A/S Norske Shell

NSEP 165

EXPLORATION WELL RESUME

WELL 31/2-8

TRADE VERSION

April 1983

A/S Norske Shell

ORIGINAL

LIST OF CONTENTS

Summary of Well Data

PART I: DRILLING AND ENGINEERING REPORT

I.1. Drilling History
2. Mud Report
3. Rig Move and Anchoring
4. Site Survey
5. Geological Samples
6. Hydrocarbon Indications
7. Petrophysical Report
8. Production Tests
- Wireline Formation Tests

PART II: GEOLOGICAL REPORT

II.1. Introduction
2. Stratigraphy
3. Seismostratigraphy
4. Reservoir Conditions
5. Geochemistry
6. Dipmeter Survey
7. Conclusions

ENCLOSURES

1. Completion Log 1:500
2. Sidewall Core Descriptions
3. Core Description Sheets
4. Main Seismic Time Picks
5. Evaluation Panel of Cored Interval 1:200
6. Well Summary Sheet
7. Rig Move Report

LIST OF TEXT FIGURES

0.1	Location Map Block 31/2
I.1.1	Abandonment Status Diagram
I.1.2	Drilling Progress Curve
I.3.1	Anchor Pattern
I.8.1	RFT Pressures vs Depth Run 1
I.8.2	RFT Pressures vs Depth Run 1 & 4
II.1.1	Well Location Map

LIST OF TABLES

I.1.1 Casing Data
I.1.2 Bit Record Summary
I.1.3 Cementation Data
I.1.4 Deviation Data
I.1.5 Formation Leak-off Test Data
I.1.6 Time Allocation

I.7.1 Overview of Schlumberger Logging Operations

I.8.1 Formation Water Analysis

II.2.1 Formation Tops
II.2.2 Biostratigraphy

WELL 31/2-8

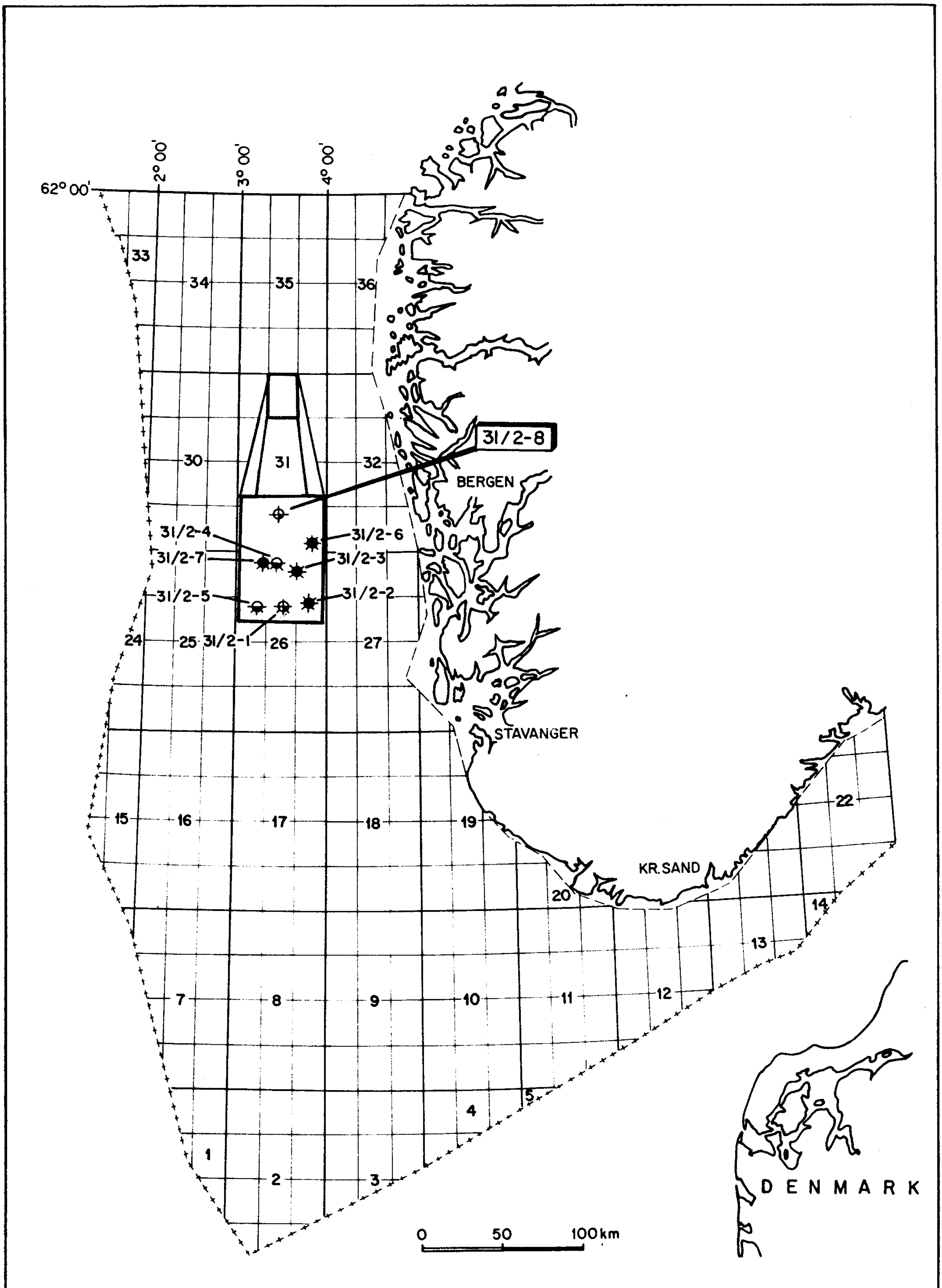
Summary of Well Data:

Well Classification :	new field well, wildcat
Location Coordinates :	N 60^{o} 57' 33.019" E 03^{o} 29' 49.843" Intersection of seismic lines 8007-158 and 81007-406
Water Depth :	345.5 m
Derrick Floor Elevation :	25 m
Contractor/Rig :	Dolphin Services A/S, Borgny Dolphin
BOP-Stack :	10 000 psi, 18 3/4"
Mudlogging Contractor :	Geoservices
Start of Operations :	15/06/82
Spudded :	16/06/82
Completed :	18/08/82
Objective :	primary: Upper Jurassic sandstones of Humber Group in downfaulted fault-block outside the Troll Field; secondary: Lower Jurassic reservoirs
Total Depth :	3375 m (driller's depth) 3380.5 m (logger's depth)
Formation at TD :	Triassic Cormorant Formation
Results :	Dry hole with oil shows in Upper Jurassic Sogn Formation; DST (1843-1848 m) recovered 34 bbls of water with traces of oil. RFT recovered 1800 cc water and 100 cc oil at 1849 m depth
Present Status :	plugged and abandoned
Casing record: :	30" csg: 469.5 m 20" csg: 826.0 m 13 3/8"csg: 1734.0 m 9 5/8"csg: 2732.0 m
Logs :	ISF-BHC-GR-SP) FDC-CNL-CAL-GR) whole well coverage LDL-NGT) DLL-MSFL) HDT) partial well coverage RFT) CBL-VDL-GR-CCL)

Logs (cont.)		Velocity survey
Cored Interval	:	1841.8 - 1888.5 m (driller's depth; 3 cores)
Sidewall Samples	:	attempted: 180
		recovered: 168

Production Licence PL 054 Group:

Statoil	50%
Norske Shell A/S (operator)	35%
Norske Conoco A/S	5%
Norsk Hydro Production A/S	5%
Superior Oil Norge A/S	5%



a·s Norske Shell
EXPLORATION & PRODUCTION FORUS

31/2-8 WELL RESUMÉ
LOCATION MAP BLOCK 31/2

AUTHOR: EPXV/2	FIG	DATE: NOV 1982
REPORT NO: NSEP 165	0.1	DRAW. NO.: G. 1539/1

JM OCT 1982

PART I

DRILLING AND ENGINEERING REPORT

I.1 DRILLING HISTORY 31/2-8

Following the abandonment of well 31/2-7 the rig Borgny Dolphin was moved to location 31/2-8. The first anchor was dropped at 04:00 hrs 15.06.82. At 10:30 hrs 15.06.82 all anchors were in position and successfully tension tested to 400,000 lbs. The final position of the rig as given by the Syledis system was:

N 60° 57' 33.009"
E 03° 29' 49.849"

The seabed condition was checked with the underwater TV camera and the temporary guide base with a 5 m long, 60" diameter skirt and four anti-rotating posts, was run and set level on the seabed. The following distances were established:

Water depth	=	345,5 m
DF - Seabed	=	370,5 m

Well 31/2-8 spudded at 05:30 hrs 16.06.82 with a 26" bit and 36" hole-opener. The 36" hole was drilled to 480 m without incident and 8 joints of 30" casing were run to 469.5 m and cemented in place with returns to seabed. The cement was drilled out with a 17½" bit and 26" hole-opener and 5 m of new hole was drilled to a depth of 485 m. The 30" hydraulic latch, ball joint and dump valve assembly were run on the 21" marine riser and successfully latched onto the 30" housing. A 14 3/4" pilot hole was drilled to 840 m and mud of 1.35 SG was spotted in the open hole to ensure hole stability during logging. The following logs were run to check for shallow gas:

1. ISF/SONIC/SP/GR (run No. 1)
2. FDC/CNL/CAL/GR (run No. 1)

Inspection of the logs confirmed the presence of a gas bearing zone from 510 to 530 m which had been suspected due to a maximum gas reading of 10% whilst drilling the 14 3/4" pilot hole.

The 14 3/4" pilot hole was under-reamed to 26" without incident. 1.30 SG mud was spotted from bottom to seabed and the dump valve opened to equalize the hydrostatic heads. The well appeared to flow and the dump valve was closed. A BGT log was run to check the hole size and it was found to be under gauge in some places. After the second under-reaming run, mud of 1.40 SG was spotted from bottom to 510 m and 1.65 SG mud from 510 m to seabed. The riser was displaced to seawater and a subsequent flow check, with the dump valve open, revealed the well to be static. The BGT log was re-run and confirmed the hole to be 26". The marine riser was unlatched and retrieved prior to running 38 joints of 20" casing to 826 m without incident. The casing was successfully cemented with cement returns to seabed.

The BOP-stack was run and satisfactorily pressure tested. After drilling out the 20" casing shoe, a leak-off test was carried out to an E.M.W. of 1.80 SG. An 8½" pilot hole was drilled to 1063 m to provide better control when drilling through a section where the seismic survey had indicated the possible presence of a gas charged fault plane. No indications of gas were seen and the pilot hole was opened up to 17½". Drilling continued to the 13-3/8" casing setting depth at 1745 m which was reached without incident at 24:00 hrs 13.07.82 after 82 hrs drilling, and the following logs were run:

1.	ISF/SONIC/SP/GR	(run No. 2)
2.	FDC/CNL/CAL/GR	(run No. 2)
3.	CST (29 recovered, 1 misfire)	(run No. 1)

Prior to running the second log a wiper trip was made due to tight hole, and the mud weight was increased to 1.40 SG to stabilize the shale. The 13 3/8" casing was run to 1734 m without any problems. During the subsequent cementation approximately 300 bbls of mud returns were lost and there was no final pressure increase, indicating that the cement plug had not landed on the float collar.

After a scheduled BOP test, an attempt to pressure test the casing failed, indicating a leaking shoe track and poor leak-off at the shoe. An RTTS packer was run and set at 1716 m and the casing was satisfactorily tested to 3000 psi for 15 mins. The shoe was drilled out and a subsequent leak-off test gave an E.M.W. of 1.45 SG. A squeeze cementation was carried out at the shoe and the second leak-off test gave an improved E.M.W. of 1.62 SG.

The 12 1/4" section was drilled to 1842 m after a drilling break at 1838 m was circulated out. The bit was pulled and coring operations commenced. The following cores were cut using a Diamant Boart fiber-glass sleeve coring assembly and 8½" coreheads:-

Core No. 1:	1842 - 1851.5 m	recovered 100 %
Core No. 2:	1851.5 - 1870 m	recovered 95 %
Core No. 3:	1870 - 1888.5 m	recovered 100 %

The hole was opened up to 12 1/4" and the 9 5/8" casing setting depth of 2743 m was reached without incident at 18:00 hrs 18.07.82 after 200 hrs of drilling including coring. The following suite of logs was run:-

1.	ISF/SONIC/SP/GR	(run No. 3)
2.	FDC/CNL/CAL/GR	(run No. 3)
3.	LDT/NGT	(run No. 1)
4.	MSFL/DLL/CAL/SP/GR	(run No. 1)
5.	HDT	(run No. 1)
6.	RFT (pressure tests)	(run No. 1)
7.	RFT (sample)	(run No. 2)
8.	RFT (sample)	(run No. 3)
9.	CST (100% recovery)	(run No. 2)
10.	CST (29 recovered, 1 empty)	(run No. 3)
11.	CST (29 recovered, 1 misfire)	(run No. 4)
12.	CBL/VDL/GR (on 13 3/8" casing)	(run No. 1)

The 9 5/8" VAM casing was run and cemented at 2732 m.

After drilling out the shoe a limited leak-off test was carried out to an E.M.W. of 1.91 SG. 8½" hole was drilled to 3317 m when a wash-out occurred in the drill pipe and the string had to be pulled. After continuing drilling, a second washout in the drill string again caused some minor delays. T.D. at 3375 m BDF was reached at 03:30 hrs 03.08.82 after 50 days on location. The following suite of logs was then run:

1. ISF/SONIC/SP/GR (run No. 4)
2. FDC/CNL/CAL/GR (run No. 4)
3. LDT/NGT/CNL (run No. 2)
4. HDT (run No. 2)
5. RFT (pressure tests) (run No. 4)
6. Velocity Survey
7. CST (28 recovered,1 empty,1 lost) (run No. 5)
8. CST (23 recovered,2 misfire,5 lost)(run No. 6)
9. CBL/VDL/CCL (on 9 5/8" casing) (run No. 2)

The 8½" hole was plugged back by setting 4 cement plugs from 3370 m to 2535 m. The last cement plug inside the 9 5/8" casing was pressure tested, by using an RTTS packer set at 2390 m, to 1000 psi differential pressure at the 9 5/8" casing shoe.

The decision was made to Drill Stem Test the Upper Jurassic sandstone and a bridge plug was set at 1870 m to limit the sump length. After spotting clean brine across the test zone the interval 1843 - 1848 m was perforated at 4 spft. using a 4" casing gun. A DST - assembly was run on 5" drill pipe with a fresh water cushion giving ca. 1000 psi drawdown on the formation. However, after setting the packer a wireline blind-box-run confirmed that a leak had occurred in the test string (later found to be the RTTS circulating valve), and the string was pulled. After re-running the DST-string and setting the packer at 1827 m, the well was flowed for 2 minutes followed by a one hour build up period. The well was re-opened and flowed until it died after some 33.2 bbls inflow (as estimated on the basis of a blind-box-run locating the water level at 34 m BDF). The APR-M valve was closed and the well killed by reverse circulation and +/- 33 bbl of formation fluid recovered. After pulling the test string, a formation water sample with traces of oil was recovered from the DST tool. A wireline-sandbailer-run was made finding 22 m of sand fill on top of the bridge plug.

The well was secured by setting a cement plug from 1870 m to 1694 m covering the perforated interval. The 9 5/8 and 13 3/8" casings were cut at 795 m and 766 m respectively. A 175 m cement plug was set across the two cuts and 30 bbls of cement were squeezed into the 20" x 13 3/8" annulus. A final 200 m cement plug was set inside the 20" casing with the cement top at 415 m. The riser and BOP stack were then pulled.

After an unsuccessful attempt to mechanically cut and retrieve the 20" and 30" casings, it was decided to re-cut the casing at 380 m with a J.R.C. chemical casing cutter. The cut casings, together with the permanent and temporary guide-bases were recovered using an 18 3/4" H-4 Vetco connector.

The sea floor was visually inspected by divers and a video recording was made. The area was found to be completely clear except for a large crater with cement around it.

The rig was deballasted and at 01:00 hrs 18.08.82 the last anchor was bolstered and the tow to Bergen shipyard commenced.

ABANDONMENT STATUS DIAGRAM 31/2 - 8

(NB. ALL DEPTHS QUOTED BDF.)

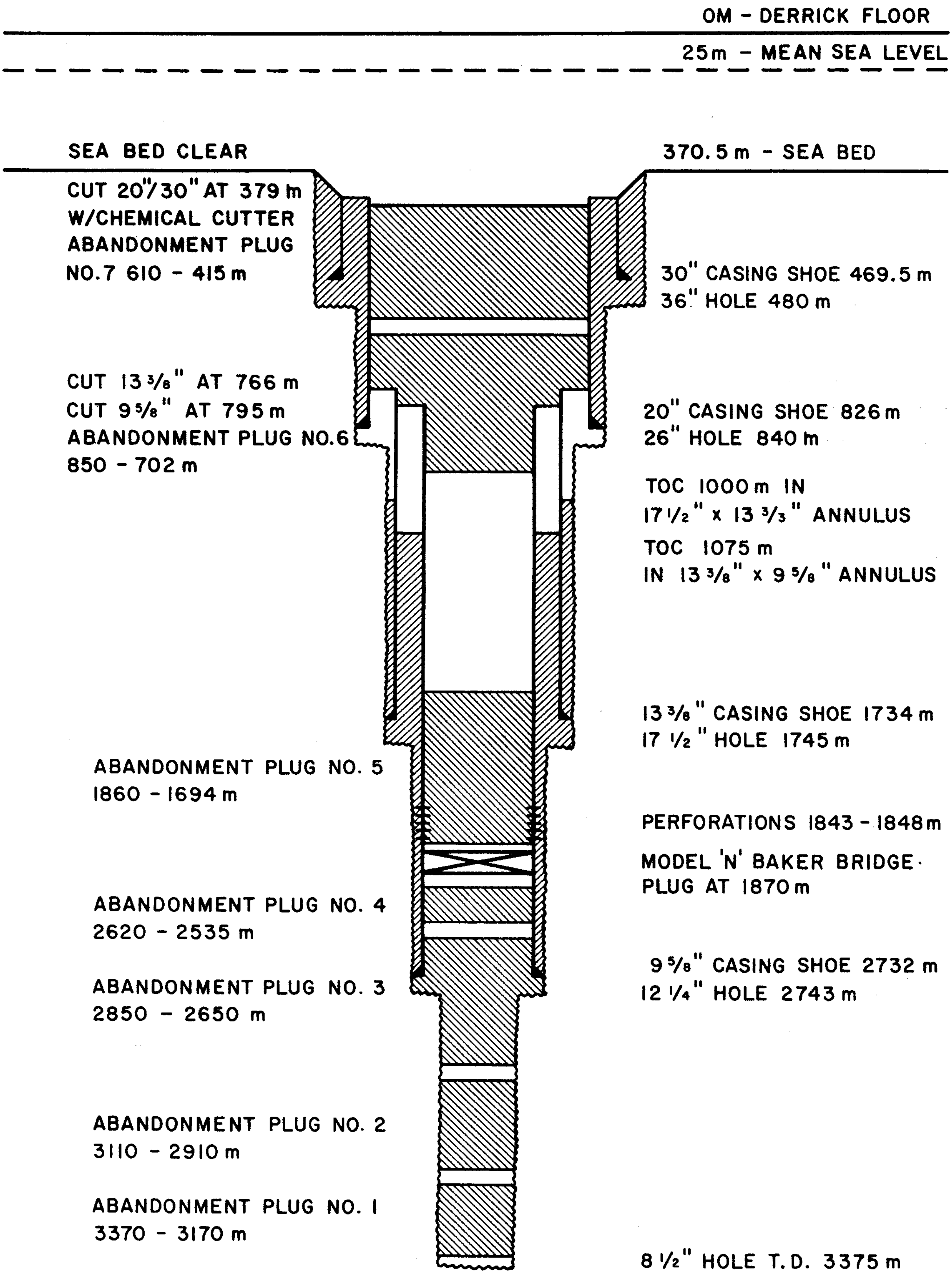


FIG. I.1.1

OK NOV. '82 G 1539/2

31/2-8 DRILLING PROGRESS CURVE

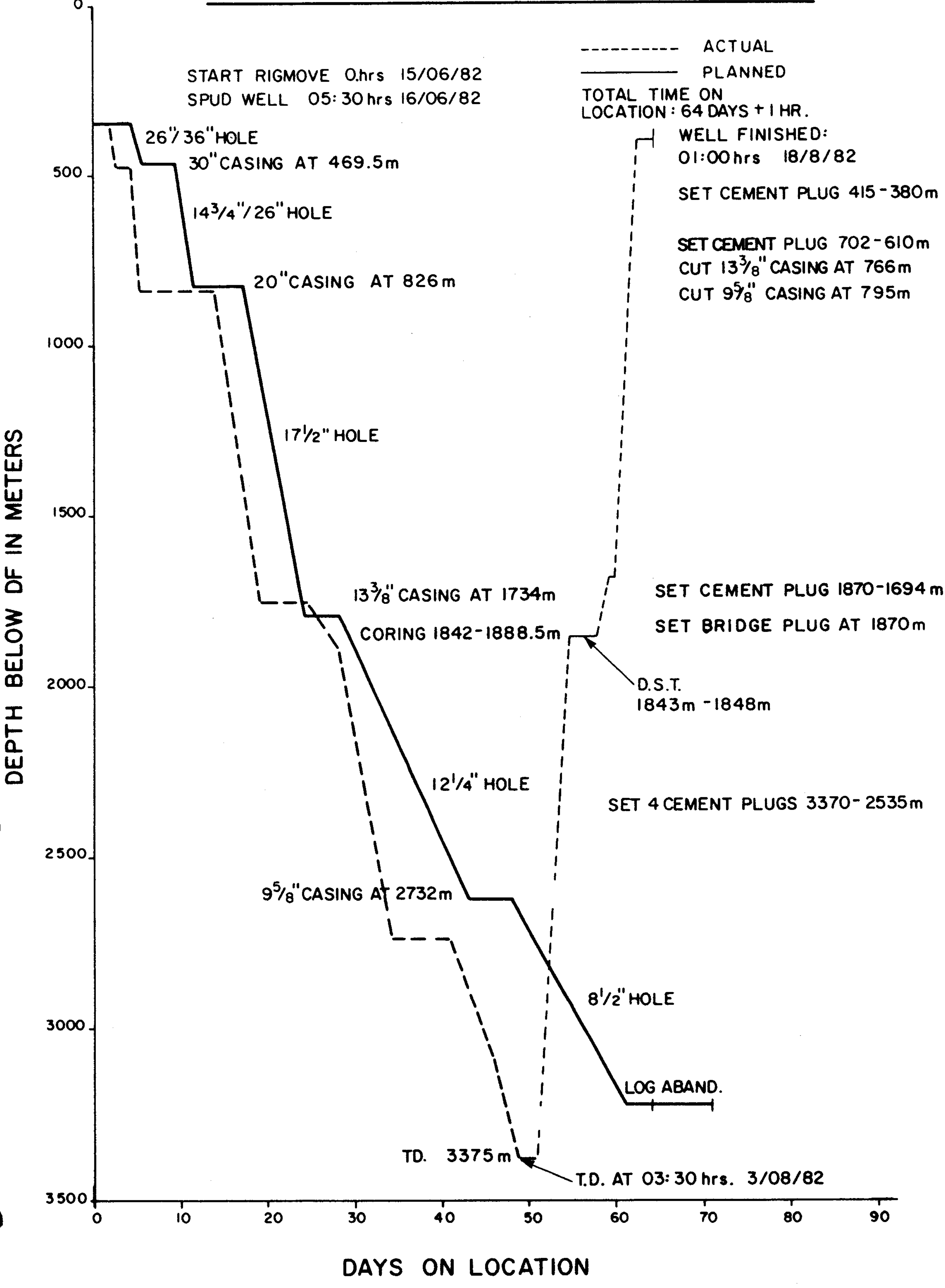


FIG. I.1.2

G 1539/3

CASING DATA WELL No. 31/2-8

DATE RUN	SIZE	GRADE	WT/FT(LBS)	COUPLING	SHOE DEPTH(MBDF)	REMARKS
17.06.82	30"	X-52	310 (1" WT)	ATD-RB Squnch	469.5 m	Housing joint 1½" WT. Vetco 30" hub.
24.06.82	20"	X-52	129	Hunting Swift DW-LH	826 m	Vetco 18-3/4" SG Housing. Float shoe used.
06.07.82	13-3/8"	L-80	72	BTC	1734 m	Shoe and float collar used.
23.07.82	9-5/8"	L-80	47	VAM	2732 m	Shoe and float collar used.

