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NORSK HYDRO a.s
FINAL REPORT
WELL 30/7-4
LICENCE 040,
NORWAY

REGISTRERT

**NORSK HYDRO REPRESENTOREN
INFORMASJONSTJENESTEN**

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PREFACE

Licence 040 was awarded the Statoil/Petronord group in March 1975 with Norsk Hydro Produksjon a.s as operator. The licence includes the blocks 29/9 and 30/7 on the Norwegian Continental Shelf.

The group consists of the following companies.

Den norske stats oljeselskap a.s - Statoil	50 per cent
Elf Norge A/S	19,2 per cent
Total Marine Norsk A/S	14,4 per cent
Aquitaine Norge A/S	9,6 per cent
Norsk Hydro Produksjon a.s	6,8 per cent

The well 30/7-4 was drilled by Norsk Hydro Produksjon a.s on behalf of the Statoil/Petronord group.

SUMMARY

The main objective of the well was to test possible middle and lower Jurassic sandstones (Brent and Statfjord formations).

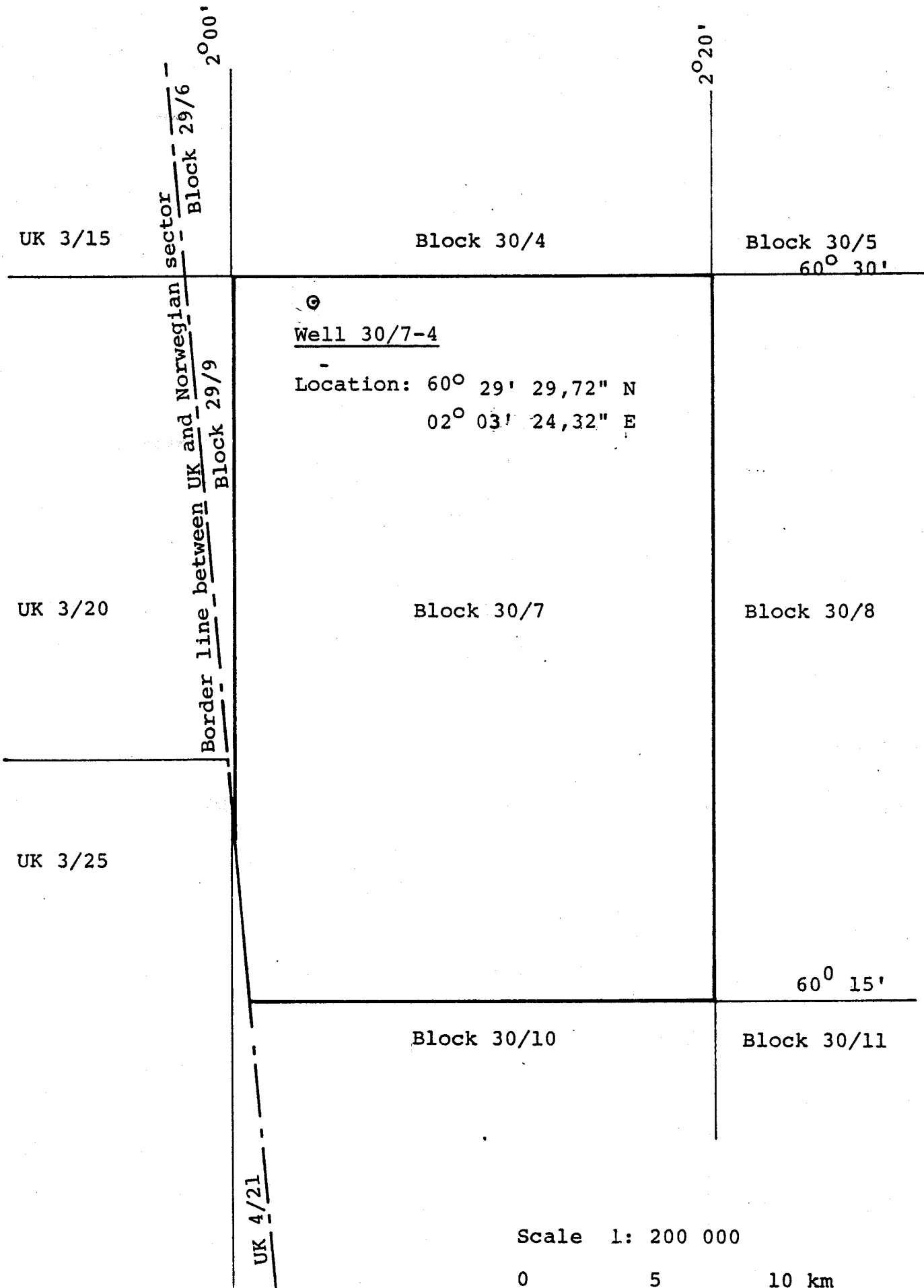
Secondary objectives were possible lower Cretaceous carbonate development, and possible upper Jurassic sandstones. However, after having drilled 26" hole down to the setting depth for the 20" casing, 778 m the drill string parted while pulling out of the hole. The bottom hole assembly was left in the hole. The fish was readily caught with fishing tools, but numerous attempts to pull the fish were unsuccessful.

The well was abandoned and a replacement well, 30/7-5 was spudded.

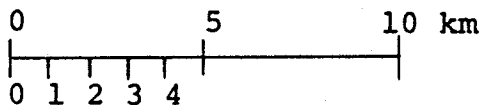
Operations to drill the well 30/7-4 started January 24, 1977 at 06.00 hrs. The well was spudded January 25, and a total depth of 778 m was reached. The drill string parted on February 3, and the well was plugged and abandoned on February 5, at 12.00 hrs.

The total cost of drilling the well was N. kr. 5.606.000,-.

LOCATION OF WELL 30/7 - 4



Scale 1: 200 000



SUMMARY OF WELL DATA

Location	60°29' 29,72" N 02°03' 24,32" E.
Operator	Norsk Hydro Produksjon a.s
Rig	Polyglomar Driller
Contractor	Rasmussen Global Marine Ltd
RKB elevation (to MSL)	25 m
Water depth (MSL)	117 m
Spudded	January 25,1977
Abandoned	February 5,1977
 Drilling of the well -----	
Hole diameters:	36" to 193 m. 17 1/2" to 778 m, opened to 26" down to 305 m.
Casing record:	30" set at 193 m.

SECTION A
OPERATIONS

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1. LOCATION SURVEY

A/S Geoteam performed a site survey with the survey vessel M/V EMERAD in the period 5th to 12th of January 1977. The instrumentation was a Simrad EKS echo sounder, an EG and G side scan sonar and an EG and G sparker boomer system.

