WELLFILE

NORSK HYDRO a.s
FINAL REPORT
WELL 15/5-2
LICENCE 048

No 20
FC

Norsk Hydro

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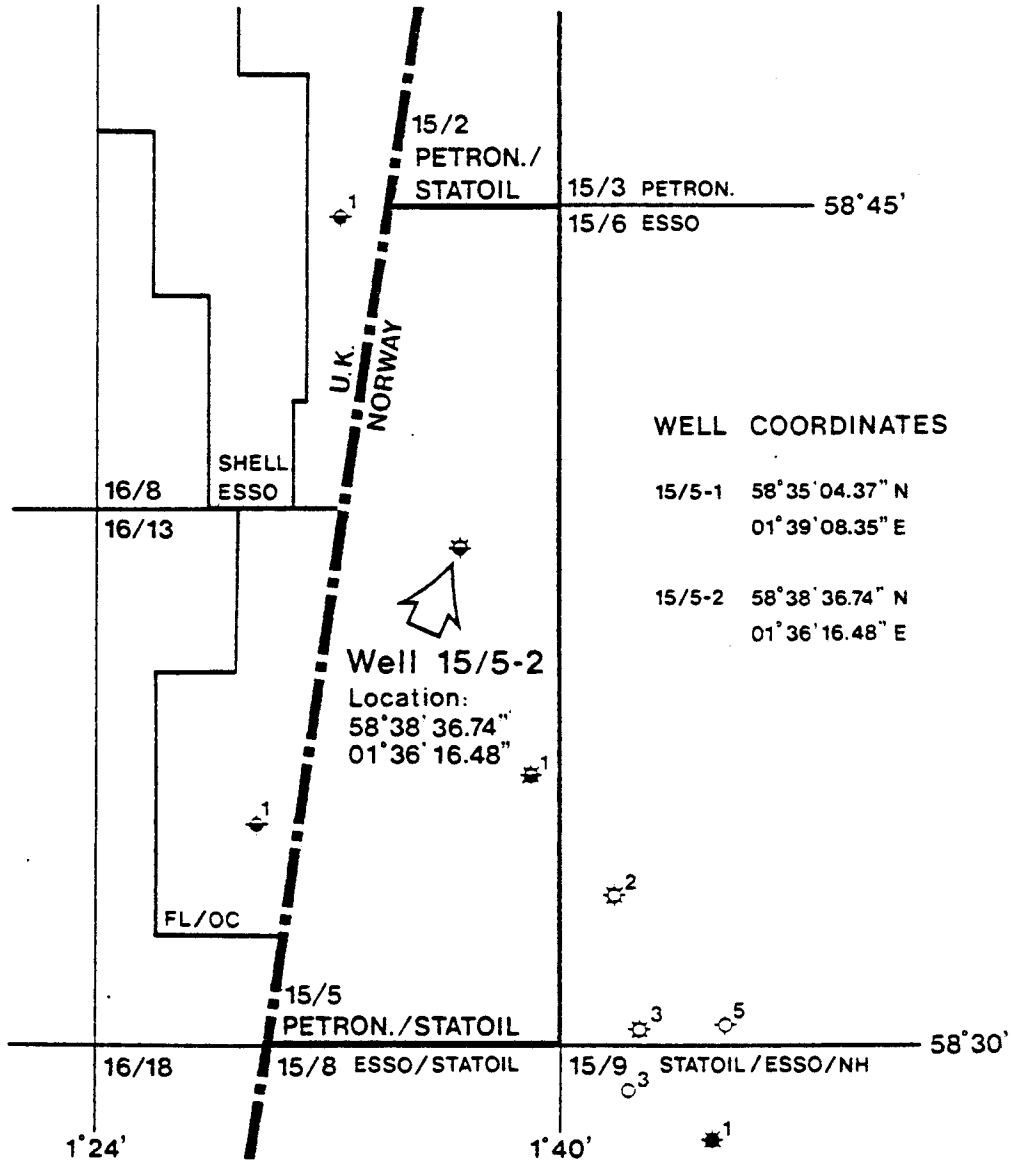
PREFACE

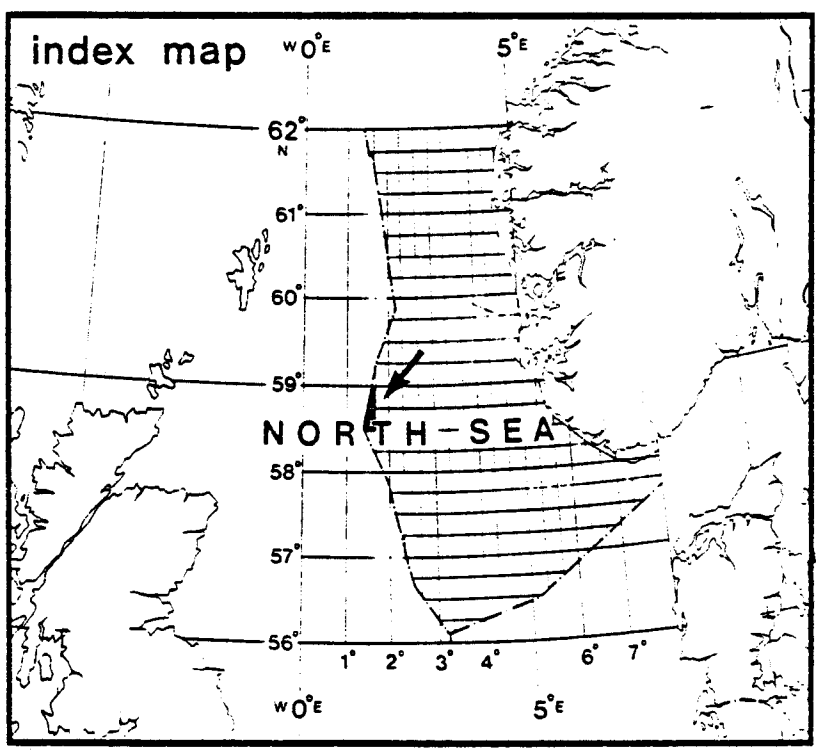
Licence 048 was awarded the Statoil/Petronord group February 18, 1977 with Norsk Hydro Produksjon a.s as operator. The licence includes the blocks 15/2 and 15/5 on the Norwegian continental shelf.

The group consists of the following companies:

Den norske stats oljeselskap	50%
Elf Aquitaine Norge a.s	21.8%
Norsk Hydro Produksjon a.s	17.3%
Total Marine Norsk a.s	10.9%

The well 15/5-2 was drilled by Norsk Hydro Produksjon a.s on behalf of the Statoil/Petronord Group.





location map

5 km

5 miles

Norsk Hydro

TABLE 1

SUMMARY OF WELL DATA

Location:	58°38'36.7" N 1°36'16.5" E
Operator:	Norsk Hydro Produksjon a.s
Rig:	Treasure Seeker
Contractor:	Wilh. Wilhelmsen
RKB elevation (to MSL)	25 m
Water depth	120.5 m MSL (145.5 m RKB)

Phase I

Start of operations:	August 15, 1978
Well spudded:	August 16, 1978
Well temporary abandoned:	December 16, 1978
T.D. (Driller):	4322 m
T.D. (Logger):	4326 m
Formation at T.D.:	Triassic sandstones
Status:	Temporarily abandoned with oil and gas shows in Jurassic and Triassic sandstones.

Well program

Hole record:	36" to 194.5 m
	26" to 469 m
	17½" to 1615 m
	12-1/4" to 3714 m
	8-3/8" to 4322 m

Casing record: 30" set at 194 m
20" set at 454 m
13-3/8" set at 1598 m
9-5/8" set at 3696 m
7" liner set at 4300 m

All depths are given with reference to RKB.

SECTION A

GEOLOGY

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1. OBJECTIVES

The main objective of the well was to test possible hydrocarbon accumulations in Middle to Upper Jurassic Bathonian/Callovian transgressive sandstones and Middle Jurassic Bajocian deltaic sandstones. The well was located in a purposely off crestal position on an approx. 16 sq. km large structure some 7 km NW of the 15/5-1 discovery. The well was planned to penetrate into the Triassic with a projected total depth of 4500 m.

2. RESULTS

The 15/5-2 well encountered two hydrocarbon bearing sandstone intervals. In the Jurassic a thin Early to Middle Bathonian sandstone development was penetrated. Below in a formation interpreted to be of Triassic age a second hydrocarbon bearing sandstone interval was encountered. The prognosed well-developed Bathonian/Callovian and Bajocian sandstones were not found.

The Jurassic sandstone interval extended between 4035 m (depths ref.: loggers depths below K.B.) and 4055 m in the well. Interbeds of siltstones and shales reduced the 20 m gross pay to a net pay of 7.3 m from wireline log interpretation. Average porosity and average water saturation over the pay interval have been calculated to 14.3 and 41.7% respectively.

The top of the Triassic sandstones were encountered at 4141.3 m and continued with interbeds of varicoloured shales and siltstones to the T.D. of the well at 4326 m. From wireline log evaluation hydrocarbon bearing sandstones can be seen down to 4158.1 m. Below this a tight cemented sandstone appears, masking the exact hydrocarbon - water contact. Proved gross pay interval is thus 16.8 m while the net pay is 12.8 m. Average porosity over this interval has been calculated to 14.6 % and the average water saturation to 43 %.

RFTs were run to evaluate both reservoirs. In the Jurassic sandstone at 4053 m a formation pressure of 705.1 bars (10227 psig) was recorded. The Triassic sandstone reservoir had a formation pressure at 4143.5 m of 721.2 bars (10460 psig). Several segregated samples were taken, but all failed to recover any formation fluid.

The well was terminated at a depth of 4326 m in a formation interpreted to be of Triassic age. It is temporarily abandoned and will be re-entered to be production tested over the Triassic sandstone interval 4142 - 4158 m.

3. STRATIGRAPHY

The biostratigraphic evaluation of the well 15/5-2 has been performed by the laboratories of Robertson Research International Ltd., covering the interval 200 - 4323 m (KB).

The basic material for the analyses is ditch cutting samples, but also chips from conventional cores and a substantial number of side wall core samples have been studied.

Well site micropalaeontology was carried out during the drilling of the section from 3230 m to 3712 m, covering the Upper Cretaceous from Santonian and down into Hauterivian in the Lower Cretaceous. The objective of this service was to try to obtain a more precise stratigraphic breakdown of the formations while drilling into the Lower Cretaceous, to be able to run the 9 5/8" casing safely before penetrating the Upper Jurassic. The information thus obtained was also incorporated into the following analyses in the laboratory.

The final stratigraphic breakdown of the well has been obtained by comparing and adjusting the results of the biostratigraphy with wireline log correlations.

The drillers and the wireline logs depths are often at variance through the well. Since the ditch cuttings samples, which are the primary materials on which the stratigraphy is

based, are designated on the drillers depths, the biostratigraphic tops may be different from those picked on the wireline logs. From 3500 m and down to 4130 m the biostratigraphic tops, when based on ditch cuttings samples, have been adjusted to the wireline log depths (ISF/Sonic/GR runs) as follows:

Loggers depth = Drillers depth + 4 m.

The chrono- and lithostratigraphy of the well is shown on page 4 and 5 . The lithostratigraphic terminology applied is taken from Deegan and Scull: "A standard lithostratigraphic nomenclature for the Central and Northern North Sea" 1977.

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Oslo - Norway

WELL : 15/5-2

DEPTH REF.: K.B. ELEVATION K B : 25 m ALL DEPTH IN METERS (m)

CRONOSTRATIGRAPHY

SYSTEM	SERIES / STAGE	DEPTH	THICKNESS
		145.5	
QUATERNARY	PLEISTOCENE		334.5
		480	
TERTIARY	PLIOCENE		220
		700	
	MIOCENE		360
		1060	
	OLIGOCENE		440
		1500	
	EOCENE		600
		2100	
	PALEOCENE		682
		2650	
	DANIAN		132
		2782	
CRETACEOUS	UPPER MAASTRICHTIAN		278
		3060	
	CAMPANIAN - SANTONIAN		233
		3293	

LITHOSTRATIGRAPHY

GROUP	FORMATION / MEMBER	
145.5		
NORDLAND GROUP		758
	UTSIRA FM	1040
1040		
HORDALAND GROUP		1603
	FRIGG FM	2128
2128		
ROGALAND GROUP	BALDER FM	2162
	SELE FM	2204
2252	LISTA FM	2252
MONTROSE GR.	HEIMDAL FM	2606
2606		
ROGALAND GR.	LISTA FM	2650
2705	MAUREEN FM	2705
	EKOFISK FM	2782
CHALK GROUP	TOR FM	2967
	FLOUNDER FM	

Norsk Hydro

Osio - Norway

WELL : 15/5 - 2

DEPTH REF. K.B. ELEVATION K.B.: 25 m ALL DEPTH IN METERS (m)

CRONOSTRATIGRAPHY					LITHOSTRATIGRAPHY		
SYSTEM	SERIES / STAGE		DEPTH	THICKNESS	GROUP	FORMATION / MEMBER	
CRETACEOUS	UPPER		3293		CHALK GROUP	FLOUNDER FM	3440
		CONIACIAN - TURONIAN		295		HERRING FM	3507
			3588			PLENUS MRL FM	3588
		CENOMANIAN		49		HIDRA FM	
			3637		3647		3647
	LOWER	ALBIAN		52		RØDBY FM	3689
			3689		CROMER KNOLL GR.		
		EARLY ALB - APT.	3701	12		VALHALL FM	
		EARLY BARREM.	3711	10			
		HAUTERIVIAN	3744	33			
		EARLY VALANG.	3759	15	3759		3759
		LATE - EARLY RYAZ.	3774	15			
JURASSIC	UPPER	MID. - EARLY VOLG.	3804	30		KIMMERIDGE CLAY FM	
		KIMMERIDGIAN	3819	15	HUMBER GROUP		3831
		LATE OXFORDIAN	3869	55		HEATHER FM	
		EARLY OXFORD.	3894	25			
		LATE-MID. CALLOV.	3924	30			
		EARLY CALLOV.	3960	36	3960		3960
	MIDDLE	LATE - MIDDLE BATHONIAN	4037	77		BRENT FM.	
		EARLY BATHON. - MID. BAJOCIAN	4087	55			
		BAJOCIAN	4113	24	4113		4113
TRIASSIC		TRIASSIC		210			
			4323 (T.D.)		4323		4323

4. LITHOSTRATIGRAPHY

This summary is compiled predominantly from ditch cuttings descriptions. Wire line logs are used as assistance in the lithological interpretation and to place boundaries of rock formations. Supplementary side wall core samples are available from Eocene in the Tertiary, through the Cretaceous and Jurassic and down into the Triassic.

4.1 QUATERNARY

Pleistocene (194 - 480 m)

The interval is predominantly clay, medium to dark grey, soft to firm, slightly sticky, slightly to moderatly calcareous, with thin silty stringers. The clay is rarely glauconitic and contains traces of pyrite and shell fragments which occur throughout the interval.

Interbeds of sand are found between 194 to 283 m. These are composed of clear occasionally frosted quartz grains, very fine to coarse, occasionally very coarse, angular to subrounded, poorly sorted, with dark grey to dark green to black lithic fragments and occasional shell fragments. Thin beds of dark brown woody lignite occur between 277 and 283 m.

The interval from sea bed and down to 1040 m is included in the Nordland Group.

4.2 TERTIARY

Pliocene (480 - 700 m)

Continuation of the medium to dark grey clays, occasionally silty and lignitic with locally abundant shell fragments and traces of glauconite.

Miocene (700 - 1060 m)

700 - 758 m

Continuation of clays as described above.

758 - 910 m

The abrupt break from the overlying clays to the sands which form the upper part of the Utsira Formation occurs at 758 m. These sands are clear, very fine to fine grained angular to sub-angular, moderatly well sorted, loose quartz with traces of glauconite, pyrite, mica and shell fragments. Occasionally minor clays which are olive grey, soft, sticky and slightly calcareous occur.

910 - 1060 m

This is a dominantly clay interval with some thin sands in the top 20 m and represents a transition from the Utsira Formation of the Norland Group (base at 1040 m) to the underlying Hordaland Group.

The clays are olive grey to olive green becoming various shades of brown, soft, sticky, slightly to moderatly silty occasionally sandy and none to slightly calcareous with traces of glauconite, mica and shell fragments. The sand stringers consist of clear to milky quartz, very fine to medium grained, subangular to subrounded with moderate sorting. Thin stringers of a hard, grey brown dolomitic limestones also occur.

Oligocene (1060 - 1500 m)

This interval consists mainly of brown claystones as described above except for increased induration and the appearence of siltstone laminations below 1250 m. These siltstones are medium grey, brown grey and brown green, firm, micro micaeous, moderatly calcareous and occasionally grade to very fine sandstone.

Two coarser clastic beds occur in this interval; an upper sand bed between 1180 and 1190 m composed of clear, very fine to medium grained quartz, occasionally becoming coarse grained, angular to sub-angular, poorly sorted with lithic fragments; and a lower sandstone bed, 1272 to 1278 m consisting of clear, white, very fine to medium grained quartz, angular to subangular, with moderate sorting, moderately hard calcareous cement and poor visible porosity.

Eocene (1500-2100 m)

1500 - 1603 m

Claystones continue dominant but have become olive green to olive grey, blocky and silty. With increasing induration they grade to shales in the lower part of the interval. They are non- to slightly calcareous. Foraminifera are fairly common. The interval is charecterized by the appearance of thin stringers of light grey to brown, argillaceous limestones. These are moderately hard and micro to cryptocrystalline.

Rare stringers of brown grey, micromicaceous siltstone occur as do traces of sandstone, formed of clear, white, very fine grained, angular to sub-angular quartz, moderately hard with a calcareous cement. Traces of glauconite and pyrite occur.

1603 - 1783 m

Sandstones become dominant and charecterize this interval at the top part of the Frigg Formation. These are formed from clear, some frosted, very fine to coarse, occasionally very coarse grained, angular to sub-angular quartz, loose and hard, with a calcareous or siliceous cement. Interbeds of claystones and shales of various shades of green and brown occur. These are blocky to sub-fissile, silghtly micro-micaceous, waxy, non-calcareous, silty in parts grading to stringers of brown black siltstone.

Traces of pyrite, glauconite and micro-fossils were found as were occasional thin stringers of white to light grey and light yellow brown, firm to hard, micro to crypto-crystalline limestone, which is occasionally dolomitic and argillaceous.

1783 - 1871 m

This interval is composed mainly of medium to dark grey or grey black shales with minor green black stringers. This shale is similar to the shale in the upper unit. Traces of dusky red, soft to firm, sub-fissile, non-calcareous shale occur, as do stringers of micro-crystalline limestone and occasional interbeds of sand and sandstone as described in the above unit.

1871 - 1916 m

This is a sand unit made up of clear, milky, fine to coarse grained, sub-angular to sub-rounded, loose quartz with thin interbeds of yellow brown to light grey argillaceous dolomitic limestone. Traces of pyrite and micro-fossils occur throughout the unit.

1916 - 2063 m

Shales light dark grey, green grey and grey brown, subfissile, occasionally silty and sandy, and non-calcareous constitute the main lithology in this interval. Thin stringers of dolomitic limestones described as above occur, becoming dolomite in the lower part which also is marked by the appearance of red brown, light grey and green, non-calcareous shales. Rare pyrite occurs throughout the unit.

2063 - 2100 m

The red brown shales occuring towards the base of the interval above become the dominant lithology in this interval. Minor grey, grey green and light grey blue shales which are soft to hard and non-calcareous occur as well and traces of light to medium grey, grey brown tuffaceous material are reported. The interval also contains traces of black carbonaceous material, pyrite, glauconite and micro-fossils.

Paleocene (2100 - 2782 m)

2100 - 2128 m

This is a continuation of the above interval and differs only in the occurence of light grey to grey brown, soft to firm, argillaceous, dolomitic, limestone stringers. The base of this unit at 2128 m forms the junction of the Hordaland Group and the Rogaland Group.

2128 - 2204 m

Varicoloured shales with traces of tuff and thin limestone stringers and traces of pyrite as described above (except predominantly light-medium grey and grey brown in colour)

constitute the lithology in this interval which comprises the Balder Formation (2128 - 2162 m) and the Sele Formation (2162 - 2204 m) within the Rogaland Group.

2204 - 2252 m

This interval consists dominantly of medium to dark grey, grey brown to medium brown, grey green and light blue grey, non-tuffaceous, fissile to blocky, non- to slightly calcareous shales with traces of grey to brown grey, hard, calcareous siltstone and loose, fine to medium grained sand.

The interval forms the upper part of the Lista Formation within the Rogaland Group, which is seperated from the lower part by the intervening arenaceous fan deposits of the Heimdal formation.

2252 - 2606 m

This interval consists mainly of thick sands and sandstones with minor interbeds of shales and occasional thin stringers of limestone and dolomite.

The sand consists of clear, fine to medium grained quartz, occasionally becoming very fine and coarse grained. It ranges from sub-rounded to angular and is moderately to poorly sorted. The sandstone is dominantly finer grained ranging from fine to very fine grained and occasionally grading to siltstone. It shows moderate sorting and a calcareous cement.

The shales are grey, grey brown and grey green, firm to moderate hard, fissile to blocky, occasionally silty and micro-micaeous and slightly to non-calcareous.

The limestones occur as white, soft, chalky and occasionally argillaceous stringers while the dolomite stringers are pale to dark yellow brown, hard and micro-crystalline.

This interval represents the Heimdal Formation of the Montrose Group.

2606-2650 m

The sands and sandstones of the Heimdal Formation are underlain by the lower part of the Lista Formation consisting of medium grey to brown grey, soft, non-calcareous clays, medium to dark grey, green grey and some red brown micro-micaeous shales with minor interbeds of white to light yellow, soft to firm, micro-crystalline, occasionally dolomitic limestone.

Danian 2650 - 2782 m

2650 - 2705 m

This interval is similar to the previous one except that the clays are becoming light grey and have an increasing calcareous content. The sand/sandstone interbeds are white to light grey as above and become dominant with depth. There are thin stringers of limestone as described above.

This interval represents the Maureen Formation and forms the lower part of the Rogaland Group. Both this formation and the Lista contain traces of pyrite and glauconite.

2705 - 2782 m

A major change occurs at the base of the Maureen Formation. The underlying Ekofisk Formation forms the upper unit of the Chalk Group and is markedly more calcareous.

The Ekofisk Formation consists predominantly of cream to white, occasionally pink, micro-crystalline to chalky limestones. These are argillaceous in part and grade to marlstones which are glauconitic in the lower part. These marlstones are predominantly medium grey to green grey, firm and blocky but occasionally red in colour. Thin stringers of dark grey to black calcareous shale occur.

4.3 CRETACEOUS

Upper Cretaceous (2782 - 3637 m)

Maastrichtian (2782 - 3060 m)

2782 - 2967 m

This interval comprises the Tor Formation consisting mainly of limestone with occasional marl interbeds and minor shale stringers.

The limestone is white to cream coloured, firm to moderately hard, crypto-crystalline and clean, some is chalky and argillaceous in part and grades to marl which is light to medium grey and soft to firm. The thin shale interbeds are light to dark grey with black laminations, firm to hard, subfiss and calcareous. Traces of pyrite and glauconite were seen in lower parts of the interval.

2967 - 3060 m

A marked decrease in the limestone and corresponding increase in amount of marlstone marks this interval which forms the upper part of the Flounder Formation.

The limestone is the same as that in the overlying Tor Formation except some appears as shades of beige and brown, micro to crypto-crystalline and hard. The marlstone is

predominantly red to red brown and firm with minor interbeds of light to medium grey marl as in the Tor Formation. The shale stringers reported above almost totally disappear.

Santonian / Campanian (3060 - 3293 m)

3060 - 3255 m

This interval is a continuation of the Flounder Formation and is marked by a continuing increase in the amount of marlstone and decrease in the amount of limestone. The marlstone forms thick dominant beds seperated by usually thin stringers of limestone.

The marlstones are mainly light to medium grey with minor light to medium red brown and occasionally very argillaceous becoming shales. The limestones are cream, off-white, hard and micro to crypto-crystalline. A thin stringer of light red to brown calcareous siltstone occurs at 3208 m.

3255 - 3293 m

Shales, dark grey, hard, sub-fissile to blocky and calcareous become dominant. Interbeds of light to medium grey marlstone with fine argillaceous laminations occur.

This interval forms a continuation of the Flounder Formation.

Coniacian / Turonian (3293 - 3588 m)

3293 - 3440 m

This interval forms the base of the Flounder Formation and is marked by an increase in limestone.

The marlstone is light to medium grey, red, red brown and some light brown, soft to hard with local fine argillaceous laminations and grades to limestone. The limestone is white

to grey, with some light tan, and is basically similar to the overlying limestones, some chalky and argillaceous, some hard and crypto to micro-crystalline. It contains rare finely disseminated pyrite and traces of pyrite aggregates, some rare glauconite and rare very finely crystalline dolomite rhombs.