TABLE I.1.1

BIT RECORD SUMMARY WELL NO. 31/2-8

RUN NO.	BIT NO.	BIT SIZE	MFGR/TYPE	JET SIZE 1	2	3	4	DEPTH OUT	METERS	HRS	ROP M/HRS	WOB 1000 LBS	RPM	PUMP PRESS	GPM	MUD WT	VIS	CODE T	B	G	REMARKS
1	1	26	HTC/OSC 3aj	24	24	24	-	480	109.5	13	8.4	0-15	110	1700	1050	S.W. visc.pills		1	1	I	Run with 36" HO.
2	2	14-3/4	Smith/DSJ	20	20	20	18	485	5	0.5	10.0	0-10	80	1800	1050	S.W. visc.pills		1	1	I	Drlng. cement.
3	3	14-3/4	Smith/DSJ	18	18	18	18	840	355	22	16.1	5-20	120-140	2800	1094	1.07	52	7	5	I	Pilot hole.
4	3RR	14-3/4	Smith/DSJ	18	18	18	18	-	-	-	-	5-13	130	2500	1094	1.07	52	-	-	-	Underreaming.
5	3RR	14-3/4	Smith/DSJ	18	18	18	18	-	-	-	-	0-10	150	2500	1094	1.12	43	-	-	-	Underreaming.
6	RR4	17½	Smith/DSJ	18	18	18	18	845	5	1.5	3.3	25	100	900	532	1.27	51	2	2	I	Drlng.cement +5m new formation.
7	5	8½	HTC/X1G	12	12	12	-	1063	218	21	10.4	10-30	110-135	2500	448	1.29	50	5	4	I	Lost 1 nozzle.
8	6	17½	Smith/DGJ	18	18	18	18	1274	211	13.5	15.6	25-50	110-140	1550-2200	600-840	1.32	55	2	3	I	
9	7	17½	Smith/DSJ	18	18	18	16	1745	471	43	11.0	30-50	140	1800-3500	800-900	1.36	54	5	6	I	Casing point.
10	8	12-1/4	HTC/X3	-	-	-	-	-	-	-	-	-	-	-	-	1.20	60	-	-	-	Check trip to locate TOC.
11	8RR	12-1/4	HTC/X3	-	-	-	-	1750	5	1	5.0	15	60-120	2000	800	1.20	60	-	-	-	Also drilled 21 m cement.
12	9	12-1/4	Smith/SDGH	14	14	14	11	1842	92	8.5	10.8	40	130	3400	670	1.20	60	2	2	I	Also drilled 35 m cement.
13	CH1	8½	CB 303	-	-	-	-	1851.5	9.5	3	3.2	10-22	100	475	200	1.21	49	-	-	-	Core No.1.
14	CH2	8½	CB 303	-	-	-	-	1870	18.5	5	3.7	10-22	100	500	220	1.21	49	-	-	-	Core No.2.
15	CH2RR	8½	CB 303	-	-	-	-	1888.5	18.5	3.5	5.3	20-25	110	700	250	1.21	49	-	-	-	Core No.3.
16	10	12-1/4	HTC/J22	13	13	14	-	2172	283.5	28	10.1	50	130	3400	650	1.22	50	4	7	I	Also opened cored hole from 1851.5 m.
17	11	12-1/4	Smith/3JS	12	14	14	-	2416	244	30.5	8.0	50	130	3400	650	1.22	50	2	7	I	
18	12	12-1/4	Smith/3JS	15	15	14	-	2743	327	34	9.6	70	80-110	3600	635	1.23	50	2	7	I	
19	9RR	12-1/4	Smith/SDGH	-	-	-	-	2743	-	-	-	-	-	-	-	1.24	50	-	-	-	Wiper trip between logging runs.
20	9RR	12-1/4	Smith/SDGH	-	-	-	-	2743	-	-	-	-	-	-	-	1.24	50	-	-	-	Wiper trip prior to running casing.
21	13	8½	HTC/X1G	12	12	12	-	2748	5	1	5.0	20-25	80	2850	455	1.24	53	3	2	I	Drilling cement + 5m new formation.
22	14	8½	Smith/F 3	10	11	11	-	2867	119	21.5	5.5	45-90	45-90	2850	389	1.24	53	1	3	I	
23	15	8½	HTC/J33	11	11	11	-	3019	152	29.5	5.2	45-50	90	2850	414	1.24	54	3	3	1/8	Badly worn on bit legs.
24	16	8½	Smith/SDGH	11	11	11	-	3055	36	9.5	3.8	20-30	130	2800	404	1.24	55	4	4	3/16	Badly worn on bit legs.
25	17	8½	Smith/F 3	11	11	11	-	3060	5	3	1.7	10-30	90	2800	399	1.24	55	1	1	I	Worn on bit legs.
26	18	8½	Smith/DGHJ	14	14	14	-	3080	20	4	5.0	20-35	130	1800	404	1.24	53	3	3	3/16	Worn on bit legs.
27	19	8½	HTC/J22	11	11	11	-	3317	237	42.5	5.6	40-45	100	2950	404	1.24	54	3	4	I	Broken teeth.
28	20	8½	HTC/J33	11	11	11	-	3375	58	11.5	5.0	40-50	100	3000	404	1.24	50	2	3	1/16	TD.

TABLE I.1.2

CEMENTATION DATA WELL NO. 31 / 2 - 8

JOB DATE	JOB DESCRIPTION	HOLE SIZE/ DEPTH (M. BDF)	CASING SHOE (M.BDF)	CEMENT TYPE	SACKS USED	SLURRY WEIGHT (PPG)	MIXWATER	ADDITIVES	LOSSES (BBLS)	REMARKS
17.06. 1982	30" Casing	36"/480	469.5	Class G	995 956	13.2 15.8	Seawater Seawater	0.36 gps Econolite 3 % BWOC $CaCl_2$	Nil	Cement returns to seabed.
24.06. 1982	20" Casing	26"/840	826	Class G	1603 579	13.2 15.8	Seawater Seawater	0.36 gps Econolite 2 % BWOC $CaCl_2$	Nil	Cement returns to seabed.
06.07. 1982	13-3/8" Casing	17½"/1745	1734	Class G	1884 383	13.2 15.8	Freshwater Freshwater	0.36 gps Econolite 0.15 gps CFR-2L	300	Lost 300 bbls of returns. The cement plug was never bumped due to problems with the stroke counter.
09.07. 1982	13-3/8" shoe squeeze	12-1/4"/ 1750	1734	Class G	244	15.8	Freshwater	0.10 gps CFR-2L 5 ppb (by mixwater) MICA	Nil	Squeezed 25 bbls to improve shoe cementation.
23.07. 1982	9-5/8" Casing	12-1/4"/ 2743	2732	Class G	187 1230	13.2 15.4	Freshwater Freshwater	0.36 gps Econolite 0.15 gps CFR-2L 0.70 gps Halad-10L	Nil	The 13.2 ppg slurry is a scavenger slurry, whilst the 15.4 ppg slurry is the main slurry. Good returns throughout the job.
06.08. 1982	Abandonment plug no.1 8½" hole.	8½"/3375	2732	Class G	223	15.8	Freshwater	0.29 gps CFR-2L	-	Interval covered: 3170-3370 m.
06.08. 1982	Abandonment plug no.2 8½" hole.	8½"	2732	Class G	223	15.8	Freshwater	0.29 gps CFR-2L	-	Interval covered: 2910-3110 m.
06.08. 1982	Abandonment plug no.3 8½" hole + 9-5/8" csg.	8½"/ 9-5/8"csg.	-	Class G	243	15.8	Freshwater	0.29 gps CFR-2L	-	Abandonment of 9-5/8" casing. Interval covered: 2650-2850 m.
06.08. 1982	Abandonment plug no.4 9-5/8" csg.	9-5/8" csg.	-	Class G	116	15.8	Freshwater	None.	-	Interval covered: 2535-2620 m. Set to cover possible weak point in the 9-5/8" casing. Tested cmt. plug to 3500 psi with RTTS packer.
12.08. 1982	Abandonment plug no.5 Squeezing off perforations.	9-5/8"csg.	-	Class G	203	15.8	Freshwater	0.15 gps CFR-2L	-	Abandonment of test zone. Squeezed 1 bbl away. Interval covered: 1694-1860 m. Tested cmt. plug to 2000 psi/15 mins. and with 20.000 lbs weight.
14.08. 1982	Abandonment plug no.6 9-5/8"/ 13-3/8"/20".	9-5/8"/ 20" csg.	-	Class G	636	15.8	Seawater	None.	-	9-5/8" csg. cut at 795 m, 13-3/8" cut at 766 m. Covered interval: 702-850 m. Squeezed 30 bbls into 13-3/8"/20" annulus. Pressure and weight tested the plug to 1000 psi and 20,000 lbs respectively.
15.08. 1982	Abandonment plug no.7.	20" csg.	-	Class G	1073	15.8	Seawater	2 % BWOC $CaCl_2$	-	Interval covered: 415-610 m. Tested plug with 20,000 lbs weight.

TABLE I.1.3

DEVIATION DATA WELL NO. 31/2-8

(MAGNETIC DECLINATION 6 DEG W. OF TRUE NORTH)

DEPTH A.H. (M.B.DF)	ANGLE (°FROM VERT)	AZIMUTH (°MAGNETIC)	AZIMUTH (°TRUE)	DEPTH T.V. (M.SS)	NORTHING (M.FROM LOCN)	EASTING (M.FROM LOCN)	DOG LEG (°/100M)
401	½	(Totco)	-	-	-	-	-
440	1	"	-	-	-	-	-
480	1	"	-	-	-	-	-
601	1	"	-	-	-	-	-
705	0	"	-	-	-	-	-
801	½	"	-	-	-	-	-
840	3/4	"	-	-	-	-	-
942	1/4	125	119	917	0.56	0.19	0.88
1054	½	95	89	1029	0.45	0.90	0.28
1063	3/4	25	19	1038	0.51	0.96	8.28
1169	3/4	25	19	1144	1.82	1.41	0.00
1274	3/4	110	104	1249	2.30	2.30	0.97
1379	0	0	354	1354	2.14	2.96	0.71
1485	½	230	224	1460	1.80	2.64	0.47
1580	3/4	110	104	1555	1.35	2.96	1.15
1685	1	63	57	1660	1.68	4.39	0.70
1896	1 1/4	87	81	1871	3.05	8.21	0.25
1990	½	100	94	1965	3.18	9.63	0.82
2135	1/4	250	244	2110	3.00	9.98	0.50
2172	½	240	234	2147	2.87	9.77	0.70
2278	3/4	228	222	2253	2.08	8.94	0.26
2382	1	240	234	2357	1.04	7.75	0.30
2416	1	220	214	2391	0.62	7.34	1.05
2532	3	242	236	2507	- 1.92	4.26	1.82
2669	3	265	259	2644	- 4.61	- 2.23	0.87
2743	2 ½	263	257	2718	- 5.34	- 5.71	0.69
2808	3 3/4	265	259	2783	- 6.06	- 9.18	1.93
2897	3 3/4	270	264	2872	- 6.92	- 14.93	0.37
3002	4 3/4	265	259	2976	- 8.11	- 22.61	1.01
3059	4 1/2	270	264	3033	- 8.79	- 27.15	0.83
3080	4 1/2	270	264	3054	- 8.97	- 28.79	0
3198	4 1/4	270	264	3171	- 9.91	- 37.74	0.21
3317	4 3/4	265	259	3290	- 11.31	- 46.96	0.53
3375	5	267	261	3348	- 12.16	- 51.82	0.52

TABLE I.1.4

FORMATION LEAK OFF TEST DATA WELL No. 31/2-8

No.	DATE	CASING		HOLE		MUD WT. IN USE		MAX EQUIVALENT MUD WT.		REMARKS.
		SIZE(")	DEPTH(m)	SIZE (")	DEPTH(m)	S.G.	PSI/1000 FT	S.G.	PSI/1000 FT	
1	28.06.82	20"	826	17½	845	1.25	540	1.80	781	Stabilized value.
2	09.07.82	13-3/8"	1734	12-1/4	1750	1.21	524	1.45	629	Low value due to poor cement job around the shoe.
3	10.07.82	13-3/8"	1734	12-1/4	1751	1.21	524	1.62	701	After squeeze cementing the shoe. Stabilized value.
4	25.07.82	9-5/8"	2732	8½	2748	1.24	537	1.91	825	Limited test.

TABLE I.1.5

TIME ALLOCATION 31/2-8

Started well at 00:00 hrs, 15.06.82, spudded well at 05:30 hrs, 16.06.82 and abandoned well at 01:00 hrs, 18.08.82.

PHASE	ITEM	JUNE	JULY	AUGUST	TOTAL HRS.	%
PREPARATION	- Towing	4			4	0.26
	- Laying/ pulling anchors	7.5			7.5	0.49
	- General preparation	18			18	1.17
Sub total					29.5	1.92
DRILLING	- Bit on bottom	67.5	238	33.5	339	22.05
	- Round tripping	59.5	173.5	54	287	18.67
	- Reaming/enlarging	42.5	8	1	51.5	3.35
	- Circulation/condition mud	33	21.5	4.5	59	3.84
	- Condition hole for casing	3	15		18	1.17
	- Running casing/drilling out cement/leak off test etc.	31	38		69	4.49
	- Cementing/ WOC	6	13		19	1.23
	- Running/pulling riser and/or BOP's	51			51	3.32
	- Flanging up and testing	15	42.5	17.5	75	4.88
	- Fishing		7.5		7.5	0.49
	- Repairs	14	9	5.5	28.5	1.85
	- Surveys	9	19	1.5	29.5	1.92
	- Observe well	6.5			6.5	0.42
	- Slip and cut drill line		3	1	4	0.25
Sub total					1044.5	67.95
EVALUATION	- Coring (on bottom)		11.5		11.5	0.75
	- Round trip with core barrel		19.5		19.5	1.27
	- Recovery of core		6.5		6.5	0.42
	- Opening cored hole		3.5		3.5	0.23
	- Condition hole for logging	1.5	23	4	28.5	1.85
	- Logging	15	43	50.5	108.5	7.06
	- Circulating for samples		8		8	0.52
	- RFT testing		41		41	2.67
Sub total					227	14.77
TESTING	- Condition hole for tubing			1	1	0.07
	- Running/pulling tubing			45.5	45.5	2.96
	- Rigging up surface equipment			10	10	0.65
	- Circulating/observing well/ bullheading/gravel packing			13	13	0.84
	- Testing BOP's etc.			4	4	0.26
	- Schlumberger wireline			7	7	0.45
	- Flopetrol wireline			9.5	9.5	0.62
	- Flowing well			1.5	1.5	0.10
	- Pressure build ups			2	2	0.13
	- Abandonment test zones			21	21	1.37
	- Repairs			3.5	3.5	0.23
Sub total					118	7.68
ABANDONMENT	- Plugging back and WOC			27	27	1.76
	- Cutting/retrieving casing			58.5	58.5	3.81
	- Pulling riser/BOP stack			10	10	0.65
	- Laying down string			4	4	0.26
	- Preparing for move			3	3	0.19
	- Anchor handling			14.5	14.5	0.94
	- Repair			1	1	0.07
Sub total					118	7.68
					TOTAL HOURS 1537	100 %

TABLE I.1.6

I.2 MUD REPORT

See special report from Anchor Drilling Fluid A/S.

I.3 RIG MOVE AND ANCHORING

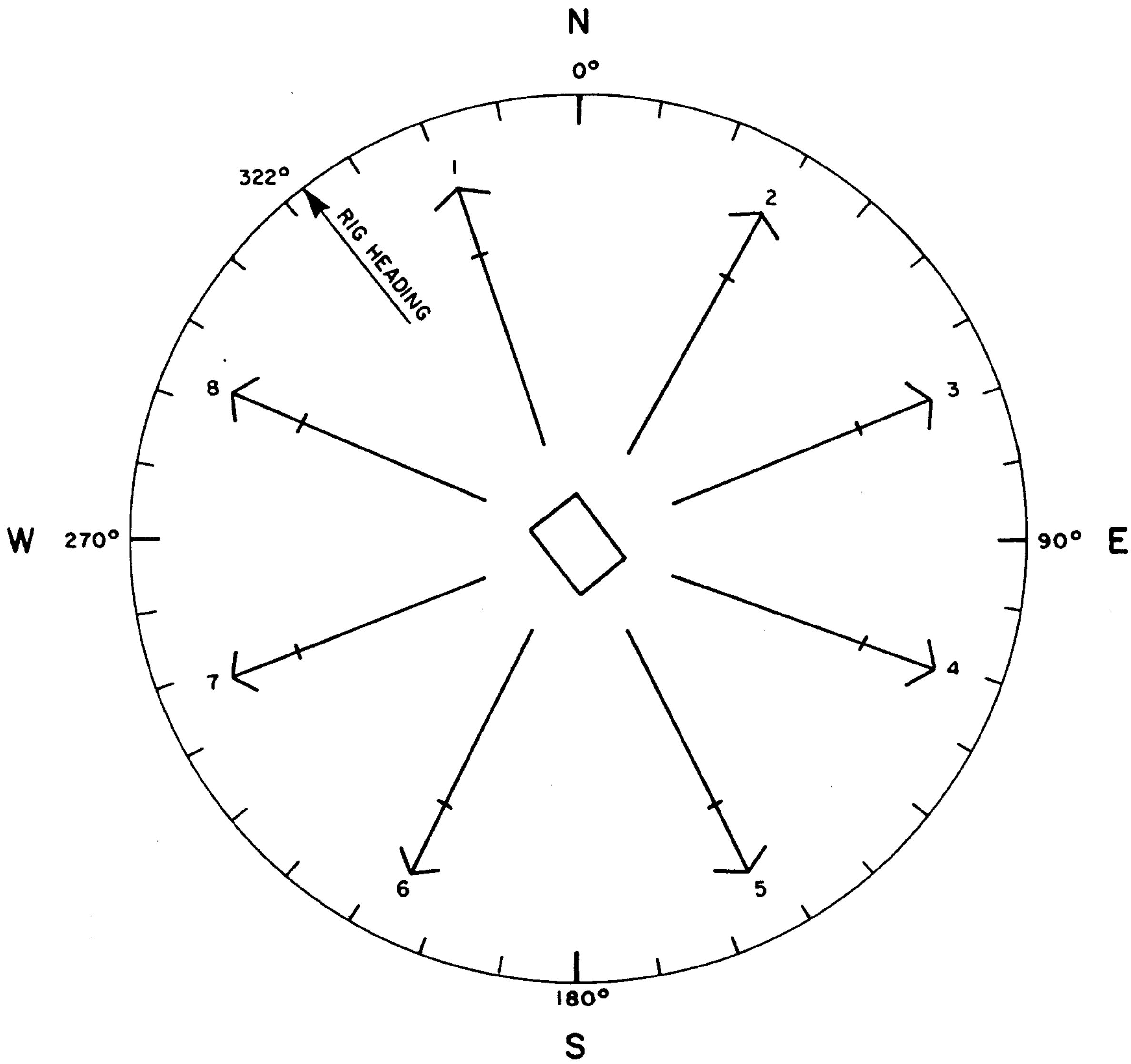
Rig Move Summary

Rig	:	Borgny Dolphin
Data rig move	:	12-15 June 1982 (2 days, 3 hours)
Rig released	:	13 June, 1500 h
Rig arrival	:	15 June, 1800 h
Old location	:	31/2-7
New location	:	31/2-8
Co-ordinates	:	60^{o} 57' 33" N
		03^{o} 29' 49.8 E
Water depth	:	345.5 m
Rig mover	:	Shell Expro
Survey operator	:	SIPM
		Huntings

For further details see encl. 7 (rig move report).

SKETCH OF ANCHOR PATTERN   RIG: BORGNY DOLPHIN

NEW LOCATION 31/2-8   DATE: 15/06/82



a-s Norske Shell EXPLORATION & PRODUCTION FORUS 31/2-8 WELL RESUMÉ ANCHOR PATTERN		
AUTHOR EPPP/11	FIG.	DATE FEB. '83
REPORT NO NSEP165	I. 3. 1	DRAW NO G 1539/4

A8

I.4 SITE SURVEY

A/S Geoteam was commissioned by A/S Norske Shell Exploration and Production to perform a site survey in block 31/2, which covers an area of approximately 5 x 5 kms around the proposed well location 31/2-8.