The area surveyed was 3 x 3 kilometers square with two sides aligned at 32.5° and with the following center co-ordinates:

Latitude	$60^{\circ}29' 28,68''$ N
Longitude	$02^{\circ}03' 24,48''$ E

The sea floor in the area was found to be relatively even with a slight slope toward north east.

The upper zone was interpreted to consist of sand with an thickness of 45 meters.

The water was reported to be 117 m.

2. POSITIONING AND ANCHORING OF RIG

The rig was navigated into position of well 30/7-4 using the satellite navigation system with reference to the European Datum. Final location survey after spud in:

Latitude: 60°29'29,72" N
Longitude: 02°03'24,32" E

This was 54 m off planned location.

Eight anchors were run and tensioned to 150.000 lbs prior to spudding. The anchors were allowed to soak prior to drilling out of the 30" casing at which point they were tensioned to a minimum of 250.000 lbs. Normal operation tension was 200.000 lbs.

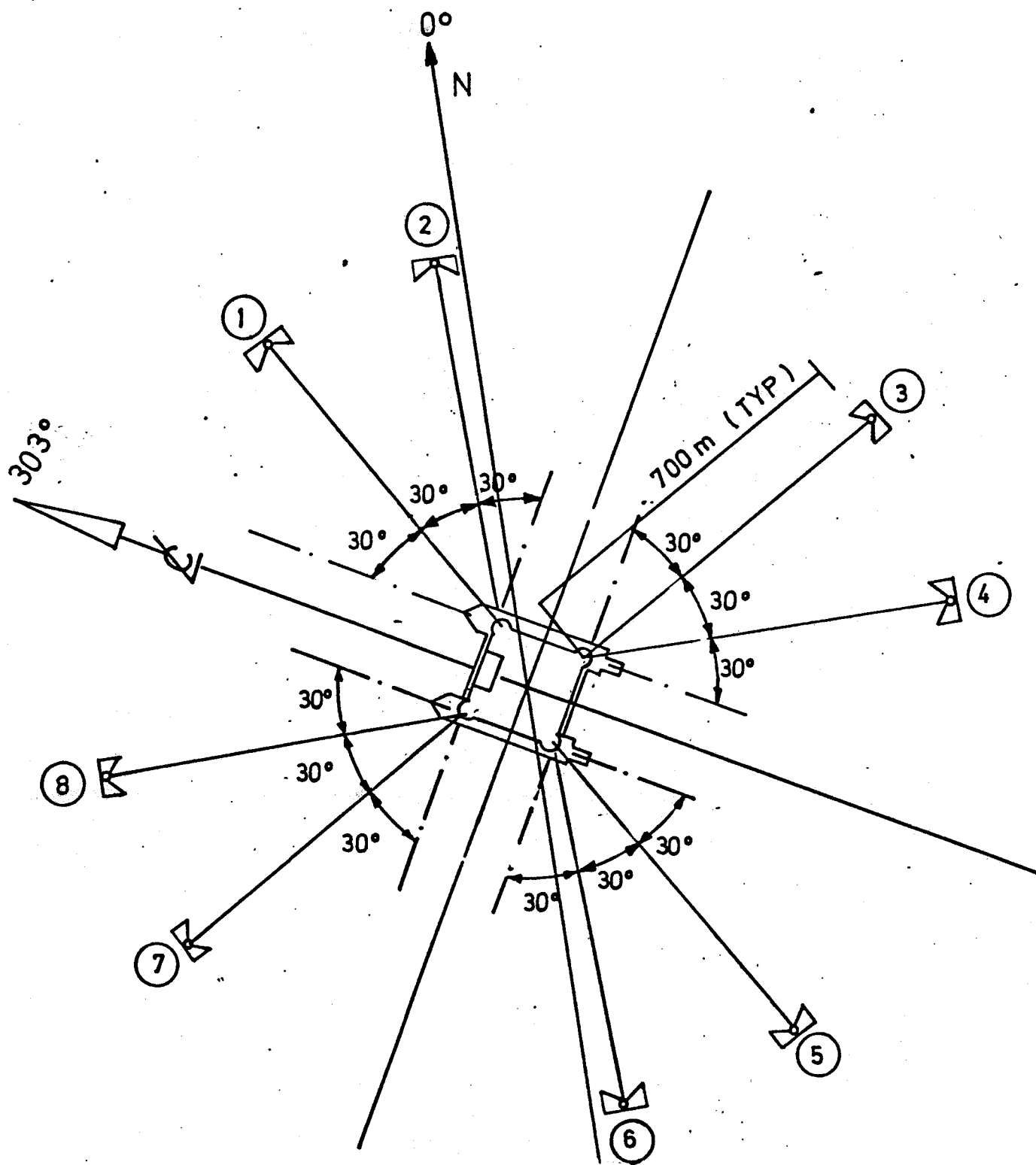
Fig. A.1 shows the mooring pattern plotted on true north heading. Results of the anchor tension test are found in table A.1.

Mooring Line Pattern

Polyglomar Driller

Well 30/7 - 4

(FWD Pilot House End)



Heading : 303°

Well coordinates : 60° 29' 29,72" N
02° 03' 24,32" E

Water depth (MSL) : 117 m

Fig.A1

TABLE A.1

ANCHOR TENSIONING - WELL 30/7-4

Anchor No.	Anchor tension test
1	250 000 lbs
2	290 000 lbs
3	260 000 lbs
4	270 000 lbs
5	260 000 lbs
6	260 000 lbs
7	310 000 lbs
8	250 000 lbs

3. RESUME OF OPERATIONS

3.1 Summary

The rig was taken over at 06.00 hrs. January 24 when the rig was under way to location 30/7-4. The rig reached location and anchors were set the same day. Well 30/7-4 was initially spudded the following day. A 17½" pilot hole was drilled to 192 m. The operation had to be suspended for two days due to bad weather. When the operation was continued, the 17½" pilot hole could not be found and a new 36" hole was drilled. The 30" casing was set and cemented at 193 m. The weather conditions made it necessary to set piggy backs on five anchors. A 17½" hole was drilled to 778 m, setting depth for the 20" casing. While reaming this hole with a 26" underreamer, the drill string parted leaving 240.5 m of bottom hole assembly and drill pipe in the hole. An over-shot was worked over the top of the fish. After having made several unsuccessful attempts to free the fish, the decision was made to abandon the well. Final abandonment of well 30/7-4 was completed at 12.00 hrs., February 5, 1977.

The rig was moved 150 ft to spud well 30/7-5.

3.2 Activity Report

The time distribution is presented in table A.3 and fig.A.3. About 20% of the total time was used for drilling and tripping before reaching 778 m.