Shale stringers occur throughout the interval and are described as being red/brown, medium to dark grey, blocky to sub-fissile, moderatly hard to hard, silty, earthy occasionally slightly carbonaceous and calcareous.

3440 - 3507 m

The overlying limestones continue down into this interval becoming more chalky and less marly, with an increase in glauconite. Both the marl and the shale become thin and minor.

This interval represents the Herring Formation.

3507 - 3588 m

This interval is marked by an increase in the amont of argillaceous material and consists of thinly interbedded marls and limestones in the upper part becoming thicker downwards with the marls becoming dominant. Some thin shales being light grey green, dark grey, micro-micaceous and slightly calcareous occur in the lower part.

This interval is defined as the Plenus Marl Formation.

Cenomanian (3588 - 3637 m)

This interval consists of the bulk of the Hidra Formation and can be divided into an upper marly section (3588 - 3610 m) and a lower limestone section.

The marls can be distinguished from the overlying grey Plenus marls by the appearance of red brown to pink interbeds.

Traces of clear, very fine grained, well sorted, glauconitic, calcareous sandstone occur in the upper marly section.

The lower limestone is similar to that described for the rest of the Chalk Group to which this Hidra Formation forms the lowest unit.

Lower Cretaceous (3637 - 3774 m)

The Lower Cretaceous comprises the Cromer Knoll Group which is divided into the Rødby Formation and the underlying Valhall Formation.

Albian (3637 - 3689 m)

The upper 10 m of the Albian (3637 - 3647 m) comprises the lowest part of the Hidra Formation as described above. The rest of the Albian consists of the Rødby Formation (3647 - 3689 m) and is predominantly light to dark grey, pink and red brown marls as described above, with thin, light grey, chalky and micro-crystalline limestone stringers which become more common downwards. Thin shale and sand stringers occur and glauconite is common in the lower part of the interval.

Early Albian - Aptian (3689 - 3701 m)

Early Barremian (3701 - 3711 m)

Hauterivian (3711 - 3744 m)

Early Valanginian (3744 - 3759 m)

This section forms the Valhall Formation and is marked by a more shaley lithology than in the overlying formations.

The shale is light to dark grey with minor red brown and occasional green grey laminations. It is firm to moderately

hard, blocky to sub-fissile, silty in parts with traces of finely disseminated pyrite and is non - to very calcareous. Thin interbeds of micro-crystalline limestone occur throughout the section and a thick marl unit occurs between 3729 and 3741 m. A thin very fine grained glauconitic sandstone occurs at 3713 - 3715 m.

Late-Early Ryazanian (3759 - 3774 m)

This interval forms the upper section of the Kimmeridge Clay Formation and consists of a dark brown, soft to firm, earthy, silty, carbonaceous, pyritic, non-calcareous shale. The Kimmeridge Clay Formation is the highest unit of the Humber Group.

4.4 JURASSIC

Upper Jurassic (3774 - 3960 m)

Middle-Early Volgian (3774 - 3804 m)

Kimmeridgian (3804 - 3814 m)

This interval is a continuation of the overlying dark brown shales and forms a part of the Kimmeridge Clay Formation. However, in this interval the shales are interbedded with two thin sandstone stringers consisting of clear to white, very fine to very coarse grained, angular to rounded, friable to hard, poorly sorted, calcareous cemented quartz with traces of glauconite.

Late Oxfordian (3814 - 3869 m)

Early Oxfordian (3869 - 3894 m)

The top 11 m of this section is a continuation of the dark brown shales of the Kimmeridge Clay Group.

Below 3831 m the shale is interbedded with medium to dark

brown micro-crystalline limestone stringers and is identified as part of the Heather Formation.

Late-Middle Callovian (3894 - 3924 m)

Early Callovian (3924 - 3960 m)

This is a continuation of the Heather Formation and forms the lowest interval of the Humber Group.

It comprises dark brown shales as described above with some medium grey, slightly calcareous shales and interbeds of dark brown, micro-crystalline dolomite. Below 3927 m the dolomite disappears and the shale is interbedded with thin stringers of light to medium brown, calcareous, silty sandstone and limestones.

Middle Jurassic (3960 - 4113 m)

This entire section is described as the Brent Formation.

Late-Middle Bathonian (3960 - 4037 m)

This section comprises the upper part of the Brent Formation and consists of dark brown and medium grey shales with interbeds of light to medium brown siltstone as described in the Heather Formation grading downwards into light brown, very fine to fine grained, calcareous sandstone interbeds and stringers. This section also contains interbeds of black, hard, vitreous coal beds up to 5 m thick.

Early Bathonian - Middle Bajocian (4037 - 4090 m)

4037 - 4055 m

This interval is composed dominantly of sandstone beds (up to 7 m thick) with dark brown and medium grey shale interbeds. The sandstone is clear, occasionally brown, very fine to fine, occasionally medium and coarse to very coarse grained, very poorly sorted and friable with a weak calcareous cement. It has moderate to good porosity and abundant hydrocarbon shows.

4055 - 4090 m

This interval is distinguished from the sandstones above by a marked increase in shale and the appearance of dolomitic limestone interbeds.

The shale is brown to greyish brown, with minor dark grey and traces of light green and it is calcareous. The limestone is micro to crypto-crystalline, hard and dolomitic in parts. In the lower part of this interval thick coal beds of similar descriptions as above occur.

Bajocian (4090 - 4113 m)

This is the lowest interval of the Brent Formation and consists of interbedded sandstones, siltstones and thin coal beds.

The sandstones show a marked change from those above and are light grey, very fine to fine grained, well sorted with moderate porosity. They grade into siltstone which is dusky yellowish brown, blocky and non-calcareous. Both the shale and coal are as described for the upper intervals of the Brent Formation. Traces of pyrite occur in this as well as in the other intervals in the Jurassic.

4.5 TRIASSIC (4113 - 4326 m (T.D.))

Changes in lithology and in log character marks the top of this interval which consists of sandstones, in places grading to siltstones, and interbedded shales. The sandstones are pale yellowish brown, yellowish grey, occasional green grey and red stained, very fine to medium, in parts silty and poorly to well sorted. They are generally loose to friable, but are occasionally hard with calcareous and siliceous cement and some clay matrix. Porosity is usually poor to fair. The shales are brownish grey, greyish red, dusky brown, light to dark grey, occasional dark greenish grey, moderate hard, micro-micaceous and slightly to non-calcareous. In places they become very fine sandy and silty grading to siltstones. Traces of a light grey, chalky limestone, a dark brown, crypto-crystalline dolomite and pyrite occur through the interval.

5. HYDROCARBON SHOWS

Evaluation of hydrocarbon shows at the well site was carried out in a conventional manner.

Below 195 m a complete hydrocarbon total gas detector (50 units = 1 %) and a gas chromatograph for automatic and continuous gas analysis, recorded as ppm by volume of C1 through C5, were operational.

Hydrocarbon shows on ditch cuttings were evaluated according to Norsk Hydro's geologist's well site manual.

5.1 GAS RECORD

195 - 310 m

Throughout this interval the continuous ditch gas recording varies between 0.1 and 4 % and the chromatograph shows methane (C1) only. The higher readings correspond to sand or lignite layers.

310 - 1300 m

In this interval the continuous ditch gas recording does not exceed 1.5 % except for the interval 520 - 570 m when the total gas recorded reaches 12 %. There is no evident lithological change to explain this gas peak.

The interval can be further subdivided on the basis of chromatograph analysis. Between 310 and 640 m and from 920 to 1190 m methane (C1) and ethane (C2) were recorded, C2 mostly as traces. For the rest of the interval C1 only was found.

1300 - 2789 m

This section is characterized by low ditch gas recordings, generally less than 0.2 %.

Down to 2510 m C1 is the only constituent recorded, except for the interval 2268 - 2278 m where ethane (C2) and propane (C3) are found in trace amounts.

Below 2510 m C2 and C3 become persistent but only as traces. The lithology in this section is dominated by sandstones, including the Heimdal Formation in the Paleocene, and shales.

2789 - 2793 m

This zone, which coincides with the top of the Maastrichtian limestone (at 2782 m) shows a total gas recording of up to 6 %, and the first occurrence of iso-butane (iC4) and normal-butane (nC4) are noted. The chromatograph peaked at 29140, 5742, 455, 245 and 25 ppm C1, C2, C3, iC4 and nC4 respectively.

2793 - 3005 m

The continuous ditch gas recordings varies between 0.2 and 2 % in this interval, with the exception of a 4 % peak at 2829 m. C1 and C2 are recorded throughout, with occasional traces of C3. Limestones and marlstones are dominating the lithology in this section.

3005 - 3759 m

Throughout this interval the total gas is low, not exceeding 0.6 %. C1 is persistent throughout, whereas C2 is reported occasionally and in small quantities. From 3705 m C3 and traces of C4 is also reported.

3759 - 3956 m

The top of this interval correlates with the Kimmerian Unconformity below which extends the organic-rich shales of

the Upper Jurassic shales of the Kimmeridge Clay Formation.

The top is marked by a moderate increase in total gas, from 0.1 to 1 % and throughout the interval the ditch gas varies between these values. The chromatograph shows C1 - iC4 down to 3795 m, below this depth only C1, C2 and C3 were recorded. The average chromatograph values were 2000, 1000, 80, 60 ppm for C 1, C2, C3 and iC4 respectively.

3956 - 4130 m

In this interval the occurrence of interbedded coal beds, sandstones and shales cause the nature of the continuous ditch gas curve to become much more erratic, with values ranging from 0.1 to 40 % total gas. A general decrease in total gas as we go downwards can be seen. This interval comprises the sandstones, coals and shales of the Middle Jurassic and the gas curve correlate generally with either coal or sandstone beds. The chromatograph recorded C1-C4 between 3990 - 4050 m, with maximum reading 134820, 5692, 3845, 500 and 1000 ppm for C1, C2, C3, iC4 and nC4 respectively, whereas for the rest of the interval only C1 - C3 were recorded.

4130 - 4270 m

From 4130 m a sharp increase in the total gas recording is again noted, with values ranging from 0.3 to 32 %. The chromatograph recorded C1 - C3 with occasional traces of C4. Below 4220 m C1 - C3 only was found. Trissic sandstones dominate this section and wireline log evaluation showed average hydrocarbon saturation of 57 % from 4141 to 4158 m. In general the total gas recording gradually decreases downwards over this interval.

4270 - 4323 m

This interval consisting of water-wet sandstones show total gas readings less than 0.2 % and the chromatograph recorded C1 with traces of C2 only.

5.2 OIL STAIN AND FLUORESCENCE

2792 - 2828 m

The top of this interval coincides roughly with the Tor Formation in the Maastrichtian and consists of limestones which occasionally grades to marls. The shows were reported as occasionally pale white to dull gold fluorescence, with trace of slow, pale yellow to blue crush fluorescence cut. The show is very weak and occurs at two distinct depths 2792 and 2828 m, this coincide with two small gas peaks.

3488 - 3588 m

This section covers the basal part of the Herring Formation and the entire Plenus Marl Formation within the Turonian-Cenomanian, and is characterized by marlstones and limestones. The limestones are reported to have pale yellow to yellowish white fluorescence, non-fast streaming, white to pale blue fluorescence cut. The show is most pronounced between 3488 and 3517 m. No definite increase in total gas can be attributed to these shows.

Note: Discrepancy drillers and loggers depth over the interval 3700 - 4130 m. Loggers depth = drillers depth + 4.5 m. Loggers depth is used in this report.

3707 - 3723 m

This zone consists of shales and marlstones with limestone stringers and is a part of the Valhall Formation in the Lower Cretaceous. The limestones show abundant white to yellowish white fluorescence, fast to instant streaming, white to blue white fluorescence cut. A small gas peak is associated with the show.

3759 - 3860 m

A marked lithological change occurs as we enter the Kimmeridge Clay Formation and passes into the Upper Jurassic. Dark, organic-rich shales predominate with occasional limestone stringers. In the shales a weak show is reported at various levels described as follows: No fluorescence, traces of slow, faint light yellow crush fluorescence cut, occasionally streaming cut.

4008 - 4055 m

In this interval Middle Jurassic sandstones, coals and shales predominate and within the sandstones the following shows were reported:

4008 - 4013 m: Abundant pale blue fluorescence, slow but extensive bluish white fluorescence cut.

4035 - 4055 m: 80 % pale brown hydrocarbon stain on clear quartz, abundant pale yellow to dull orange fluorescence, slow to fast yellow white streaming fluorescence cut.

Two cores were cut in this interval, core 1 from 4018.1 to 4025.1 m and core 2 from 4037.0 to 4047.5 m. In core 1 from 4018.1 to 4019.6 m the following show was reported:

In sandstone abundant pale blue florescence and slow, but extensive bluish white fluorescence cut. Gas was seen bleeding from numerous hairline fractures throughout the core. In core 2 shows are reported as described in the interval 4035 to 4055 m, the colour of the fluorescence varying from pale yellow or dull orange to purple red.

4141 - 4158 m

No shows were reported on the sandstone ditch cuttings while drilling this interval. Wire line logs run over the interval showed, however, average hydrocarbon saturation of 57 %.

6. CORING

6.1 CONVENTIONAL CORES

Two cores were cut in the Middle Jurassic sequence. Core 1 was taken from 4013.6 m to 4020.6 m and recovered 5.1 m (72.8 %). The core was decided to be cut based on sandstone occurrence in the ditch cuttings, but only shales and coal beds were found in the core. Core 2 was cut from 4032.5 m to 4043.0 m and recovered 9.8 m (93.3 %).

Over the interval in which the cores were taken there exists a discrepancy between the drillers and wireline log depths. To get the log depths of these cores, 4.5 m have to be added to the drillers depth.

Descriptions of the cores are shown in Appendix 1.

6.2 SIDE WALL CORES

Side wall cores were taken from 1655 m, in the Eocene, and down through the whole well with the last core recovered at 4323 m in the Triassic.

A total of 9 runs were made. The recovery varied from 3 to 30 out of 30 possible for each run. The low recoveries in run 3, 4 and 5 (see Well Summary, Appendix 3) were due to misfires which have not been explained by any technical malfunctions. A total of 174 out of 270 cores were recovered.

A detailed description of the cores is given in Appendix 2.

7. WIRELINE LOGGING

The following list contains a summary of the wireline logs run in the well 15/5-2 and shows the dates, logged intervals and run numbers for each log.

LOG	DATE	LOGGED INTERVAL	RUN NO.
BHC/GR	20.08.78	192 - 464.5 m	1
ISF/SONIC/GR	31.08.78	455 - 1621.5 m	2
"	31.08.78	1366 - 1620.5 m	2a
"	15.10.78	1593 - 3610 m	3
"	19.10.78	3500 - 3715 m	4
"	9.11.78	3691 - 4134 m	5
"	19.11.78	4000 - 4326 m	6
FDC/CNL/GR	31.08.78	455 - 1612 m	1
"	19.10.78	1593 - 3713.5 m	2
"	9.11.79	3689 - 4134 m	3
"	19.11.78	3691 - 4326 m	4a
"	20.11.78	4000 - 4325.5 m	4b
DLL/MSFL/GR	20.11.78	4000 - 4324.5 m	1
HDT	19.10.78	1593 - 3712 m	1
"	22.11.78	3690.5 - 4323.5 m	2
VELOCITY SURVEY	21.11.78	500 - 4323 m	1
RFT	22.11.78	MISRUN	1
"	24.11.78	4148.5 m	2
"	24.11.78	4145 m	3
"	25.11.78	4053 m	4
"	25.11.78	4053 m	5
"	29.11.78	4157.5 m	6
"	29.11.78	MISRUN	7
"	29.11.78	4157.5 m	8

LOG	DATE	LOGGED INTERVAL	RUN NO.
CST	20.10.78	3000 - 3710 m	1
"	20.10.78	1655 - 2990 m	2
"	22.11.78	4052 - 4315 m	3
"	23.11.78	4114 - 4323 m	4
"	23.11.78	3925 - 3961 m	5
"	23.11.78	3753 - 4275 m	6
"	27.11.78	3912 - 4149 m	7
"	28.11.78	3720 - 3992 m	8
"	28.11.78	3758 - 4140 m	9
CCL	19.11.78	0 - 3696 m	1
HRT	3.09.78	541 - 1589 m	1
"	27.10.78	2655 - 3652 m	2
CPI	12.02.79	4005 - 4295 m	1

8. SPECIAL STUDIES

The biostratigraphic evaluation of the well has been performed by the laboratories of Robertson Research International Ltd. The results are presented in the report:

"Norsk Hydro Norwegian North Sea 15/5-2 well: Biostratigraphy of the interval 200 m - 4323 m".

A geochemical study of the well has been performed by the laboratories of Robertson Research International Ltd. Canned ditch cuttings samples over the interval 1450 m to 4323 m have been analysed for maturation level and source rock potential. Sampling intervals were 50 m between 1450 and 3750 m, 5 m between 3750 and 3755 m, 2 and 3 m between 3755 and 3770 m, 5 m between 3770 and 4000 m, and 25 m between 4000 and 4323 m. The results from this study are presented in the report:

"Report on a geochemical evaluation of the Norsk Hydro 15/5-2 well, Norwegian North Sea".

APPENDIX 1

CORE DESCRIPTIONS, CORE 1 AND 2

Norsk Hydro

Well no.	Core report	Core nos
15/5 - 2		1

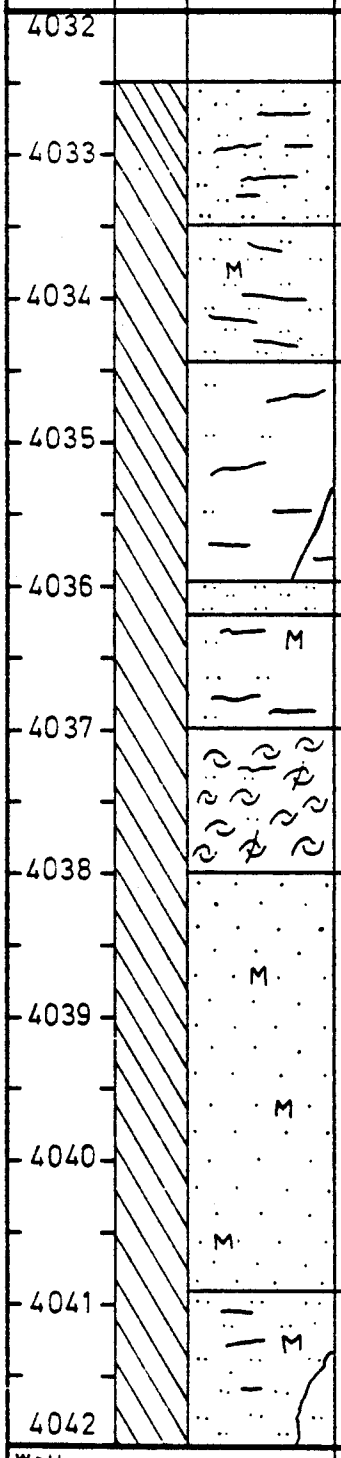
Interval	Area	Cut	Date
4013.6 - 4020.6 m	NORTH SEA, NORWAY	4013.6 - 4020.6 m	5 - 11 - 1979
Scale 1:50	**Well R.K.B.** 25 m	**Recovery** 4013.6 - 4018.7m, 72,8%	**Geologist** FAGERLAND/SKAAR

Depth scale	Re-covery	Lithological column	Depths	Lithological descriptions	Shows
4013					
4014			4013.6	Sh, beige gy-lt brn, hc, plty, v slty, occ tr coal lam, micro-mic, irr lam w/ bioturbation and slump texture w/ pocket incl of Sst, pale yel'sh brn, vf, hd, subang, silic, micro-mic, well srtd, pr por.	Gas bleeding from numerous hairline thin frac throughout the core. On Sst, dbn pale blue flu and slow but extensive bluish wh flu cut.
4015			4015.4	Coal, blk, shiny, vitreous, hd, frac, occ slickensides, occ thin intbds (1 - 5 cm) of Sh, blk, hd, fis, v carb.	
4016			4016.7	Coal, a/a intbd w/ Sh, blk - blk brn, fis, hd, v carb.	
4017					
4018			4018.7		
4019		NOT RECOVE-RED			
4020				NOTE: DISCREPANCY DRL'S AND LOGGER'S DEPTH. LOGGER'S DEPTH = DRL'S DEPTH + 4,5 m.	
4021			4020.6		

Norsk Hydro

Well no.	Core report	Core no's
15/5-2		2

Interval	Area	Cut	Date
4032.5 - 4042 m	NORTH SEA, NORWAY	4032.5 - 4043 m	7-11-1978
Scale 1:50	**Well R.K.B.** 25 m	**Recovery** 4032.5-4042.31m, 94%	**Geologist** FAGERLAND/SKAAR



Depths	Lithological descriptions	Shows
4032.5	Sst, dk yel'sh brn, vf, hd-fri, subang, slty incr towards bottom, arg, mica on bedding planes, reg lam w/low dip, calc cmt, minor silic cmt, mod srtd, pr-mod por	Abn orng-rd purple flu, fast yel-wh flu cut.
4033.5	Slst, olv gy, hd, micro-mic enriched on bedding planes, v arg grdg Sh toward bottom, reg bedding.	Abn flu a/a but more dull and slow cut.
4034.5	Sh, olv blk-brn blk, v hd, blky, occ slty, occ frac w/slicken-sides.	No shows
4036.0	Slst, a/a.	Abn faint flu and cut a/a.
4036.2	Sh, a/a w/minor Slst a/a.	Tr of shows in slst a/a.
4037.0	Sh, slty else gen a/a, but v foss, mainly bivalves, calc w/moldic and frac fillings of calc.	
4038.0	Sst, gy brn, vf-f, fri, subang, slty, sl arg, sl micro-mic dispersed, homogeneous texture, tr calc cmt, mod-well srtd, mod por	Abn orng (90%) grdg rd-purple flu, with fast yel-wh cut.
4040.9	Slst, olv gy, hd, blky, occ sl micro-mic lam, mainly dispersed, tr vf Sst grns, v arg, occ steep dip frac slickensided.	Abn show a/a, but more pale and with more slow yel-grn flu cut

Norsk Hydro

Well no.	Core report	Core no s
15/5-2		2

Interval	Area	Cut	Date
4042 - 4043 m.	NORTH SEA, NORWAY	4032.5 - 4043 m.	7-11-1978
Scale 1 : 50	**Well R.K.B.** 25 m	**Recovery** 4032.5 - 4042.31 m, 94 %	**Geologist** FAGERLAND/ SKAAR

Depth scale	Re-covery	Lithological column	Depths	Lithological descriptions	Shows
4042			4042 31	Slst, a/a.	Shows a/a.
		NOT RECOVE-RED			
4043			4043		

NOTE: DISCREPANCY DRL'S AND LOGGER'S DEPTH.
LOGGER'S DEPTH = DRL'S DEPTH + 4.5 m.

APPENDIX 2

SIDE WALL CORE DESCRIPTIONS

Norsk Hydro

SIDE WALL CORES DESCRIPTION

WELL: 15/5-2	RUN N°: 1	SERVICE COMPANY Schlum.
LICENCE: 048	PAGE N°: 1 of 2	ASKED 30
	DATE: 20 October 1978	SHOT 30
		LOST 3
		EMPTY 1
		SAMPLES RECOVERED 26
		GEOLOGIST: Fagerland

tr : trace - M : medium - G : good

N°	DEPTHS m	REC %	LITHOLOGY	Fluorescence	CUT
1	3701	60	Mrlst/Lst, m gy, hd, blky, no vis por, 100% bright yel flu, instant to v fast wh-milky cut, no resd.	STRNG	
2	3705	95	Sh, dk gy, firm, subfis, calc.		
3	3700	/	Lost		
4	3690	/	Lost		
5	3685	50	Sst, grnish gy, mod hd, vf-slty, ang, v calc, calc mtx and cmt, arg, abn glau, tr mica, well srtd, no vis por.		
6	3655	50	Mrlst, dk gy, firm, blky-subfis, v arg, sl slty.		
7	3630	60	Mrlst, m dk gy, As No. 6.		
8	3605	85	Mrlst, olv gy-lt olv gy, firm, subfis, v arg as No.7.		
9	3595	45	Slst, m gy-lt olv gy, firm-hd, blky, arg, v calc grdg to Mrlst.		
10	3587	85	Sh, m gy-grnish gy, firm, subfis, sl-non calc w tr inter-lam Sh rd, firm, sl-non calc.		
11	3575	40	Slst, m gy, mod hd, blky, v calc grdg Mrlst, mod arg.		
12	3545	40	Sh/Mrlst, m gy, firm-mod hd, subfis, sl slty.		
13	3535	40	Mrlst, m gy, mod hd, subfis, slty.		
14	3510	60	As No. 13.		
15	3505	/	Lost		
16	3490	100	Sh, m dk gy-dk gy, firm, blky, calc, sl slty.		
17	3477	/	Empty		
18	3460	40	Lst, lt gy-wh, firm-mod hd, crypto xln, 100% bright yel flu prob mainly mineral, tr v slow wh cut.		