The field work took place in the period between 21 March 1982 and 1 April 1982.

The survey was a combined seafloor investigation, bathymetric survey and a high resolution seismic survey.

In order to map the sea floor topography and locate any debris or wrecks that might present problems to a drilling operation, profiles were run with echo-sounder and side-scan sonar.

For observation of the uppermost zone of soft sediments, profiles were run with deep-towed boomer. Analog sparker was run on alternate lines to the boomer to observe the upper 40 m of seabed.

To observe geological horizons down to a depth of 1000 m below seabed, high energy sparker with multi-channel digital recording was utilised.

Conclusion

The seabed dips gently towards the NNE in the 31/2-8 survey area, water depths increasing from 343 m ML in the south-west to 349 m ML in the north-east. At the centre of the survey area the water depth is 345 m ML.

Although the general seabed topography is relatively smooth, local variations are caused by the occurrence of pockmarks. These are evenly distributed across the site and are normally between 1 m and 3 m in depth. The lengths of the larger pockmarks vary between 10 m and 40 m, with elongation in a north-west/south-east direction. There are on average 7 pockmarks, of more than 10 m length, per square kilometre in the survey area.

The soft silty clay composing the top 15 m to 30 m of seabed should be noted when anchoring a floating structure, but it is not expected to present any special problems. No obstructions or debris can be seen on the sonar data in the 31/2-8 survey area.

The erosional unconformity that lies between 480 m and 520 m MSL at the centre of the area may be overlain by sand and gravel thinning in easterly direction towards a pinchout, whose trace runs roughly in a north-south direction. The possibility of encountering pockets of gas at this depth exists, but is considered less to the east than to the west of the pinchout.

It should be noted that the centre of the survey area lies to the west of the pinchout.

At 1100 to 1200 milliseconds two-way time, 900 m to 1020 m ML, anomalous seismic reflections suggest the presence of gas accumulations several hundred metres above the anticipated payzone.

I.5 GEOLOGICAL SAMPLES

Ditch Cuttings

Cutting samples were collected every 10 m from 490 m to 1400 m. In the interval 1400 m to 3375 m (TD) samples were taken every 3 m.

The cuttings were taken and described by the geologists of the mudlogging contractor Geoservices under supervision of Shell wellsite geologists.

For a detailed description of the cutting samples see the Geoservices Master Log and the Shell geologists' Cuttings Log.

Cores

In order to properly evaluate the Upper Jurassic objective coring started just below the top of the reservoir (1836.5 m).

As oil shows were encountered, coring continued until the shows had terminated, which was achieved by cutting three cores:

Core no. 1:	1841.8 - 1851.5 m	recovery	100 %
Core no. 2:	1851.5 - 1869.7 m	recovery	95 %
Core no. 3:	1870.0 - 1888.5 m	recovery	102 %

Top core 3 is depth adjusted.

In order to cope with possibly unconsolidated sands as observed in the previous wells in block 31/2 the fibreglass sleeve coring technique was used. For details see core description sheets (encl. 3) and Master/Cuttings Logs.

<u>Sidewall Cores</u>

Sidewall cores were taken in the 17½", 12 1/4" and 8½" hole sections. A total of 180 samples were attempted, 168 of which were recovered.

A detailed description of the samples is given in enclosure 2.

I.6 HYDROCARBON INDICATIONS

Although well 31/2-8 is classified as a dry hole, several significant hydrocarbon indications were encountered particularly in the objective Sogn Formation. Also in the sequence above the Upper Jurassic reservoir sandstones minor hydrocarbon indications were noticed occasionally.

In the deeper section, however, no hydrocarbon shows were present (with the exception of one sidewall sample in the Statfjord Formation). The following is a brief description of the shows as encountered while drilling. They are also indicated on the completion log and described in detail on the cuttings and master logs, and in the sidewall sample and core descriptions respectively.

1) "Base Quaternary? unconformity"

From 520 - 530 m ditch gas readings of 8 - 10% were observed. The gas is obviously associated with the sand streaks on top of the "base Quaternary? unconformity".

2) Lower Tertiary

a) Between 1424 m and 1439 m (base Hordaland Group/Top Balder Formation) a limestone, which was, however, only present as traces in the cuttings gave a moderate to good milky white cut fluorescence. Ditch gas readings were only slightly increased above background.

b) At 1461.2 m (Balder Formation) a silty streak in a sidewall sample consisting of claystone gave good, yellow to white, direct fluorescence and a streaming cut with milky white fluorescence.

c) At 1631.6 m (Lista Formation) fluorescing, calcitic veins in a claystone sidewall sample gave a streaming cut with milky white fluorescence.

d) In cutting sample 1799 m a medium brown, hard, chalky dolomite, which was only present as traces, yielded a weak, milky white cut fluorescence.

3) Upper Cretaceous Shetland Group

When entering the porous chalk, the ditch gas reading jumped up from a background below 1% to 55% at 1811 m and decreased just as rapidly to below 1% after circulating bottoms up.

Below 1811 m, minor parts of the white, chalky limestone cuttings showed a light brown oil stain, yielding a slow cut with a weak to moderate, milky white cut fluorescence.

4. Upper Jurassic Sogn Formation

When entering into the Upper Jurassic reservoir sands (1836.5 m) ditch gas readings went up to more than 4% from a background lower than 1%. No oil shows were observed on the cutting samples.

On the cores taken, very good oil shows were observed in the coarser grained, clean sands between 1841.8 m and 1854.8 m. In the carbonate cemented band down to 1856.6 m, direct fluorescence became patchy.

In the deeper, very fine to fine, micaceous sands the quality of the shows deteriorated further until they disappeared completely around 1872 m.

At 1876.3 m, isolated, weak shows were seen. In the topmost, also very fine, micaceous interval, which had not been cored, two sidewall samples gave good shows.

For a detailed evaluation of the hydrocarbon bearing top interval of the Sogn Formation see chapters 1.7 and 1.8 (Petrophysical report/Production test) and encl. 5 (core evaluation panel).

5) Lower Jurassic Statfjord Formation

Below the Sogn Formation, only in one sidewall sample at 3050.5 m (at the top of the Statfjord Formation) were hydrocarbon indications encountered. The fine-grained sandstone showed a light yellow, moderate to good direct fluorescence, which was, however, patchy and dispersed only. The cut was slow with a milky white, weak to moderate fluorescence.

I.7 PETROPHYSICAL REPORT

General

A petrophysical evaluation was made from the top of the Jurassic sands at 1836.5 m downwards. Above this depth, no petrophysically interesting zones were encountered. This interpretation is based on a suite of Schlumberger logs, a listing of which is given in Table I.7.1.

The Jurassic sands are interpreted to be oil bearing from 1836.5 m to ca. 1868 m; below this depth no hydrocarbons are encountered.

The formation consists of sandstones with some tight calcareous streaks. The sandstones consist of clean and micaceous intervals.

The micaceous material has a clear effect on both the GR and the FDC/CNL.

The GR increases from the "clean" sandstone level at 30 API to any value up to ca. 80 API.

As in general it is thought that the the CNL is more affected by mica than the FDC, only the latter is used for porosity determination.

Two different matrix parameters are used: 2.65 g/cc for "clean" intervals (being intervals with a GR reading less than or equal to 55 API) and 2.67 g/cc for "dirty" or micaceous intervals (being intervals with a GR exceeding 55 API).

A water density of 1.02 g/cc is used.

The FDC is corrected for hydrocarbons in the oil bearing interval.

The correction is based on the hydrocarbon saturation in the invaded zone as derived from the Micro Spherically Focussed Log (MSFL).

An oil density of 0.8 g/cc is used, together with a mudfiltrate resistivity of 0.092 Ohm.m (at 191^{o} F (88.3^{o}C), salinity 21500 ppm NaCl).

The hydrocarbon saturations are calculated with the Archie formula from the true resistivity as derived from the Dual Laterolog (DLL) and MSFL using a formation water resistivity Rw=0.05 Ohm.m, m = 1.95, n = 2, and a = 1.

The hydrocarbon saturations calculated are below 50%.

The obtained values are reasonably reliable in the clean sand from 1842 m to 1853 m, but less reliable below, where the sand is very micaceous.

Averages over porosity-saturation-classes are specified below.

Class	Cut-offs	Gas/ Oil	net (m)	av.porosity (%)	av.hydrocarbon saturation (%)
0	ø < 18%	Oil	21.7	15	9
I	ø < 24% or S_H < 50% excl. 0	Oil	18.3	26	25
II	ø < 32% or S_H < 90% excl. I	Oil	0	-	-
III	ø > 32% or S_H > 90%	Oil	0	-	-

Overview of Schlumberger Logging Operations on Well 31/2-8

Casing depth (m)	Drilling depth (m)	Bit size (inch)	Log	Run no.	Interval (m)	Date
469.5	840	17-1/2	ISF/BHC/GR	1	370.5-833	20.06.82
			FDC/CNL/GR/CAL	1	469-834	
826	1745	17-1/2	ISF/BHC/GR	2	775-1741.5	04.07.82
			FDC/CNL/GR/CAL	2	777-1742.5	
			CST	1	1577-1601	(29 cores)
1734	2743	12-1/4	ISF/BHC/GR	3	1735.5-2738.5	19.07.82
			FDC/CNL/GR/CAL	3	1735-2740.5	
			DLL/MSFL/CAL	1	1735-2729	
			LDT/NGT	1	1735-2729	
			CST	2	1751-2725	(88 cores)
			HDT	1	1735-2740.5	
			RFT	1-3	20 pressures,6 samples/ attempts	
			CBL/VDL	1	469-1735	
			CBL/VDL	2	792-2725	
2732	3375	8-1/2	ISF/BHC/GR	4	2732-3378.5	03.08.82
			FDC/CNL/GR	4	2732-3379.5	
			LDT/CNL/NGT	2	2732-3379	
			CST	3	2732-3373.9	(51 cores)
			HDT	2	2732-3379.5	
			RFT	4	13 pressures	
			WST	1	575-3370	(74 levels)

List of Abbreviations:

BGT: borehole geometry tool
BHC: borehole compensated sonic
CAL: caliper
CNL: compensated neutron log
CST: chronological sample taker
DLL: dual laterolog
FDC: formation density compensated
GR: gamma ray
HDT: high resolution dipmeter tool
ISF: induction spherically focused
LDT: litho density tool
MSFL: micro spherically focused log
NGT: natural gammaray spectroscopy tool
RFT: repeat formation tester
VDL: variable density log
WST: well seismic tool (well shoot)

TABLE I.7.1

I.8 PRODUCTION TESTS

Wireline Formation Tests

Between the top of the potential reservoir sand at 1836.5 m BDF and TD at 3375 m BDF four runs were made with the Schlumberger Repeat Formation Tester (RFT) at two different stages during the drilling of the well. The tool was equipped with the high resolution Hewlett Packard (HP) crystal gauge.

The first three RFT runs were made in the 12-1/4" hole between the 13-3/8" casing shoe at 1734 m BDF and the 12 1/4" TD at 2743 m BDT. Fifteen pressure readings covering the interval from 1845 to 2702 m BDF were obtained in run no. 1. The readings indicated a water gradient of 0.447 psi/ft for the whole interval (see Fig. I.8.1). In the same run several unsuccessful attempts (due to plugging) were made to obtain a fluid sample from the clean sand interval between 1842.5 and 1855 m BDF. The presence of an oil saturation in this interval had been evidenced by bleeding cores and electric logs indicating a low hydrocarbon saturation. Additional sampling attempts from the same interval were made in run no. 2. Severe plugging and malfunction of the HP gauge were experienced at three points within the interval and the tool was moved down to 1884.5 m BDF. At this point some flow into the sampling chambers was obtained, but the HP gauge still malfunctioned. At surface the sampling chambers were each found to contain about 2 litres of mud filtrate. The tool was redressed and rerun in a last attempt to obtain a sample from the potentially hydrocarbon bearing interval. The upper sample chamber was opened at 1849 m. Flow pressures of 20-25 psi were noted. Some 1800 cc mud contaminated formation water and 100 cc of emulsified hydrocarbons were obtained at surface.

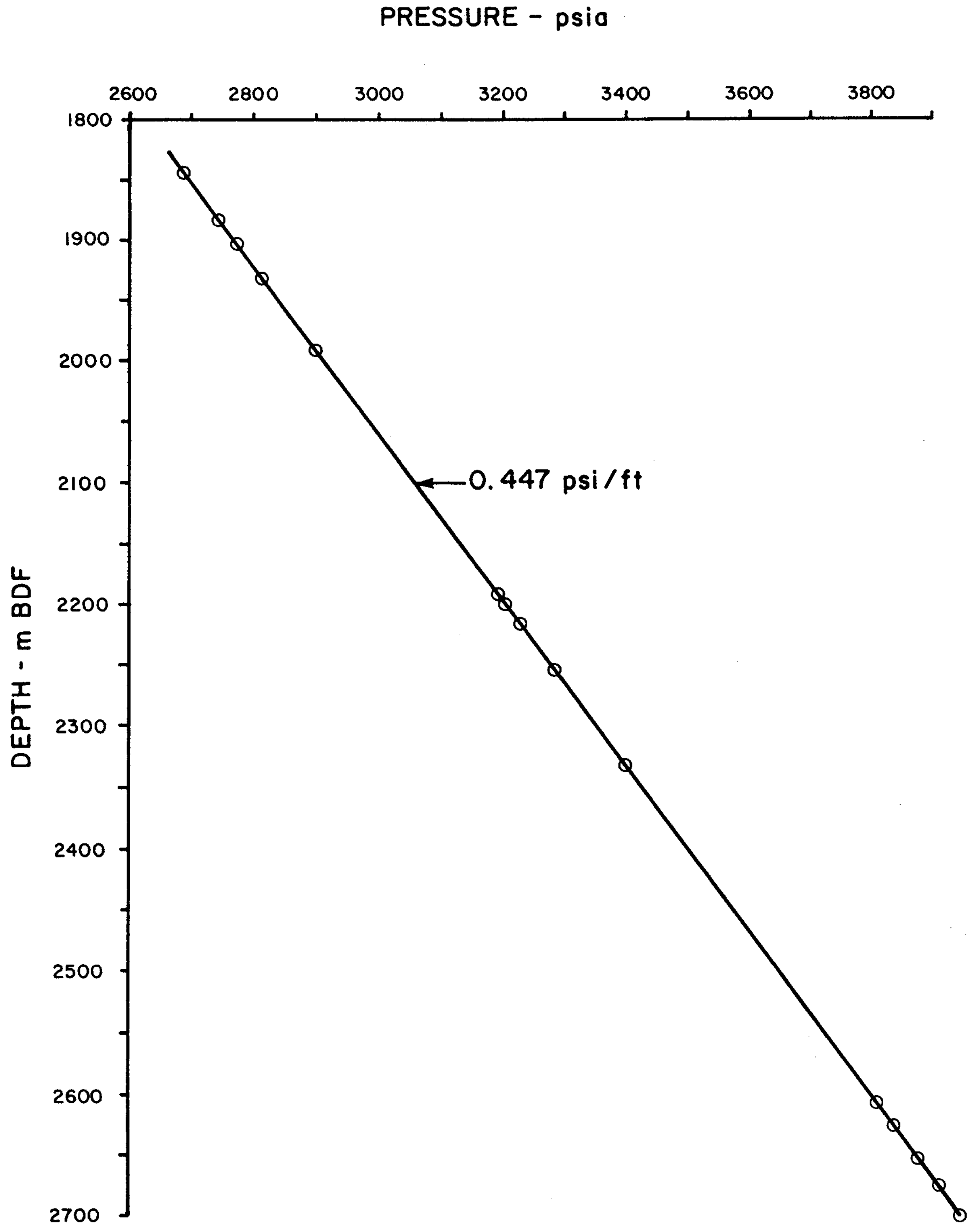
RFT run no. 4 was a pretest run made below the 9-5/8" shoe. With 11 new pressure points it extended the pressure gradient down to 3344 m BDF confirming a very thick aquifer (see Fig. I.8.2).

Drill Stem Test

Bleeding cores and the interpretation of electric logs had indicated the presence of an oil saturation (possibly only residual oil) in the clean sand interval from 1842.5 to 1855 m BDF. Unsuccessful attempts to recover a fluid sample from this interval still left uncertainty as to whether the oil was producible. It was, therefore, decided to drill stem test the interval 1843 - 1848 m BDF. The mechanical aspects of this test are discussed in the "Drilling History" section.

About 33 barrels of formation water with a trace of oil were recovered in the test. Analyses indicate that some of this water was polluted with brine. However, trustworthy samples were recovered from the drill collars. Table I.8.1 shows an analysis of this water.

The formation pressure indicated by the 31/2-8 DST is in agreement with the RFT results.

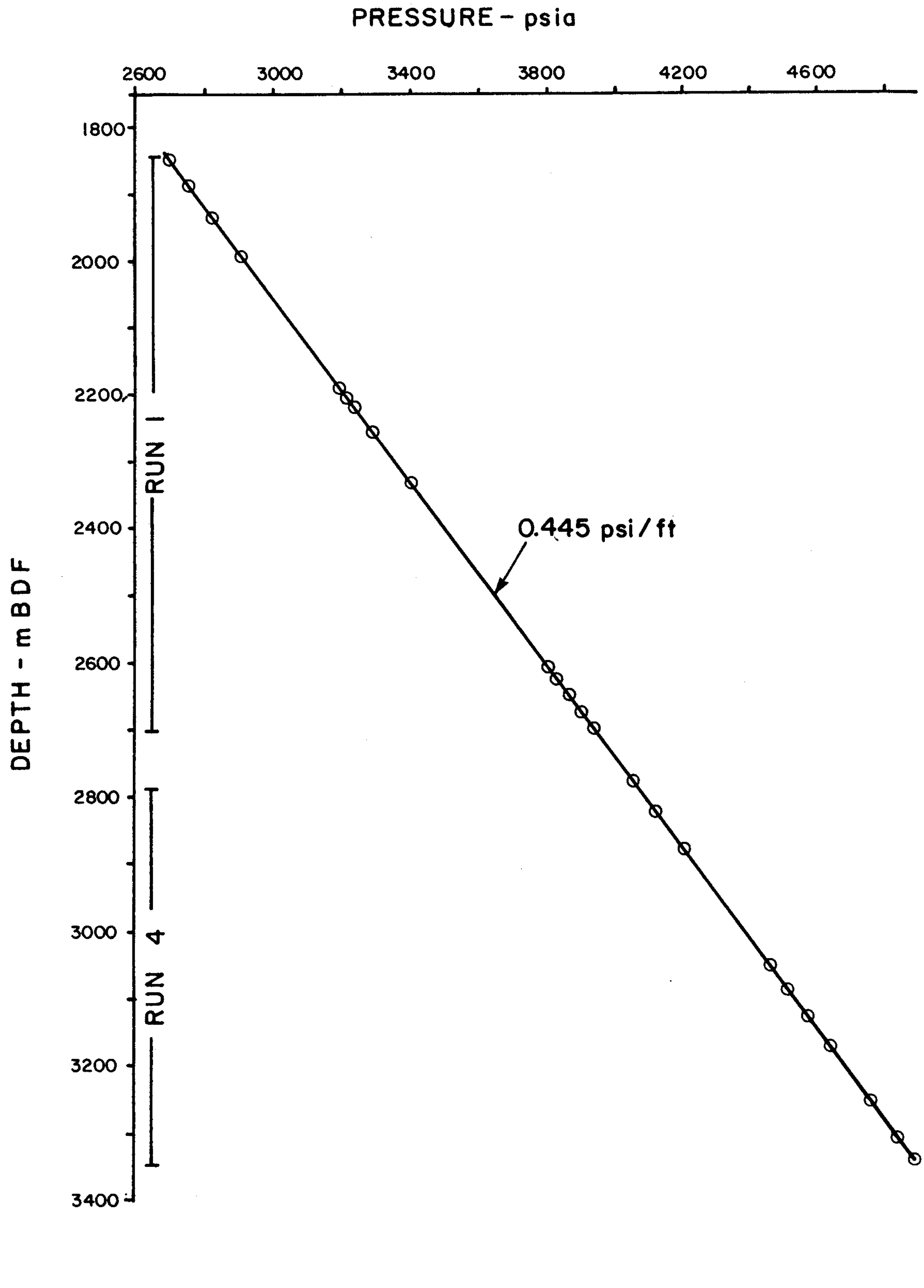


a-s Norske Shell
EXPLORATION & PRODUCTION FORUS

WELL RESUME 31/2-8
RFT PRESSURES
VERSUS DEPTH (RUN I)

AUTHOR EPPP/21	FIG	DATE JAN '83
REPORT NO NSEP 165	I 8.1	DRAW NO G 1539/5

JM '83



a·s Norske Shell
EXPLORATION & PRODUCTION FORUS

WELL RESUMÉ 31/2-8
RFT PRESSURES VERSUS-DEPTH
COMPOSITE OF RFT RUNS 1 & 4

AUTHOR EPPP/21	FIG	DATE JAN '83
REPORT NO NSEP165	I 8.2	DRAW NO 8.1539/6

JM '83

LABORATORY

FORMATION WATER ANALYSIS

Company A/S Norske Shell Date 26.08.82 SAmple no. 1; DST 2

Well 31/2-8 Field State

Sampled from Drilling collar

Date sampled 12.08.82 Date analyzed 24.08.82 Analyst TS

Total Dissolved Solids 49.520 mg/L Specific Gravity 1.034 (a 68 °F

Resistivity 0.158 ohm-meters (a 68 °F ph 7.05 (a 68 °F

*Constituens	mg/L	meq/L	Constituents	mg/L	meq/L
Sodium	16.600	723	Chloride	29.780	840
Calcium	1.870	93	Bicarbonate	615	10
Magnesium	320	26	Sulfate	0	
Strontium	295	7	Carbonate	0	
Barium	23		Hydroxide	0	
Iron	20	1	Phosfate	-	

REMARKS:

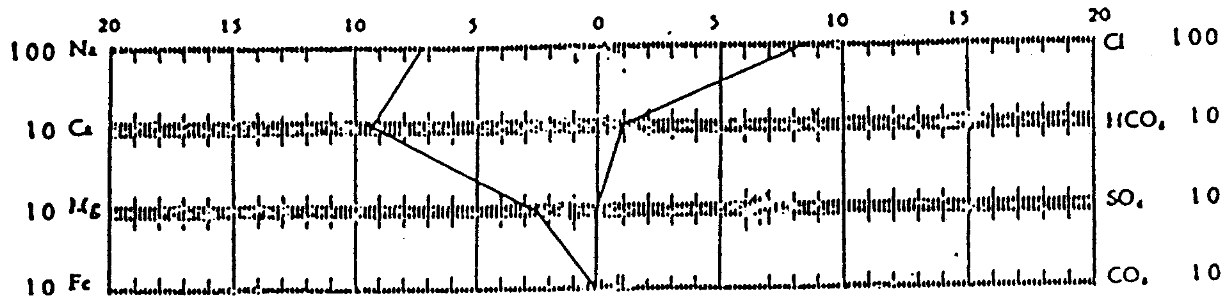


TABLE I.8.1

PART II

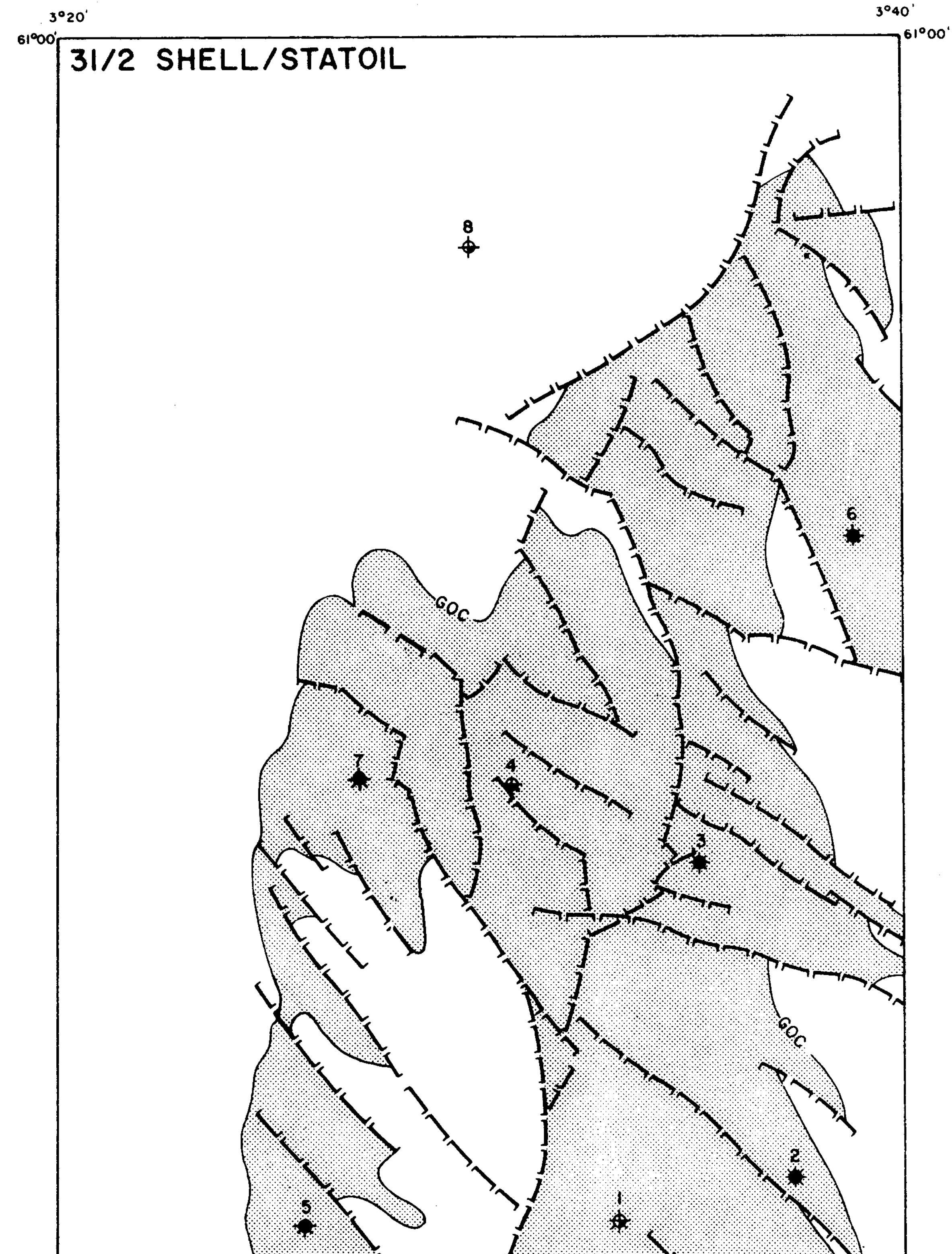
GEOLOGICAL REPORT

II.1 Introduction

Well 31/2-8 was located in the northern part of block 31/2, some 3 km NW of the Troll Field boundary, to test a downthrown Jurassic fault-block outside the Troll Field.

The primary objective was the Upper Jurassic, shallow marine sands of the Humber Group (especially the Sogn Formation).

The Lower Jurassic was a secondary objective and would be evaluated by drilling into Triassic sediments. This would also satisfy NPD's request for the last commitment well of licence 054 to be drilled as a complete Jurassic test outside the established Troll Field.



EXTENT OF GAS RESERVOIR

a·s Norske Shell
EXPLORATION & PRODUCTION FORUS

31/2-8 WELL RESUMÉ
WELL LOCATION MAP

AUTHOR EPXV/2	FIG	DATE NOV 1982	
REPORT NO NSEP165	II.1	DRAW NO G.1539/7	

25/8'82 JM

II.2 STRATIGRAPHY

The sedimentary sequence penetrated by well 31/2-8 is subdivided into lithostratigraphic groups, formations and members, which are defined in the regional geological framework of the area as far as established.

In the following, a brief lithological description of the different intervals will be given.

Table II.2.1 gives the formation tops, while table II.2.2 shows the biostratigraphic subdivision. The information is also displayed on the well summary sheet and in greater detail on the completion log (enclosures 1 and 6).

Lithology:

a) Nordland Group 370.5 (SF) - 528 m

From seafloor (370.5 m) to 485 m the hole was drilled with returns to seabed. The only log run in this interval is a gamma-ray through the casing, which is not particularly useful for determining detailed lithological variations.

From 485 m to 528 m a lightgrey, very hygroturgid, soft clay is encountered, which is variably sandy, slightly silty, carbonaceous and calcareous. Towards the base ("base Quaternary? unconformity") it is interbedded with loose, medium to coarse sand, and some streaks of soft, white, chalky limestone.

b) Hordaland Group

1) "Miocene" 528 m - 771.5 m

This section is monotonously composed of the same light-grey, soft clay, which is seen in the Nordland Group above. Occasionally traces of shell fragments are observed. Only rarely do stringers of sand occur.

2) "Oligocene" 771.5 m - 1191 m

Also below the "base Miocene unconformity" the lithology is mainly made up of clay, which is, however, slightly different from the one above.

Its colour is brownish grey. It is slightly better consolidated, more silty and slightly glauconitic and micaceous, however, hardly carbonaceous nor calcareous any more.

The interval is subdivided into two parts by the "Mid-Oligocene unconformity" at 1022.5 m.

The upper part is similarly monotonous as the Miocene. Stringers of redbrown, hard limestone or dolomite are scarce. The only remarkable feature is the scattered occurrence of crystalline pebbles, particularly between about 840 and 890 m.

The lower part stands out by a very sandy top interval with a strikingly high glauconite content. Deeper down an increase in carbonate content (both calcitic and dolomitic) is observed. Towards the base of the Oligocene the silt percentage increases until the claystone grades into siltstone over the last ten metres.

3) "Eocene" (1191 m - 1428 m)

The "Top Eocene unconformity" is a very pronounced lithological boundary, although there are claystones below and above. The Eocene claystones are moderately hard and not swelling. Very characteristic is their light bluegreen colour and waxy appearance - above all in the upper part. The top few metres are also characterized by a partly orange-brown colouration.

Stringers of carbonate cemented, fine-grained sandstone occur down to about 1300 m, as well as rare dolomite streaks.

From this depth, the claystones have again a more greyish colour and considerable carbonate and silt contents.

Around 1400 m a redbrown, and lightpurple to pink colouration is present. Towards the base limestone stringers occur.

c) Rogaland Group

1) Balder Formation (1428 - 1471.5 m)

Although being very pronounced on logs, the Balder Formation in this well does not show any specific lithological features apart from perhaps more frequent limestone stringers and an occasional brownish green colouration.

The Balder Formation and also the lower part of the overlying interval are supposed to contain volcanic tuff, which could, however, not be recognized in the samples. Possibly the abnormal colourations around 1400 m and in the Balder Formation might be caused by altered volcanics. There have, however, no special analyses been carried out to confirm this assumption.

2) Sele Formation (1471.5 - 1500 m)

The Sele Formation can be distinguished from the underlying Lista Formation only by ambiguous differences in log character. Lithologically, it consists of non-calcareous claystones similar to the ones above and below.

3) Lista Formation (1500 - 1808 m)

The main lithology of the Lista Formation is grey, silty claystone which does not show any striking differences to the overlying claystone.

At the top it is non-calcareous, but it becomes significantly calcareous further down, occasionally, and especially towards to base of the formation, grading into marl.

Additionally, streaks of different kinds of limestone are very frequent, much more than in the overlying formations and can reach thicknesses of several metres.

A special feature around 1600 m is the occurrence of sand streaks of different grain-sizes, which are occasionally carbonate cemented.

d) Shetland Group (Maureen Fm?) (1808 - 1821 m)

Only 13 m of probable Paleocene chalk on top of the Kimmerian unconformity were penetrated by well 31/2-8. The predominant lithology is white, soft, chalky limestone, which contains abundant planktonic foraminifera. Occasionally glauconite is observed. As is shown by the resistivity log these chalky limestones have a considerable porosity, which in this well was partly gas charged. (Ditch gas readings were up to 55%). Subordinate streaks of marl and dark grey, argillaceous limestone are present.

At the base, calcareous sandstone is present in one sidewall sample.

e) Humber Group

1) Kimmeridge Clay Formation (1821 - 1836.5 m)

Below the Kimmerian unconformity, 15.5 m of Kimmeridge Claystone is preserved. It shows the characteristic dark-grey to brown and black colour of this formation. Occasionally it is calcareous. Traces of coal have also been observed.

2) Sogn Formation (1836.5 - 1968 m)

Two basic types of sandstone make up the Sogn Formation. Predominant is a lightgrey, friable sandstone with grain-sizes ranging from medium to coarse sand.

The other is a medium to dark grey, hard, very fine to fine sandstone, which is characterized by considerable contents of mica and carbonaceous material.

Both types can have calcareously cemented stringers, so-called doggers. Subordinate shale streaks occur.

3) Middle Heather Formation (1968 - 2189 m)

This formation is a rather monotonous sequence of brownish-grey, argillaceous siltstone to very fine sandstone. Similar to the fine-grained sandstones of the Sogn Formation it is carbonaceous and micaceous, and also pyritic. Thin stringers of coarser sandstone occur.

Doggers are frequent. Streaks of soft, chalky limestone are observed as well.

4) Fens Formation (1280 - 2265.5 m)

The Fens Formation is characterized by an alternation of siltstone to very fine sandstone as described above and coarser sandstones.

Also here doggers and limestone streaks are present. A striking feature is the occurrence of hard tuff layers.

5) Lower Heather Formation (2265.5 - 2516.5 m)

The Lower Heather Formation is as the Middle Heather Formation a monotonous sequence of argillaceous, micaceous, pyritic, and carbonaceous siltstone to very fine sandstone.

Its colour is, however, more greyish. Doggers and limestone streaks occur also in this formation, which is slightly calcareous throughout and occasionally even marly. Stringers of coarser sands are very scarce. Worth mentioning is also the occurrence of traces of medium brown, chalky dolomite, of limonite, siliceous fragments, and coal in the upper part.

f) Brent Group

An attempt was made to subdivide the Brent Group into formation equivalents. Three are thought to be recognizable.

1) Tarbert Formation Equivalent (2516.5 - 2568.5 m)

Lithologically this interval is not significantly different from the micaceous siltstones to very fine sandstones of the overlying Lower Heather Formation. Only the colour changes slightly into light grey to yellow. Streaks of coarser sandstone, limestone and marl are, however, more frequent. In the lower part, traces of coal, which also are observed throughout the Humber Group, reach significant amounts.

2) Ness Formation Equivalent (2568.5 - 2675 m)

This interval is dominated by silty claystones with a pale grey to dark brown colour. The most characteristic feature, however, is the frequent and occasionally rather thick (up to 4 m) coal seams. Subordinate streaks of carbonaceous shale occur. Coarse sandstones occur as well, particularly in the lower part, where also the claystones can have a considerable sand content.

3) Etive Formation Equivalent (2675 - 2719.5 m)

The Etive Formation Equivalent represents a single, 45 m thick body of coarse sandstone with carbonate cemented streaks and minor streaks of siltstone, claystone and shale.

g) Dunlin Group

1) Drake Formation (2719.5 - 2824.5 m)

The Drake Formation consists mainly of grey to brown claystones, which are silty and slightly sandy and, except for the top part, only slightly consolidated and hygroturgid.

Streaks and interbeds (up to 15 m thick) of medium to coarse sand are present as well.

Both sandstones and claystones contain carbonate cemented stringers.

2) Cook Formation (2824.5 - 2895.5 m)

The Cook Formation is a thick sequence of fine to coarse sandstones. They are micaceous and argillaceous and frequently carbonate cemented. They are also the first sandstones, which have a considerable kaolinite content, a feature which is characteristic also for all the stratigraphically deeper sandstones. Streaks of dark grey to black, non calcareous, carbonaceous shale occur. Between 2870 and 2875 m, a striking bed of this shale is present.

3) Upper Amundsen Formation (2895.5 - 2966.5 m)

The Upper Amundsen Formation consists of grey, silty, and slightly sandy clays to claystones, which are often marly.

Streaks of shale and carbonate cemented sandstone occur infrequently.

4) Johansen Formation (2966.5 - 3034.5 m)

The Johansen Formation comprises a whole range of kaolinitic sandstones of different grain size classes and variable clay and mica contents. In places, they grade into claystone and/or marl. Carbonate cemented stringers are frequent.

Streaks of coal and shale occur occasionally.

5) Lower Amundsen Formation (3034.5 - 3047.5 m)

Log correlation suggests the presence of this formation. In the cuttings, however, there is no indication of a significantly thick claystone between the Johansen and Statfjord formations. Sidewall samples shot in this interval are very argillaceous, very fine-grained, micaceous sandstones, which could just as well belong to the Johansen Formation.

h) New Red Group

1) Statfjord Formation (3047.5 - 3274 m)

An attempt was made to subdivide the Statfjord Formation into its three members.

1a) Nansen Member (3047.5 - 3063 m)

The medium to coarse grained sandstone unit between the "Statfjord coals" and the Dunlin Group has tentatively been called Nansen member although its development is not particularly characteristic.

1b) Eiriksson Member (3063 - 3143 m)

The top of the Eiriksson Member is marked by about 5 m of "Statfjord coals". Two facts are worth mentioning in connection with these coals in well 31/2-8. Firstly they are not true coals but rather carbonaceous shales with coal streaks and characteristic ferruginous "seat earths". Secondly palynological analyses indicate a late Pliensbachian/ earliest Toarcian age for them, whereas generally they are supposed to be of Hettangian age.

The rest and main part of the Eiriksson Member represents a thick sequence of kaolinitic sandstone which is mainly medium to coarse grained. Occasionally it is carbonate cemented. Minor streaks of coal, claystone and shale are also present.

1c) Raude Member (3143 - 3274 m)

Palynological analyses indicate that probably the lowermost Jurassic is missing in this well. Tentatively this gap has been assigned to the top of the Raude Member.

The Raude Member represents an alternation of sandstones and silty claystones. In the upper part the claystones are characteristically grey and red variegated. In the lower part they are just grey again and sandy. Occasionally they are shaly.

Streaks of limestone and traces of limonite and silicified wood occur.

The sandstones are kaolinitic, and can be argillaceous and micaceous. Carbonate cemented streaks occur.

2) Cormorant Formation (3274 - 3380.5 m (TD))

The top of the Cormorant Formation is characterised by an almost 40 m thick, redbrown, calcareous, silty and sandy shale with streaks of white limestone.

Below it is an alternation of multicoloured shales and kaolinitic and calcareous sandstones similar to the Raude Member of the Statfjord Formation.

Well 31/2

Formation Tops (m BDF):

Nordland Group (Sea Floor)	370.5	m
Hordaland Group ("Base Quaternary? unconformity")	528	m
"Base Miocene unconformity"	771.5	m
"Mid-Oligocene unconformity"	1022.5	m
"Top Eocene? unconformity"	1191	m
Rogaland Group		
Balder Formation	1428	m
Sele Formation (Top Paleocene")	1471.5	m
Lista Formation	1500	m
Shetland Group (Maureen Fm?)	1808	m
Humber Group		
Kimmeridge Clay Formation ("Kimmerian unconf.")	1821	m
Sogn Formation	1836.5	m
Middle Heather Formation	1968	m
Fens Formation	2189	m
Lower Heather Formation	2265.5	m
Brent Group		
Tarbert Fm. Equiv.	2516.5	m
Ness Fm. Equiv.	2568.5	m
Etive Fm. Equiv.	2675	m
Dunlin Group		
Drake Formation	2719.5	m
Cook Formation	2824.5	m
Upper Amundsen Formation	2895.5	m
Johansen Formation	2966.5	m
Lower Amundsen Formation?	3034.5	m
New Red Group		
Statfjord Formation		
Nansen Member?	3047.5	m
Eiriksson Member	3063	m?
Raude Member	3143	m
Cormorant Formation	3274	m
T.D.	3375	m

TABLE II.2.1

Well 31/2-8

Biostratigraphy: (acc. SIPM, EP 12.1)

(490 m, drd)	-	770 m, drd	:	Miocene
780 m, drd	-	1174.1 m, lgd	:	Oligocene
1214.8 m, lgd	-	1432.4 m, lgd	:	Eocene
1589 m, drd	-	1807.6 m, lgd	:	Paleocene
1808 m, drd	-	1816 m, lgd	:	?Paleocene
1821.7 m, lgd	-	1830.5 m, lgd	:	Early Kimmeridgian-Early Portlandian (probably late Early Kimmeridgian)
1837.2 m, lgd	-	1937.5 m, lgd	:	late Late Oxfordian-Early Kimmeridgian (probably early Early Kimmeridgian)
1964.5 m, lgd	-	2068.5 m, lgd	:	late Late Oxfordian
2082.6 m, lgd	-	2107.5 m, lgd	:	early late Oxfordian
2120.0 m, lgd	-	2145.2 m, lgd	:	Early Oxfordian
2160.5 m, lgd	-	2285.2 m, lgd	:	Middle-Late Callovian
2314.5 m, lgd	-	2368.0 m, lgd	:	Early-Middle Callovian
2385.8 m, lgd	-	2407.1 m, lgd	:	Late Bathonian-Early Callovian
2473.5 m, lgd	-	2497.0 m, lgd	:	Middle Bathonian
2516.0 m, lgd	-	2532.5 m, lgd	:	Early Bathonian
2548.0 m, lgd	-	2665.5 m, lgd	:	?Bajocian
2672.5 m, lgd	-	2687.0 m, lgd	:	Aalenian-Bajocian
2709.3 m, lgd	-	2792.3 m, lgd	:	Middle Toarcian
2815.0 m, lgd	-	3065.8 m, lgd	:	Late Pliensbachian-Early Toarcian (probably late Pliensbachian)
3100.4 m, lgd			:	?Late Hettangian or younger
3169.8 m, lgd	-	3228.0 m, lgd	:	Rhaetian

TABLE II.2.2

II.3 SEISMOSTRATIGRAPHY

Velocity Survey

A velocity survey was carried out by Schlumberger. Data was recorded at 68 intervals in the depth range 475 - 3380 m, with 6 additional duplicate shots to ensure internal consistency within the run.

Interference of the casing caused high frequency interference at 475, 715, 875 and 1025 m. The check shot arrival times were repicked at these levels. Data recorded at 610 m and 774 m was discarded because high levels of casing noise made the arrival time picks unreliable.

For further information see the Schlumberger reports on seismic calibration log and synthetic seismogram.

Stratigraphic Identification of Reflections

The stratigraphic tie to the reflection section is given in enclosure 4. A summary of the Two Way Travel Times (datum MSL) and formation tops (datum DF) is given below.

	Depth (m)	TWTT (m-sec)
Top Hordaland Group	528	637.5
Base Miocene Unconformity	771.5	862
Middle Oligocene Unconformity	1022.5	1120.5
Top Eocene Unconformity	1191	1282.5
Top Balder Formation	1428	1517
Top Sele Formation	1471.5	1554
Top Lista Formation	1500	1581
Top Maureen Formation	1808	1824.5
Top Kimmeridge Clay Formation	1821	1834
Top Sogn Formation	1836.5	1844
Top Middle Heather Formation	1968	1925
Top Fens Formation	2189	2061
Top Lower Heather Formation	2265.5	2105

	Depth (m)	TWTT (m-sec)
Top Brent Group	2516.5	2248.5
Top Drake Formation	2719.5	2365
Top Cook Formation	2824.5	2421.5
Top Statfjord Formation	3047.5	2537
Top Cormorant Formation	3274	2655.5

II.4 RESERVOIR CONDITIONS

Well 31/2-8 encountered a thick sequence of Humber Group sandstones (680 m). Approximately 49 m of core was taken. A summary of core porosity, permeability and grain density measurements is given below. For a graphical presentation see encl. 5 (core evaluation panel).

Average coredata

31/2-8 — Humber group, Core 1-3

INTERVAL meter	type	minimum	average	maximum	Remarks
1842.1-1882.0					
	Porosity	7.60	21.63	33.00	
	Hor.perm.	.16	461.30	3293.00	
	Graindens.	2.59	2.66	2.85	
	Vert.perm.	.08	385.40	2950.00	
1882.0-1888.7					
	Porosity	12.60	24.35	35.20	
	Hor.perm.	.24	1252.70	5242.00	
	Graindens.	2.62	2.68	2.74	
	Vert.perm.	.12	260.25	930.00	
1842.1-1888.7					
	Porosity	7.60	22.17	35.20	
	Hor.perm.	.16	599.19	5242.00	
	Graindens.	2.59	2.66	2.85	
	Vert.perm.	.08	374.73	2950.00	

II.5 GEOCHEMISTRY

Geochemical investigations of six core sample extracts and a crude oil sample have been carried out by Shell's Exploration and Production Research Laboratory in Holland (KSEPL).

