5			2.65	
81	1525.00	npp						
82	1525.40	7448	7272	32.7			2.66	
83	1525.65	6158	6002	34.5			2.64	
84	1526.10	3031	2931	32.4			2.66	
85	1526.50	2721	2627	31.8			2.67	
86	1526.80	7224	7052	34.3			2.67	
87	1527.00	2384	2298	31.0			2.67	
88	1527.65	2037	1959	34.1			2.65	
89	1528.00	2381	2295	29.6		1740	2.67	
90	1528.35	7084	6913	33.0		1669	2.66	
91	1528.65	npp						
	1528.90							

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COMPANY : SHELL  
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CORE NO.: 8



Plug No.	Depth (meter)	Permeability (mD),		Porosity (%)	Pore saturation	Grain dens.	Formation Description
		horizontal	vertical				
	1530.00						
92	1530.75	1076	565	27.6		2.67	
93	1531.20	6672	6508	32.2		2.66	
94	1531.60	479	447	27.8		2.65	
95	1532.00	169	154	29.4		2.67	
96	1532.35	0.62	0.48	8.8		2.67	
	1532.50						

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Plug No.	Depth (meter)	Permeability (mD),		Porosity (%)		Grain dens. g/cc	Formation Description
		horizontal Ka	vertical K <sub>v</sub>	He	Sum. S <sub>o</sub>		
97	1533.00						
97	1533.35	50.2	43.9	45.6	39.0	28.1	2.67
98	1533.65	517	484			32.6	2.67
99	1534.00	79.6	69.9			29.0	2.65
100	1534.35	86.0	76.2			29.3	2.66
101	1534.65	32.1	27.1			27.3	2.64
102	1535.00	0.037	0.027			5.4	2.70
103	1535.35	22.9	19.0			26.0	2.78
104	1535.65	5.2	4.6			23.3	2.60
105	1536.00	78.2	68.4	nvpp		25.4	2.75
106	1536.35	9.4	7.4			24.6	2.65
107	1536.65	60.8	53.4			29.5	2.73
108	1537.00	53.9	46.2			29.8	2.68
109	1537.35	33.0	27.7			27.8	2.66
110	1537.65	14.1	11.5			25.8	2.63
111	1538.00	31.0	25.9			27.6	2.67
112	1538.35	13.7	10.9			25.6	2.66
113	1538.65	22.2	18.2			26.6	2.66
114	1539.00	17.9	14.5	4.0	3.4	25.8	2.66
115	1539.35	19.1	15.6			27.2	2.67
116	1539.65	16.4	13.2			25.8	2.65
117	1540.00	89.7	78.9			30.7	2.67
	1540.20						

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CORE NO.: 10

COMPANY : SHELL  
WELL : 31/2-15  
FIELD : 31/2  
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Plug No.	Depth (meter)	Permeability (mD), vertical		Porosity (%) He	Pore saturation So	Grain dens. g/cc	Formation Description
		Ka	KI				
	1541.00						
118	1541.00	98.4	87.0	31.4		2.68	
119	1541.35	117	104	31.7		2.68	
120	1541.65	199	181	33.9		2.65	
121	1542.00	85.0	74.7	30.8	44.7	2.67	
122	1542.35	44.7	38.5	29.6		2.65	
123	1542.65	39.1	33.4	29.0		2.65	
124	1543.00	66.3	57.6	29.0		2.67	
125	1543.35	111	99.0	30.1		2.68	
126	1543.65	79.0	69.5	29.6		2.67	
127	1544.00	49.4	42.3	28.3	21.3	2.68	
128	1544.35	21.3	17.8	25.6		2.66	
129	1544.65	29.9	25.4	27.2		2.67	
130	1545.00	3402	3294	27.7		2.66	
131	1545.35	17.0	13.8	25.9		2.61	
132	1545.65	23.6	19.8	26.5		2.66	
133	1546.00	17.7	14.4	26.1		2.64	
134	1546.35	3302	3195	24.7		2.65	
135	1546.65	69.5	60.9	25.1		2.69	
136	1547.00	57.9	50.0	26.8		2.68	
137	1547.35	640	603	28.8		2.69	
138	1547.65	169	153	27.9	144	2.69	
139	1548.00	5286	5144	33.9		2.68	
140	1548.35	10166	9953	35.5		2.67	
141	1548.65	5674	5526	33.9		2.68	
142	1549.00	2309	2225	33.7		2.68	
143	1549.35	1754	1683	34.3		2.68	
144	1549.65	1414	1352	34.4		2.67	