Norsk Hydro

SIDE WALL CORES DESCRIPTION

WELL: 15/5-2	RUN N°: 1	SERVICE COMPANY: Schlum	
LICENCE: 048	PAGE N°: 2 of 2	ASKED: 30.	
	DATE: 20 October 1978	SHOT: 30	
		LOST: 3	
		EMPTY: 1	
		SAMPLES RECOVERED: 26	
		GEOLOGIST: N. Fagerland	

tr : trace - M : medium - G : good

N°	DEPTHS m	REC %	LITHOLOGY	Fluorescence trMG	Fluorescence CUT
19	3442	40	As no. 18		
20	3430	30	Lst, as No. 19 but only abn pale wh mineral flu, no cut.		
21	3420	15	Sh, olv blk, mod hd, blky, non calc.		
22	3410	10	Sh/Mrlst, m gy, mod hd, fis.		
23	3310	70	Mrlst, m gy-bluish gy, sft, blky-subfis.		
24	3295	60	Mrlst/Sh, m gy, firm, blky.		
25	3285	75	Sh, m gy, mod hd, blky, v calc grdg to Mrlst.		
26	3208	60	Mrlst, m gy, firm-mod hd, subfis.		
27	3190	40	As No. 26.		
28	3117	85	Mrlst, m gy, firm as No. 27.		
29	3045	40	Lst, wh, mod hd, frac, crypto xln, no vis por.		
30	3000	40	Lst, wh-lt gy, firm-mod hd, sl arg, crypto xln, no vis por.		

Norsk Hydro

SIDE WALL CORES DESCRIPTION

WELL: 15/5-2	RUN N°: 2	SERVICE COMPANY: Schlum	
LICENCE: 048	PAGE N°: 1 of 2	ASKED: 30	
	DATE: October 20, 1978	SHOT: 30	
		LOST: 0	
		EMPTY: 0	
		SAMPLES RECOVERED: 30	
		GEOLOGIST: N. Fagerland	

tr : trace - M : medium - G : good

N°	DEPTHS m	REC %	LITHOLOGY	Fluorescence		CUT
31	2990	50	Lst, wh - lt gy, firm-mod hd, slarg, crypto-xln, no vis por.			
32	2980	60	Mrlst, m gy, mod hd-firm, blky.			
34	2882	70	Sh/Clyst, dk gy-gvish rd, sft, calc.			
35	2796	40	Lst, wh, mod hd, frac, crypto xln, no vis por.			
36	2785	50	As N° 35.			
37	2780	95	Sh, dk gy, firm, blky, calc.			
38	2765	60	Mrlst, m blue'sh gy-pale red, firm-sft, blky.			
39	2732	50	Mrlst/Lst, lt gy, firm, blky.			
40	2710	75	Sh, mdk gy, firm, blky, v calc, slty.			
41	2706	100	As N° 40.			
42	2695	75	Sd/Sst, wh-lt gy, lse-firm, vf, ang, tr Glau, non calc, well srtd, v gd por.			
43	2685	90	Sh, dk gy, firm, blky, calc.			
44	2655	100	Sh, dk gy-blk, firm, blky, carb, non calc.			
45	2625	90	Sh, dk gy, firm, blky, non calc.			
46	2569	75	Sd/Sst, lt gy, firm, vf, slty, ang, tr mica, non calc, sl arg, well srtd, gd por.			
47	2531	60	As N° 46.			
48	2244	100	Sh, m gy-dk gy, firm, blky, sl micro-mic, non calc.			
49	2203	100	Sh, dk gy-blk, firm, blky, carb, non calc, sl slty.			

Norsk Hydro

SIDE WALL CORES DESCRIPTION

WELL: 15/5-2	RUN N°: 2	SERVICE COMPANY: Schlum	
LICENCE: 048	PAGE N°: 2 of 2	ASKED: 30	
	DATE: October 20, 1978	SHOT: 30	
		LOST: 0	
		EMPTY: 0	
		SAMPLES RECOVERED: 30	
		GEOLOGIST: N. Fagerland	

tr : trace - M : medium - G : good

N°	DEPTHS m	REC %	LITHOLOGY	Fluorescence		CUT
					tr M G	
50	2161	90	Sh, blk, firm, blky, carb, non calc, slty.			
51	2150	90	Sh, dk gy-blk, firm, blky, carb, non calc, sl slty.			
52	2140	100	Sh, sl-non calc, as N° 51.			
53	2128	100	As N° 52.			
54	2114	70	Lst/ Dol, dk yelish brn, mod hd, micro-crypto xln, micro calc fillings, no vis por.			
55	2100	40	Slst/Tuff, lt gy, mod hd, sl-non calc, abn wh arg mtx, occ vf ang qtz, vf pseudo-sucrosic texture, tight.			
56	2090	100	Sh, gyish brn-rd brn, firm, blky, mod calc.			
57	2065	100	Sh, dk gy-blk, firm-mod hd, subfis, carb, non calc, sl slty, micro-mic.			
58	1975	100	As N° 57.			
59	1885	60	Sd, lt gy, lse, f-m, subang, well-mod, srtd, tr mica, v gd por.			
60	1655	85	Sd, m gy, lse, f, subang, well srtd, tr mica, v gd por.			

Norsk Hydro

SIDE WALL CORES DESCRIPTION

WELL: 15/5-2	RUN N°: 3	SERVICE COMPANY: Schlum	
LICENCE: 048	PAGE N°: 1 of 2	ASKED: 30	
	DATE: 22 November 1978	SHOT: 11	
		LOST: 0	
		EMPTY: 3	
		SAMPLES RECOVERED 8	
		Misfire: 19	
		GEOLOGIST:	

tr : trace - M : medium - G : good

N°	DEPTHS m	REC %	LITHOLOGY	Fluorescence		CUT
					tr M G	
1	4315	50	Slst/Sst, gy blue, vf, sl mica, w/f pyr incl, blk flks, arg, fri.			
2	4300,5	50	Sh, rd brn, slty, sl mic.			
3	4288,5	30	Sh, rd brn, slty to sdy, w/f incl of Sst, gybl, vf-f, subang.			
4	4275	20	Sst, brn rd brn, f, rr m, subang, v. fri, calc w/incl of Sh, gybl.			
5	4263,5	30	Sst, as No. 4, f, loc m, subang, w/incl of Sh, gybl, sdy.			
6	4183	/	Empty.			
7	4155	40	Sst, brn, rd brn, f to m, subang, v. fri, w/pyr incl, arg w/rr incl of Sh gybl, pyr.			
8	4150	20	Sst, brn, lt brn, f, rr m, subang, v. fri, sl calc.			
9	4147	/	Empry.			
10	4076,5	/	Empty.			
11	4052	50	Sst, dk brn, f-m, subang w/blk flk (coal?), fri, arg cmt, loc calc cmt.			
12	4047,5	/	Misfire.			
13	4014	/	"			
14	3984	/	"			
15	3970	/	"			
16	3955	/	"			
17	3946,5	/	"			
18	3935	/	"			

Norsk Hydro

SIDE WALL CORES DESCRIPTION

WELL: 15/5-2	RUN N°: 3	SERVICE COMPANY: Schlum
LICENCE: 048	PAGE N°: 2 of 2	ASKED: 30
	DATE: 22 November 1978	SHOT: 11
		LOST: 0
		EMPTY: 3
		SAMPLES RECOVERED: 8
		Misfire: 19
		GEOLOGIST:

tr : trace - M : medium - G : good

N°	DEPTHS m	REC %	LITHOLOGY	Fluorescence		CUT
19	3924	/	~~Misfire~~			
20	3913	/	"			
21	3890	/	"			
22	3868	/	"			
23	3842	/	"			
24	3827	/	"			
25	3810	/	"			
26	3790	/	"			
27	3782	/	"			
28	3775	/	"			
29	3765	/	"			
30	3753	/	"			

Norsk Hydro

SIDE WALL CORES DESCRIPTION

WELL: 15/5-2	RUN N°: 4	SERVICE COMPANY: Schlum
LICENCE: 048	PAGE N°: 1 of 2	ASKED: 30
	DATE: 23 November 1978	SHOT: 18
		LOST: 7
		EMPTY: 1
		SAMPLES RECOVERED: 10
		Misfire: 12
		GEOLOGIST: A. Davies

tr : trace - M : medium - G : good

N°	DEPTHS m	REC %	LITHOLOGY	Fluorescence		CUT
					tr M G	
1	4323	40	Sst, pale rd w/brn tinge, vf-f, ang-subrnd, slty, occ hematite stn, firm, w/calc cmt, fri, no show.			
2	4315	15	Sst, dk yel brn-gy yel grn, vf, occ f, ang-subang, grdg to Slst, firm, v fri, weak calc cmt, fair por, no show.			
3	4300,5	15	Sh, dk rd brn, firm, fis-subfis, occ slty, micro mic, non calc.			
4	4275	/	Lost			
5	4265	/	Lost			
6	4253	/	Lost			
7	4228	50	Sst, lt olv gy-lt grn gy, vf-f, rnd-subrnd, firm, fri, calc, clay mtx, low por, no show.			
8	4203	40	Sst, lt olv gy, vf-f, rnd-subrnd, firm, fri, weak calc, cmt, sme dk grn fraps, clr + dk brn mica flakes, no shows.			
9	4183	30	Sst, lt gy-lt brn, vf, occ f, rnd-subrnd, firm, v fri, calc, clay mtx, low-mod por, no show.			
10	4169	30	Sst, lt brnsh olv gy, vf-f, occ m, rnd-subrnd, occ subang, firm, v fri, w/non calc cmt, mod-gd por, no show.			
11	4156	/	Lost			
12	4150	10	Sst, sl arg else as No. 10, no shows.			
13	4147	/	Lost			
14	4143	20	Sst, pred f, else as No. 10, no shows.			
15	4140	/	Misfire			
16	4139	/	Empty			
17	4117	/	Lost			
18	4114	15	Sh, mod yel brn, firm, subfis, pr-mod cpctd, f sdy in pts.			

Norsk Hydro

SIDE WALL CORES DESCRIPTION

WELL: 15/5-2	RUN N°: 4
LICENCE: 048	PAGE N°: 2 of 2
	DATE: 23 November 1978

SERVICE COMPANY: Schlum
ASKED: 30
SHOT: 18
LOST: 7
EMPTY: 1
SAMPLES RECOVERED: 10
Misfire: 12

GEOLOGIST: A. Davies

tr : trace - M : medium - G : good

N°	DEPTHS m	REC %	LITHOLOGY	Fluorescence
19	4112,5	/	Lost	
20	4096	/	Misfire	
21	4077	/	"	
22	4072	/	"	
23	4063	/	"	
24	4030	/	"	
25	4008	/	"	
26	3994	/	"	
27	3987	/	"	
28	3981	/	"	
29	3973	/	"	
30	3968	/	"	

Norsk Hydro

SIDE WALL CORES DESCRIPTION

WELL: 15/5-2	RUN N°: 5
LICENCE: 048	PAGE N°: 1 of 1
	DATE: 23 November 1978

SERVICE COMPANY	Schlum
ASKED	30
SHOT	30
LOST	15
EMPTY	2
SAMPLES RECOVERED	3
Misfires:	20
GEOLOGIST:	A. Davies

tr : trace - M : medium - G : good

N°	DEPTHS m	REC %	LITHOLOGY	Fluorescence		CUT
					MG	
1	3964	/	Empty			
2	3961	5	Sh, v dusky rd, firm, blky, mod cpct, slty-f sdy, calc.			
3	3959	/	Empty			
4	3951	/	Lost			
5	3940	15	Sh, as No. 2, w/tr crs, subrnd, lse qtz, sl calc.			
6	3935	/	Lost			
7	3932	/	Lost			
8	3930	/	Lost			
9	3927	/	Lost			
10	3925	30	Sh, as No. 2, slty, no sd, sl calc.			
			All bullets below this point (11-30) fired together, depths unreliable, all misfires.			

Norsk Hydro

SIDE WALL CORES DESCRIPTION

WELL: 15/5-2	RUN N°: 6	SERVICE COMPANY: Schlum	
LICENCE: 048	PAGE N°: 1 of 2	ASKED: 30	
	DATE: 23 November 1978	SHOT: 28	
		LOST: 7	
		EMPTY: 2	
		SAMPLES RECOVERED: 19	
		Misfires: 2	
		GEOLOGIST:	

tr : trace - M : medium - G : good

N°	DEPTHS m	REC %	LITHOLOGY	Fluorescence		CUT
					tr MG	
1	4288,5	/	Lost			
2	4275	20	Slst, arg grdg to v.f Sst, gy grnish strongly mic in pt.			
3	4263,5	/	Lost			
4	4243	20	Sst, f, subrnd, v fri, wh to pink, no show.			
5	4212,5	/	Lost			
6	4183	/	Lost			
7	4156,5	/	Lost			
8	4148,5	30	Sst, f-m, heterogeneous, fri, subang, sl arg and mic, no show.			
9	4150	30	Sst, f-m, heterogeneous, fri, subang, sl arg and mic. Thin layers of Sh, pale grn, no show.			
10	4147	/	Lost			
11	4076	/	Empty			
12	4047,5	30	Sst, dk brn, f, fairly well consolidated, sl mic, no show.			
13	4014	30	Slst, arg, gy dk brn, sl mic, thin coal layers and vns.			
14	3984	/	Misfire			
15	3970	20	Slst, grdg to v.f Sst, brn, sl mic w thin coal vns.			
16	3955	50	Sh, v sl slty, dk brn.			
17	3946,5	/	Empty			
18	3935	60	Sh, sl slty, blk gy, ind.			

Norsk Hydro

SIDE WALL CORES DESCRIPTION

WELL: 15/5-2	RUN N°: 6	SERVICE COMPANY: Schlum	
LICENCE: 048	PAGE N°: 2 of 2	ASKED: 30	
	DATE: 23 November 1978	SHOT: 28	
		LOST: 7	
		EMPTY: 2	
		SAMPLES RECOVERED: 19	
		Misfires: 2	
		GEOLOGIST:	

tr : trace - M : medium - G : good

N°	DEPTHS m	REC %	LITHOLOGY	Fluorescence		CUT
					tr MG	
19	3924	40	Sh, dk brn, ind.			
20	3913	30	Sh, sl slty, dk brn, ind.			
21	3890	/	Lost			
22	3868	100	Sh, dk gy, sl mic w lustreous plans			
23	3842	70	Sh, dk gy, sl mic.			
24	3827	70	Sh, cpct, dkgy-blk, ind.			
25	3810	70	Sh, cpct, dkgy-blk, ind.			
26	3790	30	Sh, cpct, dk gy- blk, ind.			
27	3782	/	Misfire			
28	3775	30	Sh, dk gy- blk, ind.			
29	3765	60	Sh, dk gy-blk, ind.			
30	3753	20	Sh, cpct, pale grn, calc.			

Norsk Hydro

SIDE WALL CORES DESCRIPTION

WELL: 15/5-2	RUN N°: 7	SERVICE COMPANY: Schlum
LICENCE: 048	PAGE N°: 1 of 2	ASKED: 30
	DATE: 27 November 1978	SHOT: 30
		LOST: 6
		EMPTY: 3
		SAMPLES RECOVERED: 21
		GEOLOGIST: A. Davies

tr : trace - M : medium - G : good

N°	DEPTHS m	REC %	LITHOLOGY	Fluorescence	CUT
1	4147	15	Sst, gy-ish brn, vf-f, subrnd- subang, qtz sm red, hematite stn firm- mod hd, mod fri, v sl calc, cmt, sl arg, mod por, noshow.		
2	4146	15	Sst, wh, lt gy, f, occ m, ang-sub ang, firm, fri, calc cmt, sl arg, mod srtd, pr por, no show.		
3	4145	20	Sst, v lt brn gy, vf, ang-subang, firm, fri, clr, red, grn, qtz v well srtd, cln, calc cmt, mod por, no show.		
4	4144	30	Sst, lt brn, vf-f, as no. 3 mod well srtd, mod por, no show.		
5	4142	20	Sst, as no. 3 no show.		
6	4140	/	Empty		
7	4139	30	Sh, gy red, sft, cly, pr-mod cpct, blky, v.sl.calc, no show.		
8	4117	30	Sh, gy red, sft as no. 7 w intercal slty + f sdy, sl calc no show.		
9	4112.5	30	Cly, mod lt gy, sft, pr cpctd, tr f, clr ang qtz, non calc, no show.		
10	4096	/	Lost		
11	4077	30	Sh, m dk gy, mod hd, mod cpctd, subfis-fis, tr f dism pyr, cal, no show.		
12	4072	15	Sh, m dk gy- brn gy, hd, well cpct, blky, sl calc, no show.		
13	4063	/	Lost		
14	4030	40	Sh, m dkgy as no. 13, subfis, non calc, no show.		
15	4008	10	Sh, m gy, hd, well cpct, blky, non calc.		
16	3994	20	Sh, brn gy, mod hd-hd, well cpctd, blky-subfis, sl earthy, slty, sl calc, no flu, weak lt yel crush cut		
17	3987	25	Sh, as no. 16 no flu, weak lt yel crush cut		
18	3981	30	Sh, as no. 17 firm- mod hd, tr pyr, v sl calc, no flu, weak lt yel crush cut		

Norsk Hydro

SIDE WALL CORES DESCRIPTION

WELL: 15/5-2	RUN N°: 7	SERVICE COMPANY: Schlum	
LICENCE: 048	PAGE N°: 2 of 2	ASKED: 30	
	DATE: 27 November 1978	SHOT: 30	
		LOST: 6	
		EMPTY: 3	
		SAMPLES RECOVERED: 21	
		GEOLOGIST: A. Davies	

tr : trace - M : medium - G : good

N°	DEPTHS m	REC %	LITHOLOGY	Fluorescence tr M G	Fluorescence CUT
19	3973	20	Sh, as no. 18 non calc, no flu, weak lt yel crush cut.		
20	3968	/	Empty		
21	3964	/	Empty		
22	3959	20	Sh, as no. 19 hd, pyr, calc, no flu, no crush cut, v weak lt yel flu resd.		
23	3951	10	Sh. brn blk. hd. well cpct. blky-subfis. v sl calc. tr v f dism pyr. no flu. v. weak lt yel flu resd.		
24	3935	/	Lost		
25	3932	/	Lost		
26	3930	30	Sh, brn gy, firm, mod cpct, cly, slty, earthy, sl calc, calc, rr f dism pyr, no flu, v weak lt yel flu resd.		
27	3927	/	Lost		
28	3921	30	Sh. as no. 26 tr f pyr nod. v sl calc. no show.		
29	3916	/	Lost		
30	3912	40	Sh, mod yel brn, firm, mod cpct, earthy, subfis, slty, v calc no show.		

Norsk Hydro

SIDE WALL CORES DESCRIPTION

WELL: 15/5-2	RUN N°: 8	SERVICE COMPANY: Schlum	
LICENCE: 048	PAGE N°: 1 of 2	ASKED: 30	
	DATE: 28 November 1978	SHOT: 30	
		LOST: 3	
		EMPTY: 10	
		SAMPLES RECOVERED: 17	
		GEOLOGIST: A. Davies	

tr : trace - M : medium - G : good

N°	DEPTHS m	REC %	LITHOLOGY	Fluorescence		CUT
					TYPE	
1	3992	30	Sltst, dk yel brn, firm, fri, pr ind, sft, cly mtx, occ vr ang qtz micro mic, tr carb, low por, no show.			
2	3990	20	Sst, dk yel brn, vf, occ f, ang-subang, weak calc cmt, slty, mtx, fri pr ind, micro mic, tr pyr, low-mod por, no show.			
3	3985	/	Empty			
4	3980	/	Empty			
5	3975	/	Empty			
6	3972	/	Empty			
7	3953	/	Empty			
8	3950	/	Empty			
9	3943	20	Sltst, dk yel brn as no. 1 v. calc, no flu, no cut, v weak lt yel flu resd.			
10	3935	20	Sh, dusky yel brn, firm, pr cpct, blky, subfis, slty occ f sdy, sl calc, earthy, no flu, v slow, weak dull yel crush cut.			
11	3900	60	Sh, dusky yel brn, firm-mod hd, mod cpct, blky, slty, sl earthy, sl calc, no flu, dull yel crush cut			
12	3890	65	Sh, brn blk, firm, mod cpct, homogenus, occ sl slty, sl calc, blky, no show.			
13	3885	15	Sh, brn blk as no. 12 sub fis, v calc, no show.			
14	3880	60	Sh, brn blk, blky-subfis as no. 13 no show.			
15	3875	20	Sh, brn blk as no. 14 calc, occ slty, no show.			
16	3868	/	Empty			
17	3855	/	Empty			
18	3837	50	Sh, brn blk-dk gy, firm-mod hd, w cpct, fis, occ spltry, slty in pts, sl calc, -v calc, no show.			

Norsk Hydro

SIDE WALL CORES DESCRIPTION

WELL: 15/5-2	RUN N°: 8	SERVICE COMPANY: Schlum	
LICENCE: 048	PAGE N°: 2 of 2	ASKED: 30	
	DATE: 28 November 1978	SHOT: 30	
		LOST: 3	
		EMPTY: 10	
		SAMPLES RECOVERED: 17	
		GEOLOGIST: A. Davies	

tr : trace - M : medium - G : good

N°	DEPTHS m	REC %	LITHOLOGY	Fluorescence	CUT
19	3832	30	Sh, m gy, m dk gy, mod hd, well cpct, blky, wxy, in pts v calc grds to Mrlst, no show.		
20	3826	/	Empty		
21	3820	30	Sh, dk gy- brn gy, mod hd, w cpct, fis, sm spltry, earthy, slty in pts, sl calc, no show.		
22	3800	/	Lost		
23	3791	30	Sh, olv gy, hd, well cpct, fis, sm spltry, occ slty, tr vf pyr nod. sl calc, no flu mod lt yel flood cut, slow sl yel strmg cut		
24	3776	/	Lost		
25	3764	/	Lost		
26	3758	/	Empty		
27	3750	30	Lst, lt gy-lt blue gy, mod hd, mod well ind, crypto xln, sl rexln . arg, abn vf pyr, low por, no show.		
28	3740	20	Mrlst, brn olv gy, firm, pr cpct, v arg. no show.		
29	3726	20	Lst, m lt gy, mod hd, f ind, blky, micro xln, sl arg. sl , low por, no show		
30	3720	15	Lst, as no. 29 less arg. no show.		

Norsk Hydro

SIDE WALL CORES DESCRIPTION

WELL: 15/5-2	RUN N°: 9	SERVICE COMPANY: Schlum	
LICENCE: 048	PAGE N°: 1 of 2	ASKED: 30	
	DATE: 28 November 1978	SHOT: 29	
		LOST: 14	
		EMPTY: 2	
		SAMPLES RECOVERED 13	
		Misfire: 1	
		GEOLOGIST: A. Davies	

tr : trace - M : medium - G : good

N°	DEPTHS m	REC %	LITHOLOGY	Fluorescence	CUT
1	4140	30	Sltst, gy red, sft-firm, pr-mod cpct, cly, grdg to vf ang Sst, non calc, no shows.		
2	4096	20	Sltst, lt gy-v lt gy, firm as no. 1 no show.		
3	4065	10	Cly st, dk yel brn, sft, pr cpct, gummy, slty, sl calc, no show.		
4	4063	/	Empty		
5	4027	/	Lost		
6	3985	/	Lost		
7	3980	/	Lost		
8	3975	30	Mrl, lt brn, sft, pr cpct, sticky, gummy, slty, sl calc.		
9	3972	/	Lost		
10	3968	/	Empty		
11	3966	30	Coal, blk, hd, brit, dull, sl arg, low rank, thin shiney vit lam, no flu, v weak, slow lt yel crush cut.		
12	3964	/	Lost		
13	3953	/	Lost		
14	3950	/	Lost		
15	3936	/	Lost		
16	3935	15	Lst, dk gy, hd, mod dns, well ind, micro-f xln, arg, no vis por, no show.		
17	3932	/	Lost		
18	3927	/	Lost		

Norsk Hydro

SIDE WALL CORES DESCRIPTION

WELL: 15/5-2	RUN N°: 9	SERVICE COMPANY: Schlum	
LICENCE: 048	PAGE N°: 2 of 2	ASKED: 30	
	DATE: 28 November 1978	SHOT: 29	
		LOST: 14	
		EMPTY: 2	
		SAMPLES RECOVERED: 13	
		Misfire: 1	
		GEOLOGIST: A. Davies	

tr : trace - M : medium - G : good

N°	DEPTHS m	REC %	LITHOLOGY	Fluorescence		CUT
					MG	
19	3916	10	Sh, lt brn gy, sft, pr cpct, cly, subfis, sl calc, no show			
20	3869	25	Sh, mod brn, sft-firm, pr cpct, cly, fis, v sl calc, no show.			
21	3868	/	Lost			
22	3860	/	Lost			
23	3855	/	Lost			
24	3850	/	Lost			
25	3826	40	Sh, dusky yel brn, firm mod cpct, sub fis, cly, tr micro mic, sl calc, no flu, weak, slow, lt yel crush cut.			
26	3800	50	Sh, dk gy, mod hd, well cpct, subfis, plty, f slty, sl carb, tr micro mic, sl calc, no flu, weak, slow lt yel crush cut.			
27	3776	50	Sh, olv blk, mod hd, w cpct, sub fiss as no. 26, v sl calc, no flu slow, weak lt yel flood + crush cut			
28	3764	50	Sh, brn blk, mod hd as no. 27, sl calc, no flu, slow weak lt yel strmg cut, slow, weak lt yel flood + crush cut.			
29	3759	/	Misfire			
30	3758	25	Lst, m gy, mod hd, mod well ind. plyt micro xln, varg, no show.			