Furthermore KSEPL have prepared a source rock evaluation report over the interval 1736 - 3375 m (T.D.), i.e.: Lower Tertiary - Triassic.

II.6 DIPMETER SURVEY

Normal HDT was run in well 31/2-8 from 1735.0 m to 2740.5 (Run 1) and from 2727.5 m to 3379.5 m (Run 2). Arrow plots from Schlumberger's cluster program indicates good quality of the data, and sedimentary dips can be picked up in Upper to Middle Jurassic strata.

The Dunlin Formation has an average dip of 4-6^{o} towards ENE.

In the Statfjord and Cormorant formations the arrow plots give some sedimentary dips.

II.7 CONCLUSIONS

Well 31/2-8 was plugged and abandoned as a dry hole the 18th August 1982, although an interval with very good oil shows in the Upper Jurassic Sogn Formation was encountered. The logs indicated an oil saturation of less than 50%, whilst porosities and permeabilities were excellent. A subsequent drill stem test yielded only water with traces of oil. This supports the conclusion that the oil encountered is not moveable but residual only.

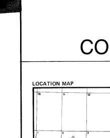
Though hydrocarbon shows have been encountered in various other stratigraphic intervals, they are considered of no significance.

31/2 WELL RESUMÉ ENCL: I NSEP 165

A/S Norske Shell, E & P

COMPLETION LOG WELL: 31/2-8

LOCATION MAP SCALE 1:1000 000



LICENCE	PL 054
FIELD	
COORDINATES	N 60° 57' 33.019" E 03° 29' 49.843"
SPUD DATE	16. 06. 1982
COMPLETION DATE	18. 08. 1982
RIG	BORGNY DOLPHIN
CONTRACTOR	DOLPHIN SERVICES A/S
K.B. ELEVATION	25 m
WATER DEPTH	345.5 m
T.D. (DRILLER)	3375 m
T.D. (LOGGER)	3380.5 m
T.D. FORMATION	TRIASSIC, CORMORANT FORMATION
STATUS	PLUGGED AND ABANDONED
CASING RECORD	30" at 469.5 m, 20" at 826 m, 13 3/8" at 1734 m, 9 5/8" at 2732 m

MUD LOGGING CONTRACTOR: GEOSERVICES

SHELL GEOLOGISTS: P. IMMERZ, O. NORVIK, K. ABRAHAMSEN

LITHOLOGY SYMBOLS

CLAY, CLAYSTONE, SHALE, SILT, SILTSTONE, SAND, SANDSTONE, LIGNITE/COAL, CARBONACEOUS, BITUMINOUS, GRAVEL/CONGLOMERATE, MARL, CHALK, LIMESTONE, DOLOMITE, SALT, GYPSUM, ANHYDRITE, TUFF, CHERT, FOSSIL FRAGS, GEN.

HYDROCARBON INDICATIONS

WEAK OIL SHOWS, STRONG OIL SHOWS, PROVED PRODUCTIVE, WEAK GAS SHOWS, STRONG GAS SHOWS, PROVED PRODUCTIVE

LOG AND RUN No.	DATE	MEASURED	BIT SIZE	BHT °C	MUD TYPE		API WT.	RESISTIVITY SCHLUMBERGER SURFACE	BHT	MUD FILTRATE RESISTIVITY	
[illegible]											

Description of Sidewall Cores

31/2-8

31/2-8
Exploration Well Resumé
Enclosure No. 2

A/S Norske Shell
Lic. 054

31/2-8 SWS

sample recovery summary:

1)	17½" hole:	840 - 1745 m
	attempted:	30 bullets
	recovered:	29 "
	misfire:	1 "
2)	12 1/4" hole:	1745 - 2743 m
	attempted:	90 bullets
	recovered:	88 bullets
	misfire:	1 "
	empty:	1 "
3)	8½" hole:	2743 - 3375 m
	attempted:	60 bullets
	recovered:	51 bullets
	misfire:	2 "
	empty:	1 "
	lost:	6 "

together:	attempted:	180	bullets
	recovered:	168	"
	misfire:	4	"
	empty:	2	"
	lost:	6	"

31/2-8 SWS

Depth (m)	Recovery (mm)	Lithology
856.0	52	CLST, GY-BRN, SLT, NON-SWELLING, CALC, SFT-MOD HD, MIC,(CARB), (GLC)
921.0	49	CLST, A.A., SLT, (HYGROTURGID), ((CALC)), (MIC), ((GLC))
1014.2	50	CLST, GY-GN, SLT, NON-SWELLING, NON-CALC, SFT, (MIC), GLC
1120.0	40	CLST, BRN, SLT, ((HYGROTURGID)) NON-CALC, SFT, (MIC), GLC, WITH A LENS OF: SLTST, GY, QRTZ, CALC, MOD HD, GLC
1174.1	55	CLST, DK GY/BRN, SLT, ((HYGROTURGID)), NON-CALC, MOD HD, MIC, GLC
1182.0	52	CLST, a.a., (GLC)
1196.6	52	CLST, GN, (SLT), (HYGROTURGID), NON-CALC, MOD HD, ((MMIC)), WAXY
1214.8	52	CLST, A.A.
1296.0	50	CLST, A.A.
1342.3	55	CLST, GY-GN, HYGROTURGID, (MMIC), ELSE A.A.
1384.6	55	CLST, GN, SLT, HYGROTURGID, ((CALC)), SFT, MIC, PY, GLC
1416.8	20	CLST/MRL, A.A, NON-SWELLING, CALC

31/2-8 SWS

Depth (m)	Recovery (mm)	Lithology
1432.4	55	CLST, DK GY, SLT, NON-SWELLING, NON-CALC, MOD HD, MIC (BIG FLAKES), CARB?
1461.2	32	CLST, GY-BRN, (SLT), NON-SWELLING, NON-CALC, MOD HD, MMIC, CARB; ONE OF THE SILTY, GY-GN, GLAUCONITIC LAMINAE IS FLUORESCING: DIR FLU: GOOD, YEL/WH, CUT: STREAMING, CUT FLU: MILKY WHITE
1467.5	42	CLST, DK GY/BRN, SLT, NON-SWELLING, NON-CALC, MOD HD, MMIC, LAM
1472.7	50	CLST, DK GY, (SLT), NON-SWELLING, NON-CALC, SFT-MOD HD, MMIC
1485.8	40	CLST, A.A., LAM (VERY THIN WH LAM)
1512.7	40	CLST, A.A.
1552.3	33	CLST, GY, SLT, NON-SWELLING, NON-CALC, MOD HD, MMIC, WITH THIN LAM OF: SLTST, GY, QRTZ (OCC ROSE QRTZ), (MIC)
1583.2	32	CLST, GY-GN, SLT, (S), NON-SWELLING, NON-CALC, SFT-MOD HD, PY, GLC, SMALL ELONGATED DK GRAINS
1585.6	MISFIRE	
1587.7	32	CLST, GY MOTTLED BRN/WH, SLT, NON-SWELLING, NON-CALC, SFT, PY, STICKY

31/2-8 SWS

Depth (m)	Recovery (mm)	Lithology
1593.0	32	2 LITHOLOGIES BOUND BY LAYER OF PY/GLC WITH BIG CALC NODULE: CLST, GY, SLT, NON-SWELLING, NON-CALC, MOD HD, PY MRL, DK GY, SLT, ARG, CALC
1605.5	53	CLST, OLV GY, SLT, (HYGROTURGID), NON-CALC, MOD HD, MMIC, PY (LARGE CONCRETIONS), WITH VERY HD, BLK/BRN, ANG, MM-CM-SIZE PEBBLES, CONCOIDAL FRACTURES
1622.2	48	CLST, GN-GY, (SLT), (HYGROTURGID), NON-CALC, MOD HD, MMIC, ((CARB)), PY, STICKY
1631.6	20	CLST, DK OLV-GY, SLT, NON-SWELLING, CMT, CALC, HD, MMIC, WITH WH/BRN CALCITIC VEINS FLUORESCING, 5-10% FLUORESC. DIR FLU: GOOD, YEL/WH, CUT: STREAMING, CUT FLU: MLKY WH
1660.0	42	CLST, DK OLV-GY, SLT, HYGROTURGID, NON-CALC, MOD HD, MMIC
1700.0	45	CLST, DK BRN, SLT, NON-SWELLING, ((CALC)), MOD HD, MMIC
1719.4	45	CLST, A.A.
1733.7	55	CLST, A.A., (CALC)-CALC
1751.3	45	CLST, MD/DKGY, (PLASTIC), CALC
1762.0	MISFIRE	

encl. 2

31/2-8 SWS

Depth (m)	Recovery (mm)	Lithology
1769.2	42	LST/MRL, MDGY, MOD HD, ARG
1781.5	37	LST/MRL, A.A.
1792.0	36	CLST, MD/DKGY, (PLASTIC), CALC
1795.2	37	LST/MRL, A.A.
1804.5	18	LST/MRL, A.A.
1807.6	32	LST/MRL, A.A.
1812.5	37	LST/CHK, W, LTGY/YEL-WH, MOD HD, MARLY, ABUNDANT PLANKTONIC FORAMS
1816.0	45	MRL, LT/MDGY, MD HD
1820.0	42	SST, MOD HD, QTZ, MSL, SRT, (ANG), (ELONG), CALC, INTERMIXED WITH GREY AND GREEN CLAY MATRIX, (GREEN: GLC??)
1821.7	24	CLST, DKGY/BRN, MOD HD, MIC, CRYPTOFISSILE, NON CALC
1826.0	29	CLST, A.A., MM-SLT-STRKS
1830.5	26	CLST, A.A.
1832.8	27	CLST, A.A.
1836.0	30	CLST, A.A.

31/2-8 SWS

Depth (m)	Recovery (mm)	Lithology
1837.2	45	SST, MDGY/BRN, (GLC), MIC, ARG, SLT, FSU, FRI-MOD HD, DIR FLU: WH/LTYEL, CUT: STREAMING, CUT FLU: MLKY/WH, MOD
1839.5	37	SST , MD GY/BRN, GLC, MIC, ARG, SLT, FSU, FRI-MOD HD, NON CALC, SWELLING IN ACID DIR FLU: WH/LTYEL, CUT: STREAMING, CUT FLU: MLKY WH, MOD
1843.8	46	SST, WH/LTGY, MSL-CRSSU, SRT-(SRT), SFT-FRI, ((CALC), DIR FLU: WH/LTYEL, CUT: STREAMING, CUT FLU: MLKY/WH, GOOD
1893.2	37	SST, LTGY, MIC, PYR, FSL-FSU, FRI, NON CALC
1897.2	47	SST, WH-LTGY, FRI, CARB, PYR, (SID), (MIC), CALC, SRT, PORES PARTLY FILLED BY KAOLINITE
1904.0	40	SST, MSL-MSU, SRT, (OCC CRS GRNS), ELSE A.A.
1913.5	43	SST, MSL-MSU, SRT, FRI, (CALC), ELSE A.A.
1924.6	36	SST, (CALC), FSL-CRSSL, (SRT), ELSE A.A.
1932.0	40	SST, FSL-MSL, ELSE A.A.
1934.0	42	SST, A.A.

encl. 2

31/2-8 SWS

Depth (m)	Recovery (mm)	Lithology
1937.5	34	SST, MOD HD, MDGY, MIC, CARB, ARG, FSL-(FSU), (SID), HYGROCLASTIC
1941.5	29	SST, A.A.
1955.0	55	SST, SFT-FRI, LTGY, MSL-CRSSU, SRT- SRT, (MIC), (CALC), (ARG)
1964.5	42	SST, MDGY, FSL, POORLY SRT, FSL-CRSSU, (RND), (SPH), MIC, CARB, ARG, (CALC), HYGOTURGID
1965.5	42	SST, MDGY, FSL, MIC, ARG, CALC, HYGROTURGID
1969.8	48	SST, LT/MDGY, SLT, FOSS FRGM, (CALC), (FSL-FSU), CARB, MIC, ARG, HYGROTURGID
1979.7	35	SST, A.A., CALC, GRADING INTO SLTST
1989.5	43	SST, A.A. CARB, CLAY PEBBLES + CRS QRTZ GRNS
2003.0	39	SST, LT/MDGY, ARG, SLT, FOSS FRGM, MIC, CARB, HYGROTURGID, (CALC), (FSL-FSU)
2015.5	40	SLTST, MDGY/BRN, MOD HD, MIC, ARG, (CALC), (LAMINATED SANDFILLED GEOPETAL STRUCTURES)
2032.0	34	SLTST, A.A.
2043.5	38	SLTST, A.A.
2055.0	37	SLTST, A.A.
2068.5	37	SLTST, A.A., SWELLING IN ACID

31/2-8 SWS

Depth (m)	Recovery (mm)	Lithology
2082.6	33	SLTST, A.A., SWELLING IN ACID
2093.0	39	SLTST, MDGY/BRN, MOD HD, MIC, ARG, (CALC)
2107.5	44	SLTST, MDGY/BRN, S, ARG, MMIC, (CARB), (CALC), FRI, (HYGROCLASTIC) - CRYPTOFISSILE, FAINT FLASER LAMINATION, BURROW FILLS OR PEBBLES OF SST, WH, CALC, MSL(-CRSSL) SRT, (RND), (SPH)
2120.0	40	SLTST/SST, A.A.
2133.8	33	SLTST, MDGY/BRN, MOD HD, MIC, S, ARG, (CARB), (CALC), HYGROTURGID, FLASERLAMINATION
2145.2	39	SLTST, A.A.
2160.5	35	SLTST, A.A.
2168.5	30	SST, LTGY, CARB, CALC, MOD HD, MIC, ARG, SLT, FS
2181.5	29	SST, MDGY, FRI-MOD HD, ARG, SLT, MIC, CARB, FS, GRADING INTO SLTST, HYGROCLASTIC, FOSS FRGM, (CALC)
2198.5	29	SST, MDGY, FRI-MOD HD, ARG, SLT, MIC, CARB, FS, HYGROCLASTIC, FOSS. FRGM
2217.5	25	SST, MD-DKGYBRN, ARG, SLT, MIC, CARB, CRYPTOFISSILE, FSU, WITH GN MIN (GLC?)
2237.5	EMPTY	
2250.5	15	SST, MD-DKGYBRN, ARG, SLT, MIC, CARB, CRYPTOFISSILE, FSU.

31/2-8 SWS

Depth (m)	Recovery (mm)	Lithology
2267.1	35	SST, LTGY, CARB, CARB STRKS, MIC, ARG, (PORES PLUGGED BY KAOL), FSL, NON CALC-((CALC)), CRYPTOFISS.
2285.2	28	SST, GY, FRI-MOD HD, ARG, MIC, SLT, FSU-FSL, HYGROTURGID, CARB STRKS
2314.5	35	CLST, MDGY-GN/BRN, FRI-MOD HD, MMIC, SLT, (S), ((CALC))-NON CALC, CRYPTOFISSILE
2330.5	23	ALTERNATION OF SLTST, MDGY/GN, ARG, (S), MMIC, (CARB), (CALC), FRI, (HYGROCLASTIC) - CRYPTOFISSILE, FLASERLAMINATION AND SST, LT-DKGY MTL, MOD HD, ARG, MMIC, CARB, ((CALC)), FS, (CRYPTOFISSILE)
2349.5	24	SLTST/SST, A.A.
2355.6	20	SLTST, MDGY/GN, ARG, (S), MMIC, (CARB), (CALC), FRI, (HYGROCLASTIC)- CRYPTOFISSILE, FLASER LAMINATION
2368.0	28	SLTST, DKGY/GN/BRN, FRI-MOD HD, ARG, ((CALC))- NON CALC, MMIC, CRYPTOFISSILE, S, (FS)
2385.8	31	CLST, (AS SLTST ABOVE), GRADING INTO SLTST, S
2398.5	35	CLST, A.A., (GRADING INTO SST, ARG, (FSL-FSL), MM-STREAKS OF SA
2407.1	30	CLST, A.A., SLT, S, (GRADING INTO SST, ARG, (FSL-FSL) MM-STREAKS OF SA
2424.5	29	CLST, SLT, (S), ELSE A.A.

31/2-8 SWS

Depth (m)	Recovery (mm)	Lithology
2436.0	25	CLST, SLT, ELSE A.A.
2452.0	27	CLST, (SLT), WITH TINY (1 MM) SAND STREAKS, ELSE A.A.
2473.5	21	CLST, DKGY/GN/BRN, FRI-MOD HD, (SLT), ((CALC))- NON CALC, MMIC, CRYPTOFISSILE
2491.5	38	CLST, A.A.
2497.0	26	CLST, A.A.
2516.0	30	SST, LT-DKGY MTL, MOD HD, ARG, MMIC, ((CALC)), FS, (CRYPTOFISSILE), LAMINATED
2532.5	30	SST, A.A., FLASERY LAMINATION
2548.0	24	SST, A.A., PRED. LTGY/YEL
2565.9	20	SST, LT-DKGY MTL, MOD HD, ARG, MMIC, ((CALC)), FS (CRYPTOFISSILE), LAMINATED
2575.0	35	COAL, BLK-BRN, FRI-BRTL, PYR
2578.0	35	COAL, BLK, HD, BRTL
2595.5	43	CLST, MDGY/BRN, MMIC, FRI-MOD HD, NON CALC
2612.0	38	CLST, LTGY/(GN), FRI-MOD HD, CARB, MMIC, NON CALC
2618.0	23	CLST, A.A.
2632.5	40	COAL, BLK, HD, BRTL

31/2-8 SWS

Depth (m)	Recovery (mm)	Lithology
2642.5	25	SH, DKGY/BRN, MIC, MOD HD, NON CALC
2654.0	28	SST, WH-LTGY, FRI, ARG, (MIC), NON CALC, FSL, SRT
2665.5	22	SST, WH-LTGY/BRN, FRI, CALC, CARB, ARG, (MIC), FSU
2672.5	28	SST, LTGY, FRI, ARG, MIC, NON CALC, (CARB), FSU-FSL
2687.0	38	SST, WH, FRI, (CALC), (CARB), MIC, (ARG/KAOL), CRSSL, (SRT)
2695.0	25	SST, A.A.
2709.3	33	SST, WH, (CALC), FRI, MIC, ARG, FSL, SRT, WITH MM-LAMINAE OF CLST, MDGY(GN), SFT-FRI, (MIC), NON CALC, CRYPTOFISSILE
2722.3	25	SST, A.A.
2725.0	25	CLST, MDGY(GN), SFT-FRI, (MIC), NON CALC, WITH MM-STREAKS OF SST, WH, FSL, MIC
2737.3	MISFIRE	
2755.4	MISFIRE	
2766.2	LOST	
2773.9	25	CLST, MOD HD-FRI, MDGY, MMIC, SHALY, NON CALC, SLT, NON SWELLING
2778.0	33	CLST, MOD HD-FRI, MDGY, MMIC, SHALY, NON CALC, SLT, NON SWELLING

31/2-8 SWS

Depth (m)	Recovery (mm)	Lithology
2780.5	35	SST, WH-LTGY/MTL, FRI, CARB, KAOL, MMIC, (CALC), HYGROFISSILE, FSL-FSU, SRT
2784.2	22	CLST, MD-DKGYBRN, MMIC, FRI, SLT, NON CALC, CRYPTOFISSILE, WITH CM SA-STRKS, (FS, ARG)
2792.3	22	CLST, A.A., (MM-SA-STRKS)
2815.0	22	CLST, A.A.
2823.6	LOST	
2825.7	40	SST, FRI, MSU-CRSSL, SRT, (ARG), (KAOL), HYGRO-CLASTIC, WH-LTGY/MTL, MIC, CARB, (CALC)
2840.9	39	SST, FSU, WITH CLST STRKS, MIC, MSU-CRSSL, FRI- MOD HD, ARG, CARB, KAOL, (CALC), HYGROCLASTIC
2855.4	22	SST/CLST, A.A.
2867.5	19	SST, WH-LTGY/MTL, MSU-CRSSL, FRI-MOD HD, ARG, MIC (MICA LAMINAE), CARB, KAOL, (CALC), HYGROCLASTIC,
2872.4	LOST	
2892.4	31	CLST, MDGYBRN-(DKGY), FRI-MOD HD, NON CALC-(CALC), HYGROCLASTIC, (MIC), SLT, S
2912.0	25	CLST, MDGYBRN-(DKGY), FRI-MOD HD, NON CALC-(CALC), HYGROCLASTIC, (MIC), SLT, (S), INTERLAYERED WITH MM-STRKS OF FS
2920.9	23	A.A.

encl. 2

31/2-8 SWS

Depth (m)	Recovery (mm)	Lithology
2923.0	25	A.A.
2943.8	27	A.A.
2965.0	23	A.A.
2968.8	20	A.A.
2973.3	44	SST, WH-LTGY/MDGY(GN) MTL, ARG, FS-CRSSL, (SRT), (CARB), ANG, (RND), (CALC), HYGROCLASTIC
2977.7	33	SST, MDGY/BF, FS, SLT, ARG, (MIC), (SRT), (GRAINS UP TO 2 MM), CALC, HYGROCLASTIC
2996.2	LOST	
3007.2	LOST	
3016.1	20	SST, LT-MDGY, MTL, MIC, (CARB), MOD HD, CALC, ARG, KAOL, HYGROCLASTIC, FSL-FSU
3020.5	27	SST, HD, PYR, CARB STRKS, (CALC), ELSE A.A.
3033.5	22	SST, LT-MDGY, MTL, MIC, (MICA LAMINAE), (CARB), MOD HD
3043.3	18	SST, MDGY/BRN, MIC, CARB, FRI, ARG, NON CALC, CRYPTOFISSILE
3046.5	24	SST, LTGY/BF, FS, CARB, FRI, ARG, (MIC), NON CALC, CRYPTOFISSILE

encl. 2

31/2-8 SWS

Depth (m)	Recovery (mm)	Lithology
3050.5	36	SST, FSL-FSU, CARB, CRYPTOFISSILE, SRT-SRT, (ANG), (ELONG), COAL GRAINS, WELL COMPACTED DIR FLU: LTYEL, MOD-GOOD, PATCHY, DISPERSED CUT: SLOW CUT FLU: MLKY WH, WEAK TO MOD
3056.0	26	SST, FSL-FSU, CARB, CRYPTOFISSILE, ELSE A.A.
3063.8	19	CLST, DKGY, MOD HD, SHALY, MIC, CARB, (SLT), NON CALC, NON SWELLING
3065.8	25	CLST, A.A., MM-STRKS OF COAL, PYR
3083.2	EMPTY	
3089.5	16	SST, MSU-CRSSL, SRT-SRT, (ANG), (ELONG), COAL GRAINS, NOT CRYPTOFISSILE, WELL COMPACTED
3100.4	23	SST, WH-LTGY, FRI-MOD HD, (MIC), FSL-CRSSU, (SRT), KAOL, NON CALC, CRYPTOFISSILE, CARB, WITH COAL STRK (COAL PARTLY RAHTER CARB SH)
3111.7	24	SST, WH-LTGY, FRI-MOD HD, (MIC), FSL-CRSSU, (SRT), KAOL, (CARB), NON CALC, CRYPTOFISSILE
3133.2	29	SST, WH-LTGY, FRI-MOD HD, MIC, FSL-FSU, SRT, NON CALC, SLT, KAOL, CRYPTOFISSILE
3148.0	47	CLST, MD-DKGY, FRI-MOD HD, SHALY, NON CALC, NON SWELLING
3169.8	50	CLST, RDBRN, SFT-MOD HD, CALC, CRYPTOFISSILE