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COMPANY : SHELL  
 WELL : 31/2-15  
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Plug No.	Depth (meter)	Permeability (mD), vertical		Porosity (%) He	Pore saturation S <sub>o</sub>	Grain dens. g/cc	Formation Description
		K <sub>a</sub>	K <sub>l</sub>				
145	1550.00	3874	3757	33.7		2.66	
146	1550.35	9407	9204	30.3		2.67	
147	1550.65	3030	2929	29.9		2.70	
148	1551.00	1384	1323	32.7	1865	2.72	
149	1551.35	16740	16451	31.9		2.70	
150	1551.65	5010	4872	29.2		2.71	
151	1552.00	31835	31406	33.1		2.66	
152	1552.35	15460	15185	31.2		2.65	
153	1552.65	10435	10219	34.2		2.66	
154	1553.00	npp		34.7		2.65	
155	1553.35	21593	21255				
156	1553.65	npp					
157	1554.00	354	328	28.4	785	2.64	
158	1554.35	npp					
159	1554.65	2912	2814	32.4		2.63	
160	1555.00	18905	18594	35.8		2.64	
161	1555.35	8611	8419	32.4		2.65	
162	1555.65	570	535	30.7		2.65	
163	1556.00	330	306	27.8		2.62	
164	1556.35	1222	1166	28.5		2.70	
165	1556.65	7940	7758	29.6		2.64	
166	1557.00	284	261	33.1		2.66	
167	1557.35	18589	18281	28.4	10.3	2.62	
168	1557.65	1996	1919	31.0	8.3	2.65	
169	1558.00	1437	1374	34.6		2.66	
170	1558.35	1221	1164	30.4		2.63	
171	1558.65	357	331	32.4		2.67	
	1559.00						

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Plug No.	Depth (meter)	Permeability (mD), vertical		Porosity (%) He	Pore saturation		Grain dens. g/cc	Formation Description
		K <sub>a</sub>	K <sub>i</sub>		S <sub>o</sub>	S <sub>w</sub>		
172	1559.00	0.031	0.023	3.4			2.69	
173	1559.35	0.015	0.011	5.9			2.69	
174	1559.65	0.008	<0.01	4.3			2.71	
175	1560.00	0.20	0.15	7.9			2.68	
176	1560.35	1.3	0.98	16.9			2.72	
177	1560.65	11.3	9.0	25.5			2.64	
178	1561.00	55.0	47.3	27.9			2.64	
179	1561.35	51.6	44.3	30.2			2.63	
180	1561.65	15.0	12.1	27.3			2.62	
181	1562.00	0.022	0.016	4.9			2.70	
182	1562.35	34.2	28.7	27.8			2.65	
183	1562.65	6.6	5.7	24.2			2.65	
184	1563.00	13.4	12.0	25.6			2.60	
185	1563.35	62.0	57.6	26.0			2.59	
186	1563.65	9.3	8.1	24.4			2.64	
187	1564.00	6.9	6.0	23.5		1.5	2.64	
188	1564.35	2.9	2.4	21.4			2.64	
189	1564.65	4.3	3.7	21.7			2.59	
190	1565.00	15.5	13.9	22.6		0.74	2.57	
191	1565.35	37.7	34.6	24.4			2.54	
192	1565.65	10.0	8.8	23.4			2.69	
193	1566.00	13.6	12.1	24.7			2.54	
194	1566.35	10.3	9.1	23.4			2.61	
195	1566.65	6.9	6.0	22.4			2.61	
196	1567.00	12.8	11.3	21.2			2.62	
197	1567.35	0.16	0.12	10.5			2.84	
198	1567.65	3.1	2.6	21.3			2.64	