APPENDIX 3

WELL SUMMARY

WELL SUMMARY

Coord: 58°38'36,7" N, 01°36'16,5" E
Line: 508 - 190 SP: 106
Depths datum: R.K.B.
Rig: TREASURE SEEKER
Water depth: 120,5 m R.K.B. elev: 25 m
Stopped in: TRIASSIC(?)

Spudded: AUGUST 16. 1978
Started drilling: AUGUST 16. 1978
At T.D.: NOVEMBER 14. 1978
Completed: DECEMBER 16. 1978
Status: Temporarily Suspended
T.D. Driller: 4323 m T.D. Logger: 4326m

Well: 15/5 - 2
Country: NORWAY

OPERATOR: NORSK HYDRO PRODUKSJON A/S
LICENCE: 048 OWNED BY: STATOIL / PETRONORD

TARGETS:
UPPER / MIDDLE JURASSIC SANDSTONES

RESULTS:
EARLY - MIDDLE BATHONIAN SST: 4035 - 4055 m
GROSS PAY: 20 m NET PAY: 7,3 m
AVERAGE ϕ: 14,3 % AVERAGE S_W: 41,7 %
TRIASSIC (?) SST: 4141,3 - 4158,1 m
GROSS PAY: 16,8 m NET PAY: 12,8 m
AVERAGE ϕ: 14,6 % AVERAGE S_W: 43,0 %

CASINGS

30"	AT	194 m
20"	AT	454 m
13 3/8"	AT	1598 m
9 5/8"	AT	3696 m
7" LINER	AT	4300 m

CORES

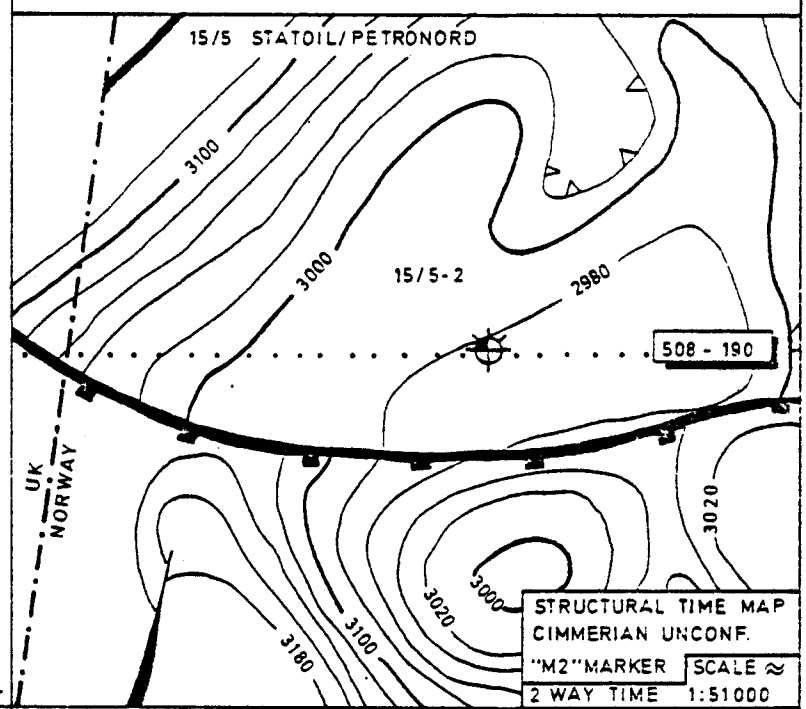
CORE #1	CUT: 4013,6 - 4020,6 m	
	REC: 4013,6 - 4018,7 m	
	⊗ 72,8 %	
CORE #2	CUT: 4032,5 - 4043 m	
	REC: 4032,5 - 4042,3 m	
	⊗ 93,3 %	

⊗ Loggers depth = Drillers depth + 4,5 m

CST 1	3000 - 3710 m	30/26
CST 2	1555 - 2990 m	30/30
CST 3	3753 - 4315 m	30/8
CST 4	3968 - 4323 m	30/10
CST 5	3925 - 3964 m	30/3
CST 6	3753 - 4288,5m	30/19
CST 7	3912 - 4147 m	30/21
CST 8	3720 - 3992 m	30/17
CST 9	3758 - 4140 m	30/13

SHOWS

194 - 310 m: 0,1 - 4,0 % C1.
310 - 1300 m: 0,5 - 1,0 % C1. occ C2, 520 - 570 m peak 12 %
1300 - 2278 m: < 0,4 % C1, tr C2, C3 from 2268 m.
2278 - 2789 m: < 0,2 % C1, tr C2, C3 from 2510 m.
2789 - 2793 m: C1 - nC4 peak of 6,0 %.
2793 - 3005 m: 0,2 - 2,0 % C1, C2, occ C3 peak 4,0 % at 2829 m.
3005 - 3702 m: 0,1 - 0,6 % C1, occ C2, C3.
3702 - 3956 m: 0,1 - 1,0 % C1-C3, occ iC4 and nC4.
3956 - 3990 m: 0,1 - 3,0 % C1-C3.
3990 - 4050 m: 0,4 - 40,0 % C1-nC4.
4050 - 4130 m: 0,1 - 3,0 % C1-C3.
4130 - 4270 m: 0,3 - 32,0 % C1-C3, occ iC4 and nC4.
4270 - 4323 m: < 0,2 % C1, C2.



LOGS

BHC-GR	192 - 464,5 m	1
ISF / SONIC GR	455 - 1621,5 m	2
"	1366 - 1620,5 m	2a
"	1593 - 3610 m	3
"	3500 - 3715 m	4
"	3691 - 4134 m	5
"	4000 - 4326,5 m	6
FDC / CNL	455 - 1612 m	1
"	1593 - 3713,5 m	2
"	3689 - 4134 m	3
"	3691 - 4326 m	4a
"	4000 - 4325,5 m	4b
DLL / MSFL	4000 - 4324,5 m	1
HDT	1593 - 3712 m	1
"	3690,5 - 4323,5 m	2

VELOCITY SURVEY	500 - 4323 m	1
HRT	541 - 1589 m	1
"	2655 - 3652 m	2
CCL	0 - 3696 m	1
CPI	4005 - 4295 m	1
RFT	MISRUN	1
"	4148,5 m	2
"	3990,5 - 4292 m	3
"	4053 m	4
"	4053 m	5
"	4157,5 m	6
"	4157,5 m	7
"	4157,5 m	8

SHOWS

In Lst 2792 m: tr of slow pale yel-blue crush cut.
In Lst 2828 m: tr of slow pale yel crush cut.
In Lst 3488 - 3515 m: pale yel - yel wh flu, wh - pale blue, slow - fast strmg flu cut.
In Lst 3565 - 3582 m: pale yel - yel wh flu, wh - pale blue, non - slow strmg flu cut.
In Lst 3707 - 3723 m: wh - yel wh flu, wh - blue wh, fast - instant strmg flu cut.
In Sh 3757 m: tr lt yel, slow, weak crush cut.
In Sh 3783 - 3785 m: pale yel, slow, weak crush cut.
In Sh 3833 m: tr of lt yel, v weak, slow strmg and crush cut.
In Sh 3860 m: lt yel, v weak, slow crush cut.
In Sst 4002 - 4015 m: abn pale blue flu, slow but extensive bluish wh cut.
In Sst 4025 - 4035 m: abn pale yel flu, pale yel - wh, slow strmg cut, 80 % pale brn hydrocarbon stain
In Sst 4036 - 4055 m: dull orange flu, yel - wh, fast strmg cut, hydrocarbon stain on clear qtz.
In Lst 4190 m: wh - yel flu, wh, fast strmg cut.

Checked: S.I. Leivestad
Date: 8.6.79

RFT RESULTS

RUN 1

DEPTH (KB)	FORMATION PRESSURE
TOOL FAILURE	

RUN 2

	DEPTH (KB)		FORMATION PRESSURE	
(½)	4148,5	m	10560	PSIG

RUN 3

	DEPTH (KB)		FORMATION PRESSURE	
(3)	4292	m	10682	PSIG
(3)	4271,5	m	TIGHT	
(3)	4259	m	10610	PSIG
(3)	4227	m	10562	PSIG
(3)	4210	m	10538	PSIG
(3)	4195,5	m	10528	PSIG
(3)	4186	m	SEAL FAILURE	
(3)	4157	m	10456	PSIG
(3)	4155,5	m	10457	PSIG
(3)	4151,5	m	TIGHT	

RUN 3

	DEPTH (KB)		FORMATION PRESSURE	
(3)	4150	m	10455	PSIG
(3)	4148,5	m	10455	PSIG
(3)	4145	m	10460	PSIG
(3)	4143,5	m	10460	PSIG
(3)	4055	m	10231	PSIG
(3)	4053	m	10227	PSIG
(3)	4051,5	m	10227	PSIG
(3)	4049	m	10225	PSIG
(3)	4045,2	m	SEAL FAILURE	
(3)	4045,5	m	SEAL FAILURE	
(3)	4046	m	SEAL FAILURE	
(3)	3991	m	SEAL FAILURE	
(3)	3990,5	m	SEAL FAILURE	

RUN 4

	DEPTH (KB)		FORMATION PRESSURE	
(¼)	4053	m	10229	PSIG

RUN 5

	DEPTH (KB)		FORMATION PRESSURE	
(⅛)	4053	m	10229	PSIG

RUN 6

	DEPTH (KB)		FORMATION PRESSURE	
(⅛)	4157,5	m	10516	PSIG

RUN 7

	DEPTH (KB)		FORMATION PRESSURE	
(1/m)	4157,5	m	10471	PSIG
(2/m)	4157,5	m	10482	PSIG

RUN 8

	DEPTH (KB)		FORMATION PRESSURE	
(⅛)	4157,5	m	10456	PSIG

Segregated sampling was performed as followes:

Run 1 Tool failed

Run 2 at 4146,5 m { Recovery: 1 gal. mud filtrate; 2¾ gal. mud filtrate

Run 3 at 4145 m { Recovery: 1 gal. mud filtrate; 2¾ gal. mud filtrate

Run 4 at 4053 m Sampling failed

Run 5 at 4053 m { Recovery: 1 gal. mud filtrate; 2¾ gal. mud filtrate

Run 6 at 4157,5 m { Recovery: 1 gal. failed; 6 gal. mud filtrate

Run 7 at 4157,5 m No recovery, tool malfunction

Run 8 at 4157,5 m { Recovery: 1 gal. mud filtrate; 6 gal. mud filtrate

Checked: S.I.Leirvestad
Date: 8.6.79

GEOLOGICAL WELL SUMMARY

LOCATED ON LINE : 508-190 SP 106
N 58°38'36,7" E 01°36', 16,5"
WATER DEPTH : 120 m

WELL 15/5-2

DEPTHS m KB | LITHO SECTION | SYSTEM | SERIES | SHOWS | DESCRIPTIONS. OBS

25 m SEA LEVEL

145.5 m SEA BOTTOM
Drilled with return to seabed.

30" 195 m

194
Cly, m-m dk gy olvgy, sft-firm, silty, sl stky, sl-mod calc.
Occ intbds of Sd: qtz, clr, occ fros, vf-crs, occ v crs, ang-subrnd, pr srtd, w/dk gy-dk grn-blk lithic frags.
Tr Lst, wh, hd, cnky.
Tr shell frags and Pyr.

20" 454 m

480
Abn shell frags, Tr Glau and Lig.

700

758
Sd, clr, lse, vf-f, ang-subrnd, mod well srtd, w/occ layers of Cly a/a.
Tr shell frags, Pyr, Glau and Mica.

910
Cly, olv gy-olv grn, sft, sl calc, silty.
Tr Sd, clr, vf-f, subang mod srtd.
Tr shell frags, Mica, Glau.

1060

Sd, clr, vf-m, occ crs, ang-subang, pr srtd, w/lithic frags.
Below 1250 m lam of Sist, mgy, brn-gy, brn-grn, firm, micro mic, v arg, mod calc

13 3/8" 1598 m

Sst, clr, wh, mod hd, vf-m, ang-subrnd, mod srtd, calc cmt.
Cly, a/a but bcm ind grdg to Clyst.

1500 Clyst, olv grn-olv gy, firm, silty, non-sl calc. Strgs of Lst, lt gy-brn, mod hd, arg, silty, micro-xln

1603
Sst, clr, vf-vcrs, lse and hd, ang-subrnd, pr srtd intbd w/ Clyst/Sh, olv-dk grn gy, grn blk, non calc, silty in pts. Occ strgs of Lst, wh-lt gy, firm-hd, dol.
Tr Pyr, Glau.

1783 Sh, m-dk gy, gy blk, micro mic, occ silty, pyr, non calc w/strgs of Lst and occ Sst, a/a.

1871 Sd, qts, clr, f-crs, lse, w/ intbds of Dol/Lst.

1916
Sh, lt-dk gy, occ grn gy, gy brn, sl silty, non calc w/ strgs of Dol/Lst.
Tr Pyr

2063
Sh, rd brn, gy, gy grn, gy blue, sft-hd, non calc, occ w/blk carb specs.

2100

2128 Tr Tuff.
Sh, lt-m gy, gy brn else a/a.
Tr Pyr.

2204

2252
Sd, clr, lse, f, occ vf and m, ang, mod srtd. Tr of Sst, clr, wh, vf, grdg to slt, ang-subang, mod srtd, calc cmt, no vis por.
Minor intbds of Sh, var gy, sft-firm, blky-fis, occ sl calc, occ grdg to Clyst.
Strgs of Lst/Dol
Tr Pyr, Glau

TERTIARY
QUATERNARY
PLEISTOCENE
PLIOCENE
MIOCENE
OLIGOCENE
EOCENE
PALEOCENE
C1 - C2
C1

GEOLOGICAL WELL SUMMARY

LOCATED ON LINE

SP

WATER DEPTH : 120 m

WELL 15/5 - 2

DEPTHS m KB | LITHO SECTION | SYSTEM/ SERIES | SERIES/ STAGES | SHOWS | DESCRIPTIONS OBS

TERTIARY: PALEOCENE, DANIAN — Shows: C1, occ tr C2; C1-C3

UPPER CRETACEOUS: MAASTRICHTIAN, SANTON.-CAMPAN., TURONIAN-CONIACIAN, CENOM., ALB., E.BARR.-ALB. — Shows: C1, C2, occ C3; C1, occ tr C2

95/8" casing 3696 m

Sh, a/a, incr in Cly, m gy-bm gy, sft, non calc.

2506 Cly, a/a w/ minor Sh a/a.

2650

2705 Lst, wh, crm, mod hd, micro-xln and lt gy, sft, arg, grdg to Mrlst and tr of Sh, m dk gy-blk, firm, occ slty, calc.

2782 Lst, a/a but pred cln, occ chky, occ grdg to Mrl, lt-m gy, sft-firm.

Minor thin intbds of Sh, lt-dk gy, w/blk lam, firm-hd, subfis, calc.

Tr Glau, Pyr.

2967 Mrlst, lt-m rd brn, minor lt gy, hd, v arg, intbd w/ Lst, wh, crm, lt brn rd, firm, crypto xln, often arg, grdg to Mrlst, a/a.

3060 Mrlst, pred lt-m gy, minor rd brn a/a, firm, v arg, occ grdg to Sh. Occ intbds of Lst, crm, wh, hd, micro-crypto xln, cln and arg, occ sl dol.

Sh, dk gy hd, calc w/ intbds of Mrlst, lt-dk gy, sft-mod hd, w/ arg lam.

3293 Mrlst, lt-m gy, minor lt brn and rd brn, grdg downwards to Lst, wh, lt gy, sft and hd. Tr Sh, dk gy, rd brn, occ slty, tr carb, calc and non calc.

Lst, lt-m gy, chky, calcilutite, and micro-xln, occ arg.

3507 Mrlst, lt-m gy, sft-firm, intbd w/ Lst, wh lt gy, sft-hd, micro-xln, chky, in pts grdg to Mrlst, a/a. Tr Sh, a/a.

3588 Mrlst, lt gy, pink, rd brn sft-firm, occ slty grdg to Lst.

3637

3689 Sh, lt-dk gy, lt gy grn, 3701 rd brn, micro-mic, non-v calc, in pt grdg to Mrlst. strgs of Lst and tr Sst.

LOWER CRET.: E.RYAZ.-HAUT.; UPPER JURASSIC: KIMM.-VOLG., OXFORD, CALLOV.; MIDDLE JURASSIC: M-L BATH, BAJOC.-E.BATH; TRIASSIC — Shows: C1-C3, occC4; C1-C3; C1-C4; C1-C3; C1-C4; C1-C3; C1 occC2

Core 1, Core 2

7" liner 4300 m

T.D 4326 m (LOGGER)

3711

3759 (M2)

3774 Sh, dk brn, brn blk, sft-firm, earthy, slty, carb, n-sl calc, vf pyr.

3814

3831 Sh, dk brn-dk gy, firm-mod hd, blky-fis, occ earthy, slty, carb, sl-mod calc

3894 intbd w/strgs of Lst, m-dk brn, micro-xln, arg and Dol, dk brn, hd-v hd.

3960 Sh, a/a intbd w/Coal, blk, firm-hd, shiny, occ shly and slty and Slst, lt-m brn, hd, blky, non calc.

4037 Sst, wh-lt brn, vf-f, occ m and crs-vcrs, ang-subrnd, fri-hd, calc, occ silic cmtd, mod-well srtd, pr-mod por.

4113

Sst, pale yelsh brn, yelsh gy, occ grnsh gy, occ rd stained, vf-m, in pt slty, ang-subrnd, lse-fri, silic and calc cmt, occ mic, pr-well srt, pr-fair por.

Intbds of Sh, brnsh gy, gysh rd, dusk brn, lt-dk gy, micro-mic, sl-non calc in places grdg to Slst, gysh rd, fri-hd, non calc.

Tr of Lst and Dol.

SECTION B
OPERATIONS

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1. LOCATION SURVEY

From June 5 through June 16, 1978 the vessel M/S "Bommeløy" performed a site survey in the area for the planned well 15/5-2, which was given as:-

58° 38' 34.85" N
01° 36' 17.27" E

The survey area was a rectangle of approximately 5.0 by 4.6 kilometers. The survey equipment used was echo sounder for bathymetric mapping, dual channel side scan sonar, boomer and high and low energy sparker. 5 Gravity cores were also obtained.

The gravity cores showed that the sea bed consisted of fine sand which made the penetration for the gravity corer difficult. The length of the samples achieved varied from a few centimeter to 1.3 m.

The seismic data indicated that the uppermost 30 m of the sediments consisted of soft sand. Between 30 and 140 m below the sea bed a zone probably consisting of morainic deposits was identified.

No shallow gas zones were observed in the upper layers around the given drilling location. No obstructions were found within the survey area, which could be interpreted to create any problems for the drilling operation.

The water depth at the proposed location was found to be 121.3 m, referred to Mean Sea Level.

2. POSITIONING AND ANCHORING OF THE RIG

The location for the well 15/5-2 was defined as shotpoint 106 on seismic line 508-190 shot by Western in 1976, with the use of Decca Hifix and Sat.nav. as navigation systems. The well should be spudded within a radius of 70 m from this position.

The equipment on board the rig for positioning was Pulse/8 and Sat.nav. No problems were encountered during the mooving of the rig, and on August 15 at 15.30 hrs. the rig arrived on the location. At 22.30 hrs. all eight anchors were set with piggy-backs on No. 1,3,5 and 7, as shown in Fig. A-1.

Prior to spudding on August 16 the anchors were pretentioned to:-

Chain	No.	1:	820 kN
"	"	2:	780 "
"	"	3:	910 "
"	"	4:	730 "
"	"	5:	930 "
"	"	6:	930 "
"	"	7:	870 "
"	"	8:	1000 "

Before drilling out of the 30" casing all anchors were tested to minimum 1110 kN.

The final position of well 15/5-2 was established on August 18 at 09.00 GMT. (referred to the European Datum 1950):

58° 38' 36.7" N
01° 36' 16.5" E

This is 60 m in a 348 degrees direction from the planned location.

3. OPERATION RESUMÉ

3.1 Summary

Treasure Seeker was taken over from Statoil August 15, at 07.35 hrs. and moved to the well 15/5-2 location. It was ready to spud after 40 hrs. of anchor handling.

The 36" hole was drilled to 194.5 m RKB and the 30" casing was set at 194 m and cemented back to the sea floor. The riser was run and a 17½" pilot hole was drilled to 469 m with returns to the surface. The hole was logged prior to under-reaming to 26". The 20" casing was run to 454 m and cemented back to the sea floor.

After having run and tested the BOP stack to full working pressure the 20" casing shoe was drilled out and a formation integrity test was run at 474 m giving 1.47 rd.

The drilling of the 17½" hole continued to 1267 m without stabilizers in the drill string. While running in the hole after having installed the stabilizers, a tight hole section was encountered, and while working the drill string through this section, the string unscrewed 185 m above the bit. The fish was recovered on the first attempt, and the drilling of the 17½" hole continued down to 1615 m. The hole was logged, and the 13-3/8" casing was run with the casing shoe at 1598 m RKB. The casing was cemented back to 1150 m before the casing was tested to 207 bar.

The 12-1/4" hole was drilled down to 1635 m, where a formation integrity test was performed, giving 1.68 rd.

When drilling from 1884 m to 2069 m torque problems were encountered and the near bit stabilizer was found to be worn 1/4" on the diameter of the blades. Below 2069 m no severe problems were encountered and the drilling continued down to 2293 m. When pulling out for bit change the string got stuck at 1928 m and the drill string was backed off at 1723 m. After jaring on the fish without any success the string was backed off at 1839 m, leaving nine joints of 8" drill collars, three stabilizers, one bit sub, one junk basket and the bit in the hole.

A cement plug was set twice above the fish for side tracking before the operation successfully continued by drilling the 12-1/4" side tracked hole.

When drilling at 1879 m the operation was shut down for 48 hrs. due to heavy weather conditions.

The drilling of the 12-1/4" hole continued down to 3606 m without any major problems. At this depth an intermediate ISF/sonic log was run to confirm the geological prognosis. After having drilled to 3714 m, logs were run before two cones lost in the hole were fished out.

The 9-5/8" casing was run with the casing shoe at 3696 m RKB. The cement was brought back in the annulus to 3200 m, and the casing was tested to 345 bar. A formation integrity test was performed at 3719 m, giving 2.07 rd.

The drilling of the 8-3/8" hole continued down to 4013 m, where the mud density had to be increased from 1.46 rd to 1.63 rd due to gas cut mud. Two cores were cut, one from 4013 m to 4020 m, and one from 4032 m to 4044. At 4130 m two intermediate logs consisting of ISF/sonic and FDC/CNL were run before the drilling of 8-3/8" hole continued down to 4322 m, using a 1.90 rd mud.

Due to heavy weather on November 14 the riser was disconnected, and in the same period one anchor chain broke. A total of 4.5 days were lost before the broken chain could be repaired and the riser connected.

The final logging in the 8-3/8" hole took place over a period of 11 days. Problems encountered during this period were malfunctioning of the RFT and CST tools, sticking of HDT tool and in the attempts to obtain formation fluid samples by the RFT. Only mud filtrate samples were obtained from the RFT sampling.

After discussion with the partners it was decided to temporary abandon the well, and a 7" liner was run with the shoe set at 4300 m.

While cementing the liner one cement line plugged, causing the cement to be brought back in the annulus only to 3780 m. 5.3 m^3 cement were spotted on top of the liner hanger, of which 2.9 m^3 were squeezed into the formation, leaving a 60 m plug on top of the liner, which was successfully tested to 140 bar.

The well was temporary abandoned, and the last anchor was retrieved on December 16, after waiting on weather for aprroximately 10 days.