About 13.6% (40 hours) was spent on attempts to free the fish stuck in the hole. A heavy winter storm made it necessary to wait on weather for 2.5 days (20% of total time).

TABLE A.2

HOLE DEVIATION

<u>Deviation</u>	<u>Direction</u>	<u>Depth</u>
1 deg.		193 m
1,5 deg.	N 11 W	225 m
0,5 deg.	N 17 E	311 m
0,5 deg.	S 80 W	406 m
0,5 deg.	S 62 E	501 m
1 deg.	S 37 W	596 m
0,5 deg.	S 30 W	700 m
1 deg.	S 55 E	778 m

TIME DISTRIBUTION WELL 3017-4

I T E M	OPERATIONS	Drilling operations hours	Plugging and aban- donment hours	TOTAL TIME	
				Hours	% of Total time
1	Under way	12.25	0	12.25	4.17
2	Mooring	20.75	0	20.75	7.08
3	Drilling	33.25	0	33.25	11.31
4	Tripping-Survey	29	0	29	9.86
5	Circulating	3.25	0	3.25	1.11
6	Run-cement casing	16.5	0	16.5	5.61
7	Formation evaluation	11.5	0	11.5	3.91
8	Subsea equipment	17	0	17	5.78
9	Lost time-DRLG equip	0.5	0	0.5	0.17
10	- , , - Subsea equip.	0	0	0	0
11	- , , - Fishing	40	0	40	13.61
12	- , , - Hole problems	2	0	2	0.68
13	Mooring - , , - system	27.5	0	27.5	9.35
14	- , , - W O weather	58.75	0	58.75	19.98
15	- , , - W O equip.	0	0	0	0
16	- , , - W O orders	0	0	0	0
17	- , , - Completion equip.	0	0	0	0
18	- , , - Other	9.75	0	9.75	3.32
19	Plug and Abandon	0	12	12	4.08
20	CUMULATIVE TOTALS	282	12	294	100

TIME DISTRIBUTION WELL 30/7-4

TOTAL TIME : 294 HOURS (12,25 DAYS)

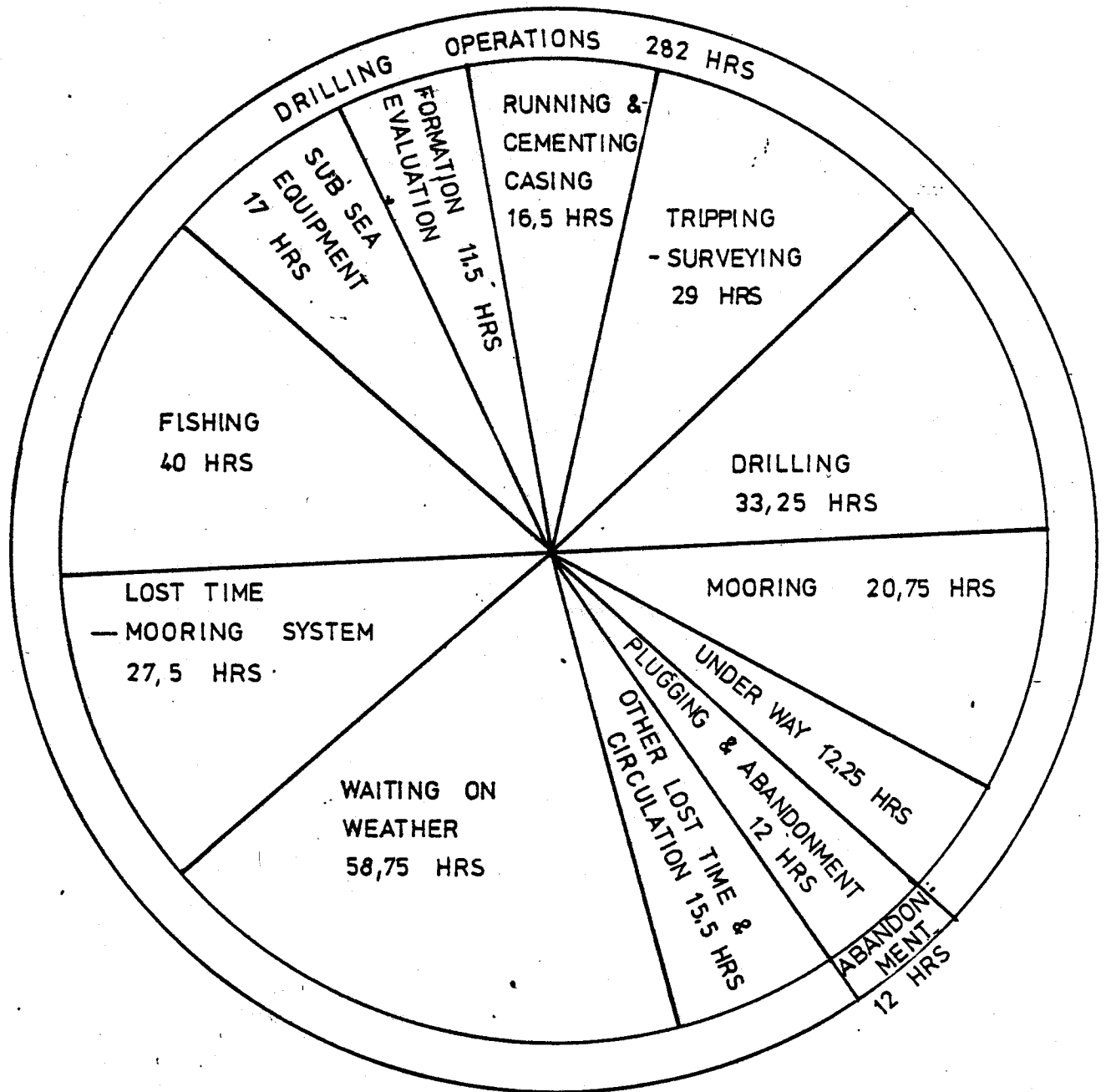


FIG. A.2.

3.3 Fishing Operations

While reaming out the 17½" hole to 26" prior to running 20" casing, the drill string parted. An overshot was worked over the fish but attempts to pull the fish were unsuccessful. The string was backed off at 538 m in the x-over above the overshot and the well was abandoned.

A list of tools is presented in table A.4.