31/2-8 SWS

Depth (m)	Recovery (mm)	Lithology
3181.7	32	SST, WH, FRI, KAOL, NON CALC, MSL-CRSSU
3196.0	25	CLST, DKRDBRN, SFT-MOD HD, MMIC, NON SWELLING, NON CALC, IN PACTCHES DKGY, HD
3211.7	20	SST, WH-LTGY, CALC, HYGROTURGID, ARG, MIC, (CARB), (FS), SLT
3228.0	17	CLST, (CARB), (SLT), CRYPTOFISSILE, DKGY, MOD HD, MMIC, NON CALC, SHALY
3242.7	37	CLST, DKGY, MOD HD, MMIC, NON CALC, SHALY
3248.2	18	SST, WH-LTGY/DKGY MTL, FRI, KAOL, FSL-CRSSL, (SRT)-SRT, (ANG), (ELONG), ((CALC)), CRYPTOFISSILE
3262.9	23	CLST, LTGNGY, S, (FS), MIC, SLT, HYGROCLASTIC, NON CALC
3272.8	23	SLTST, WH-LTGY(GN), MIC, KAOL, ARG, (CARB), HYGROCLASTIC, NON CALC-(CALC), (S), (FS)
3275.5	36	CLST, RDBRN-LTGNGY, MTL, MIC, CARB, SLT, (S), (CALC), HYGROCLASTIC
3279.8	38	CLST, LTGN(GY), MMIC, SFT-FRI, NON CALC-((CALC)), GREASY, NON SWELLING
3299.1	43	SST, WH-LTGY(GN) FSL - FSU, KAOL, CALC, (MIC), ((CARB)), (GLC?)
3311.5	41	CLST, GN(GY), FRI, SLT, (S) (FSU), NON CALC, HYGROCLASTIC, MIC, (CALC)

31/2-8 SWS

Depth (m)	Recovery (mm)	Lithology
3315.2	LOST	
3327.4	25	SST, LTGYGN, CALC, FSL-(FSU), ARG, MIC, SLT
3349.0	23	SST, GN, FRI-MOD HD, FSL-FSU, ((CALC)), MIC, SLT, ARG
3362.0	50	CLST, RDBRN-GYGN MTL, SFT-MOD HD, PLASTIC, MIC, CALC, (GRADING INTO MRL), CONTAINING PEBBLES (UP TO 1 CM) OF LST, MDGY, HD, XLN
3366.3	38	SST, WH-LTGY(GN), MOD HD, FSU-MSU, (SRT)-SRT, (ANG)-(RND), (SPH)-(ELONG), MIC, (CARB), (GLC), CALC, KAOL IN PORES
3373.9	29	CLST, RDBRN-GYGN MTL, MOD HD-FRI, MMIC, SLT, (CALC) IN PATCHES

encl. 2

Core Description Sheets

31/2-8

31/2-8
Exploration Well Resumé
Enclosure No. 3

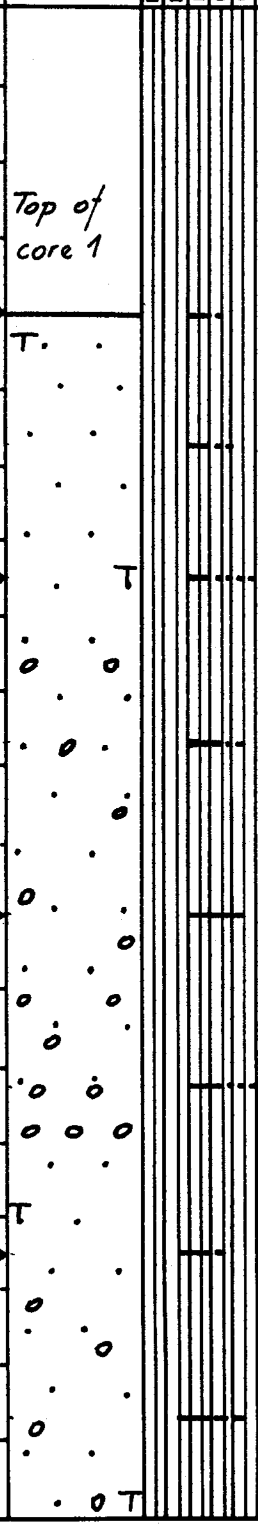
A/S NORSKE SHELL	Well: 31/2-8	Core No. 1

CORE DESCRIPTION

Cored from 1841,8 to 1851,5 Recovered: 9,68 m 100 % Core size: 4"

Formation: JU Date: 11.07.82 Described by: P. Immerz Corehead: CB 303

Sheet: 1 of 3



DEPTH & SAMPLES	SEDIMENTARY STRUCTURES & FEATURES	COLOUR	COMPOSITION (& ACCESSORY MINERALS)	CMT	ESTIMATED Ø %	HYDROCARBON INDICATIONS SMPL FLU	CUT COL	CUT FLU	GAS %	REMARKS (OIL BLEED; DIPS; FRACTURES ETC.)
1841										
1.0	(-0-v)	Lt gy	(calc), (mic), (carb), ((arg))	hd	20	wh, yel mod, good	yel str.	mlk wh mod, good		yel - ltbrn oil stain
1842										steeply dipping fracture (healed)
1.1	(=)cm		((carb)), ((mic))	mod hd	>20					
	1842,7 - 1844,0 scattered Qz pebbles (up to 3mm ø)									
1843										
1.2				lse-fri	25					
1844										
1.3	(∠)cm (=)cm 1844,4 - 1845,6 pebbles a.a. occ enriched in layers		((carb))	fri-mod hd	10-15					
1845										

A/S NORSKE SHELL	Well: 31/2-8	Core No. 1

CORE DESCRIPTION

Cored from ________ to ________ Recovered: ________ m ________ % Core size: ________

Formation: ________ Date: ________ Described by: ________ Corehead: ________ Sheet: 2 of 3

DEPTH & SAMPLES	GRAPHIC LITHOLOGY	GRAIN SIZE (FINE, FINE, MED, CRS, CRS)	SEDIMENTARY STRUCTURES & FEATURES	COLOUR	COMPOSITION (& ACCESSORY MINERALS)	CMT	ESTIMATED Ø %	HYDROCARBON INDICATIONS SMPL FLU	CUT COL	CUT FLU	GAS %	REMARKS (OIL BLEED; DIPS; FRACTURES ETC.)
1845	T		(═)									
1.4				lt gy	((mic)), (pyr), ((calc))	fri-mod hd	25	yel mod	yel-brn strm	mlk wh good		lt brn oil stain
1846 1.5				wh/lt gy			30	yel good	yel-brn strm	bl-wh mod good		
			≠									
1.6 1847				wh/lt gy	((mic)) ((calc))		15	yel good	yel-brn strm	mlk wh good		
			(⊥) (═)									
			≠									
1.7 1848				wh/lt gy	(calc), (pyr),		15	yel good	yel-brn strm	mlk wh good		
			(⊥) cm									
1.8			(═) ≠	lt gy	((mic)), ((carb))		15-20	yel good	yel-brn strm	mlk wh good		no oil stain in hard bands
1849	T											

A/S NORSKE SHELL	Well: 31/2-8	Core No. 1

CORE DESCRIPTION

Cored from ________ to ________ Recovered: ________ m ________ %___ Core size: ________

Formation: ________ Date: ________ Described by: ________ Corehead:

Sheet: 3 of 3

DEPTH & SAMPLES	GRAPHIC LITHOLOGY	GRAIN SIZE (FINE, FINE, MED, CRS, CRS)	SEDIMENTARY STRUCTURES & FEATURES	COLOUR	COMPOSITION (& ACCESSORY MINERALS)	CMT	ESTIMATED Ø %	HYDROCARBON INDICATIONS SMPL FLU	CUT COL	CUT FLU	GAS %	REMARKS (OIL BLEED; DIPS; FRACTURES ETC.)
1849	T		(═) cm-dm (∠)?			tri-mod hd						lt-mdbrn oil stain
1.9				lt gy	(carb) (calc)		20	yel good	yel-brn stron	wh mod good		
1850			(═)									
1.10				ltgy			20	yel good	yel stron	wh good		
1851			(═) dm									
1.11	T			ltgy pink	(mic), (calc), (carb)		20	yel good	yel stron	wh good		
	End of core 1											
1852												

A/S NORSKE SHELL	Well: 31/2-8	Core No. 2

CORE DESCRIPTION

Cored from 1851,5 to 1869,7 Recovered: 17,2 m 95 % Core size: 4"

Formation: JU Date: 12.07.67 Described by: P. Jmmerz Corehead: CB 303

Sheet: 1 of 5

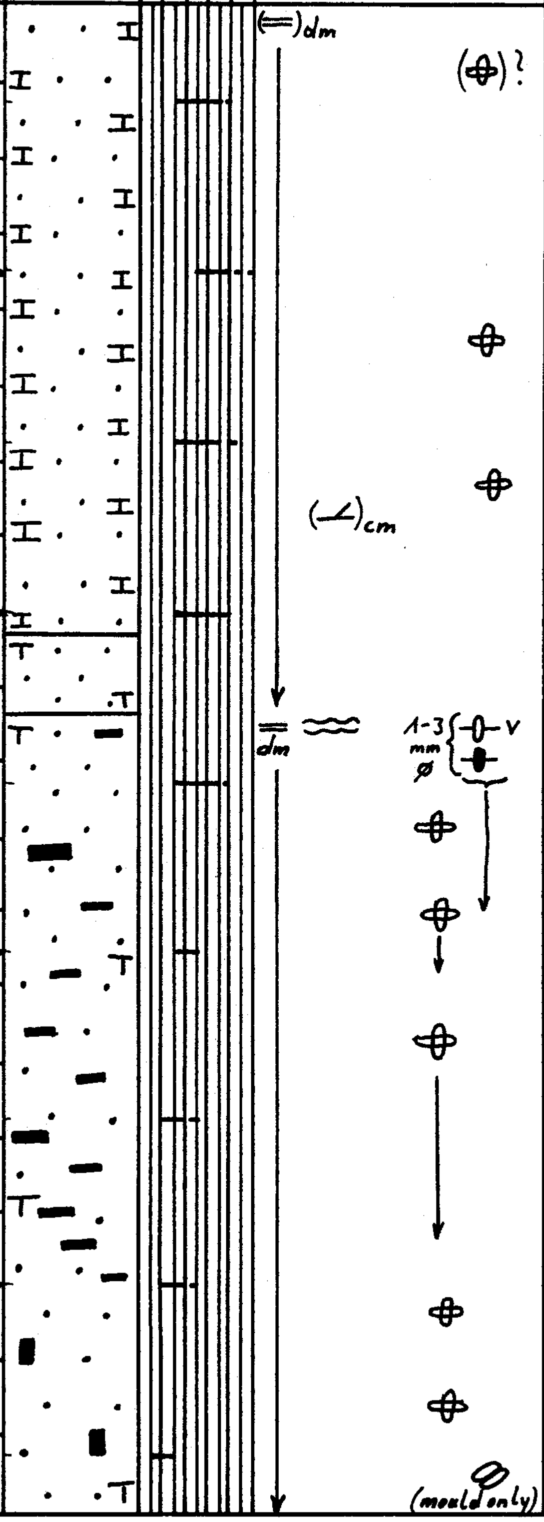
DEPTH & SAMPLES	GRAPHIC LITHOLOGY	GRAIN SIZE (FINE / FINE / MED / CRS / CRS)	SEDIMENTARY STRUCTURES & FEATURES	COLOUR	COMPOSITION (& ACCESSORY MINERALS)	CMT	ESTIMATED ø %	HYDROCARBON INDICATIONS: SMPL FLU	CUT COL	CUT FLU	GAS %	REMARKS (OIL BLEED; DIPS; FRACTURES ETC.)
1851	core 1											
	Top of core 2											
1852	not recovered											
2.3				dkgy-blk	arg	hd	%	–	–	–		
1853 / 2.4			(=) (∠)	ltgy	((calc))	fri-lse	20	yel good	yel-brn strm	mlk wh good		yel oil stain
2.5 / 1854			(∠) (⊕)? (⊕)?	wh-ltgy	(calc) ((arg))	hd	5-10	yel good	yel-brn strm	mlk wh good		yel oil stain
2.6 / 1855			(=) dm	ltgy	(carb), (mic), calc-calc	hd-hd	3	yel good	yel brn strm	mlk wh good		yel/ltbrn oil stain

A/S NORSKE SHELL	Well: 31/2-8	Core No. 2

CORE DESCRIPTION

Cored from ________ to ________ Recovered: ________ m ________ % ___ Core size: ________

Formation: ________ Date: ________ Described by: ________ Corehead:
Sheet: 2 of 5



DEPTH & SAMPLES	SEDIMENTARY STRUCTURES & FEATURES	COLOUR	COMPOSITION (& ACCESSORY MINERALS)	CMT	ESTIMATED ø %	HYDROCARBON INDICATIONS SMPL FLU	CUT COL	CUT FLU	GAS %	REMARKS (OIL BLEED; DIPS; FRACTURES ETC.)
1855	(=)dm (⊕)?									
2.7		lt gy	calc, (arg) (mic) - mic	hd	1	yel good ptch	yel-brn slow	mlk wh mod		
1856	(∠)cm									
2.8		ltgy	calc, (arg), (mic)-mic (carb)-carb	hd	1	yel good ptch	yel-brn slow	mlk wh wk		patchy, ltbrn oil stain
1857	dm 1-3 mm ø									colour change from lt to md gy
2.9		lt-md gy	mic, (arg) ((calc)), carb	mod hd	20	yel md-good ptch	yel-brn strm	mlk wh good		smell bioturbation can be observed in carb strks only
1858										
2.10		lt-mdgy	mic-mic carb, ((calc)), (arg)-arg	mod hd	<10	yel good ptch	yel-brn blm	mlk wh md-good		smell
1859	(mould only)									

A/S NORSKE SHELL | Well: 31/2-8 | Core No. 2

CORE DESCRIPTION

Cored from ______ to ______ Recovered: ______ m ______ % Core size: ______

Formation: ______ Date: ______ Described by: ______ Corehead: Sheet: 3 of 5

DEPTH & SAMPLES	GRAPHIC LITHOLOGY	GRAIN SIZE (FINE, FINE, MED, CRS, CRS)	SEDIMENTARY STRUCTURES & FEATURES	COLOUR	COMPOSITION (& ACCESSORY MINERALS)	CMT	ESTIMATED Ø %	HYDROCARBON INDICATIONS SMPL FLU	CUT COL	CUT FLU	GAS %	REMARKS (OIL BLEED; DIPS; FRACTURES ETC.)
1859			dm									
2.11			V 1cmØ	mdgy	mic, (carb), (arg)	mod hd	10	yel good ptch	yel-brn blm strm	mlk wh mod-good		
1860												
2.12			H; V 1cmØ	mdgy	mic-mic, carb, calc, (arg)-arg	mod hd-hd	<5	yel mod-good ptch, disp	yel-brn slow	mlk wh wh-mod		
2.13			cm (-mm); (cm); V 1cmØ	mdgy	mic, (carb), (calc), (arg)	mod hd-hd	5	yel good ptch strk disp	yel-brn slow	mlk wh mod		
1861												
2.14			cm; H 2-3 mmØ; H 1cmØ	dkgy	mic, (carb), (calc), ((arg)),	hd	<5	yel mod-good ptch strk	yel-brn slow	mlk wh mod-good		
1862			mm; mm									
2.15				dkgy	mic, (carb), (calc), ((arg))	hd	5	yel good ptch	yel-brn blm strm	mlk wh mod		
1863			H 1cmØ									

A/S NORSKE SHELL	Well: 31/2-8	Core No. 2

CORE DESCRIPTION

Cored from ________ to ________ Recovered: ________ m ________ % ____ Core size: ________

Formation: ________ Date: ________ Described by: ________ Corehead: Sheet: 4 of 5

DEPTH & SAMPLES	GRAPHIC LITHOLOGY	GRAIN SIZE (FINE, FINE, MED, CRS, CRS)	SEDIMENTARY STRUCTURES & FEATURES	COLOUR	COMPOSITION (& ACCESSORY MINERALS)	CMT	ESTIMATED ø %	HYDROCARBON INDICATIONS SMPL FLU	CUT COL	CUT FLU	GAS %	REMARKS (OIL BLEED; DIPS; FRACTURES ETC.)
1863			mm (-cm); mm; H 2-3 mmø									
2.16				dkgy	mic, (carb), ((calc), ((arg))	hd	5-10	yel good ptch	yel-brn blm strm	mlk wh mod-good		
1864			H; 1cmø									
2.17				dkgy	mic, carb, (arg)	hd	5	yel mod ptch	yel-brn blm-strm	mlk wh mod-good		
			(mould only)									
1865												
2.18				dkgy	mic, (carb) ((calc)), (arg)	hd-hd	5-10					
1866			H									
2.19				md-dkgy	mic-mic ((calc)), ((arg)), (carb)	hd-mdhd	5-10	yel good ptch	yel-brn strm	mlk wh mod-good		good fluorescence in burrows
			H; c									
2.20				md-dkgy	mic-mic (carb)-carb, (calc)	hd	5	yel mod-good ptch	clr slow	mlk wh mod-good		
1867												

A/S NORSKE SHELL	Well: 31/2-8	Core No. 2

CORE DESCRIPTION

Cored from ________ to ________ Recovered: ________ m ________ % Core size: ________

Formation: ________ Date: ________ Described by: ________ Corehead: ________ Sheet: 5 of 5

DEPTH & SAMPLES	GRAPHIC LITHOLOGY	GRAIN SIZE (FINE, FINE, MED, CRS, CRS)	SEDIMENTARY STRUCTURES & FEATURES	COLOUR	COMPOSITION (& ACCESSORY MINERALS)	CMT	ESTIMATED Ø %	HYDROCARBON INDICATIONS SMPL FLU	CUT COL	CUT FLU	GAS %	REMARKS (OIL BLEED; DIPS; FRACTURES ETC.)
1867			cm; H 2-3 mm Ø; F									
												Top of coarsening-upwards cycle
2.21				lt-mdgy	calc-calc carb, mic	mod hd-hd	10	yel good ptch strk	clr blm	mlk wh mod-good		
1868												
	(pyr)		cm (-mm)									
2.22			V 2cm Ø	md-dkgy	carb, (calc) mic-mic	mod hd-hd	5-10	yel wk-mod (disp)	yel-brn blm-strm	mlk wh wk-mod		
1869			H 1cm Ø									
2.23				md-dkgy	mic-mic, carb, (calc), (pyr)	mod hd	10	yel wk (strk)	yel-brn slow blm	mlk wh wk-mod		
1870	Bottom of core 2, Top of core 3 depth adjusted to 1870,0											

A/S NORSKE SHELL	Well: 31/2-8	Core No. 3

depth adjusted

CORE DESCRIPTION

Cored from 1870,0 to 1888,5 Recovered: 18,9 m 102 % Core size: 4"

Formation: JU Date: 12.07.82 Described by: P. Jmmerz Corehead: CB 303 Sheet: 1 of 5

DEPTH & SAMPLES	GRAPHIC LITHOLOGY	GRAIN SIZE (FINE, FINE, MED, CRS, CRS)	SEDIMENTARY STRUCTURES & FEATURES	COLOUR	COMPOSITION (& ACCESSORY MINERALS)	CMT	ESTIMATED Ø %	HYDROCARBON INDICATIONS SMPL FLU	CUT COL	CUT FLU	GAS %	REMARKS (OIL BLEED; DIPS; FRACTURES ETC.)
1870 / 3.0			cm–mm	md-dkgy	mic (carb) - carb (calc) - calc	mod hd-hd	5-10	yel mod strk disp	yel-brn blm-strm	mlk wh mod		
3.1 / 1871			1-2 cm ø; cm; (moulds only); 1-2 mm ø	mdgy	calc, mic, carb, (arg),	hd	<5	yel wk-mod disp	clr slow	mlk wh wk		
3.2 / 1872			cm; 1 cm ø; cm; 1-2 mm ø; cm	mdgy	mic - mic carb - carb calc, (arg)	hd	<5	yel wk disp		very weak		
3.3 / 1873			1-2 cm ø; 1-2 mm ø; 1 cm ø	md-dkgy	mic, (calc), (carb) - carb	hd	<5					= syndepositional mini-faults
3.4 / 1874				md-dkgy	mic, (calc), (arg), (carb)	hd-hd	<5					