Weekly drilling report

Week	Weeks Progress	Report no.	Page	of
14/8-20/8-1978		1	1	

Area	Well	Rig
North Sea	15/5-2	TREASURE SEEKER

Casing	Size	30"					
	Setting depth (m)	194					

Date	Depth (m) / Progress (m)	Pore Press grad (r.d.)	Mud Dens grad (r.d.)	Detailed operation
15/8	-	-	-	Treasure Seeker was taken over from Statoil at 07.35 hrs. Moved the rig from 24/12-1 to 15/5-2. The anchors were run with 4 piggybacks. Started to ballast the rig.
15/8	192	1.07	1.30	Ballasted the rig. Ran a 26" bit and a 36" hole opener. The measured depth to sea bed was 145.5 m. RKB. Drilled 36" hole from 145.5 m to 192 m.
17/8	194.5	1.07	1.08	Drilled from 192 m to 194.5 m. Made a short trip and started to run the 30" casing. Was not able to get below 182.5 m. Pulled out the 30" casing and ran in the hole with the 36" hole-opener again. Reamed from 175 m to 194.5 m. Ran and landed the 30" casing at 194 m. Cemented the same with full returns to seabed.
18/8	202	1.07	1.08	Ran the 30" hydraulic latch on the 21" riser. Installed the diverter and tested same. Ran in the hole with 17½" bit to drill the pilot hole. Tagged cement at 190 m. Drilled from 194.5 m to 202 m.
19/8	469	1.07	1.14	Drilled 17½" hole from 202 m to 469 m. Ran sonic log but the tool would not go below 282 m. Reamed with the 17½" bit to bottom and raised the mud weight to 1.14 rd.
20/8	469	1.07	1.16	Conditioned the mud prior to logging. Ran sonic log. Opened the 17½" hole to 26" by using an underreamer.

Norsk Hydro

Weekly drilling report

Week	Weeks Progress	Report no.	Page	of
21/8-27/8-1978		2	2	

Area	Well	Rig
North Sea	15/5-2	TREASURE SEEKER

	Size						
Casing		30"	20"				
	Setting depth (m)	194	454				

Date	Depth (m) / Progress (m)	Pore Press grad (r.d.)	Mud Dens grad (r.d.)	Detailed operation
21/8	469	1.07	1.16	Pulled the 21" riser. Made wiper trip with the 26" bit. Started to run the 20" casing.
22/8	469	1.07	1.16	Ran the 20" casing with the shoe at 454 m. Tested the casing to 69 bar for 15 min. Prepared to run the BOP and the riser.
23/8	469	1.07	1.16	When function testing the BOP the lower annular preventer would not open fully. Dressed and serviced the same and changed out spm and shuttle valves for the upper outer choke valve. Ran the 21" riser and the BOP and latched the BOP to the wellhead. Tested the BOP to the full working pressure.
24/8	559	1.07	1.16	Finished testing the BOP. Drilled 17½" hole to 474 m. Ran leak-off test, giving 1.47 rd. equivalent mud density. Drilled 17½" hole from 474 m to 559 m.
25/8	966	1.07	1.13	Drilled 17½" hole from 559 m to 966 m.
26/8	1267	1.07	1.14	Drilled 17½" hole from 966 m to 1267 m. Pulled out for bit change. Ran in with new bit and 2 string stabilizers.
27/8	1267	1.07	1.16	Ran in the hole. Hit tight spots at 760 m and 1124 m. Lost 333 kN of the string weight when attempted to pass 1124 m. Pulled out and found the drill string had unscrewed 2 singles above the drill collars. Ran in with an overshot, latched to the fish and pulled out. Ran in the hole and reamed all tight spots.

Weekly drilling report

Week	Weeks Progress	Report no.	Page	of
28/8-3/9-1978		3	3	

Area	Well	Rig
North Sea	15/5-2	TREASURE SEEKER

	Size						
Casing		30	20	13-3/8			
	Setting depth (m)	194	454	1598			

Date	Depth (m) / Progress (m)	Pore Press grad (r.d.)	Mud Dens grad (r.d.)	Detailed operation
28/8	1416	1.07	1.16	Reamed to bottom. Drilled 17½" hole from 1267 m to 1416 m.
29/8	1615	1.07	1.17	Drilled 17½" hole from 1416 m to 1615 m. Conditioned mud prior to logging.
30/8	1615	1.07	1.20	Made wiper trip to the 20" casing shoe. Pulled out for logging. Schlumberger was not able to get below 990 m. Ran in with the bit and raised the mud density to 1.20 rd and reduced the water loss to 6 cc.
31/8	1615	1.07	1.20	Ran ISF-sonic-GR log. The sonice tool did not work in the lower 200 m, had to relog the bottom section. Ran the FDC-GR log. The caliper arm would not work. Repaired cable failure. Ran the FDC-GR for 2. time , but the tool did not operate properly. Pulled out and checked the tool . Ran FDC-GR for the 3. time.
1/9	1615	1.07	-	Finished running FDC-GR log. RIH with 17½" bit. Had to break all connections to check made up torque.
2/9	1615	1.07	-	Ran and cemented the 13-3/8" casing with the shoe at 1598 m.
3/9	1615	1.07	-	Tested the casing to 207 bar for 15 min. Ran temperature log which indicated the top of the cement to be at 1150 m. Tested the BOP and the surface equipment to 345 bar.

Norsk Hydro

Weekly drilling report

Week	Weeks Progress	Report no.	Page	of
4/9-10/9-1978		4	4	

Area	Well	Rig
North Sea	15/5-2	Treasure Seeker

Casing	Size	30	20	13-3/8			
	Setting depth (m)	194	454	1598			

Date	Depth (m) / Progress (m)	Pore Press grad (r.d.)	Mud Dens grad (r.d.)	Detailed operation
4/9	1802	1.07	1.20	Ran in with 12-1/4" bit. Tagged the cement at 1573 m. Drilled cement, collar and shoe and continued to drill 12-1/4" hole to 1635 m. Ran leak-off test, giving 1.68 rd equivalent mud density. Drilled 12-1/4" hole from 1635 m to 1802 m.
5/9	1884	1.07	1.20	Pulled out to install stabilizers in the string. Drilled 12-1/4" hole from 1802 m to 1884 m. Bit torqued up. Pulled out and had 400 kN overpull at 1800 m.
6/9	1903	1.07	1.20	The bit and the stabilizers were badly balled up and the inner teeth on the bit were broken. Ran in the hole and drilled from 1884 m to 1903 m. The rotary stalled due to high torque. Pulled out. Found that the near bit stabilizer was 1/4" worn down. Ran in the hole without the near bit stabilizer.
7/9	2149	1.07	1.20	Drilled 12-1/4" hole from 1903 m to 2069 m. Had torque problems when the 3 stabilizers in the string passed 1901 m.
8/9	2293	1.07	1.22	Drilled 12-1/4" hole from 2069 m to 2293 m. Pulled out for bit change. Got stuck 3 times on the way out. Managed to work the pipe free by circulating. The depths were 2106 m, 1963 m and 1944 m. When reaching 1928 m the pipe got stuck again and the circulation was lost. Pulled with max. 890 kN overpull without managing to free the pipe.

Week	Weeks Progress	Report no.	Page	of
4/9-10/9-1978		4	5	

Area	Well	Rig
North Sea	15/5-2	Treasure Seeker

	Size						
Casing		30	20	13-3/8			
	Setting depth (m)	194	454	1598			

Date	Depth (m) / Progress (m)	Pore Press grad (r.d.)	Mud Dens grad (r.d.)	Detailed operation
9/9	2293	1.07	1.22	Attempted to free the string by pulling 979 kN overpull without success. Ran free point indicator which indicated that the string was free down to the drill collars. Schlumberger ran string shot in an and attempt to back off at 1723 m. No success. Ran 2. string shot and managed to back off. When the pipe backed off the Schlumberger cable broke on surface and was dropped inside the drill pipe. Started to build fishing spear for the cable.
10/9	2293	1.07	1.22	Schlumberger ran the CCl-log and tagged the top of wire at 265 m. RIH with the rig made fishing spear and fished for the cable. No success. Cemented a 50 m cement plug from 1190 m to 1240 m inside the drill pipe. After waiting on cement, pulled out with the string and the wire.

Week	Weeks Progress	Report no.	Page	of
11/9-17/9-1978		5	6	

Area	Well	Rig
North Sea	15/5-2	Treasure Seeker

	Size						
Casing		30	20	13-3/8			
	Setting depth (m)	194	454	1598			

Date	Depth (m) / Progress (m)	Pore Press grad (r.d.)	Mud Dens grad (r.d.)	Detailed operation
11/9	2293	1.07	1.22	Retrieved the Schlumberger wire. Ran CCl-log to check the 13-3/8" casing. Found everything ok. Ran in the hole with a jar in the string and screwed into the fish. Jared both ways but were unable to free the fish.
12/9	2293	1.07	1.22	Backed off at 1839 m after 2 attempts. Retrieved 12 joints of 8" drill collars. Ran in the hole and set a cement plug from the top of fish at 1839 m to 1779 m. Tested the BOP.
13/9	1827	1.07	1.22	Finished testing the BOP. Ran in the hole with a new bottom hole assembly for sidetracking. Drilled 12-1/4" hole from 1775 m to 1827 m.
14/9	1740	1.07	1.22	Drilled 12-1/4" hole from 1827 m to 1840 m where the top of the fish was tagged. Pulled out of the hole and set a new cement plug from 1840 m to 1740 m.
15/9	1829	1.07	1.22	Drilled 12-1/4" hole from 1781 m to 1829 m. The angle was build up to 5-3/4°. Pulled out to change bottom hole assemblies.
16/9	1874	1.07	1.22	Drilled 12-1/4" hole from 1829 m to 1879 m. The angle dropped to 5°. Due to hurricane forecast pulled into 13-3/8" casing shoe and prepared to hang off. Waited on weather from 16.00 hrs. Hung off at 18.30 hrs. and disconnected at 23.00 hrs.
17/9	1874	1.07	1.22	Waited on weather.

Week	Weeks Progress	Report no.	Page	of
18/9-24/9-1978		6	7	

Area	Well	Rig
North Sea	15/5-2	Treasure Seeker

Casing	Size	30	20	13-3/8	-		
	Setting depth (m)	194	454	1598			

Date	Depth (m) / Progress (m)	Pore Press grad (r.d.)	Mud Dens grad (r.d.)	Detailed operation
18/9	1945	1.07	1.20	Waited on weather until 10.00 hrs. Latched on to the BOP and drilled 12-1/4" hole from 1874 m to 1945 m.
19/9	2127	1.07	1.20	Drilled 12-1/4" hole from 1945 m to 2127 m.
20/9	2232	1.07	1.26	Drilled 12-1/4" hole from 2127 m to 2232 m. Pulled out of hole for bit change. Got stuck at 1939 m but managed to free the string by jarring down. Added 1% diesel to the mud, lowered the water loss and raised the mud density to 1.26 rd. Worked the string in singles through the tight section.
21/9	2232	1.07	1.26	Pulled out of the hole. Tested the BOP. Ran in the hole with a new bit.
22/9	2351	1.07	1.26	Reamed from 1991 m to 2048 m and from 2147 m to 2232 m. Drilled 12-1/4" hole from 2232 m to 2351 m. From 09.00 to 15.00 hrs. rig personnel were on strike.
23/9	2456	1.07	1.26	Drilled 12-1/4" hole from 2351 m to 2355 m. Pulled out of the hole for bit change. Drilled 12-1/4" hole from 2355 m to 2456 m.
24/9	2613	1.10	1.26	Drilled 12-1/4" hole from 2456 m to 2488 m. Pulled out for bit change and continued drilling to 2613 m.

Week	Weeks Progress	Report no.	Page	of
25/9-1/10-1978		7	8	

Area	Well	Rig
North Sea	15/5-2	Treasure Seeker

Casing	Size	30	20	13-3/8			
	Setting depth (m)	194	454	1598			

Date	Depth (m) / Progress (m)	Pore Press grad (r.d.)	Mud Dens grad (r.d.)	Detailed operation
25/9	2711	1.17	1.26	Drilled 12-1/4" hole from 2613 m to 2639 m. Pulled out for bit change and continued drilling to 2711 m.
26/9	2737	1.17	1.27	Drilled 12-1/4" hole from 2711 m to 2731 m. Made a bit change and drilled to 2737 m.
27/9	2826	1.17	1.27	Drilled 12-1/4" hole from 2737 m to 2826 m. Pulled out for bit change.
28/9	2826	1.17	1.27	Tested the BOP. Made up the turbine and diamond bit and ran in the hole. Had to ream through tight sections at 2034 m and 2321 m.
29/9	2842	1.17	1.27	Reamed 12-1/4" hole from 2341 m to 2742 m and from 2799 m to 2826 m. Drilled 12-1/4" hole from 2826 m to 2842 m.
30/9	2929	1.17	1.27	Drilled 12-1/4" hole from 2842 m to 2929 m. Made short trip to 2400 m.
1/10	3007	1.17	1.27	Drilled 12-1/4" hole from 2929 m to 3007m.

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Weekly drilling report

Week	Weeks Progress	Report no.	Page	of
2/10-8/10-1978		8	9	

Area	Well	Rig
North Sea	15/5-2	Treasure Seeker

Casing	Size	30	20	13-3/8			
	Setting depth (m)	194	454	1598			

Date	Depth (m) / Progress (m)	Pore Press grad (r.d.)	Mud Dens grad (r.d.)	Detailed operation
2/10	3075	1.17	1.27	Drilled 12- 1/4" hole from 3007 m to 3075 m.
3/10	3147	1.17	1.27	Drilled 12-1/4" hole from 3075 m to 3147 m.
4/10	3213	1.17	1.27	Drilled 12-1/4" hole from 3147 m to 3213 m.
5/10	3279	1.18	1.27	Drilled 12-1/4" hole from 3213 m to 3279 m.
6/10	3340	1.18	1.27	Drilled 12-1/4" hole from 3279 m to 3340 m.
7/10	3359	1.18	1.27	Drilled 12-1/4" hole from 3340 m to 3359 m. Had to pull out due to one pump motor burned down. Tight hole was encountered at 2210 m and 1857 m.
8/10	3369	1.18	1.27	Tested the BOP and surface equipment and ran in the hole with conventional rock bit. Drilled 12-1/4" hole from 3359 m to 3369 m.

Week	Weeks Progress	Report no.	Page	of
9/10-15/10-1978		9	10	

Area	Well	Rig
North Sea	15/5-2	Treasure Seeker

	Size						
Casing		30	20	13-3/8			
	Setting depth (m)	194	454	1598			

Date	Depth (m) / Progress (m)	Pore Press grad (r.d.)	Mud Dens grad (r.d.)	Detailed operation
9/10	3411	1.17-1.22	1.30	Drilled 12-1/4" hole from 3369 m to 3411 m.
10/10	3435	1.17-1.22	1.30	Drilled 12-1/4" hole from 3411 m to 3425 m. Pulled out for bit change. Continued drilling to 3435 m.
11/11	3486	1.17-1.22	1.30	Drilled 12-1/4" hole from 3435 m to 3486 m. Started to pull out for bit change.
12/10	3504	1.17-1.22	1.30	Changed the bit and continued drilling 12-1/4" hole from 3486 m to 3504 m. Had drop in pump pressure. Searched for leaks in the surface equipment, but no leaks were detected. Pulled out. Found crack in the crossover between the hw. drill pipe and the drill collar.
13/10	3544	1.17-1.22	1.30	Changed the bit and the crossover and ran in the hole. Drilled 12-1/4" hole from 3504 m to 3544 m.
14/10	3599	1.17-1.22	1.30	Drilled 12-1/4" hole from 3544 m to 3599 m.
15/10	3606	1.17-1.22	1.30	Drilled 12-1/4" hole from 3599 m to 3606 m. Pulled out of the hole for bit change. Ran ISF/sonic/GR log as intermediate log run. Tested the BOP and the surface equipment.

Week	Weeks Progress	Report no.	Page	of
16/10 - 22/10		10	11	

Area	Well	Rig
North Sea	15/5-2	Treasure Seeker

Casing	Size	30	20	13-3/8			
	Setting depth (m)	194	454	1598			

Date	Depth (m) / Progress (m)	Pore Press grad (r.d.)	Mud Dens grad (r.d.)	Detailed operation
16/10	3626	1.22	1.30	Finished testing the surface equipment. Ran in the hole with the two cone bit, type A1. Hit bridge at 3593 m and had to jar to free the string. Reamed from 3593 m to 3606 m. Drilled 12-1/4" hole from 3606 m to 3626 m.
17/10	3681	1.22	1.30	Drilled 12-1/4" hole from 3626 m to 3681 m.
18/10	3712	1.27	1.34	Drilled 12-1/4" hole from 3681 m to 3712 m. Circulated and raised the mud density to 1.34 rd. Pulled out of the hole for logging.
19/10	3712	1.27	1.34	Finished pulling out. Found both cones lost. Ran 3 log runs. Run No. 1: ISF/sonic/gr/sp Run No. 2: fdc/cnl/cal/gr Run No. 3: hdt Started to ran in the hole with a magnet.
20/10	3712	1.27	1.34	Recovered only small fragments with the magnet. Finished logging by running 2 runs with cst log. Ran in the hole with a reverse circulating junk basket with a finger shoe.
21/10	3712	1.27	1.34	Pulled out of hole with the reverse circulating junk basket but recovered only lost bullets from the cst log. Ran in the hole with a hard formation bit and drilled on the junk. Pulled out of the hole.
22/10	3714	1.27	1.34	Ran in the hole with a convential junk basket. Recovered both lost cones. Made a wiper trip prior to running the 9-5/8" casing. Drilled 2 m of new hole to ensure that all the junk was recovered.

Week	Weeks Progress	Report no.	Page	of
23/10 - 29/10		11	12	

Area	Well	Rig
North Sea	15/5-2	Treasure Seeker

Casing							
Casing	Size	30	20	13-3/8	9-5/8		
	Setting depth (m)	194	454	1598	3696		

Date	Depth (m) / Progress (m)	Pore Press grad (r.d.)	Mud Dens grad (r.d.)	Detailed operation
23/10	3714	1.27	1.34	Ran the 9-5/8" casing. Rigged up for cementing. The casing shoe set at 3696 m.
24/10	3714	1.27	1.34	Cemented the 9-5/8" casing back to 3200 m. Torqued up the seal assembly to 19000 Nm and tested the same to 69 bar. Pulled out and layed down the running string. Ran down with the 18-3/4" seal assembly retrieving and reinstallation tool on 8" drill collars. Torqued up the seal assembly to 34000 Nm. Ran the temperature log. Located top of the cement at 3200 m. Started to test the BOP.
25/10	3714	1.27	1.34	Continued testing the BOP. Had 14 bar in pressure drop on all 690 bar tests. The tests on the annulars to 240 bar were ok. Tested the kelly hose, kelly valves and stabbing valve to 345 bar. Ran down with the test plug and a circulating sub. Attempted to pressure test the seal assembly against closed lower pipe ram but chicksans on the drill floor were leaking. Repaired the chicksans and tested the seal assembly to 690 bar for 15 min. Continued testing the BOP to 690 bar on the rams and valves. Located the leak to be in the coflexip house on the kill side. Made up bit No. 25 and new bottom hole assembly.
26/10	3725	1.27	1.40	Tagged the cement at 3646 m. Tested the casing to 345 bar for 15 min. Drilled the float collar, cement and float shoe. Drilled 8-3/8" hole from 3714 m to 3719 m. Ran a leak-off test, giving leak-off pressure equivalent to 2.07 rd mud. Drilled 8-3/8" hole from 3719 m to 3725 m.
27/10	3765	1.33	1.40	Drilled 8-3/8" hole from 3725 m to 3743 m Pulled out of the hole for bit change. Installed the stabilizers in the string and ran in the hole with bit No. 26. Drilled 8-3/8" hole from 3725 m to 3765 m.

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Norsk Hydro

Weekly drilling report

Week	Weeks Progress	Report no.	Page	of
23/10 - 29/10		11	13	

Area	Well	Rig
North Sea	15/5-2	Treasure Seeker

	Size						
Casing		30	20	13-3/8	9-5/8		
	Setting depth (m)	194	454	1598	3696		

Date	Depth (m) / Progress (m)	Pore Press grad (r.d.)	Mud Dens grad (r.d.)	Detailed operation
28/10	3808	1.33	1.40	Drilled 8-3/8" hole from 3765 m to 3808 m. Pulled out of the hole for bit change. Ran bit No. 27. Had 3-3/4 hrs. rig repairing on the block retractor.
29/10	3865	1.37	1.44	Finished repairing the block retractor. Drilled 8-3/8" hole from 3808 m to 3825 m. Raised the mud density to 1.44 rd. Drilled 8-3/8" hole from 3825 m to 3865 m.

Week	Weeks Progress	Report no.	Page	of
30/10 - 5/11		12	14	

Area	Well	Rig
North Sea	15/5-2	Treasure Seeker

	Size						
Casing		30	20	13-3/8	9-5/8		
	Setting depth (m)	194	454	1598	3696		

Date	Depth (m) / Progress (m)	Pore Press grad (r.d.)	Mud Dens grad (r.d.)	Detailed operation
30/10	3913	1.39	1.44	Drilled 8-3/8" hole from 3865 m to 3871 m. Pulled out of the hole for bit change. Drilled 8-3/8" hole from 3871 m to 3913 m.
31/10	3941	1.39	1.44	Drilled 8-3/8" hole from 3913 m to 3941 m. Made wiper trip to 3859 m. Pulled out of the hole for bit change. Had 6-1/4 hrs. rig repair on the block retractor.
1/11	4001	1.40	1.44	Drilled 8-3/8" hole from 3941 m to 3994 m. Circulated up formation sample. Drilled 8-3/8" hole from 3994 m to 4001 m.
2/11	4013	1.45	1.59	Drilled 8-3/8" hole from 4001 m to 4013 m. Made a flow check, no flow. Worked the pipe without pumping and circulated a full circulation. Maximum gas reading was 1020 units. Raised the mud density in steps to 1.52 rd. Was not able to obtain more than 1.48 rd. on the mud density out. Raised the mud density to 1.59 rd.
3/11	4013	1.45	1.59	Pulled out of the hole for bit change. Retrieved the wear bushing and tested the BOP.
4/11	4020	1.60	1.63	Ran in the hole with the core barrel and circulated a full circulation. Had maximum gas reading on 2000 units. Raised the mud density to 1.63 rd. Cored 8-3/8" hole from 4013 m to 4020 m. Pulled out with the core barrel.
5/11	4030	1.74	1.80	Recovered 5 m with core. Ran in the hole with bit No. 30. Circulated and conditioned the mud. Had maximum gas reading of 1440 units. Drilled 8-3/8" hole from 4020 m to 4030 m. Had drilling break up to 20 m/hr at 4026 m. Checked for flow - well stabile. Raised the mud density in steps to 1.80 rd.

Week	Weeks Progress	Report no.	Page	of
6/11 - 12/11		13	15	

Area	Well	Rig
North Sea	15/5-2	Treasure Seeker

Casing	Size	30	20	13-3/8	9-5/8		
	Setting depth (m)	194	454	1598	3696		

Date	Depth (m) / Progress (m)	Pore Press grad (r.d.)	Mud Dens grad (r.d.)	Detailed operation
6/11	4032	1.74	1.80	Circulated and raised the mud density to 1.80 rd. Pulled out for coring.
7/11	4059	1.74	1.82	Cored 8-3/8" hole from 4032 m to 4044 m. Pulled out of the hole and recovered 94%. Made up bit No. 31 and ran in the hole. Circulated and conditioned the mud, trip gas 1870 units. Drilled 8-3/8" hole from 4044 m to 4059 m. Made flow checks at 4044 m, 4053 m and 4059 m - no flow. Raised the mud density to 1.82 rd.
8/11	4111	1.74	1.82	Drilled 8-3/8" hole from 4059 m to 4111 m.
9/11	4130	1.74	1.82	Drilled 8-3/8" hole from 4111 m to 4130 m. Circulated and conditioned the mud, and pulled out for bit change and logging. Rigged up Schlumberger and ran the ISF/ sonic/gr log.
10/11	4150	1.70	1.82	Ran the FDC/CNL log. Ran in the hole with a diamond bit. Drilled 8-3/8" hole from 4129 m to 4150 m.
11/11	4192	1.80	1.90	Drilled 8-3/8" hole from 4150 m to 4183 m. Circulated a full circulation after drilling break at 4183 m. Maximum gas reading was 1600 units. Drilled 8-3/8" hole from 4183 m to 4185 m. Raised the mud density to 1.90 rd. Drilled 8-3/8" hole from 4185 m to 4192 m.
12/11	4271	1.80	1.90	Drilled 8-3/8" hole from 4192 m to 4271 m. Circulated and conditioned the mud due to high viscosity out.