TABLE A.4

LIST OF TOOLS LOST IN THE HOLE

Quantity	Description
1	17½" Bit
1	X-over sub - 6-5/8" reg. pin x 7-5/8" reg. box, 10" OD
1	26" DUR-16 underreamer - 6-5/8 reg. box and pin
1	X-over sub - NC 70 box x 6-5/8" reg. box, 10" OD
1	10" OD monel drill collar - NC 70 box and pin
2	17½" Servco stabilizer series 9096,-NC 70 box x NC 70 pin
8	10" OD drill collars - NC 70 box and pin
1	X-over sub - NC 50 box x NC 70 pin, 10" OD
9	5" OD Hevi Wate drill pipe - NC 50 box and pin
1	5" OD grade "E" 19,5 lbs/ft drill pipe - NC 50 box and pin
6	5" OD grade "G" - 105, 19,5 lbs/ft drill pipe - NC 50 box and pin
1	11-3/4" Bowen overshot w/6½" basket grapple - NC 56 box
1	X-over sub - NC 50 box x NC 56 pin
1	Basket grapple control mill and grapple control packer
1	42" Bowen hook wall guide for 11-3/4" overshot

Total cost: N. kr. 723.000,-

3.4 Diary Report

The rig was taken over by Norsk Hydro at 06.00 hrs on January 24, 1977 and moved to block 30/7 to spud well 30/7-4.

January 24, 1977

Under way to location 30/7-4. Arrived at location and set anchors. Started ballasting down the rig.

January 25, 1977

Ballasted the rig. Determined position with satellite navigation system. Adjusted position by moving rig with anchors. RIH and tagged sea bed at 142 m. Drilled 17½" pilot hole to 192 m. POOH. Reentered the hole twice without any problem. WOW to make up 30" casing.

January 26, 1977

WOW. Rigged up baseplate. Made up two joints of 30" casing. Tested anchors to 220 000 lbs. WOW.

January 27, 1977

WOW. Tested mud manifold to 5000 psi. Picked up 4 joints of 30" casing with wellhead and made up stinger.

January 28, 1977

Locked the casing into the base plate. Hung off casing to starboard side. Made up 36" hole opener and 26" bit. Drilled 36" hole to 193 m. Circulated and cleaned the hole. Made up running tool and ran 30" casing to 193 m. Started to cement the 30" casing.

January 29, 1977

Cemented 30" casing with 443 sxs class "G" + 12% gel + 2% CaCl₂, and 504 sxs class "G" + 2% CaCl₂. Held tension on

casing with heave compensator. Backed off running tool and POOH. Picked up the riser assembly. Positioned the rig over the hole. Ran the riser and the 30" hydraulic latch.

January 30, 1977

Made up bottom hole assembly with 17½" bit. Drilled cement from 190 to 193 m. Drilled from 193 to 225 m. Circulated and ran survey. Drilled from 225 to 311 m. Lost some mud into the formation. Circulated until full circulation was regained. A total of 70 bbls of mud were injected in to the formation.

No. 6 anchor slipped. POOH due to mooring failure. Released 30" latch and pulled riser and BOP stack. WOW. Tested BOP on the stump.

January 31, 1977

Set piggy back on No. 2 and 3 anchor. Picked up No. 6 anchor and ran out same with piggy back. Latched 30" hydraulic latch to wellhead and repositioned the rig. Made pick up test on the hydraulic latch.

February 1, 1977

Made up 17½" bit and bottom hole assembly. RIH. Drilled from 311 to 772 m. Ran survey at 406 m, 501 m, 596 m, 700 m.

February 2, 1977

Drilled from 772 to 778 m. Circulated for bottom hole samples. Ran survey at 778 m. Made wiper trip to the 30" shoe. Worked through bridge at 618 m. Checked for flow and POOH. Ran BHC/GR log. Made up new bit and RIH.

Circulated and conditioned the mud. POOH. RIH with 26" underreamer. Reamed to 209 m. Boulders encountered from 199 to 209 m. POOH to inspect underreamer and stabilizers as excessive movement of the riser was observed. Ran TV to inspect the wellhead and found mud leak at the base plate. Jumped divers to inspect leak at the base plate.

February 3, 1977

RIH to 209 m and circulated. The divers found mud flowing up through the formation 10 m from the base plate. Reamed from 209 to 305 m. Twisted off drill pipe inside the riser at 64,5 m RKB. (length of fish = 240,5 m). Last joint pin end showed wash out in shulder. POOH with drill pipe. Made up overshot with 6-3/8" basket grapple, 15" guide, 6 ea 8" drill collars, drill pipe. RIH to tag the top of the fish. Tagged side of fish at 674 m. POOH. Dressed overshot with 11-3/4" wall guide and RIH. Stopped at 200 m as one joint of drill pipe was bent. POOH and lay down bent joint of drill pipe. RIH with overshot. Worked the overshot over the fish at 539 m. Circulated and worked the pipe over the fish.

February 4, 1977

Worked the pipe in attempt to free the fish. Spotted 40 bbls mud with 0.5% diesel. Pumped sea water at 1200 psi. Spotted mud with 'Pipe Lax' and worked the pipe. Made a misrun with the free point indicator. Ran charge, but were unable to get it below 667 m. Ran collar locator to 550 m. Attempted to back off the fish at 665 m, but unscrewed in x-over sub on top of overshot. Ran in the hole with open ended drill pipe. Bridge found at 208 m. Worked through bridge to 542 m. Circulated pipe clean and rigged up to cement.

February 5, 1977

Spotted cement plug from 490 m to 540 m. Pulled out of cement and circulated with sea water, Spotted second cement plug from 160 m to 230 m. Pulled out to 155 m and circulated with sea water, POOH, Ran charge to 151 m and severed the 30" casing. Worked casing and base plate free with an overpull of 169 000 lbs. Pulled riser and 30" latch with the wellhead.

The well was abandoned at 12.00 hrs, February 5, 1977.

4. ABANDONMENT OF THE WELL

Cement plug No. 1 was set from 540 m to 490 m with 525 sxs class G cement with 2% CaCl_2 .

Plug No. 2 was set from 230 m to 160 m with 854 sxs class G cement with 2% CaCl_2 . (30" casing was set at 193 m).

The 30" casing was severed 11 m below the sea bed and the wellhead was retrieved.

The sea floor inspection was postponed due to bad weather, but a side scan sonar survey of the area will be made after completion of the planned well.