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Plug No.	Depth (meter)	Permeability (mD), vertical		Porosity (%) He	Pore saturation		Grain dens. g/cc	Formation Description
		K <sub>a</sub>	K <sub>l</sub>		S <sub>o</sub>	S <sub>w</sub>		
199	1568.00	3.5	3.0	23.7			2.61	
200	1568.35	9.0	8.0	23.8	1.3	1.0	2.61	
201	1568.65	7.4	6.5	25.0			2.62	
202	1569.00	7.6	6.6	23.1			2.60	
203	1569.35	16.0	14.4	24.6			2.61	
204	1569.65	5.4	4.6	22.7			2.65	
205	1570.00	7.8	6.9	22.8			2.63	
206	1570.35	3.6	3.1	23.6			2.59	
207	1570.65	3.6	3.0	21.6			2.60	
208	1571.00	1.3	0.98	20.1			2.58	
209	1571.35	9.4	8.2	18.0			2.53	
210	1571.65	9.9	8.7	24.6			2.64	
211	1572.00	11.9	10.5	22.3			2.51	
212	1572.35	6.6	5.7	20.1			2.59	
213	1572.65	6.5	5.6	20.3			2.57	
214	1573.00	3.5	3.0	21.1			2.61	
215	1573.35	3.5	2.9	21.5	2.5	1.9	2.55	
216	1573.65	7.9	7.0	23.0			2.60	
217	1574.00	12.9	11.5	24.5			2.59	
218	1574.35	2.8	2.3	22.2	0.49	0.38	2.60	
	1574.40							





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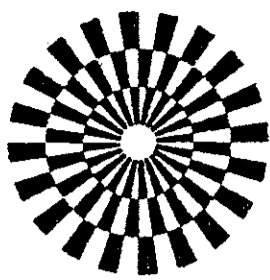
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Plug No.	Depth (meter)	Permeability (mD), vertical		Porosity (%) He	Pore saturation S <sub>o</sub>	Grain dens. g/cc	Formation Description
		K <sub>a</sub>	K <sub>l</sub>				
219	1577.00	1.9	1.5	21.7		2.61	
220	1577.15	3.1	2.6	24.5		2.63	
221	1577.45	6.7	5.9	22.9		2.60	
222	1577.70	1.3	1.0	20.2		2.58	
223	1578.00	nmp	1.3	20.4	0.98	2.57	
224	1578.35	0.010	<0.01	2.8		2.69	
225	1578.65	2.3	1.8	21.1		2.60	
226	1579.00	5.4	4.7	23.3		2.62	
227	1579.30	6.0	5.3	23.4		2.60	
228	1579.65	55.9	51.8	26.3		2.65	
229	1580.00	205	196	30.9		2.68	
230	1580.35	181	172	28.6		2.69	
231	1580.65	12.2	10.8	25.3		2.72	
232	1580.90	405	390	24.9		2.65	
233	1581.20	99.3	93.3	26.0		2.66	
234	1581.55	93.7	87.9	26.7		2.66	
235	1582.00	0.016	0.011	3.3	166	2.69	
236	1582.65	18.4	16.4	26.9		2.60	
237	1583.00	14.9	13.3	26.0		2.63	
238	1583.35	1.5	1.1	21.9		2.63	
239	1583.65	11.0	9.6	26.2		2.64	
240	1584.00	1.6	1.2	21.7		2.63	
241	1584.35	1.4	1.1	22.0		2.61	
242	1584.65	9.4	8.3	25.2		2.63	
243	1585.00	4.8	4.1	24.1		2.61	
244	1585.65	4.3	3.6	22.8	nmp	2.61	
245	1586.00	0.73	0.56	20.4		2.58	
246	1586.35	1.8	1.4	20.6		2.61	
247	1586.65	5.0	4.3	21.6		2.59	
248	1587.00	1.6	1.2	20.6		2.54	
	1587.35						
	1588.20						

COMPANY: SHELL  
 WELL: 31/2-15  
 LOCATION:

FIELD: 31/2  
 COUNTY:  
 STATE: NORWAY

FILE:  
 DATE: NOV. 1984  
 ELEV.:



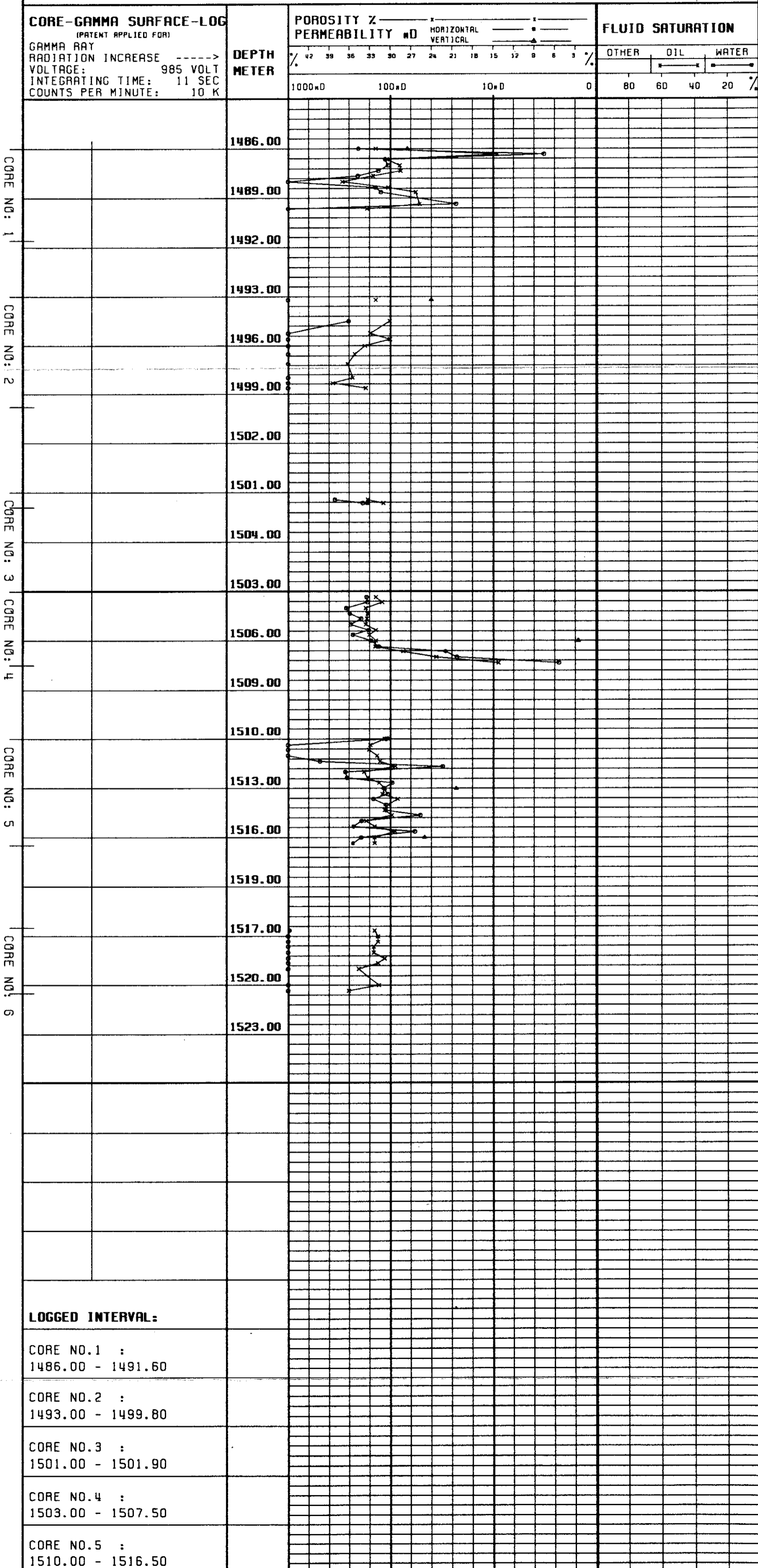
**GECO**  
 GEOPHYSICAL COMPANY  
 OF NORWAY A.S.

# CORE GRAPH

THESE ANALYSES, OPINIONS OR INTERPRETATIONS ARE BASED ON OBSERVATIONS AND MATERIAL SUPPLIED BY THE CLIENT TO ANDER, AND FOR HIS EXCLUSIVE AND CONFIDENTIAL USE. THIS REPORT IS MADE. THE INTERPRETATIONS OR OPINIONS EXPRESSED REPRESENT THE BEST JUDGMENT OF GECO LABORATORIES AND ITS OFFICERS AND EMPLOYEES.

VERTICAL SCALE: 1:200

## LABORATORY

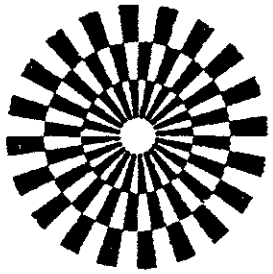


CORE NO. 6 :  
 1516.50 - 1520.50

COMPANY: SHELL  
 WELL: 31/2-15  
 LOCATION:

FIELD: 31/2  
 COUNTY:  
 STATE: NORWAY

FILE:  
 DATE: NOV.1984  
 ELEV.:



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**CORE GRAPH**

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**LABORATORY**