Week	Weeks Progress	Report no.	Page	of
13/11 - 19/11		14	16	

Area	Well	Rig
North Sea	15/5-2	Treasure Seeker

	Size						
Casing		30	20	13-3/8"	9-5/8"		
	Setting depth (m)	194	454	1598	3696		

Date	Depth (m) / Progress (m)	Pore Press grad (r.d.)	Mud Dens grad (r.d.)	Detailed operation
13/11	4271	1.80	1.90	Due to excess pump pressure across the diamond bit this was pulled out of the hole. The bit was found 100% worn. Tested the BOP. Ran in with bit No. 33.
14/11	4322	1.80	1.90	Circulated a full circulation and drilled 8-3/8" hole from 4271 m to 4322 m. Due to heavy weather the bit was pulled into the 9-5/8" casing shoe and the string was hung off on the upper pipe ram. At 18.30 hrs. anchor chain No. 8 parted after having a tension peak up to 2669 kN.
15/11	4322	1.80	1.90	Waited on weather
16/11	4322	1.80	1.90	Waited on weather
17/11	4322	1.80	1.90	Waited on weather. Deballasted the rig to transfer draft and managed to transfer the chain end from the rig to the supply-boat.
18/11	4322	1.80	1.90	Ballasted the rig to 60 ft draft. Run out and set anchor No. 8. Tensioned up to 800 kN. Ballasted the rig to 70 ft draft and connected the riser to the BOP. Checked for any pressure build-up before opening the shear ram. Retrieved the hang-off tool and ran to bottom. Circulated a full circulation. Maximum gas reading was 1650 units. Pulled out of the hole.
19/11	4322	1.80	1.90	Ran ISF/Sonic/GR log. Ran FDC/CNL/GR log. The tool was sticking between 3714 m to 3928 m and between 4306 m and 4125 m. Misrun. Ran DLL/MSFL log. The tool was sticking at 3707 m. Misrun. Ran in the hole for wiper trip.

Week	Weeks Progress	Report no.	Page	of
20/11 - 26/11		16	17	

Area	Well	Rig
North Sea	15/5-2	Treasure Seeker

	Size						
Casing		30	20	13-3/8	9-5/8		
	Setting depth (m)	194	454	1598	3696		

Date	Depth (m) / Progress (m)	Pore Press grad (r.d.)	Mud Dens grad (r.d.)	Detailed operation
20/11	4322	1.80	1.90	Circulated and conditioned the mud. Pulled out of the hole. Ran FDC/CNL log. Prepared to run the velocity survey.
21/11	4322	1.80	1.90	Ran the velocity survey. Ran in the hole for wiper trip before running the RFT No. 1.
22/11	4322	1.80	1.90	Ran the RFT No. 1. The tool got stuck at 3706 m. Got free, but the tool did not function properly. Rigged up and ran the HDT log. The tool hung up several places between 4000 m and the 9-5/8" casing shoe. Ran the CST No. 1 and 2.
23/11	4322	1.80	1.90	Ran the CST No. 3 and 4. Ran in the hole for wiper trip.
24/11	4322	1.80	1.90	Conditioned the mud and pulled out of the hole. Ran the RFT No. 2 and 3.
25/11	4322	1.80	1.90	Ran the RFT No. 4. Misrun due to blocking of the flow line to the sample chamber. Ran the RFT No. 5. Ran the HDT No. 2 . The tool got stuck at 3724 m. Started to run in the hole, with the drill pipe while stripping over the Schlumberger cable.
26/11	4322	1.80	1.90	Continued to run in the hole while stripping over the cable. Recovered the fish and pulled out. Ran in the hole for wiper trip. Circulated and conditioned the mud.

Week	Weeks Progress	Report no.	Page	of
27/11 - 3/12		17	18	

Area	Well	Rig
North Sea	15/5-2	Treasure Seeker

Casing	Size	30	20	13-3/8	9-5/8	7 liner	
	Setting depth (m)	194	454	1598	3696	4300	

Date	Depth (m) / Progress (m)	Pore Press grad (r.d.)	Mud Dens grad (r.d.)	Detailed operation
27/11	4322	1.80	1.90	Made a short trip into the 9-5/8" casing shoe and ran to bottom again. Circulated a full circulation before pulling out. Waited 2-1/4 hrs. before a new Schlumberger cable was installed. Ran the CST No. 5.
28/11	4322	1.80	1.90	Ran the CST No. 6 and 7. Ran in the hole for wiper trip.
29/11	4322	1.80	1.90	Ran the RFT No. 6. Had installed a 2-3/4 gal and a 6 gal chamber, but the 2-3/4 gal would not open. Ran the RFT No. 7. The 6 gal chamber would not open. Ran the RFT No. 8. Recovered mud filtrate sample.
30/11	4322	1.80	1.90	Tested the BOP and ran in the hole for wiper trip.
1/12	4322	1.80	1.90	Prepared to run the 7" liner. Ran 67 joints 7" liner, 29 lbs/ft on drill pipe.
2/12	4322	1.80	1.90	Hung off the liner at 3494 m with the shoe at 4300 m. Started to cement the liner. After having mixed 24.4 m^3 out of total 31.3 m^3 the cement liner plugged up. Released the plug and displaced the cement. Pressured up to 138 bar when the plug landed, but the pressure bled off. Pulled out of the hole and layed down the running string. Ran down and attempted to pressure test the liner hanger to 110 bar. The pressure bled back to 89 bar. Established a injectivity rate of 0.24 m^3/min at 110 bar. Spotted 5.2 m^3 cement on top of the liner and squeezed 2.9 m^3 around the liner hanger. The final squeeze pressure was 110 bar. Held 96 bar on the cement for 4 hrs.

Weekly drilling report

Week	Weeks Progress	Report no.	Page	of
27/11 - 3/12		17	19	

Area	Well	Rig
North Sea	15/5-2	Treasure Seeker

Casing	Size	30	20	13-3/8	9-5/8	7 liner	
	Setting depth (m)	194	454	1598	3696	4300	

Date	Depth (m) / Progress (m)	Pore Press grad (r.d.)	Mud Dens grad (r.d.)	Detailed operation
3/12	PBTD: 3434 m	1.80	1.90	Bled off the pressure and pulled out. Pressure tested the first cement plug on top of the liner hanger to 138 bar for 15 min. Set a 30 m balanced cement plug from 445 m to 415 m. Pulled out and ran a bridge plug on wire line down to 305 m. Pressure tested the bridge plug to 69 bar for 15 min. Retrieved the wear bushing.

Week	Weeks Progress	Report no.	Page	of
4/12 - 10/12		18	20	

Area	Well	Rig
North Sea	15/5-2	Treasure Seeker

	Size						
Casing		30	25	13-3/8	9-5/8	7 liner	
	Setting depth (m)	194	454	1598	3696	4300	

Date	Depth (m) / Progress (m)	Pore Press grad (r.d.)	Mud Dens grad (r.d.)	Detailed operation
4/12	PBTD: 305	1.80	1.90	Prepared to pull the riser and BOP. Waited on weather from 02.30 hrs. Disconnected the riser due to one broken tension wire.
5/12	PBTD: 305	1.80	1.90	Waited on weather to 19.00 hrs. Connected the riser to the BOP and pulled the BOP and the riser.
6/12	PBTD: 305	1.80	1.90	Finished pulling the BOP and prepared to run the corrosion cap. Had to modify the running tool. Ran the corrosion cap and cut guide lines No. 2, 3 and 4 by using the hydraulic cutter. The knife broke and the divers had to be used to cut guide line No. 1. Deballasted the rig to 60 ft. draft. Retrieved the piggy-back anchor No. 1 and 3. Had to shut down operation due to the weather.
7/12	-	-	-	Waited on weather
8/12	-	-	-	Waited on weather
9/12	-	-	-	Waited on weather
10/2	-	-	-	Pulled anchor No. 2, 7 and the piggy-back anchor No.5. Attempted to retrieve piggy-back No. 7, but the pennant line broke and the anchor was lost overboard. Waited on weather.

Week	Weeks Progress	Report no.	Page	of
11/12 - 17/12		19	21	

Area	Well	Rig
North Sea	15/5-2	Treasure Seeker

Casing	Size	30	20	13-3/8	9-5/8	7 Liner	
	Setting depth (m)	194	454	1598	3696	4300	

Date	Depth (m) / Progress (m)	Pore Press grad (r.d.)	Mud Dens grad (r.d.)	Detailed operation
11/12	-	-	-	Waited on weather
12/12	-	-	-	Waited on weather
13/12	-	-	-	Waited on weather
14/12	-	-	-	Waited on weather
15/12	-	-	-	Waited on weather for 4 hours. Deballasted the rig and started to pull the anchors. Anchor chain No. 4 broke on the wildcat and shortly after the tail chain on the anchor broke and the anchor was dropped. Managed to retrieve anchor No. 4 after 2 hrs. grappling. Continued picking up the remaining anchors.
16/12	-	-	-	Last anchor was bolstered at 02.30 hrs.

3.3 Time Distribution

The total time used to move the rig to the location, to drill and temporary plug and abandon the well 15/5-2 was 122.8 days. The time distribution is shown in Table A.1 and Fig. A.2.

The operation can be divided into five main groups:

1. Underway and position the rig; 1,7 days
2. Drilling of the well to TD; 98,5 days
3. Final logging; 11,0 days
4. Plug and abandon the well; 1,6 days
5. Waiting on weather before mooving; 10 days

A total of 7,3 days were lost when the pipe got stuck at 1930 m and the hole had to be sidetracked.

2 days were lost due to waiting on weather on September 17 and 18.

Close to two days were lost due to the fishing for the two cones that were lost in the hole.

4,5 days were lost due to waiting on weather from November 15 to 18.

The long time spent on the final logging was caused by several factors:

a. Malfunctions of the RFT-tool

b. Several attempts to obtain formation fluid sample.

c. Malfunctions of the CST gun

d. Stuck HDT. Had to fish the tool out by stripping over the cable.

A total of 10 days were lost waiting on weather after the well was plugged prior to any anchor handling could take place.

TABLE A.1

TIME DISTRIBUTION

	OPERATION	HOURS	PERCENTAGE OF TOTAL TIME
1.	Under way	8	0,3
2.	Positioning and mooring	32,75	1,1
3.	Drilling	814,5	27,6
4.	Tripping	262,5	9,0
5.	Surveying	42	1,4
6.	Circ. and conditioning the mud	71,5	2,4
7.	Reaming	25	0,9
8.	Slipping and cutting the drlg. line	20,75	0,7
9.	Subsea equipment handling	30,5	1,0
10.	Testing of equipment	102,5	3,5
11.	Running and cementing casing	236,75	8,0
12.	Formation evaluation		
	a. Logging, leak-off tests· circ. bottoms up	385,5	13,1
	b. Coring	51,25	1,7
13.	Lost time drlg. equipment	63,25	2,2
14.	Lost time subsea equipment	12,25	0,4
15.	Lost time fishing	148,25	5,0
16.	Lost time hole problems	159,5	5,4
17.	Lost time mooring	11,25	0,4
18.	Lost time waiting on weather	395,5	13,4
19.	Lost time waiting on equipment	2	0,1
20.	Plugging and abandonment	38	1,3
21.	Misc.	33,5	1,1
	SUM TOTAL	2947	100%

= 122,8 days

TABLE A.2

HOLE DEVIATION - 15/5-2

Depth (m)	Inclination (degrees)	Direction (degrees)
194.5	1.50	-
297	0.50	310
402	0.25	200
469	0.25	212
560	0.13	115
722	0.25	310
815	0.13	290
919	0.50	355
1007	0.13	315
1101	0.13	263
1195	0.63	48
1284	0.25	65
1390	0.25	80
1495	0.25	160
1600	0.75	5
1697	1.00	124
1802	0.75	30
1884	1.00	15
1983	1.00	335
2069	0.75	315
2154	0.75	0
2260	1.00	0
1796 (1. sidetrack)	1.38	20
1815 (")	1.75	10
1834 (")	2.00	9
1800 (2. sidetrack)	2.50	102
1819 (")	4.75	110

TABLE A.2 Cont.

Depth (m)	Inclination (degrees)	Direction (degrees)
1828 (2. sidetrack)	5.75	111
1859 (")	5.00	107
1888 (")	4.25	107
1917 (")	4.00	113
1945 (")	3.50	119
1973 (")	2.75	122
2031 (")	2.75	144
2127 (")	1.75	135
2232 (")	1.25	185
2326	0.75	200
2432	1.13	190
2488	1.00	180
2639	0.75	175
2731	0.50	143
2826	1.25	228
2929	1.00	225
3076	1.25	203
3256	2.50	186
3333	2.50	200
3425	2.00	190
3486	2.25	196
3712	2.50	195
4130	1.75	195

4. TEMPORARY ABANDONMENT OF THE WELL

The approved abandonment program is shown in Fig. A-3 and it was carried out as follows:

1. A 60 m cement plug from 3494 m to 3434 m was set on top of the liner hanger.

2. A 30 m cement plug was set from 445 m to 415 m.

3. A bridge plug was set at 305 m.

4. A corrosion cap was mounted on the wellhead.

5. The wellhead location was marked with 3 buoys shown in Fig. A-4.

Due to the temporary abandonment, no inspection of the sea bed was done prior to abandoning the well.

The following items are reported lost on 15/5-2 Phase I.

1. Drain pipe from shaker and shaker tank 16 m long, OD = 24". Direction: 360°, 15 m from the wellhead.

2. One 15 ton piggy-back anchor with 2 x 152 m pennant lines. Direction: 216°, 914 m from the wellhead.

3. Crane wire, 129 m, OD = 38 mm. Direction: 180° , 40 m from the wellhead.

5. PORE PRESSURE AND FORMATION INTEGRITY

5.1 Pore Pressure

The pore pressure detection started at appr. 2000 m and was performed to total depth of 4313 m.Drilling parameters and electric logs were used in this work. The results are given in the following table.

Depth	dc-exp.	Sonic log	Predicted
2600	1.07	1.07	1.07
2690	1.18	''	''
2700	''	''	''
2800	''	''	1.15
2900	''	''	''
2980	''	1.23	''
3000	''	''	''
3100	''	''	''
3200	''	''	''
3250	''	1.31	''
3300	''	''	''
3350	''	1.42	''
3400	''	''	''
3425	1.22	''	''
3500	''	''	''
3520	''	1.44	''
3600	''	''	''

Depth	dc-exp.	Sonic log	Predicted
3700	1.27	1.60	1.20
3760	1.43 *	''	1.25
3800	'' *	''	1.27
3820	1.43 *	1.80	1.29
3900	'' *	''	1.38
3960	1.57	''	1.43
4000		''	1.50
4050		1.75	1.57

*) Calculated after the well was drilled.

The result from RFT taken at 4049 m showed a pressure of 1.77 rd.

5.2 Formation Integrity

The following table shows the formation integrity tests .

20" csg. : 454 m , 1.47 rd

13 3/8" csg.: 1598 m , 1.68 rd

9 5/8" csg.: 3696 m , 2.07 rd

6. MATERIALS REPORT

6.1 Casing and Wellhead

A Vetco SG-5 1000 bar wellhead system was used. This would made it possible to use the 1000 bar BOP stack if higher formation pressures were encountered.

The 36" hole was spudded and drilled without any guidance system. The 30" casing was run with the 30" wellhead housing locked into the permanent guide structure. The extended posts would have facilitated guidance if the 1000 bar BOP stack had to be used.

The riser was run prior to drilling of the 17½" pilot hole and underreaming to 26" hole. The 20" casing was run with the 18-3/4" wellhead housing and landed in the 30" wellhead.

The 17½" hole was drilled with the 690 bar BOP stack installed. The 13-3/8" casing was run, landed in the 18-3/4" housing and cemented.

The 12-1/4" hole was drilled and the 9-5/8" casing was run, and cemented.

The 8-3/8" hole was drilled to TD at 4322 m. The 7" liner was run and hung off inside the 9-5/8" casing by using a Brown Oil Tool hydraulic liner hanger.

The well was temporary plugged and abandoned.

The following types of casing were run:

Size	Grade	Weight lbs/ft	Length m	Threads	Setting depth m
30"	B	310	38.1	S.J.	
	B	457	13.5	S.J.	194
20"	K-55	133	286.2	But.	
	K-55	133	12.3	But/Lx	
	K-55	133	13.1	Vetco/Lx	454
13-3/8"	K-55	68	34.4	But.	
	N-80	72	1420.8	But.	1598
9-5/8"	N-80	47	514.4	But.	
	P-110	47	1838.9	But.	
	P-110	53.5	1200.3	VAM	3696
7" liner	N-80	29	798.8	But.	4300 m

6.2 Drill Bit Record

Size	Amount	IADC Code
26"	1	111
17½"	2	111
	1	124
12-1/4"	1	114
	11	135
	4	215
	1	527
	1	517
	1	325
	1	LX16 diamond
8-3/8"	3	134
	2	135
	1	136
	1	214
	2	527
	1	Core head
	1	S-IR diamond

TABLE A.3

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BIT RECORD

COUNTY	FIELD	STATE	SECTION	TOWNSHIP	RANGE	LOCATION	WELL NO.
NORWAY							

CONTRACTOR	RIG NO.	OPERATOR	TOOLPUSHER	SALESMAN
WILHELM WILHELMSEN	TS	NORSK HYDRO		

SPUD	UNDER SURF.	UNDER INTER.	SET SAND ST.	REACHED T.D.	PUMP NO. 1 LINER	PUMP NO. 2 LINER	PUMP POWER	TYPE MUD

DRILL PIPE SIZE	TYPE	O.D.	TOOL JOINTS	DRILL COLLARS NUMBER	O.D.	I.D.	LENGTH	DRAWWORKS POWER

NO.	SIZE	MAKE	TYPE	JET 32ND IN	SERIAL	DEPTH OUT (M)	(M)	HOURS	m/hr	ACCUM DRLG. HRS.	WT 1000 N	R P M	VERT DEV	PUMP PRESS BAR	PUMP OPER-ATION	SPM 1	SPM 2	MUD WT	MUD VIS	MUD W.L.	DULL. COND. T	DULL. COND. B	DULL. COND. G	DULL. COND. OTHER	FORMATION REMARKS
1	26"/36"	HUGHES SERVCO	OSC - 3AJ	3 x 22		194.5	49	13	3.77	13	75	60	1½°	40	P 7"	80	80	1.08	12	-	2	2	1		
1	RERUN	FOR REAMING																							
2	17 1/2"	REED	Y 11 J	3 x 20		469	274.5	10 3/4	25.5	23 3/4	44	150		138	P 7"	90	90	1.14	6	-	1	2	1		
2	RERUN	FOR REAMING																							
	26"	SERVCO	UNDERREAMING																						
1	RERUN,	CIRCULATING																							
3	17 1/2"	SMITH	DSJ	3 x 18		1267	834	40.5	20.6	64 1/4	100	100/50		190	P 7"	100	100	1.06 1.13	4-8	-	6	4	1		
4	17 1/2"	SMITH	SDT	3 x 18	WA 799	1615	348	38 3/4	9	103	220	150	1/4	220	P 7"	86	86	1.16			4	2	1		
RR4	FOR COND. HOLE	FOR LOG																							
RR4	FOR COND. HOLE	FOR 13 3/8 CSG																							
5	12 1/4	SMITH	SDGH	1 x 14 2 x 15	WC 607	1802	187	13 3/4	13.6	126,75	60/110	50/150		207	P 7"	60	60	1.20			4	4	1		CMT. CLAY
6	12 1/4	SMITH	SDS EN-CJ	4 x 12	WA 843	1884	82	4	20.5	130,75	110/178	110		206	P 7"	55	55	1.20			5	2	1		
7	12 1/4	SMITH	SDGH	1 x 14 2 x 15	WC 585	1903	19	3 1/2	5.4	134 1/4	20/90	25/200		210	P 7"	60	60	1.20			1	2	1/8		
8	12 1/4	SMITH	SDGH	1 x 14 2 x 15	VP 113	2293	390	31 1/4	12.5	165 1/2	178	110	1°	193	P 7"	55	55	1.20			-	-	-		LOST IN HOLE
			PLUGGED BACK W/CEMENT TO			1775 M																			
9	12 1/4	SMITH	SDGH	3 x 15	WC 606	1840	65	2 3/4	23.6	168 1/4	55/110	50		140/80	S 7"	100/60		1.20			1	1	1		
			PLUGGED BACK W/CEMENT TO			1781 M																			
10	12 1/4	SMITH	SDGH	3 x 15	VM 658	1829	48	6 1/4	7.7	174 1/2	90/160	60/100		90	S 7"	70		1,22			1	1	1		
11	12 1/4	SMITH	SDGH	1 x 14 2 x 15	WB 851	2232	403	40 3/4	9.9	215 1/4	81/150	130		188/207	P 7"	53	53	1.2			6	6	1/8		
12	12 1/4	SMITH	SDGH	2 x 14 1 x 13	VM 692	2355	123	9	13.7	224 1/4	133	110		214	P 7"	51	51	1,26			6	7	0 1/8		
13	12 1/4	SMITH	SDGH	2 x 14 1 x 13	VM 915	2488	133	17 3/4	7.5	242	133/177	115		210	P 7"	51	51	1,26			8	6	1/8		
14	12 1/4	SMITH	SDGH	2 x 14 1 x 13	VN 022	2639	151	12 1/2	12.1	254 1/2	150/220	120		214	P 7"	50	50	1,26			7	5	1/8		

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HTC 557 D

Table A.3 cont.

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BIT RECORD

COUNTY	FIELD	STATE	SECTION	TOWNSHIP	RANGE	LOCATION	WELL NO.
NORWAY							15/5 - 2

CONTRACTOR	RIG NO.	OPERATOR	TOOLPUSHER	SALESMAN
WILH. WILHELMSEN	TS	NORSK HYDRO		

SPUD	UNDER SURF.	UNDER INTER.	SET SAND ST.	REACHED T.D.	PUMP NO. 1 LINER	PUMP NO. 2 LINER	PUMP POWER	TYPE MUD

DRILL PIPE SIZE	TYPE	O.D.	TOOL JOINTS	NUMBER	O.D.	I.D.	LENGTH	DRILL COLLARS	DRAWWORKS POWER

NO.	SIZE	MAKE	TYPE	JET 32ND IN	SERIAL	DEPTH OUT (M)	(M)	HOURS	M/HR	ACCUM DRLG. HRS.	WT 1000 N	R P M	VERT DEV	PUMP PRESS BAR	PUMP OPER.	SPM 1	SPM 2	MUD WT	MUD VIS.	MUD W.L.	DULL T	DULL B	DULL G	DULL OTHER	FORMATION REMARKS
15	12 1/4	HUGHES	XDV	1 x 13 2 x 14	596 RK	2731	92	19 1/4	4,8	273 3/4	220	100		214	P-7"	50	50	1,26			5	5	I		MARL/LIMESTONE
16	12 1/4	SMITH	SDGH	1 x 13 2 x 14	VN 766	2826	95	24	4.0	297 3/4	155	120		214	P	58 7"	57 6"	1,26			3	6	1/16		LIMESTONE
17	12 1/4	DIAMANT BOART	LX 16	-	7600206	3359	533	172	3.1	469 3/4	70 200	750		290	P	75 6"	75 6"	1,27			CRACKS				LIMESTONE/MARL
18	12 1/4	HUGHES	J 22	1 x 12 2 x 13	CH 439	3425	66	38 1/2	1.7	508 1/4	245	58		220	P	56 6½"	56 6½"	1,30			1	3	I		LIME / MARL
19	12 1/4	SMITH	SDGH	1 x 12 2 x 13	WC 539	3486	61	25 3/4	2,4	534	245	120		220	P	55 6½"	55 6½"	1,30			6	4	I	BROKEN TEETH	"
20	12 1/4	HUGHES	XDV	1 x 12 2 x 13	RK 594	3504	18	9 1/2	1.9	543 1/2	245	80/90		220	P 6 ½"	56	56	1,30			6	7	1/16		"
21	12 1/4	HUGHES	XDV	1 x 12 2 x 13	RK 593	3606	102	43	2,4	596 1/2	245	100		220	P 6 ½"	53	53	1,30			4	8	I		"
22	12 1/4	SMITH	A-1	1 x 10 2 x 13	612 SB	3712	106	50 1/4	2.1	636 3/4		70/90		227	P 6 ½"	55	55	1,30			8	8	I	NOZZLES OUT.	CONES OFF MARL/LIMESTONE
23	12 1/4	HUGHES	XDR	3 x 13	Q 7056	3712	0	3	0	636 3/4	22	50		130	P 6 ½"	53	53	1,34			6	2	1/8		DRLG. JUNK.
24	12 1/4	HUGHES	XDV	3 x 13	116 RK	3714	2	1/2	4	637 1/4	45	50		130	P 6 ½"	53	53	1,34			1	1	I		
25	8 3/8	SMITH	SDG	2 x10 1 x11	723 FR	3743	29	10 1/2	2.8	647 3/4	180	85		170	S 6 ½"	65		1,40			7	8	1/16		DRLG. CMT FLOATS, SHALE
26	8 3/8	SMITH	SV	2 x10 1 x11	958 FT	3808	65	18	3,6	665 3/4	151	80		208	S 6 ½"	65		1,40			5	7	I		SH./LIMIE
27	8 3/8	SMITH	SDG	2 x10 1 x11	897 FR	3871	63	20 1/4	3,1	686	133	80		208	S 6 ½"	68		1,44			7	8	I		SH./LIMIE
28	8 3/8	HTC	J 3	2 x10 1 x11	JA 70 H	3941	70	21 3/4	3,2	707 3/4	133	80		208	S 6 ½"	68		1,44			6	3	I		SH./DOLE
29	8 3/8	SMITH	SDG	2 x10 1 x11	389 RR	4013	72	21 1/2	3,3	729 1/4	132	80		200	S 6 ½"	68		1,44			6	8	I	BT	SH./SD./COAL
CB 1	8 3/8	HYC	CMH 1-P	-	17078	4020	7	3 1/2	2.0	732 3/4	124	100		124/137	S 6 ½"	60		1,63			3	0	0		SH./COAL
30	8 3/8	SMITH	SDGH	2 x10 1 x11	351 RS	4032	12	2 3/4	4,4	735 1/2	135	80		230	S 6 ½"	53		1,80			1	1	I		SH./COAL/SAND
CB 1 RR	8 3/8	HYC	CMH 1-P	-	17078	4044	12	4 3/4	2,5	740 1/4	125	80		145	S 6 ½"	59		1,82			20	0	0		SH./SD./SLST.
31	8 3/8	SMITH	F 2	3 x 12	415 PR	4130	86	40	2.2	780 1/4	132	60/70		220	S 6 ½"	73		1,82			2	4	1/16		SH./SD./SLST.
32	8 3/8	HYC	S-1R	-	17029	4271	141.	39 3/4	3,5	820	110 66	150		220	S 6 ½"	68		1,90			100	0	0		SHOWS OF PYR SST/WAL/SLST
33	8 3/8	SMITH	F-2	3 x 12	368 PR	4322	51	9 1/2	5,4	829 ½	90	50/60		205	S 6 ½"						1	2	I		SST POOH TO LOG
34	8 3/8	SMITH	SDGH	-	628 PC	WIPER TRIP																			