See fig. A.6 for abandonment details. -

ABANDONMENT OF WELL 30/7-4

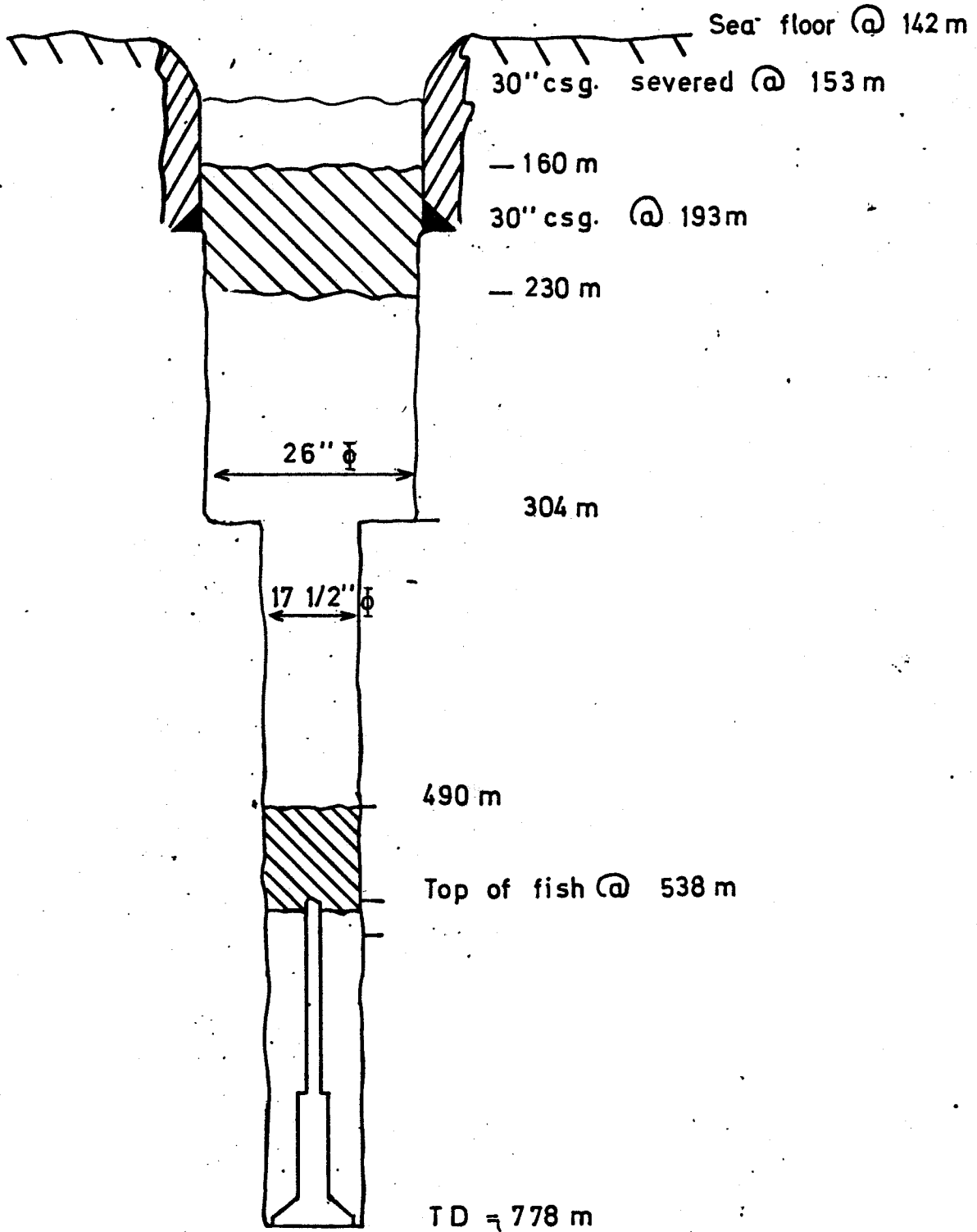


fig. A.3

5. MATERIALS REPORT

5.1 Casing and Wellhead

A Vetco wellhead system was used. The 36" hole was drilled without any guidance system. The 30" casing was run with the 4 post guide base. The riser was run and latched to the 30" housing with the hydraulic latch before drilling the 17½" pilot hole.

Only 30" casing was run before the hole was abandoned.

Size	Grade	Weight, lbs/ft	Quantity	Setting depth/m
30"	2	457	1 jt.	152 m
30"	2	310	3 jts.	193 m

5.2 Bit Record

The drill bits used in this well are specified in the bit record, table A.5.

TABLE A.5

BIT RECORD

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COUNTY NORTH SEA		FIELD 30/7		STATE NORWAY		SECTION	TOWNSHIP	RANGE	LOCATION		WELL NO. 30/7-4'
CONTRACTOR RASMUSSEN GLOBAL MARINE LTD.			RIG NO. Poly - 60MAR DRILLER	OPERATOR NORSK HYDRO			TOOLPUSHER		SALESMAN		
SPUD 24.1.77 @0600 HRS.	UNDER SURF.	UNDER INTER.	SET SAND ST.	REACHED T.D.	PUMP NO. 1	LINER 7 1/4" x 12"		PUMP NO. 2	LINER 7 1/4" x 12"	PUMP POWER 1600 HP	TYPE MUD
DRILL PIPE 5" O.D. - 19.5 LBS/FT		TOOL JOINTS	SIZE	TYPE	O.D.	NUMBER	O.D.	I.D.	LENGTH	DRAWWORKS POWER	
DRILL COLLARS											

NO.	SIZE	MAKE	TYPE	JET 32ND IN	SERIAL	DEPTH OUT	METER	HOURS	M/HR	ACCUM ORLG. HRS.	WT. 1000 LBS.	R P M	VERT DEV.	PUMP PRESS	PUMP OPER. ATION	S P M		MUD			DULL. COND.				FORMATION REMARKS			
																1	2	WT.	VIS.	W.L.	T	B	G	OTHER				
1	17 1/2"	REED	Y-11-J	—		192	50	3	166	3	0/5	50/65		700		115		S. W.									Boulders at 178 m.	
2	26"	TSUKAMOTO	TSK	3-22		193	51	5	10.2	8	0/5	50/60	1°	700		70	70	S. W.										
	36"	SERVCO	H.O.																									
3	17 1/2"	REED	Y-11-J	3-20		311	118	4 1/2	26.2	12 1/2	20/30	150	1/2°	2700		100	100	SALT WATER									MUD. INC	
4	17 1/2"	"	Y-11-J	3-20		778	467	16 1/4	28.7	28 3/4	5/10	150	1/2°	2700		75	75	—									34 I	
5	17 1/2"	"	Y-11-J	3-20																								
	26"	AZ	DUR-16																									LOST IN THE HOLE

Table A5

5.3 Mud Report

36" hole 30" casing Drilled with sea water with return to the sea bed. Displaced hole with spud mud before running casing.

MW = 1,20

Visc = 60 sec/qt

Drilled out cement in 30" csg. with sea water.