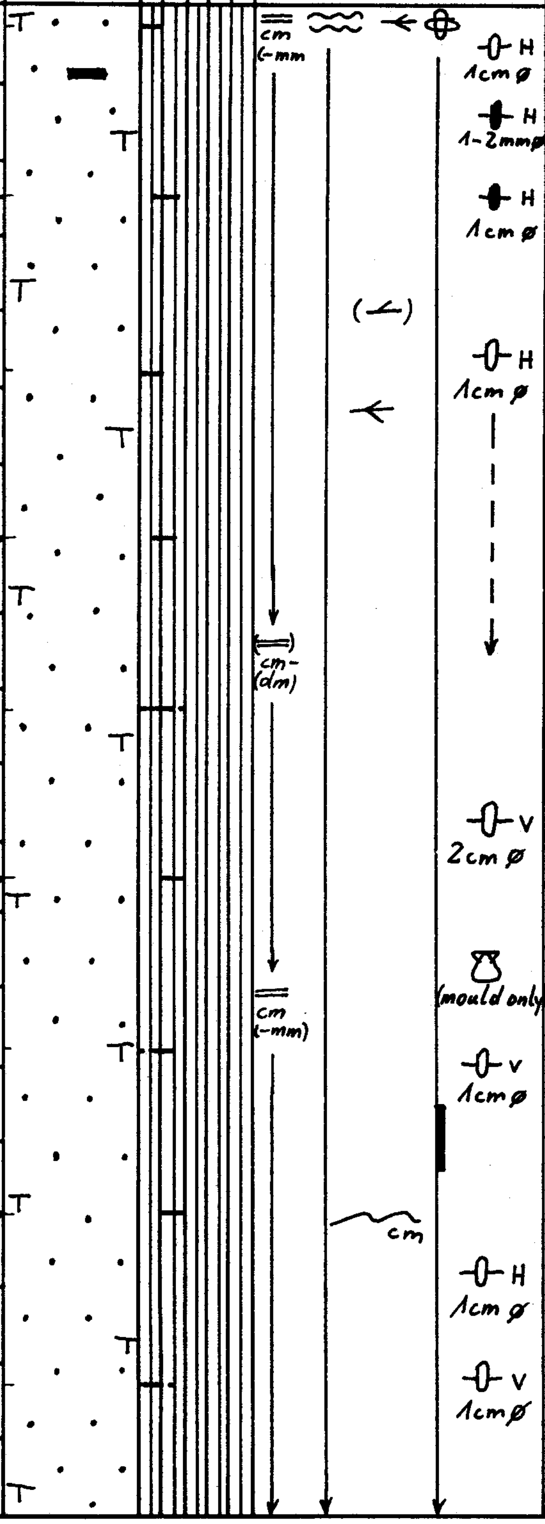
A/S NORSKE SHELL | Well: 31/2-8 | Core No. 3

CORE DESCRIPTION

Cored from ________ to ________ Recovered: ________ m ________ % ____ Core size: ________

Formation: ________ Date: ________ Described by: ________ Corehead:

Sheet: 2 of 5



DEPTH & SAMPLES	GRAPHIC LITHOLOGY	GRAIN SIZE (FINE, FINE, MED, CRS, CRS)	SEDIMENTARY STRUCTURES & FEATURES	COLOUR	COMPOSITION (& ACCESSORY MINERALS)	CMT	ESTIMATED ø %	HYDROCARBON INDICATIONS SMPL FLU	CUT COL	CUT FLU	GAS %	REMARKS (OIL BLEED; DIPS; FRACTURES ETC.)
1874												
3.5				md-dkgy	mic, (carb), (calc), (arg)	hd-hd	<5					
1875												
3.6				md-dkgy	mic, (carb), ((calc)), (arg)-arg	hd-hd	<5					Top of coarsening-upwards cycle?
1876												
3.7				md-dkgy	mic, carb, calc, (arg),	hd-hd	<5	yel wk-mod ptch disp	yel-brn slow	mlk wh wk-mod		sideritic cement
1877												dispersed pyrite
3.8				md-dkgy	(calc), mic, (carb), ((arg))	hd	<5					
1878												

A/S NORSKE SHELL | Well: 31/2-8 | Core No. 3

CORE DESCRIPTION

Cored from ________ to ________ Recovered: ________ m ________ % ____ Core size: ________

Formation: ________ Date: ________ Described by: ________ Corehead: ________ Sheet: 3 of 5

DEPTH & SAMPLES	GRAPHIC LITHOLOGY	GRAIN SIZE	SEDIMENTARY STRUCTURES & FEATURES	COLOUR	COMPOSITION (& ACCESSORY MINERALS)	CMT	ESTIMATED Ø %	HYDROCARBON INDICATIONS (SMPL FLU / CUT COL / CUT FLU)	GAS %	REMARKS (OIL BLEED; DIPS; FRACTURES ETC.)
1878 / 3.9			cm-mm; V 1-2cm Ø; H 1-2mm Ø	md-dkgy	mic-mic carb-(carb) non calc (arg)	hd	<5			dispersed pyrite
1879 / 3.10			H 1mm-1cm Ø	dkgy	a.a.	hd	<5			X = diagonal, occasionally criss-crossing burrows 1-2 mm Ø dark fill
3.11 / 1880			cm	md-dkgy	a.a.	hd	<5			
			mm							
3.12 / 1881			H 1-2 mm Ø	md-dkgy	a.a.	hd	<5			
3.13 / 1882			H 1cm Ø	dkgy	a.a.	hd	<5			

A/S NORSKE SHELL | Well: 31/2-8 | Core No. 3

CORE DESCRIPTION

Cored from ________ to ________ Recovered: ________ m ________ % Core size: ________

Formation: ________ Date: ________ Described by: ________ Corehead: Sheet: 4 of 5

DEPTH & SAMPLES	GRAPHIC LITHOLOGY	SEDIMENTARY STRUCTURES & FEATURES	COLOUR	COMPOSITION (& ACCESSORY MINERALS)	CMT	ESTIMATED ø %	HYDROCARBON INDICATIONS (SMPL FLU / CUT COL / CUT FLU)	GAS %	REMARKS (OIL BLEED; DIPS; FRACTURES ETC.)
1882		cm-mm; G							dispersed pyrite
3.14		dm	wh-ltgy	glc, (arg), non calc (carb)	hd	<5			colour change
1883	pyr; pyr	(cm); 1cm ø							siderific cement
3.15	sid	1cm ø	wh-ltgy	glc, (arg) (calc)-calc	fri-mod hd	5-10			
1884									
3.16		pebbles up to 7mm ø	ltgy	(glc), (calc)	mod hd	20			
1885									
3.17		(cm)? (cm-dm)	wh-ltgy	(calc)	fri-mod hd	20-30			
1886									

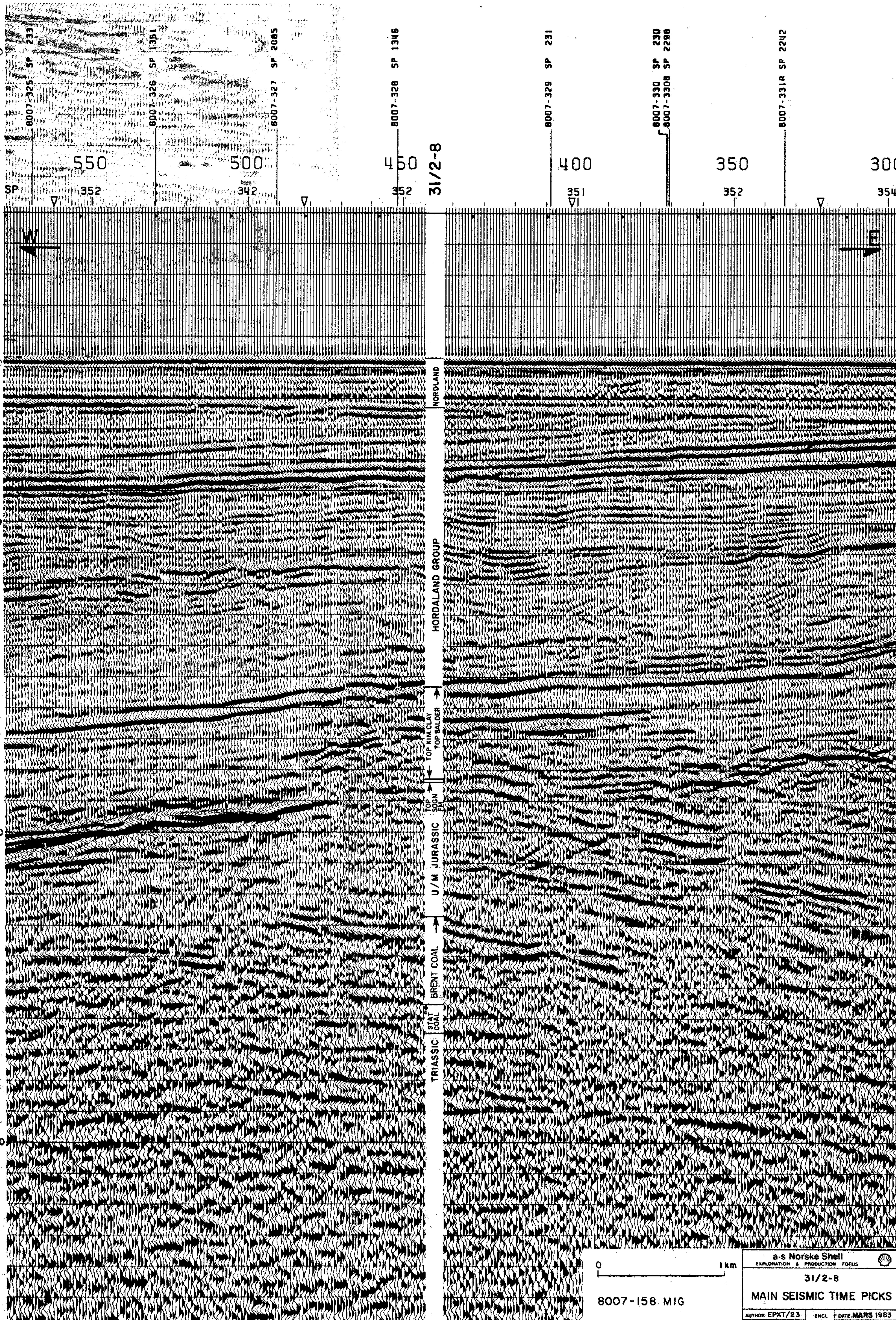
A/S NORSKE SHELL	Well: 31/2-8	Core No. 3

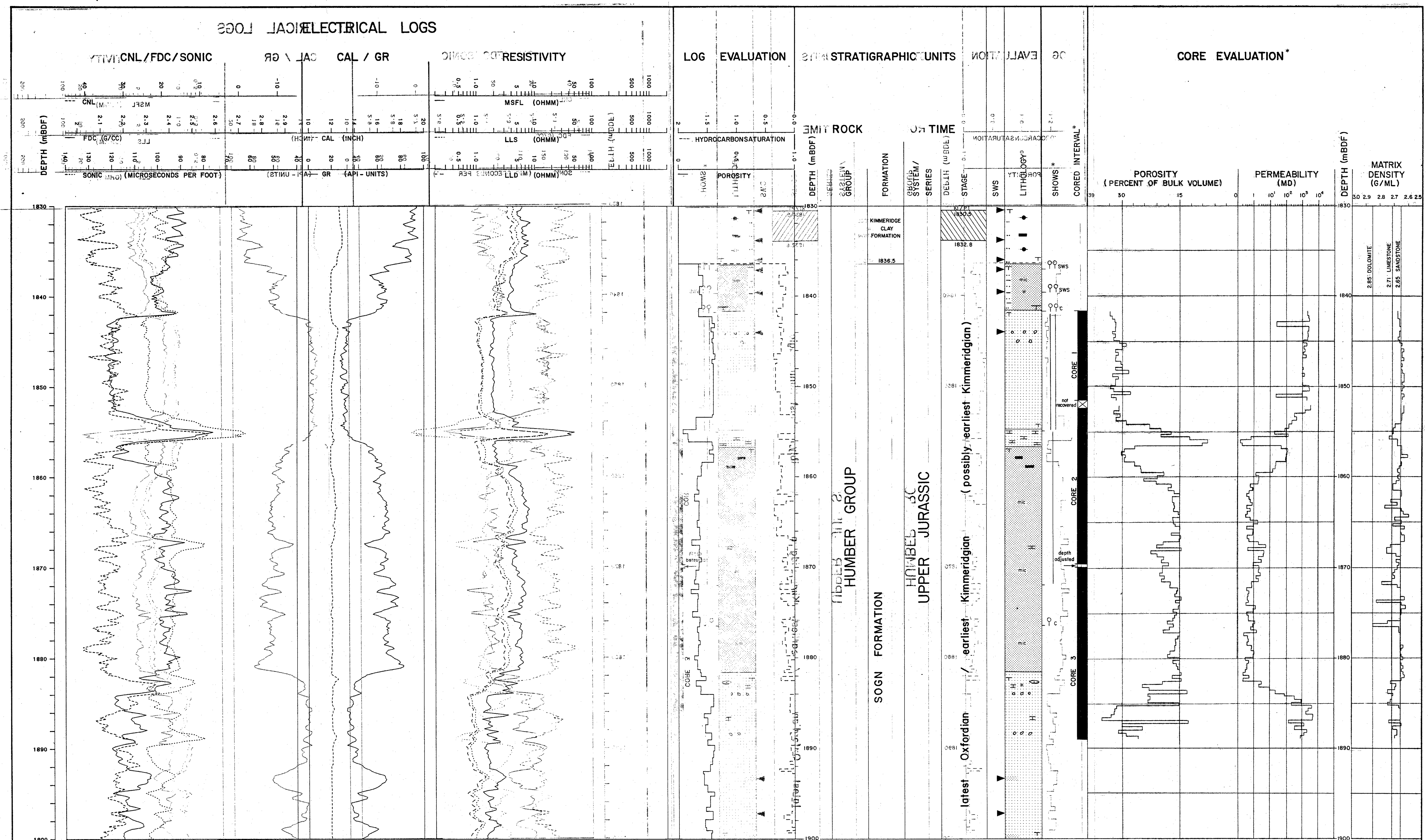
CORE DESCRIPTION

Cored from ________ to ________ Recovered: ________ m ________ % Core size: ________

Formation: ________ Date: ________ Described by: ________ Corehead: Sheet: 5 of 5

DEPTH & SAMPLES	GRAPHIC LITHOLOGY	GRAIN SIZE (FINE, FINE, MED, CRS, CRS)	SEDIMENTARY STRUCTURES & FEATURES	COLOUR	COMPOSITION (& ACCESSORY MINERALS)	CMT	ESTIMATED Ø %	HYDROCARBON INDICATIONS (SMPL FLU, CUT COL, CUT FLU)	GAS %	REMARKS (OIL BLEED; DIPS; FRACTURES ETC.)
1886, 3.18			≠ - (=) dm ((∠))	wh-ltgy	(calc) (kaol)	fri-lse				dispersed pyrite; sid cem.
			heavily fractured							
1887, 3.19				wh-ltgy	calc	mod hd				
			pebbles up to 3mm Ø							
1888, 3.20				wh-ltgy	((calc))	fri-lse				
3.21				wh-ltgy	((calc))	fri				
1889	Bottom of core 3									


8007-325 SP 233
8007-326 SP 1351
8007-327 SP 2085
8007-328 SP 1346
8007-329 SP 231
8007-330 SP 230
8007-330B SP 2298
8007-331A SP 2242
550
500
450
31/2-8
400
350
300
SP
352
342
352
351
352
354
W
E
1.0
2.0
3.0
NORDLAND
HORDALAND GROUP
TOP KIM.CLAY
TOP BALDER
TOP SOGN FM
U/M JURASSIC
BRENT COAL
STAT COAL
TRIASSIC
0
1 km
8007-158. MIG
a·s Norske Shell
EXPLORATION & PRODUCTION FORUS
31/2-8
MAIN SEISMIC TIME PICKS
AUTHOR EPXT/23
ENCL 4
DATE MARS 1983
REPORT NO. NSEP165
DRAW NO. G 1539/8



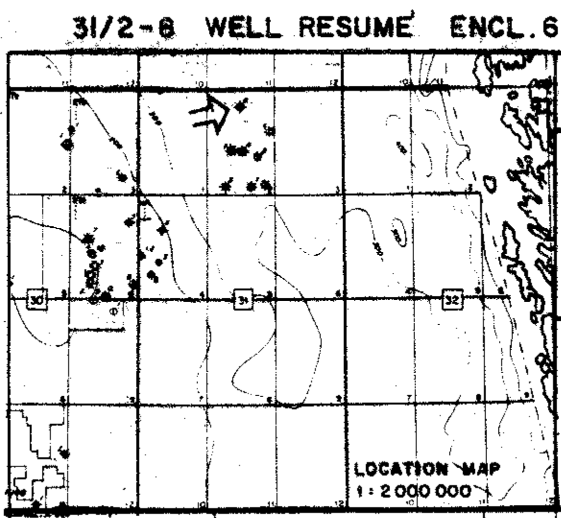
31/2-8 1836.5 - 1900.0 M NO BOREHOLE CORRECTIONS
POR FROM FDC CORRECTED FOR HYDROCARB. SW FROM ARCHIE
USING RT MATRIX DENSITY DEPENDING ON GR CUTOFF OF 55 API

*CORED INTERVAL, SHOWS AND CORE EVALUATION COLUMNS ON DRILLER's DEPTH.

a·s Norske Shell EXPLORATION & PRODUCTION FORUS		
WELL RESUMÉ 31/2-8		
EVALUATION PANEL OF CORED INTERVAL		
SCALE 1:200		
AUTHOR: EPXV/2, EPPP/4	ENCL:	DATE: NOV. '82
REPORT NO.: NSEP 165	5	DRAW. NO.: G.1539/9

R.H.

31/2-8 WELL RESUMÉ ENCL. 6 NSEP 165 TRADE VERSION



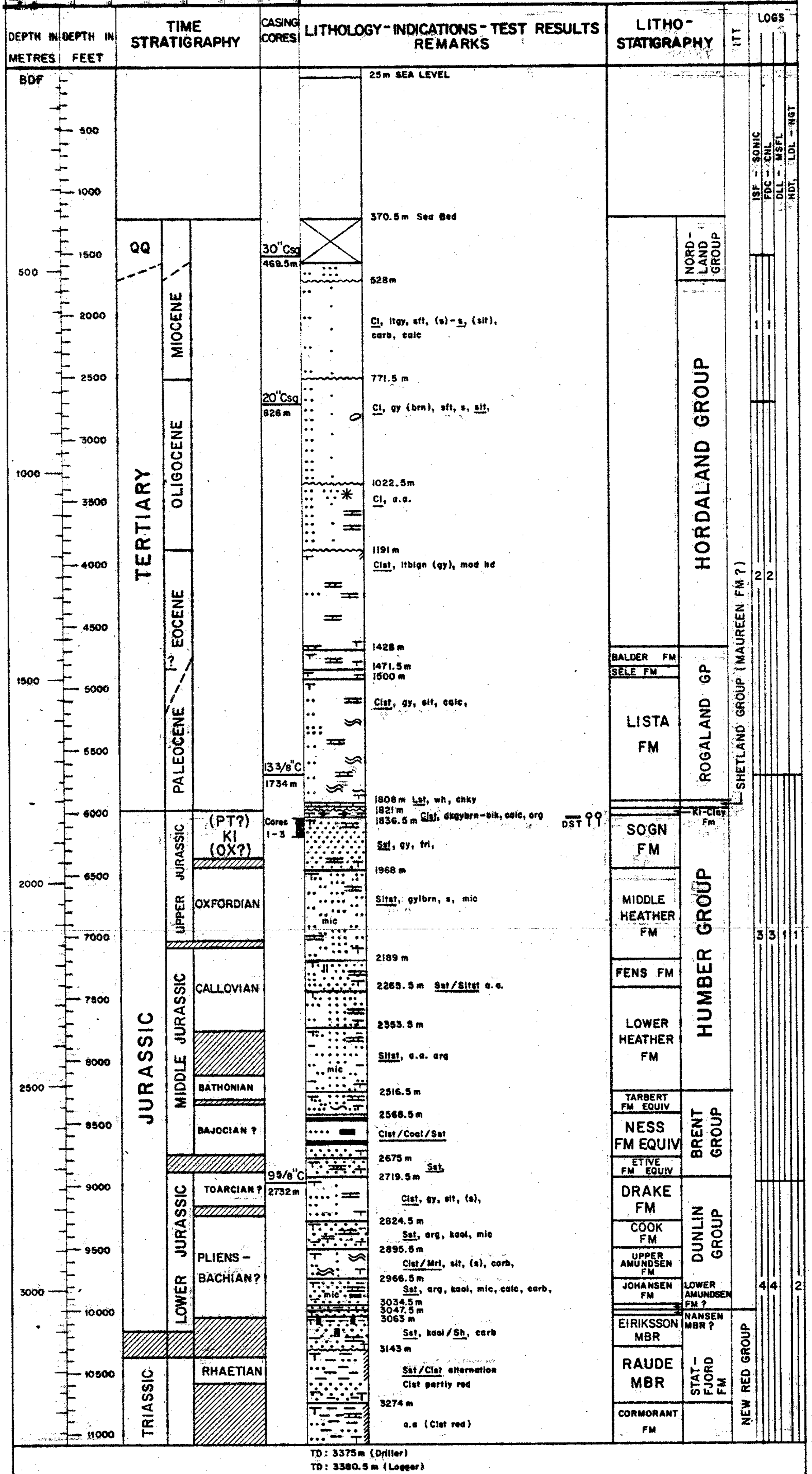
a-s Norske Shell

EXPLORATION & PRODUCTION FORUS

WELL SUMMARY SHEET
31/2-8
(NORSKE SHELL)

SCALE 1 : 10 000

COORDINATES LAT.: 60°57' 33.019" N LONG.: 03°29' 49.843" E
ELEVATION DF: 25 m RIG: BORGNY DOLPHIN
WATER DEPTH: 345.5 m SPUDDED: 16. 06. 1982
TOTAL DEPTH: 3375 m (DRILLER) COMPLETED: 18. 08. 1982
3380.5 m (LOGGER) TYPE COMPL.: p + a



CORES:

Core no. 1 : 1841.8 – 1851.5 m, rec. 100%
Core no. 2 : 1851.5 – 1869.7 m, rec. 95%
Core no. 3 : 1870.0 – 1888.5 m, rec. 102%
Top core 3 is depth - adjusted
core depths in drillers' depth

RFT - pressure gradient:

1845 – 3344 m : 0.455 psi/ft (water)
RFT- sample 1849 m: recovered water + 100 cc oil

DST:

1843 – 1848 m :
recovered 33 bbls of water and traces of oil

Rig Move Report

31/2-8

31/2-8
Exploration Well Resumé
Enclosure No. 7

R I G   M O V E   R E P O R T

RIG NAME: BORGNY DOLPHIN **DATE:** 10th JUNE 1982

OWNER: DOLPHIN A.S. **CHARTERER:** SHELL (NORWAY)

	RIG RELEASED	RIG ARRIVAL	TOTAL
EXPECTED TIME			
ACTUAL TIME	1500 13th June	1800 15th June	51 hrs.