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6.3 Bottom Hole Assemblies

Bit No.	Bit size	Bottom Hole Assembly
1	26"	bit - 36" hole opener - 1 x 9½" monel - 8-9½" DC - XO - 3 x HWDP
2	17 1/2"	bit - bit sub - 1 x 9½" monel - 8 x 9½" DC - XO - 15 x HWDP
RR2	17 1/2"	bit - 26" UR - bit sub - 1 x 9½" monel - 8 x 9½" DC - XO - 15 HWDP
3	17 1/2"	bit - bit sub - 1 x 9½" monel - 14 x 9½" DC - XO - 15 HWDP
4	17 1/2"	bit - NB stab - 1 x 9½" monel - stab.- 2 x 9½" DC - stab - 12 x 9½" DC - XO - 15 HWDP
5	12 1/4"	bit - bit sub - 1 x 8" monel - 20 x 8" DC - XO - 15 HWDP
6	12 1/4"	bit - NB stab - 1 x 8" monel - stab - 2 x 8" DC - stab - 3 x 8" DC stab.- 15 x 8" DC - XO - 15 HWDP
7	12 1/4"	As bit no. 6
8	12 1/4"	bit - junk sub - bit sub - 1 x 8" monel - stab - 2 x 8" DC - stab - 3 x 8" DC - stab - XO - 15 HWDP
	Fishing string	XO - jar - 11 x 8" DC - 1 x bumper sub - XO - 15 HWDP
9	12 1/4"	bit - bit sub - XO - 1 x 6½" monel - 5 x 6½"DC - XO - stab - 9 x 8" DC - XO - 15 HWDP
10	12 1/4"	Bit - NB stab - XO - 1 x 6½" monel - 5 x 6½"DC - XO - XO - 9 x 8" DC - XO - 15 HWDP

Bit No.	Bit size	Bottom Hole Assembly
11	12 1/4"	bit - bit sub - 1 x 8" monel - stab - 1 x 8" DC - stab - 3 x 8" DC - slip on centr. - 7 x 8" DC - jar - 3 x 8" DC - XO - 15 HWDP
12	12 1/4"	bit - NB stab - 1 x 8" monel - stab - 2 x 8" DC - 3 x 8" DC - slip on centr. - 9 x 8" DC - jar - 3 x 8" DC - XD - 15 HWDP
13	12 1/4"	As bit no. 12
14	12 1/4"	As bit no. 12
15	12 1/4"	As bit no. 12
16	12 1/4"	bit - junk sub - bit sub - 1 x 8" monel - stab - 2 x 8" DC - stab - 3 x 8" DC - slip on centr.- 9 x 8" DC - jar - 3 x 8" DC - XO - 15 HWDP
17	12 1/4"	bit - turbine - XO - stab - 1 x 8" monel - stab - 2 x 8" DC - stab - 3 x 8" DC - slip on centr. - 12 x 8" DC - jar - 3 x 8" DC - XO - 15 HWDP
18	12 1/4"	bit - NB stab.- 1 x 8" monel - stab.- 2 x 8" DC - stab.- 3 x 8" DC - slip on centr. - 12 x 8" DC - jar - 3 x 8" DC - XD - 15 HWDP
19	12 1/4"	As bit no. 18
20	12 1/4"	As bit no. 18
21	12 1/4"	As bit no. 18

Bit No.	Bit Size	Bottom Hole Assembly
22	12 1/4"	bit - NB stab - 1 x 8" monel - stab - 2 x 8" DC - stab - 3 x 8" DC - stab - 12 x 8" DC - jar - 3 x 8"DC - XO - 15 HWDP
	Fishing string	Magnet - junk sub - NB stab - 1 x 8" monel - stab - 2 x 8" DC - stab - 3 x 8"DC - stab - 12 x DC - jar - 3 x 8"DC - XD - 15 HWDP.
	Fishing string	Reverse circ.junk basket - stab - 1 x 8" monel - stab - 2 x 8"DC - stab - stab - 15 x 8"DC - jar - 3 x 8"DC - XO - 15 HWDP.
23	12 1/4"	bit - bit sub - 1 x 8" monel - 17 x 8"DC - jar - 3 x 8"DC - XO - 15 HWDP.
24	12 1/4"	As bit no. 23.
25	8 3/8"	bit - bit sub - 1 x 6½" monel - 22 x 6½" DC - XO - jar - XO - 3 x 6½" DC - XO - 15 HWDP.
26	8 3/8"	bit - junk sub - NB stab - 1 x 6½" monel - stab - 2 x 6½" DC - stab - 3 x 6½" DC - stab - 17 x 6½" DC - XO - jar - XO - 3 x 6½" DC - XO - 15 HWDP.
27	8 3/8"	As bit no.26 except for the junk sub.
28	8 3/8"	As bit no.27.
29	8 3/8"	As bit no.26.

Bit No.	Bit Size	Bottom Hole Assembly
Core bit no.1.	8 3/8"	bit - core bbl - XO - stab - 2 x 6½" DC - stab - 3 x 6½" DC - stab - 17 x 6½" DC - XO - jar - XO 3 x 6½" DC - XO - 15 HWDP.
30	8 3/8"	As bit no.27.
RR Core bit no.1.	8 3/8"	As core bit no.1.
31	8 3/8"	As bit no.27.
32	8 3/8"	bit - NB stab - 1 x 6½" monel - stab - 2 x 6½" DC - stab - 3 x 6½" DC - stab - 20 x 6½" DC - XO - 15 HWDP.
33	8 3/8"	As bit no.27.
34	8 3/8"	As bit no.27.

6.4 Mud Report

36" hole, 30" csg.: The 36" hole was drilled with sea water with returns to the sea bed. 45 m^3 mud with 1.04 rd was mixed and spotted on connections and 50 m^3 mud with 1.20 rd was mixed which was displaced in the hole prior to running casing.

26" hole, 20" csg.: The riser was run before the 17½" pilot hole was drilled. A 1.08 rd sea water mud mixed with gel, spersene, caustic soda, drilling detergent, magconol and soda ash was used. The mud density was raised to 1.14 rd and YP to 11 before logging.

Increased the mud density to 1.16 rd while underreaming the hole to 26".

17½" hole, 13-3/8" csg.: Drilled out of the 20" csg. shoe with 1.13 rd. Lost 80 m^3 mud due to an open dump valve. Started to control the fluid loss at 1250 m, but problems was encountered due to continuously adding of water. At 1462 m the water loss was 9 cc. Prior to running of the logs the water loss was reduced to 6 cc and the mud density increased to 1.20 rd. Materials used in this interval were barite, gel, caustic soda, spersene, XP-20, CMC, lime, soda ash and tannathin. Cloride content varid from 20 000 to 14 000 ppm.

12-1/4" hole, 9-5/8" csg.: Drilled out with the mud density of 1.20 rd. The water loss was 6.0 cc down to 2172 m at which depth this was reduced to 4.0 cc. Problems were encountered in keeping the viscosity down while drilling the sidetracked hole at 1966 m. Added mud consisting of

prehydrated bentonite, spersene and XP-20. Had to slow down the pumps to 1000 gal/min due to capacity limitations in the mud treatment system. Had tight hole when pulling out from 2232 m. and bit lube and diesel was added to the mud. The water loss was reduced to less then 3 cc and at the same time the mud density was increased to 1.26 rd. When drilling below 2345 m continued to add bit lube, sollex and diesel (4%) to reduce the torque. Increased the mud density to 1.30 rd from 3415 m and down to 3682 m. At this depth the density was increased to 1.34 rd. Cloride content was reduced from 14 000 ppm in the top of the 17½" hole to 5000 ppm at 2172 m. Below 2172 m the cloride content varied between 6000 ppm and 4600 ppm. Materials used in this interval were barite, gel spersene, XP-20, caustic soda, CMC, bit lube, drilling detergent, lime, drispac, magconol, soda ash, soltex, and resinex.

8-3/8" hole, 7" liner: Drilled out of the 9-5/8" casing with the mud density of 1.40 rd. At 3873 this was increased to 1.43 rd and at 4013 m to 1.59 rd. The mud density was continuously increased to 1.90 rd at 4200 m. This mud density was necessary to control the increased amount of gas. The water loss was kept to approximately 3.0 cc in this hole section. Materials used in this interval were barite, gel, spersene, caustic soda, XP-20, CMC, bit lube, lime, drispac, soda ash and resinex.

WELL DATA SHEET

TABLE A.4

MAG-949-A

OPERATOR: Norsk Hydro	SURVEY SEC. T R	CASING SIZE / DEPTH MTS / DRLG. DAYS	BIT SIZE
WELL: 15/5-2	FIELD: 15	SURFACE: 20" 454 6	26"
CONTRACTOR: Wilhelmsen,	COUNTY	INTERMEDIATE: 13 3/8 1598 16	17 1/2"
ENGINEER	STATE / COUNTRY: Norway	PRODUCTION	

Aug78 DATE	DEPTH	Sp Gr WT.	VISCOSITY SEC.	VISCOSITY CPS.	CORR. 115°F PV	CORR. 115°F YP	GELS 0	GELS 10	pH BECK ☐ STRIP ☑	FLUID LOSS 100 PSI API	FLUID LOSS 500 PSI 300 °F HT-HP	CL ☑ CACL ☐ NACL ☐	ALKALINITY PF	ALKALINITY PM	ALKALINITY MF	CA ppm	Mg ppm	RETORT % OIL	RETORT % SOL	RETORT % WATER	ACTIVITY A_s	ACTIVITY A_m	RATIO OIL	RATIO H_2O	# Bbl CEC	
					Pas		Pascal																			
8-17	0	1040	100	-	10	25	7	13	9.5	n/c		2,500	.5			TR		0	3	97					32	
18	194.5	1050	48	-	8	11	6	15	10.0	n/c		3,000	.2			160		0	3	97					22	Run 30
19	297	1080	42	-	4	8	2	9	9.5	n/c		14,000	.2			240		0	3.5	96.5					18	Drlg
20	469	1140	35	-	6	11	3	15	10.0	n/c		15,000	.4			320		0	5	95					21	
21	469	1160	40	-	7	12	2	14	10.0	n/c		15,000	.3			250		0	7	93					24	Drlg
22	469	1160	40	-	7	15	3	15	10.0	n/c		16,000	.3			400		0	6	94					22	Ind.rr
23	469	1030	50	-	7	20	4	20	9.5	n/c		500	.2			160		0	3	97					21	20"
24	608	1129	34	15.5	3	9	6	20	9.5	n/c		20,000	.2	.6	0	1800		0	3	97					19	Prehy
25	1016	1129	34	30	8	14	6	20	9.5	n/c		20,000	.2	.6	0	1200		0	6	94					20	
26	1267	1168	43	34	10	14	3	16	9.5	n/c		18,000	.2	.4	0	1000		0	7	93					28	
27	1462	1164	65	32	9	14	3	10	9.5	9		16,500	.2	.3	0	400		0	8	92					40	
28	1462	1164	65	32	9	14	3	10	9.5	9		16,500	.2	.3	0	400		0	8	92					40	
29	1616	1177	50	24	8	8	2	9	9.5	9		19,000	.1	.2	0	700		0	10	90					40	
30	1616	1200	49	27	9	9	2	7	10.5	6.5		15,000	.2	.4	10	360		0	11	89					40	
31	1616	1200	48	26	8	10	2	9	9.5	5.0		15,000	.1	.4	0	360		0	11	89					40	
1	1616	1200	72		12	11	14	58	10.5	6.3		14,000	.25	.45	0	360		0	12	88						Logs
2	1616	1200	68		11	12	6.7	41.2	10.0	6.2		14,000	.3	.2	0	360		0	12	88						Circ
3	1598	1200	68		12.5	11.5	7.6	18.2	9.5	6.6		14,000	.2	-	0	460			-	-						13 3/8
4	1802	1200	75		15	12	4	6	11.0	5.8		13,000	.2	-	0	400			10	90						BOA
5	1884	1200	47		9	11	3	20	10.5	5.7		11,000	.7	1.2	1.9	360			11	89						Drill
6	1902	1200	44		11	9	3	21	11.5	5.8		12,000	.8	1.8	2.6	350			10	90					32	Drill
7																									40	
8	2199	1200	51	30	10	10	3	8	10.5	5.4		8,000	1.0	1.9	1.3	200		0	11	89					28	
9	2294	1220	48	20	6	8	2	5	10.5	6.0		8,000	.8	1.4	1.9	200		0	10	90					26	Drill
10	2294	1220	46	19	5	7	2	4	10.0	6.0		7,800	.5	.9	.8	200		0	9	91					25	Stuck
11	2294	1220	46	19	5	7	2	4	9.5	6.5		7,800	.3	.6	.5	200		0	9	91					25	Stuck
12	2294	1220	47	16	5	6	2	4	8.5	6.0		7,500	.1	.3	.2	180		0	9	91					26	Stuck

DATE SPUD: 16/8/78 DATE T.D.: 15.11.78 B.H.T.

COMPLETION FLUID TYPE: None COST: 0

PACKER MUD TYPE: Active mud COST: 0

WELL DATA SHEET

TABLE A.4 cont.

MAG-948-A

OPERATOR	SURVEY SEC.	T	R	CASING SIZE	DEPTH	DRLG. DAYS	BIT SIZE
Norsk Hydro				SURFACE 20	454	6	26"
WELL 15/	FIELD 15			INTERMEDIATE 13 3/8	1598	16	17 1/2"
CONTRACTOR Wilhelmson	COUNTY			PRODUCTION 9 5/8"	3696	46	12 1/4"
ENGINEER	STATE North Sea		COUNTRY Norway				

	DATE	DEPTH	SpGr WT.	VISCOSITY SEC.	VISCOSITY CPS.	CORR. USGS Pascals PV	CORR. USGS Pascals YP	GELS 0	GELS 10	pH BECK X STRIP X	FLUID LOSS 100 PSI API	FLUID LOSS 500 PSI 300 °F HT-HP	CL X CACL NACL	ALKALINITY PF	ALKALINITY PM	ALKALINITY MF	CA ppm	Mg ppm	RETORT % OIL	RETORT % SOL	RETORT % WATER	ACTIVITY A_s	ACTIVITY A_m	RATIO OIL	RATIO H_2O	# Bbl CEC
Sept	13	1780	1220	48	16	5	6	2	3	9.5	7.0		8000	.2	.5	.4	200			9	91					25
	14	1840	1220	46	15	5	5	2	4	11.5	6.8		6000	.9	2.8	1.7	500			9	91					30
	15	1740	1220	44	14	4	6	2	4	11.0	6.2		6500	.8	1.6	2.3	500	1500		8	92					30
	16	1829	1220	46	21	7	7	6	27	10.0	6.1		7500	3.1	4.2	3.8	560	1640		10	90					29
	17	1874	1220	46	18	6	6	2	22	10.5	6.0		6000	1.1	2.6		300	1100		8	92					31
	18	1874	1220	41	18	6	6	2	22	9.5	6.2		6000	2.1		2.8	300	1100		9	91	Hung Off				
	19	1966	1210	44	11	5	6	2	20	11.0	5.8		6000	1.3		2.4	330	1070		8	92					31
	20	2172	1210	48	19	9.5	9.5	4	26	11.0	6.0		5000	1.1		2.2	330	970	3	9	88					28
	21	2232	1260	54	23	10		7	26	11.0	4.6		5000	.9	1.2	2.1	350		4	12	84					28
	22	7000	1260	62	29	9	10	4	6	10.2	4.1		5000	.6	2.1	1.4	260	98	4	11	85					30
	23	2345	1270	52	25	8	9	3	6	11.0	4.0	10	5000	1.2	2.6	1.9	400	95	4	11	85					29
	24		1260	49	23	8	7	2	5	9.9	3.4	10	5000	.4	1.8	.9	160	73	4	9	87					25
	25	2639	1260	60	36	14	8	4	9	10.4	2.8	10	5000	1.1	2.5	1.3	200	80	4	10	86					20
	26	2723	1260	51	33	12	9	2	6	10.7	2.8		5000	.4	2.6	1.1	160	145	4	9	87					25
	27	2754	1270	52	30	11	8	2	6	10.4	3.0		5000	.6	1.9	1.8	320	290	4	9	87					25
	28	2826	1270	46	23	9	5	2	4	11.5	3.2		5000	1.2	2.4	1.9	450	260	4	9	87					23
	29	2826	1260	55	30	9	7	3	7	10.0	3.4	10.5	4800	.8	1.5	1.3	500	300	4	9	87					23
	30	2855	1260	48	30	9	7	3	6	10.9	3.2	12.0	6000	.7	2.5	1.6	150	50	4	8	88					27
Oct	1	2938	1270	45	25	10	5	2	4	10.2	3.6	13	6500	.6	2.3	1.6	160	210	4	9	87					23
	2	3016	1270	50	36	14	8	3	7	11.0	3.6	12	4800	1.2	3.0	2.0	160	146	4	10	87					30
	3	3081	1270	48	34	12	10	2	8	10.3	3.6	8	5000	.8	2.2	2.3	180	140								
	4	3156	1270	52	38	13	7	4	7	10.0	3.8	11.0	4600	.5	2.6		80		4	12.5	83.5					30
	5	3223	1270	47	29.5	9.5	7.5	2	9	9.5	4.0	15.0	5000	.5	2.0		160		3	15	82					
	6	3285	1270	51	37	20	7.5	3	6	10.5	4.4	8.0	5000	1.2	3.0	3.8	200		3	16	81					28
	7	3359	1270	46	27	16	7.5	3	16	9.5	4.4	9.0	5000	.8		2.4	160	140	3	14	83					28

DATE SPUD: 16/8/78 | DATE T.D.: 15/11/78 | B.H.T. 118°C | COMPLETION FLUID TYPE: None | PACKER MUD TYPE: Activ Mud | COST: $- 11 | COST: $ -0

WELL DATA SHEET

TABLE A.4 cont.

MAG-348-A

OPERATOR	SURVEY SEC.	T	R	CASING SIZE	DEPTH	DRLG. DAYS	BIT SIZE
Norsk Hydro							
WELL 15/5-2	FIELD 15			SURFACE 20	454	6	26"
CONTRACTOR Willhelmsen	COUNTY			INTERMEDIATE 13 3/8"	1598	6	17 1/2"
ENGINEER	STATE North Sea	COUNTRY Norway		PRODUCTION 9 5/8"	3696	46	12 1/4"

	DATE	DEPTH	Sp Gr WT.	VISCOSITY SEC.	VISCOSITY CPS.	CORR. 115°F PV	CORR. 115°F YP	GELS Pascals 0	GELS Pascals 10	pH BECK ☐ STRIP ☒	FLUID LOSS 100 PSI API	FLUID LOSS 500 PSI 300 °F HT-HP	Cl ☒ CACL ☐ NACL ☐	ALKALINITY Pf	ALKALINITY Pm	ALKALINITY Mf	Ca ppm	Mg ppm	RETORT % OIL	RETORT % SOL	RETORT % WATER	ACTIVITY A_s	ACTIVITY A_m	RATIO OIL	RATIO H_2O	# Bbl CEC	
	Aug 78																										
Oct	8	3359	1270	56		21	3	3	16.5	9.0	4.2	16.0	5000	.6	1.2	1.8	150		2	13	85					27	Trip
	9	3375	1270	45	23	18	10	6	28	9.5	4.4	11.0	4800	.9	2.0	3.8	160		2.5	12	85.5					26	Trip
	10	3415	1300	43	21	16	10	5	23	9.5	4.4	14.0	4600	.9	1.8	3.1	180		3	13	84					25	Drlg.
	11	3439	1300	42	21	16	10	6	21	9.5	4.6	-	5000	1.0	1.7	3.4	200		4	12	84					24	Trip
	12	3470	1300	45	25	19	12	6	22	9.0	5.0	10.8	4900	.6	1.1	2.0	180		4	13	83					26	Trip
	13	3504	1300	43	27	19	12	6	20	10.0	4.2	11.0	4800	1.1	1.5	3.4	180		4	12	84					25	Trip
	14	3550	1300	44	26	18	16	6	24	9.0	4.2	16.0	4600	.8	1.7	2.4	180		4	14	82					24	
	15	3606	1300	52	34	21	26	9	38	9.0	4.8	16.0	4600	.8	1.6	3.0	200		3	14	83					27.5	Log
	16	3606	1300	49						9.0	4.4	Logging. Not circulating															
	17	3630	1300	48	25.5	19	13	6	30	9.5	4.4	16.0	4600	.7	1.7	2.6	280		3	17	80					28	Drlg.
	18	3682	1300	47	23	18	10	6	26	9.5	4.4	14.0	4600	.7	1.9	2.6	200		4	14	82					25	
	19	3712	1340	43	25	18	14	5	16	9.5	4.4	14.4	4600	.8	1.6	2.2	180		3	16	81					28	Loggin
	20	3712	1340	45	25	18	14	6	16	9.5	4.4	15	4600	.8	1.6	2.2	180		3	16	81					28	"
	21	3712	1340	45	25	18	14	6	16	9.5	4.4	15	4600	.8	1.6	2.2	180		3	16	81					28	Fishin
	22	3712	1340	50	25	20	10	6	20	10	414	15	4600	1.0	1.6		160		3	16	81					28	
	23	3713	1340	45	22	18	8	4	16	11	4.0	14.6	4600	1.4	1.6		100		3	16	81					28	Run Cs
	24	3713	1340	45	22	18	8	5	16	11	4.0	14.6	4600	1.4	1.6		100		3	16	81					28	Csg
	25	3713	1400	50	21	21	12	6	20	11	4.0	15	5000	1.4	1.6		100		3	16	81						WOC
	26	3713	1400	50	23	18	10	6	16	10.5	4.2	15	5000	1.2	1.6		100		3	16	81						Test BOP
	27	3735	1400	43	24	21	6	3	9	10.5	4.8	15	4500	2.7		3.1	250		3	17	80					27	Drlgou
	28	3771	1400	42	25	22	10	5	16	10.5	4.6	5	4500	1.4		2.6	250		2	14	84					26	Drlg
	29	3813	1400	47	22.5	17	11	18	110	10.5	4.8	18.0	4500	1.6		2.2	180		2	14	84					31	Drlg
	30	3873	1438	44	21.5	17	9	5	66	11.0	4.2	17.0	4400	2.0		3.4	160		2	16	82					30	Drlg
	31	3925	1438	49	24	21	10	5	38	10.0	3.4	15.0	4400	1.8		2.6	260		2	17	81					35	
Nov	1	3941	1438	52	24	18	12	4	36	9.5	3.4	-	4500	1.4		2.8	260		2	16	82					33	
	2	4013	1438	48	20	16	8	5	14	9.5	3.5	16.0	4500	1.2		2.8	300		2	16	82					30	
	3	4013	1590	52	27	27	7	2	16	10	3.5	6	4500	1.2			160		2	18	80					30	Raisoi

DATE SPUD: 16 August, 1978 DATE T.D.: 15/11/78 P.A.T. COMPLETION FLUID TYPE: None COST: 0

PACKER MUD TYPE: Active Mud COST: 0

TABLE A.4 cont.