17½" pilot hole

Drilled with prehydrated gel - sea water system. When the pilot hole reached setting depth for the 20" casing, viscous mud was spotted before running in hole with the 26" hole opener. The hole was lost before the reaming was finished.

See table A.6.

TABLE A6
MUD SUMMARY - WELL 30/7-4
MUD SYSTEM - SEAWATER GEL

Depth m	W.t. Sp.gr.	Funn. Visc.	P.V. CP	Y.P lb/100 ft ²	Gelstr. lb/100 ft ²	Ph	Water loss	Cake 32nd in.	Fm	Pf/Mf	Cloride ppm	Calsium ppm	Sand %	Solids %	Oil %	Water %	Meth. blue
193	1,07	51	11	8	3/22	9	-	4	-	0,151	8500	350	1	5	0	95	-
310	1,04	33	11	6	2/7	9	-	4	-	0,1	8000	200	0,5	5	0	95	-
772	1,07	40	10	13	4/8	10	-	2	-	0,3	7000	280	4	12	0	88	-
778	1,07	50	19	23	4/6	9,5	-	3	-	1	7000	220	1	3	0	97	-

5.4 Cementing Report

The 30" casing was cemented with 443 sxs class G cement with 12% gel and 2% CaCl₂ as lead slurry, and 504 sxs class G cement with 2% CaCl₂ as tail-in slurry. The 30" casing was cemented with returns to the sea floor.

For the abandonment procedure see chapter 4 and fig.A.4.

COST REPORT

A cost report for the well is found in table A.7. The costs are considered preliminary because some of the items may be redated later.

TABLE A.7

OPERATION COSTS

Amounts in 1000 N. kr.

Misc. services rel. to rig pos.

Locationing	150	
Pilots, harbour fees, misc.	<u>33</u>	
Sub total, positioning		183

Drilling rig

Rig contract	<u>2.462</u>	
Sub total, drilling rig		2.462

Supplies

Drill bits	50	
Casing and casing eq.	217	
Mud products	251	
Cement	67	
Wellhead eq.	137	
Fuel and greases	184	
Miscellaneous	<u>5</u>	
Sub total, supplies		911

Services and tool rentals

Helicopter	200	
Supply boats/standby ship	551	
Mud engineering	10	
Mud logging	60	
Cementing	32	
Logging	85	
Test tool rentals	22	
Diving	155	
Radioservices	6	
Catering	12	
Miscellaneous services	<u>25</u>	
Sub total, services and tool rentals:		1.158

Amounts in 1000 N. kr

Costs related to operation

Mobilisation	167
Repair cost	137
Insurance	61
Base	135
Laboratory studies	12
Onshore services	186
Drilling supervision	102
Geological supervision	70
Exploration assistance	12
Miscellaneous	<u>10</u>

Sub total related costs

Operation:

892

Total operation cost of well:

5.606

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FIG. A 4

DRILLING PROGRESS, WELL 30/7-4

Operator:
 Coordinates: 60° 29' 29,72" N
 02° 03' 24,32" E

Spud in: Jan 25, 1977
 Well compl: Feb. 5, 1977
 Rig: Polyglomar Driller

Water depth: 117m
 RKB to MSL: 25m
 RKB to SeaBed: 142m

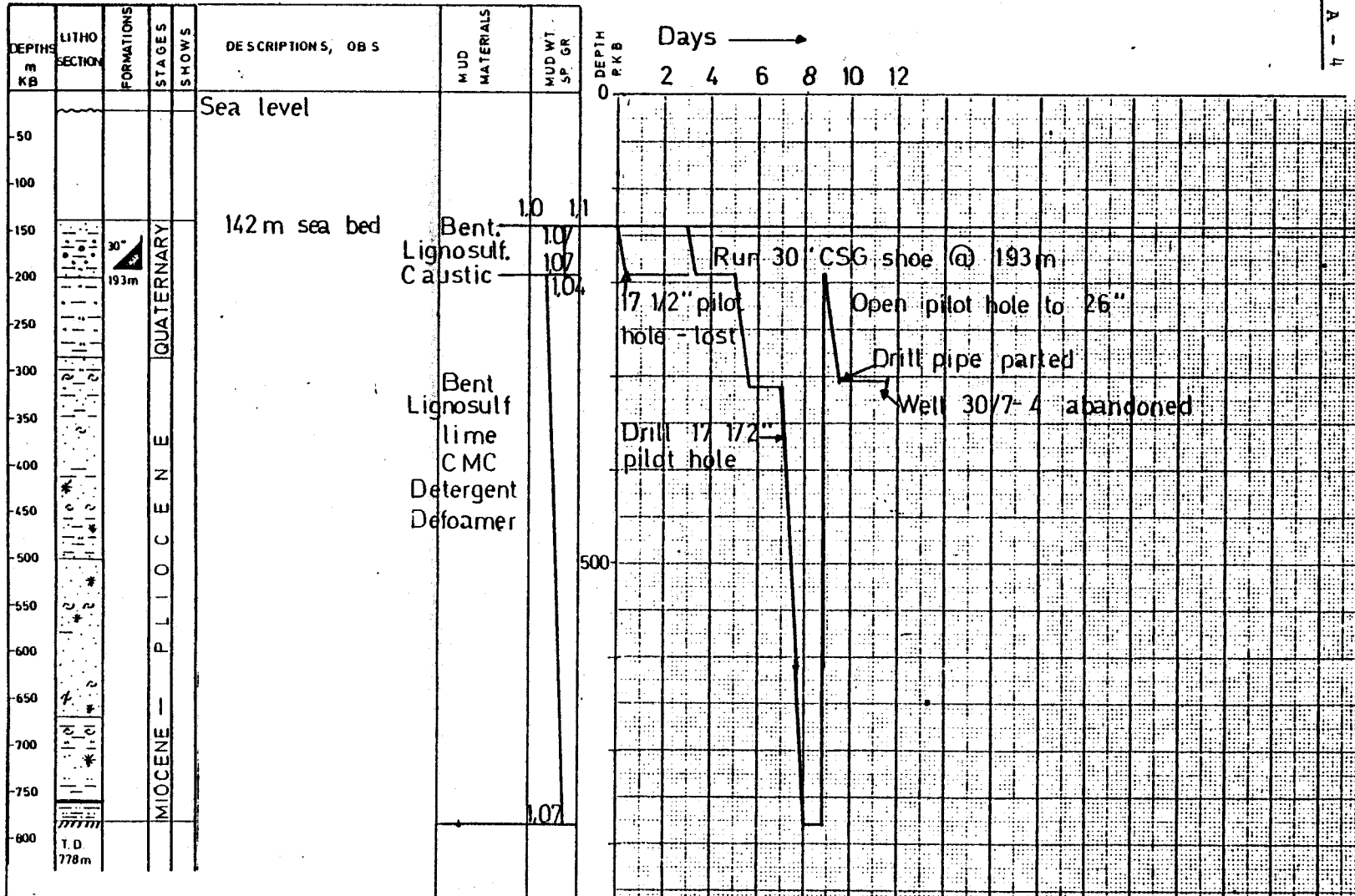


FIG. A - 4

SECTION B

GEOLOGY

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B.1. WELL SUMMARY

1. OBJECTIVES

The main objective of the well was to test possible middle and lower Jurassic sandstones (Brent and Statfjord formations). Secondary objectives were possible lower Cretaceous carbonate development, and possible upper Jurassic sandstones.