A. LOCATIONS

	OLD LOCATION	NEW LOCATION
BLOCK NAME/NO.	31/2 - 7 J	31/2 - G8
CO-ORDINATES	60°51.25N 03° 27.01E	60°57°33.2N 03°29°50.1E
WATER DEPTH	335 m.	350 m.
RIG HEADING	322°	

B. PRE-MOVE CORRESPONDENCE

REFER

TOWMASTER K.R. DAWSON
OPP. SUP. G.J.[illegible]
DRILL SUP. H. CO[illegible]
MAT SUP. O. [illegible]
MAT SUP. S. [illegible]

PRE MOVE MEETING: 1430 **ON:** 10th June **ATTENDED BY:**

C. PERSONNEL ON BOARD INVOLVED IN RIG MOVE: **COMPANY:**

1.	**PERSON IN CHARGE OF RIG:**	CAPT. S. SKJASTAD	DOLPHIN
2.	**BARGE ENGINEER** :	CAPT. T. GUDMUNDSEN	DOLPHIN
3.	**CHARTERERS DRILL REPR.** :	JIM HULME	SHELL
4.	**INSURANCE SURVEYOR** :	NIL	
5.	**RIG MOVER** :	KEITH R. DAWSON	CHANNEL OFFSHORE
6.	**SURVEY OPERATOR(S)** :	BOB BLOW NIGEL LEWSEY	HUNTING SURVEY
7.	SURVEY (SHELL) :	J. CHRISTIANSEN	

E.S. 0800 11th JUNE ON CHARTER

CRAFT INVOLVED:

VESSEL	TYPE	BHP	B.P.	MASTER	ON LOCATION		DISMISSED	
					DATE	TIME	DATE	TIME
STAD SENIOR	TUG SUPPLY	10560	130 T	J. AUSTNES	12 Jun.	0430	15th	1230
NORMAND ENGINEER	TUG SUPPLY	6160	75 T	R. HESTNES	PERM	SHELL	CHARTER	
BALDER FOSNO	TUG SUPPLY	8160	110 T	H. KRISTOFFERSEN	PERM	SHELL	CHARTER	

WEATHER SUMMARY: (SPECIFY RETRIEVING/TOW/RUNNING)

DATE	TIME	WIND		ACTUAL SEA STATE			WEATHER	VIS.	RETR/ T/ RUN
		DIR.	SPEED	DIR.	HT.	PERIOD			
JUNE									
14th	1400	N	30	N	4.5m	4	CLEAR	20	RET
15th	0000	N	24	N	3m	4	CLEAR	20	TOW
15th	1200	N	20	N	3m	4	CLEAR	20	RUN

REPORT SIGNIFICANT CHANGE IN WEATHER ATTACH WEATHER REPORTS AND FORECASTS

TIME SUMMARY:

	FROM	TO	TOTAL	%
RIG RELEASED/IN POSITION	1400-14 June	1300-15 June	28 hrs.	100%
RETRIEVING BACK UPS	NONE			
RETRIEVING MAIN ANCHORS	1400	2400	10 hrs.	35%
UNDER TOW	0000	0404	4 hrs. 4 min	14.0%
RUNNING ANCHORS	0404	1050	6 hrs. 46 min	240%
RE-LAYING ANCHORS	1050	1100	10 min	0.6%
RUNNING BACK UPS	NONE			
BALLASTING ~~AND~~ SOAKING	1100	1500		15.7%
TEST LOADING ANCHORS	1500	1800	3 - 00	10.7%
TENSION ANCHORS TO 360-400 KIPS				

LOST TIME SUMMARY:

	DAYS	HOURS
W.O.W.	0	23 hrs.
RIG EQUIPMENT FAILURE	NIL	
CRAFT EQUIPMENT FAILURE	NIL	
MOORING EQUIPMENT FAILURE	NIL	
SURVEY EQUIPMENT FAILURE	NIL	
CRAFT PROBLEMS	NIL	
W.O. SURVEY VESSEL	NIL	
W.O. LOCATION MARKERS	NIL	
RE-LAYING ANCHORS		10 mins.
RE-LAYING BACK UPS	NIL	
OTHERS	NIL	

REMARKS ALL VERY GOOD - RIG, CRAFT, CREWS SURVEY EQUIPMENT.

BREAKDOWN LOST TIME SUMMARY

RETRIEVING:	DAYS/HOURS	REMARKS
W.O.W.	23 - 00	STRONG NNE WINDS - HIGH SEAS AND SWELL
RIG EQUIPMENT FAILURE		
CRAFT EQUIPMENT FAILURE		
MOORING EQUIPMENT FAILURE		
CRAFT PROBLEMS (NON TECHN.)		
OTHERS		
SUB TOTAL:	23 - 00	
UNDER TOW:		
W.O.W.		
RIG EQUIPMENT FAILURE		
CRAFT EQUIPMENT FAILURE		
SURVEY EQUIPMENT FAILURE	NIL	
W.O. SURVEY VESSEL		
W.O. LOCATION MARKERS		
OTHERS		
SUB TOTAL:	23 - 00	
RUNNING ANCHORS:		
W.O.W.		
RIG EQUIPMENT FAILURE		
CRAFT EQUIPMENT FAILURE		
MOORING EQUIPMENT FAILURE		
CRAFT PROBLEMS (NON TECHN.)		
OTHERS		
SUB TOTAL:	23 00	
TOTAL:	23 00	

TOWING/TOW ARRANGEMENTS

TOWING VESSELS	BHP	B.P.	CONNECTED	DISCONNECTED
NORMAND ENGINEER ,	6160	75 T	2200 14th	0725 15th
BALDER FOSNA	8160	110	2400 14th	0645 15th

BUILD UP OF TOWING GEAR AND METHOD OF TOWING: BOTH TOWED ON ANCHORS N.E.-No.8. B.F.-No.1. THREE HUNDRED FEET OF CABLE PAID OUT + 1000 FT. PENNANT WIRE.

TOWING DRAFT: ....26 - 0.... FT/ .... M **RIG DECKLOAD:** 1700 TONS

CHANGES IN INITIAL TOWING DRAFT (REASON):

RIG ASSISTED PROPULSION: YES

AVERAGE THROTTLE: 60 %

TYPE AND NUMBER OF THRUSTERS: ELECTRIC

BHP: 4000 EACH

TOW COMMENCED: 0000 - 15th

TOW FINISHED: 0404 15th

TOWING DISTANCE: 8.4 miles

AVERAGE SPEED: 2.1 kn.

SOIL INFORMATION:

	OLD LOCATION	NEW LOCATION
TYPE :	VERY SOFT ORGANIC CLAY	SAME
GOOD HOLDING :	V.G.	V.G.
FAIR HOLDING :		
POOR HOLDING :		

OLD LOCATION

J. **MOORING ASSEMBLY AND TESTS**

ANCHOR NO.	WIRE/CHAIN LENGTH + SIZE	DISTANCE (FEET)	BEARING (TRUE)	TYPE/WEIGHT ANCHOR	LENGTH/SIZE GROUND WIRE/CHAIN	TYPE/WEIGHT BACK-UPS	PENNANT COMPOS.	TYPE OF BUOY + NO/LETTER	SPRING BUOY	TEST TENSION (KIPS)
1	3" CHAIN	1282m	341°	10 T. DELTA FLIPPER		NIL	$2\frac{1}{2}$ "wire"	STEEL	NIL	360-400
2	"	1193	028°			"	500 ft x 2	CYLINDER		"
3	"	1265	069			"	300 ft x 1			"
4	"	1321	111			"	200 ft x 1			"
5	"	1201	155			"				"
6	"	1307	205			"				"
7	"	1206	248			"		52 plastic		"
8	"	1304	294			"				"

FINAL OBSERVED POSITION OF ANCHOR BUOYS RELATIVE TO CORNER OF RIG.

J. MOORING ASSEMBLY AND TESTS

ANCHOR NO.	WIRE/CHAIN LENGTH + SIZE	DISTANCE (~~[illegible]~~) METER	BEARING (TRUE)	TYPE/WEIGHT ANCHOR	LENGTH/SIZE GROUND WIRE/CHAIN	TYPE/WEIGHT BACK-UPS	PENNANT COMPOS.	TYPE OF BUOY + NO/LETTER	SPRING BUOY	TEST TENSION (KIPS)
1	3" CHAIN	1195	338	10 T DELTA FLIPPER	3" CHAIN	NIL	500 FT x 2	STEEL	NIL	360
2	3" CHAIN	1020	023	10 T DELTA FLIPPER	3" CHAIN	NIL	300 FT x 1	CYLINDER		375
3	"	1142	066	10 T DELTA FLIPPER	"	"	200 FT x 1			400
4	"	1189	112	"	"	"	ALL			380
5	"	1290	163	"	"	"	JOINING			375
6	"	1191	205	"	"	"	SHACKLES			375
7	"	1175	252	"	"	"	ARE NOW KENTERLINKS			400
8	"	1228	296	"	"	"				400

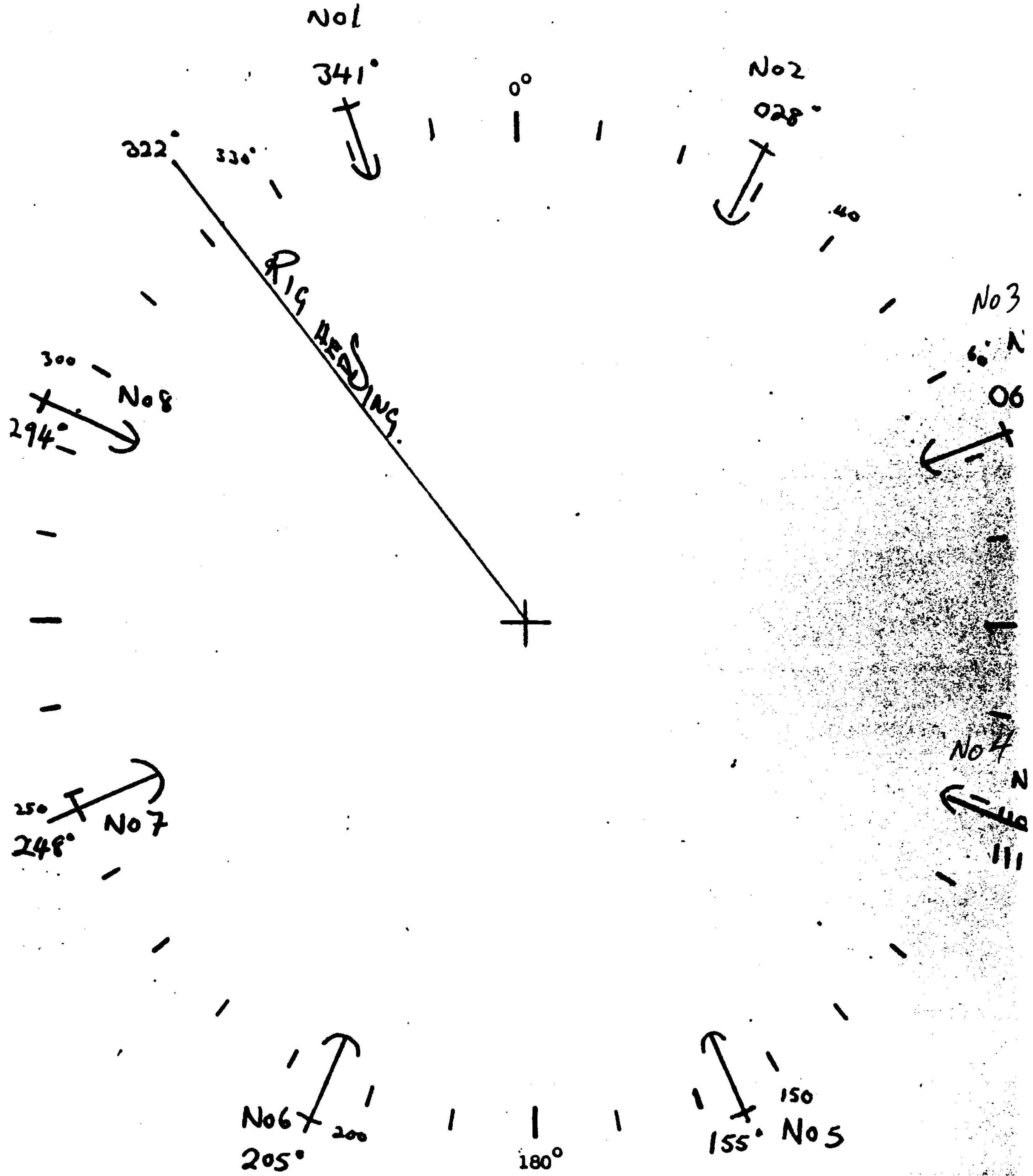
FINAL OBSERVED POSITION OF ANCHOR BUOYS RELATIVE TO CORNER OF RIG.

SKETCH OF ANCHOR PATTERN

RIG:

OLD LOCATION

DATE:

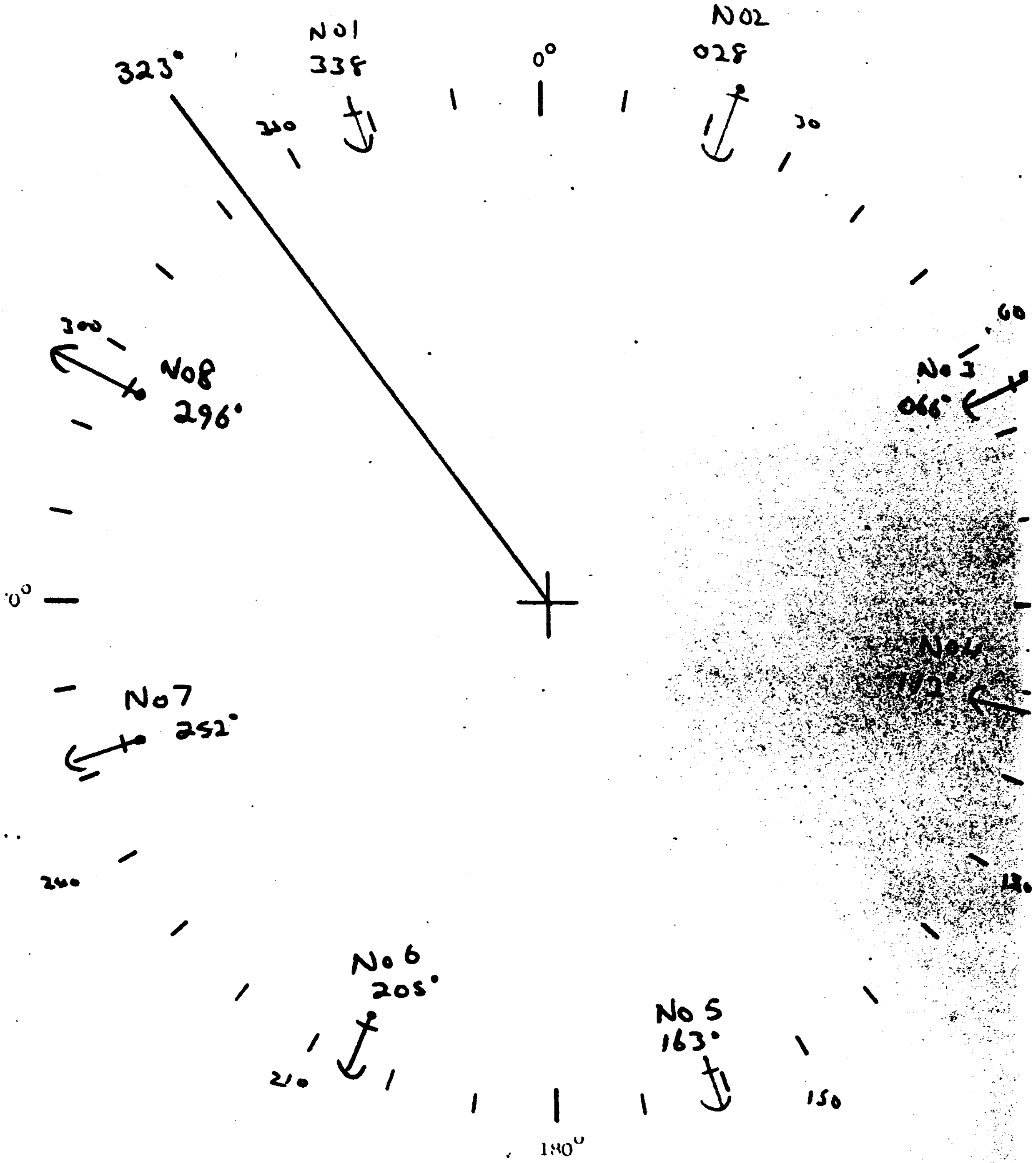


K. SKETCH OF ANCHOR PATTERN

RIG: BORGNY DOLPHIN

NEW LOCATION

DATE: 15th JUNE 1982



L. **RETRIEVING BACK-UP ANCHORS** NO BACK UPS

ANCHOR NO.	DATE/TIME	VESSEL	BUOY ON BOARD	ANCHOR ON DECK	BUOY IN WATER	DELAYS/REMARKS
		NONE				

M. RETRIEVING MAIN ANCHORS

ANCHOR NO.	VESSEL	VESSEL CALLED	BUOYS/ CHASER ON BOARD	ANCHOR OFF BOTTOM	RIG START HEAVING	ANCHOR RACKED	PENNANTS HANDED TO RIG	TOTAL TIME	LOST TIME	REMARKS EVENT + TIME
1	B.F.	2020	2050	2310	2310	NOT RACKED - TOW ON ANCHOR				ANCHOR KEPT ON BOTTOM UNTIL NO.5 RACKED
2	B.F.	1400	1415	1515	1516	1630	1640	2h. 40	NIL	V.C.
3	B.F.	1645	1705	1755	1800	1915	1915	2h. 30	NIL	V.C.
4	N.E.	1500	1515	1620	1630	1730	1730	2h. 30	NIL	V.C.
										1845 [illegible] S.S. TO CHA[illegible] CHAIN
5	N.E./SS	1810	1825/	1845/with parts			2345			
	S.S.	2005 COM CHASE	2110 C or D	2110	2110	2345				
6	S.S.	1625	1638	1715	1720	1840	1845	2h. 20	NIL	V.C.
7	S.S.	1400	1420	1457	1550	1615	1615	2h. 5	NIL	V.C.
8	N.E.	1845	1955	2040	2045	2200*	RIG TOWED ON ANCHOR			
							2200-2230 1st SHACKLE CHANGED FOR KENTERLINK			
9							2250 READY TO IN PENDANTS			
							TOW A NO.8			

I. **LOG OF TOW**

[illegible] 8.4 [illegible]

DATE	TIME	CO-ORDINATES	SPEED	DRAFT	DISTANCE COVERED	DISTANCE TO GO

REMARKS:

O. RUNNING MAIN ANCHORS

ANCHOR NO.	VESSEL	VESSEL CALLED	PENNANT/ ~~CHASER~~ PASSED	ANCHOR RAN OUT TO MARKER	ANCHOR ON BOTTOM	BUOY RELEASED	TOTAL TIME	LOST TIME	REMARKS
4	BY RIG				0404	0440	36m	NIL	[illegible]
1	B.F.	TOWING ON ANCHOR	COMM SLACK 0500	0535	340°. 0545	0645	1 hrs.45	NIL	
8	N.E.	TOWING ON ANCHOR	COMM SLACK 0515	0615	0620	0725	2 hr.10m	NIL	
5	S.S.	0550	0600	0640	0645	0715	1 hr.25m	NIL	
3	B.F.	0655	0700	0740	0805	0825	1 hr.30m	NIL	
6	S.S.	0730	0745	0840	0852	0935	2 hr. 5m	NIL	
7	N.E.	0830	0845	0930	0945	1005	1 hr.35m	NIL	
2	B.F.	0900	0925	1020	1030	1050	1 hr.30m	NIL	
1	S.S.	0940	BUOY ON DECK	COM LEAVE 1050	ANCHOR ON BOTH 1100			10 m.	No.8 ANCHOR LIFTED FROM BOTTOM TO HEAVE IN 200 FT
					COMBINED	TOTAL	12.36		

TOTAL START TO FINISH. 6hrs. 46 mins

LIST IN SEQUENCE OF RUNNING

P. RUNNING BACK-UP ANCHORS (PIGGY BACKS)

ANCHOR NO.	VESSEL	PIGGY BACK ON BOARD	BUOY ON BOARD/ START	P.B. ON BOTTOM	BUOY IN WATER	COMPOSITION OF PENNANTS	TOTAL TIME	LOST TIME	REMARKS
				NONE					
						TOTAL			

LIST IN SEQUENCE OF RUNNING

Q. RELAYING MAIN AND/OR BACK-UP ANCHORS

ANCHOR NO.	VESSEL	MAIN ANCHOR FROM	MAIN ANCHOR TO	MAIN ANCHOR TOTAL	BACK-UP ANCHOR FROM	BACK-UP ANCHOR TO	BACK-UP ANCHOR TOTAL	DELAYS	REMARKS
8	STAD SENIOR	1050	1100	10 min					NO.8 ANCHOR LIFTED OFF BOTTOM TO HEAVE IN 200FT.
			TOTAL	10 mins		TOTAL			

LOG OF CRAFT UTILISATION

RETRIEVING ANCHORS

VESSEL	NO. OF ANCHORS
1. BALDER FOSNA	1,2,3
2. STAD SENIOR	5,6,7
3. NORMAND ENG.	4,8
4.	

RUNNING ANCHORS

VESSEL	NO. OF ANCHORS
1. B.F.	1,3, & 2
2. S.S.	5,6
3. N.E.	8,7
4. RIG DROPPED NO.4	

VESSEL PERFORMANCE

ALL GOOD.

S.S. VERY GOOD - BIG NEW BOAT VERY GOOD WINCHES PLENTY OF STOWAGE SPACE

COMMENTS ON RIG MOVE

NO PROBLEMS. GOOD EQUIPMENT - [illegible] RIG.

ALL SHACKLES NOW [illegible]
ALL 4" [illegible] WIRE [illegible] BEFORE RUNNING ANCHORS

SUGGESTED IMPROVEMENTS/SOLUTIONS

IT WOULD BE USEFUL TO HAVE CHAIN TENSION GAUAGES IN PILOT HOUSE, SO ALL GUAGES COULD BE SEEN AT ALL STAGES OF OPERATION.

W.O.W. LOG

DATE	TIME	WIND		SEA			BARO
		SPEED KNOTS	DIREC -TION	DIREC -TION	HEIGHT ~~FEET~~ m	PERIOD SECONDS	
[illegible]							
13th	1500	45	NNE	NNE	7-8	6 secs	998
	1700	45	NNE	NNE	7-8	6 secs	998
14th	0700	30	NNW	N ly	5-6	5 secs	1002
	1400	30	N ly	N y	4-5	4 secs	1005