2. RESULTS

None of the objectives were tested due to abandonment of the hole at 778 m, i.e. before 20" casing could be set.

3. STRATIGRAPHY

SYSTEM	SERIES/STAGE	INTERVAL M (R.K.B)	THICKNESS (M)
QUATERNARY	Early Pleistocene	141 - 286	145
TERTIARY	Miocene-Pliocene	286 - 778	492

The stratigraphic division is based on results obtained by the "Continental Shelf Institute" (IKU) from samples taken in a subsequent well at the same location: 30/7-6. Divisions are based on biostratigraphy and almost exclusively depending on identification of foraminifera.

In addition, correlations of litho and electric logs have been made with wells 30/7-5, 30/7-6 and others nearby.

4. LITHOLOGY

I. Early Pleistocene

141 - 286 m

Note:

Between 141 m (sea bed) and 195 m there were no sample returns and the lithology was interpreted from rate of penetration and samples found adhered to the bit and hole-opener assembly.

141 - 178 m

Unconsolidated sand: clear quartz, very fine to medium, subangular to subrounded grains with glauconite, pyrite, and shell fragments. At around 165 m this breaks over to silty and sandy clays: medium to dark grey, soft and sticky, slightly calcareous and with some pebbles.

The base of this unit is defined by a thin glacial clay overlying a pebble and boulder bed; scour channels are known to truncate both, inferring their infra-glacial age. The overlying unconsolidated sands infill the channels and are post-glacial to present day.

178 - 286 m

Clay and unconsolidated sands similar to above, with boulders and pebbles at the top, down-grading into more homogeneous silty clay below 204 m. The boulders and pebbles are an admixture of rolled granites, gneisses, schists and flints. The underlying clay is dark to medium grey, firm, sticky, silty and slightly calcareous, it is interpreted as representing a glacial marine environment.

II. Miocene - Pliocene

286 - 778 m (total depth)

A mixed lithology comprising mainly unconsolidated sands with interbedded clays. Shell fragments are abundant at several horizons, the sand is frequently glauconitic and thin lignite occurs at 760 m.

The sand is generally clear, very fine to medium, and occasionally coarse grained, moderate to poorly sorted, and angular to rounded. The glauconite is generally nodular and dark green; occasionally there is mica. Macro-shell fragments are dominated by lamellibranchs, with occasional echinoids and gastropods; the dominating fauna, however, is foraminifera. The environment is interpreted as shallow marine.

The interspersed clays are medium grey to olive, soft and sticky, occasionally becoming slightly more indurated and firm, with frequent intervals of silty clay. Occasional beds of silt occur, these being brown-grey to light grey, soft and slightly calcareous.

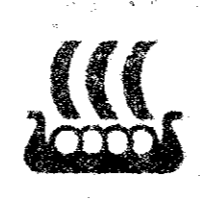
5. HYDROCARBON SHOWS

No oil shows were encountered. Gas shows were small and never more than 2.4%. The only gas encountered was methane (C1). In general gas was encountered as follows:

200 - 280 m:	Trace - zero
280 - 560 m:	Average of 0.5% with peaks correlating with sands at: 290: 1.8% 330: 3.0% 410: 2.16%
560 - 778 m:	Trace to zero

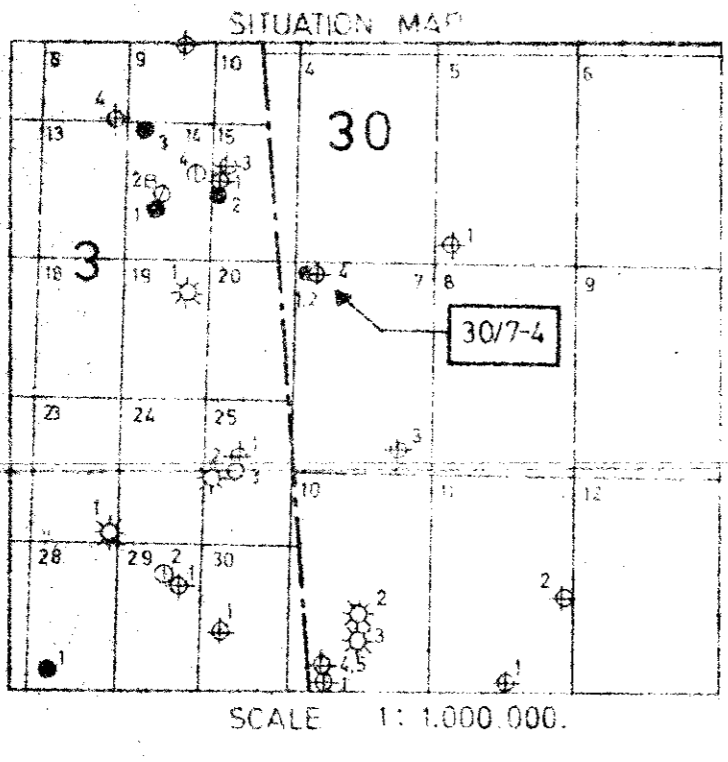
6. LOGGING

A Sonic-Gamma Ray log was run from 779.5 m to 193 m (loggers depths) in the 17½" pilot hole prior to enlargement. The Gamma Ray was run through 30" casing to surface.



Composite well log

Scale 1:500

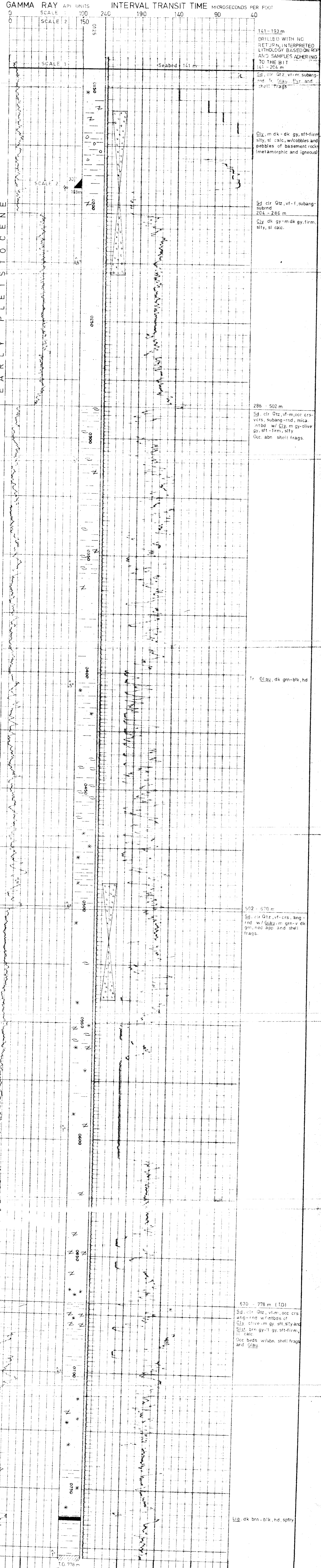
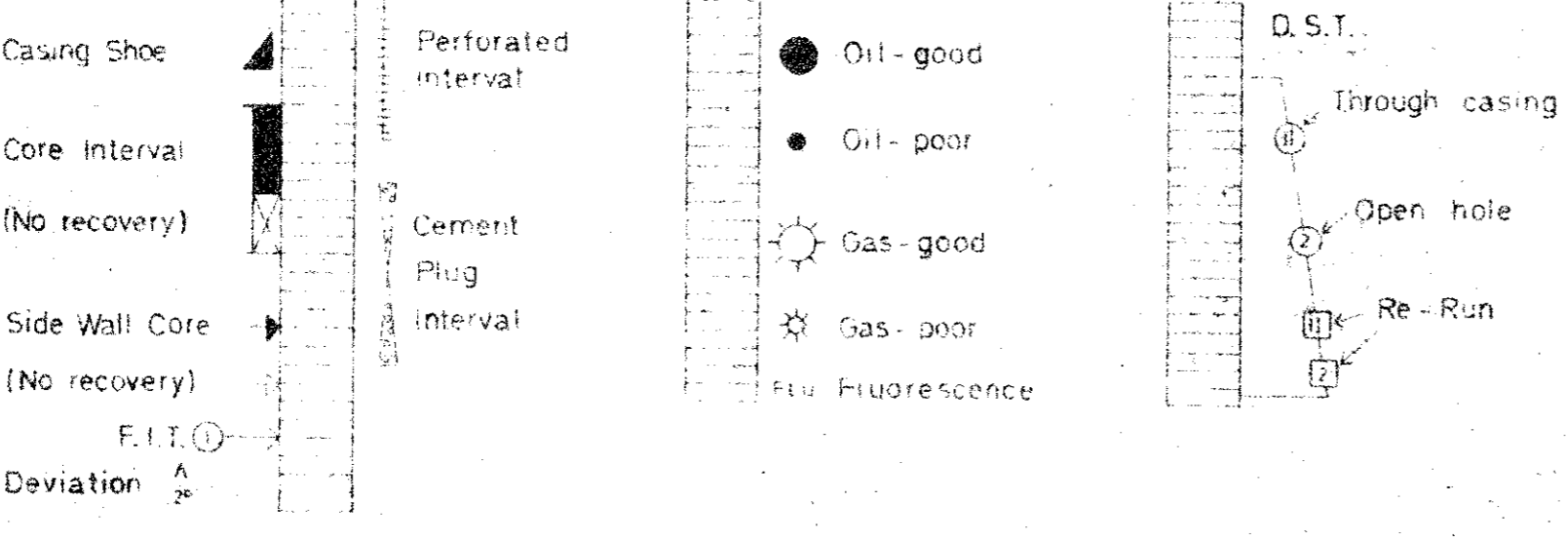


COORDINATES N 60° 29' 29.72"
E 02° 03' 24.32"
ELEVATION KB: 25 m
WATER DEPTH: 117 m
T.D. (DRILLER): 778 m
T.D. (LOGGER): 779.5 m
CASING RECORD: 31 - 193 m
REMARKS: Hole lost due to twisted off on pipe
GEOLOGISTS: Beckman, Thomassen

DATE ON LOCATION: Jan. 24th 1977
DATE SPUNDED: Jan. 25th 1977
REACHED T.D.: Feb. 1st 1977
COMPLETED: Feb. 5th 1977
STATUS: Plugged and abandoned
AQ: Polyglomar Driller
METHODOLOGY: Exploration Logging

CLAY	SAND / SANDSTONE	DIOLOMITE	CONGLOMERATE	ANHYDRITE
CLAYSTONE	SILT / SILTSTONE	KALCAREOUS DILOMITE	CHALK	SALT
SHALE	LIMESTONE	MARL / MARLSTONE	TUFF	GYPSUM
SILTY SHALE	DIOLOMITE	COAL / LIGNITE	IGNEOUS UNDIFFERENTIATED	

- | | | | |
|---------------------|-----------------|----------------|--------------------------|
| C Carbonaceous mat. | Phosphate | Y Bryozoans | Macrofossils |
| △ Chert | Pyrite/Hematite | Corals | Microfossils |
| * Glauconite | Algae | Foraminifera | P Foraminifera |
| M Mica | Brachiopods | B Gastrotrichs | Tubes (undifferentiated) |



T E R T I A R Y E O C E N E P L I O C E N E E O C E N E P L I O C E N E Q U A T E R N A R Y E A R L Y P L E I S T O C E N E Q U A T E R N A R Y

141 - 193 m
DRILLED WITH NO RETURN, INTERPRETED LITHOLOGY BASED ON ROP AND SAMPLES ADHERING TO THE BIT
141 - 204 m
Sd, clr Qtz, vt-m subang-rnd Tr Glau, Pyr and shell frags

193 - 204 m
Sd, clr Qtz, vt-f, subang-subrnd
204 - 286 m
Cly dk gy-mdk gy, firm, silty, sl calc.

286 - 502 m
Sd, clr Qtz, vt-m, occ crs-vcrs, subang-rnd, mica, intbd w/ Cly, m gy-olive gy, sft-firm, silty Occ abn shell frags.

502 - 670 m
Sd, clr Qtz, vt-m, occ crs-rnd w/ Glau, m grn-v dk grn, red app and shell frags.

670 - 778 m (T.D.)
Sd, clr Qtz, vt-m, occ crs-ang-rnd w/intbds of Cly, olive-m gy, sft, silty and calc.
Occ beds w/abn shell frags and Glau

Liq. dk brn-blk, hd, spfry