WELL DATA SHEET

MAG-548-A

OPERATOR: Norsk Hydro	SURVEY SEC. T R	CASING SIZE	DEPTH	DRLG. DAYS	BIT SIZE
WELL: 15/5-2	FIELD: 15	SURFACE	13 3/8"	1598 6	17 1/2"
CONTRACTOR: Wilhelmson	COUNTY	INTERMEDIATE	9 5/8"	3696 16	12 1/4"
ENGINEER	STATE: North Sea COUNTRY: Norway	PRODUCTION	7"	4292 22	8 3/8"

	DATE	DEPTH	Sp Gr WT.	VISCOSITY SEC.	VISCOSITY CPS.	CORR. 115°F PV	CORR. 115°F YP	GELS 0	GELS 10	pH BECK ☐ STRIP ☒	FLUID LOSS 100 PSI API	FLUID LOSS 500 PSI 300 °F HT-HP	CL ☒ CACL ☐ NACL ☐	ALKALINITY PF	ALKALINITY PM	ALKALINITY MF	CA ppm	Mg ppm	RETORT % OIL	RETORT % SOL	RETORT % WATER	ACTIVITY A_o	ACTIVITY A_m	RATIO OIL	RATIO H_2O	# Bbl CEC	
Nov.	4	4013	1590	50		28	14	4	16	10	3,5	16	4500	1.2			160		2	18	80					30	
	5	4020	1630	47		26	14	4	16	10	3,5	14	4000	1.8			160		2	19	79					20	
	6	4030	1800	48		35	14	6	16	10,5	3,5	14	4000	1.6			160		2	23	75					20	
	7	4036	1800	47		31	14	4	14	10,5	3,5	14	4500	1.6			160		1	25	74					30	
	8	4066	1820	47		30	12	4	12	11	3,5	12	4500	1.8			160		1	26	73					30	
	9	4113	1820	49		29	11	4	10	10,5	3,5	12	5000	1.5			160		1	26	73					30	
	10	4130	1820	49		29	11	4	10	10	3,5	-	5000	1.5		3.8	160		1	26	73					30	
	11	4156	1820	54		22	10	5	18	10	4,0	13,6	5000	1.8		2.2	190		1	23	76					20	
	12	4200	1900	54		24	14	6	26	10,5	3,8	13,2	5000	1.5		1.9	160		1	29	70					26	
	13	4270	1900	53		26	14	7	82	10..	3,8	13,6	5200	1.9		2.6	240		TR	32	68					26	
	14	4290	1900	55		22	14	6	20	11..	4,0	8,6	5000	2.4		3.0	230		TR	32	68					26	
	15	4322	1900	55		42	12	9	32	10	3,4	-	5200	2.2		2.8	220		TR	33	67					26	WOW
	16	4322	1900	55		42	12	9	32	10	3,4	13	5200	2.2		2.8	220		TR	33	67					26	WOW
	17	4322	1900	55		42	12	9	32	10	3,4	13	5200	2.2		2.8	220		TR	33	67					26	WOW
	18	4322	1900	55		42	12	9	32	10	3,4	13	5200	2.2		2.8	220		TR	33	67					26	WOW
	19	4322	1900	45		30	12	4	14	10,5	3,2	11	5200	2.0		2.6	220		TR	33	67					26	CIRC.
	20	4322	1900	43		27	10	3	12	10	3,4	11	5000	1.0			220		TR	32	68					24	Loggi
	21	4322	1900	43		27	10	3	12	10	3,4	11	5000	1.0			220		TR	32	68						Log
	22	4322	1900	40		24	8	2	6	10	3,0	7	4000	1.0			160		TR	30	70					22	
	23	4322	1900	40		24	4	2	6	10	3,0	7	4000	1.0			160		TR	30	70					24	
	24	4322	1900	56		18	7	3	8	9,5	3,2	-	4000	1.0		2.8	160		TR	31	69					24	
	25	4322	1900	44		24	8	2	6	9,5	3,0	11,2	4000	1.0		-	160		TR	30	70					24	
	26	4322	1900	43		31	15	2	6	9,5	3,1	-	4000	1.0		-	160		TR	30	70					24	
	27	4322	1900	54		16	8	2	8	10	2,8	-	4100	1.2		3.1	160		TR	31	69					24	TESTING
	28	4322	1900	43		31	15	2	6	10	2,8	10,2	4000	1.0		3.2	160		TR	30	70					24	
	29	4322	1900	45		12	10	4	14	14	3,6	10,0	4400	.9		2.7	160		TR	31	69					-	
	30	4322	1900	47		25	13	6	16	9,3	3,4	14,0	4400	.9		2.8	160		TR	30	70					25	

DATE SPUD: 16 August 1978 DATE T.D.: 15 November 197. B.H.T. 118° COMPLETION FLUID TYPE: None COST: 0

PACKER MUD TYPE: Active Mud COST: 0

TABLE A.4 cont.

WELL DATA SHEET

MAG-543-A

OPERATOR: Norsk Hydro	SURVEY SEC.	T	R	CASING SIZE	DEPTH	DRLG. DAYS	BIT SIZE
WELL: 15/5-2	FIELD: 15			SURFACE: 20	454	6	26"
CONTRACTOR: Wilhelmsoh	COUNTY			INTERMEDIATE: 13 3/8"	1598	16	17 1/2"
ENGINEER	STATE: North Sea	COUNTRY: Norway		PRODUCTION: 9 5/8"	3696	46	12 1/4"

DATE	DEPTH	Sp Gr WT.	VISCOSITY SEC.	VISCOSITY CPS.	CORR. 115°F PV	CORR. 115°F YP	GELS 0	GELS 10	pH BECK ☐ STRIP ☐	FLUID LOSS 100 PSI API	FLUID LOSS 500 PSI 300 °F HT-HP	CL ☐ CACL ☐ NACL ☐	ALKALINITY PF	ALKALINITY PM	ALKALINITY MF	CA ppm	Mg ppm	RETORT % OIL	RETORT % SOL	RETORT % WATER	ACTIVITY A_o	ACTIVITY A_m	RATIO OIL	RATIO H_2O	# Bbl CEC
Dec 1	4322	1.9	43		30	7	3	10	9.3	3.5	14	4400	.9	2.9	1.3	100		TR	30	70					25
2	4322	1.9	46		25	8	3	9	11.5	3.6	16	4800	1.3	2.5	3.2	100		TR	31	69					25
3	4322		The hole temporarily abandoned																						

DATE SPUD: 16.8.78 DATE T.D.: 15.11.78 T.

COMPLETION FLUID TYPE: None COST: 0

PACKER MUD TYPE: Active Mud COST: 0

6.5 Cement Report

30" Casing

Setting depth was 194 m and it was cemented back to the sea bed.

Lead slurry:

	Composition	Total used
Class "G" cement:		13.1 ton
Yield:	1.51 m^3/ton	
Sea water:	1.07 m^3/ton	14.0 m^3
Econolite:	0.05 m^3/ton	0.66 m^3
Density:	1.5 rd	
Thickening time:	4:00 hrs. at 7°C BHST	

Tail slurry:

Class "G" cement		11.1 ton
Yield:	0.84 m^3/ton	
Sea water:	0.44 m^3/ton	4.9 m^3
$CaCl_2$:	0.07 m^3/ton	0.78 m^3
Density:	1.87 rd	
Thickening time:	3:30 hrs. at 7°C BHST	

20" Casing

Setting depth was 454 m and it was cemented back to the sea bed.

Lead slurry:

Class "G" cement		62.25 ton
Yield:	1.51 m^3/ton	
Sea water:	1.07 m^3/ton	66.6 m^3
Econolite:	0.05 m^3/ton	3.1 m^3
Density:	1.5 rd	
Thickening time:	6:30 hrs at 28°C BHST	

Tail slurry:

	Composition	Total used
Class "G" cement:		9.8 ton
Yield:	0.79 m^3/ton	
Sea water:	0.45 m^3/ton	4.41 m^3
$CaCl_2$:	0.024 m^3/	0.24 m^3
Density:	1.5 rd.	

Thickening time: 6:30 hrs. at 28°C BHST

13-3/8" Casing

Setting depth was 1598 m and it was cemented back to 1150 m.

Cement slurry:

Class "G" cement		34.5 ton
Yield:	0.77 m^3/ton	
Fresh water:	0.40 m^3/ton	13.8 m^3
CFR-2L:	0.026 m^3/ton	0.89 m^3
FL-1:	0.036 m^3/ton	1.24 m^3
Density:	1.89 rd	

Thickening time: 5:50 hrs. at 42°C BHST

9-5/8" Casing

Setting depth was 3696 m and it was cemented back to 3200 m.

Cement slurry:

Class "G" cement		33 ton
Yield:	0.77 m^3/ton	
Fresh water:	0.40 m^3/ton	13.2 m^3
CFR-2L:	0.026 m^3/ton	0.86 m^3
FL-1:	0.036 m^3	1.19 m^3
HR-6L:	0.0036 m^3/ton	0.12 m^3
Density:	1.89 rd	

Thickening time: 5:07 hrs. at 121°C, BHST

7" Liner

Setting depth was 4300 m and it was cemented back to approximately 3780 m.

Cement slurry:

	Composition	Total used
Class "G" cement		32 ton
Yield:	0.76 m^3/ton	
Fresh water:	0.447 m^3/ton	14.3 m^3
CFR-2L:	0.026 m^3/ton	0.83 m^3
FL-1:	0.067 m^3/ton	2.14 m^3
HR-12L:	0.012 m^3/ton	0.38 m^3
Density:	1.92 rd	
Thickening time: 6:00 hrs.	at 138°C BHST	

7" Liner hanger squeeze job

Due to a blocked cement line during the primary cement job the 7" liner hanger had to be squeezed off and a 60 m cement plug was spotted on top of the hanger.

Cement slurry:

Class "G" cement		6.7 ton
Yield:	0.74 m^3/ton	
Fresh water:	0.44 m^3/ton	2.9 ton
CFR-2L:	0.013 m^3/ton	0.087 m^3
HR-12L:	0.0055 m^3/ton	0.037 m^3
FL-1:	0.0335 m^3/ton	0.224 m^3
Density:	1.93 rd	

Cement plug from 415 m to 445 m

Class "G" cement		1.5 ton
Yield:	0.74 m^3/ton	
Fresh water:	0.424 m^3/ton	0.64 m^3
Density:	1.93 rd	
Thickening time: 2.0 hrs.		

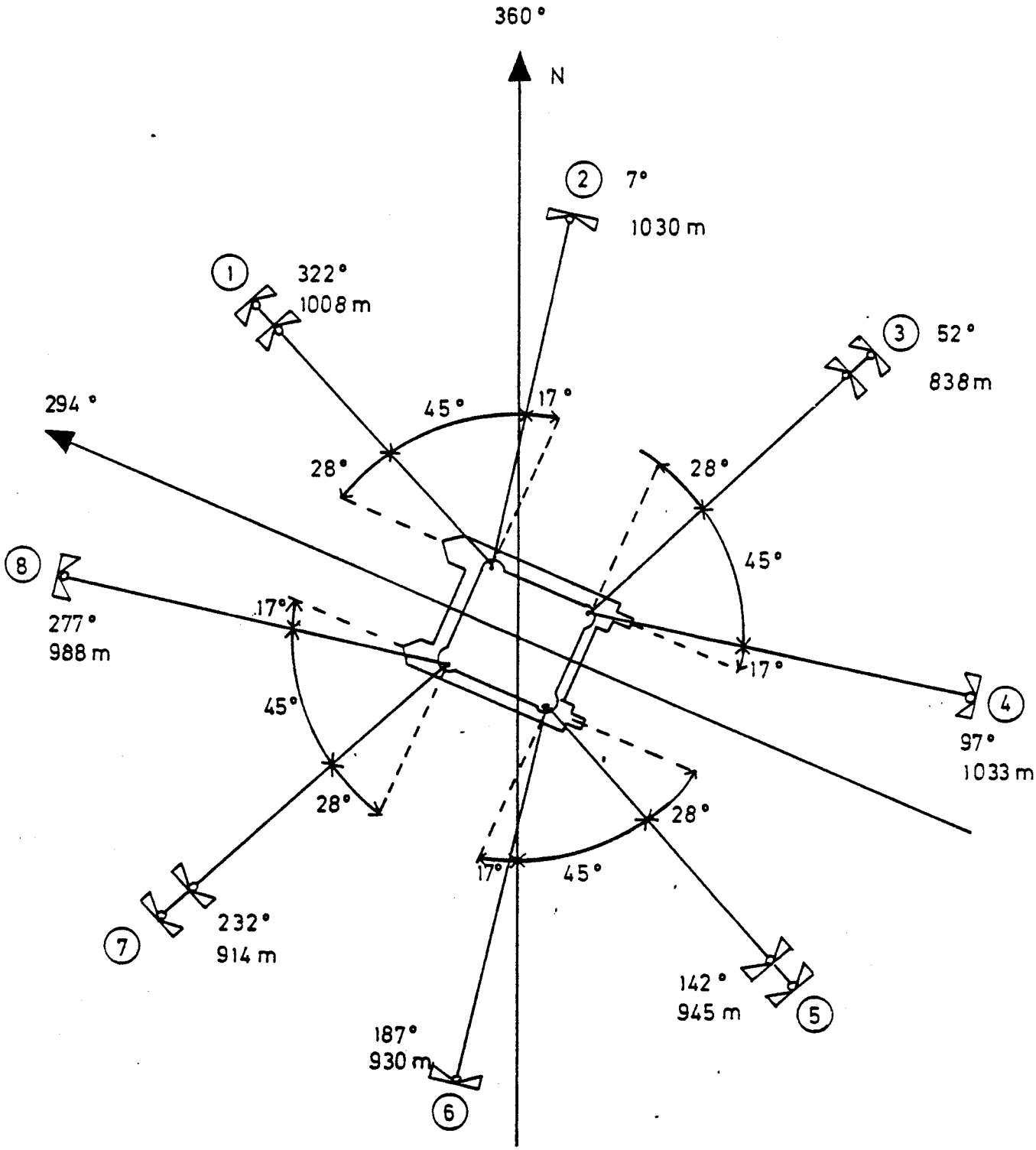
6.6 Lost in the hole

When the pipe got stuck at 1928 m the following equipment had to be left in the hole, see Fig. A-6

- 12-1/4" bit, type SDGH
- Junk sub
- Bit sub
- 3ea 12-3/16" stabilizers
- 1ea 8" monel drill collar
- 8ea 8" drill collars

7. PRELIMINARY COST REPORT

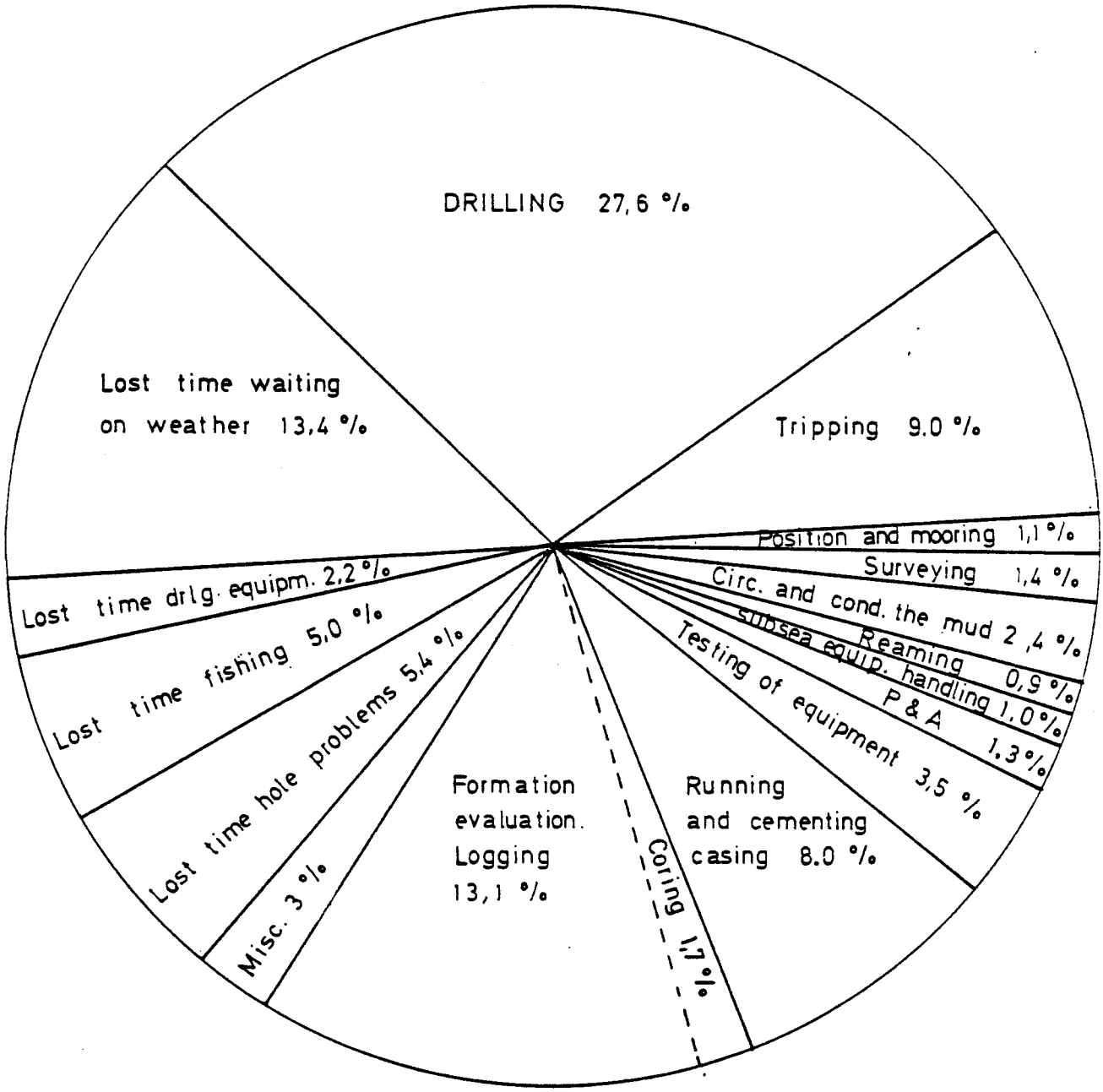
Site survey, misc.	N.kr. 515.000
Rig contract	N.kr. 18.090.000
Supplies	N.kr. 10.816.000
Services	N.kr. 12.708.000
Operator's cost	N.kr. 7.894.000
TOTAL	N.kr. 50.023.000



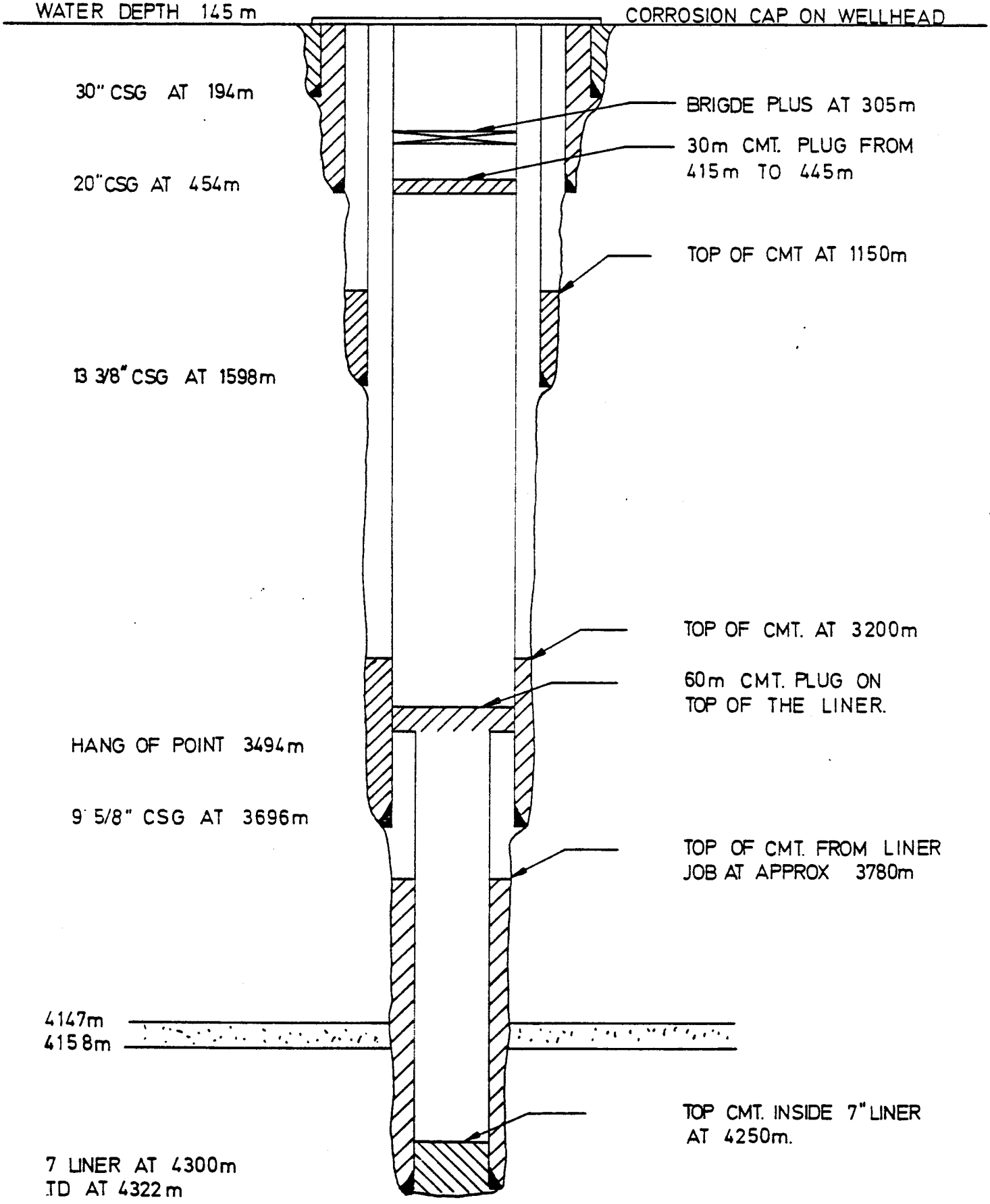
Heading : 294°

Well coordinates : 50° 38' 36,7" N
1° 36' 16,5" E

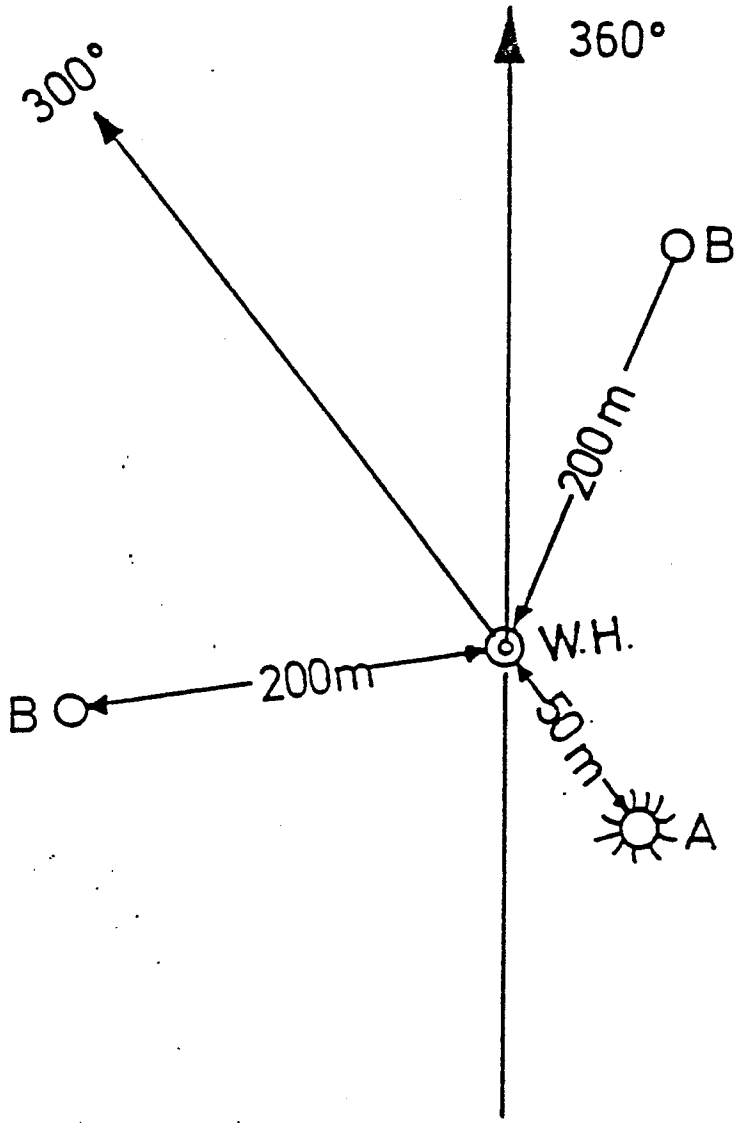
Norsk Hydro Drilling Dept.	Mooring line pattern Treasure Seeker Well 15/5-2	Gr. no. 4	Fig. A 1
		Date: 22/1-1979 Sign: TSk/Hes	Dwg. no. 31



Norsk Hydro Drilling Dept.	Total time distribution. Well 15/5-2	Gr. no 4	Fig. A 2
		Date: 22/1-1979 Sign: TSk / Hes	Dwg no 32



NORSK HYDRO DRILLING DEPT.	TEMPORARY ABANDONMENT OF WELL 15/5-2	GR. NO. 4	FIG. A-3
		DATE: 21.02.79. SIGN: T.B	DWG. NO. 37



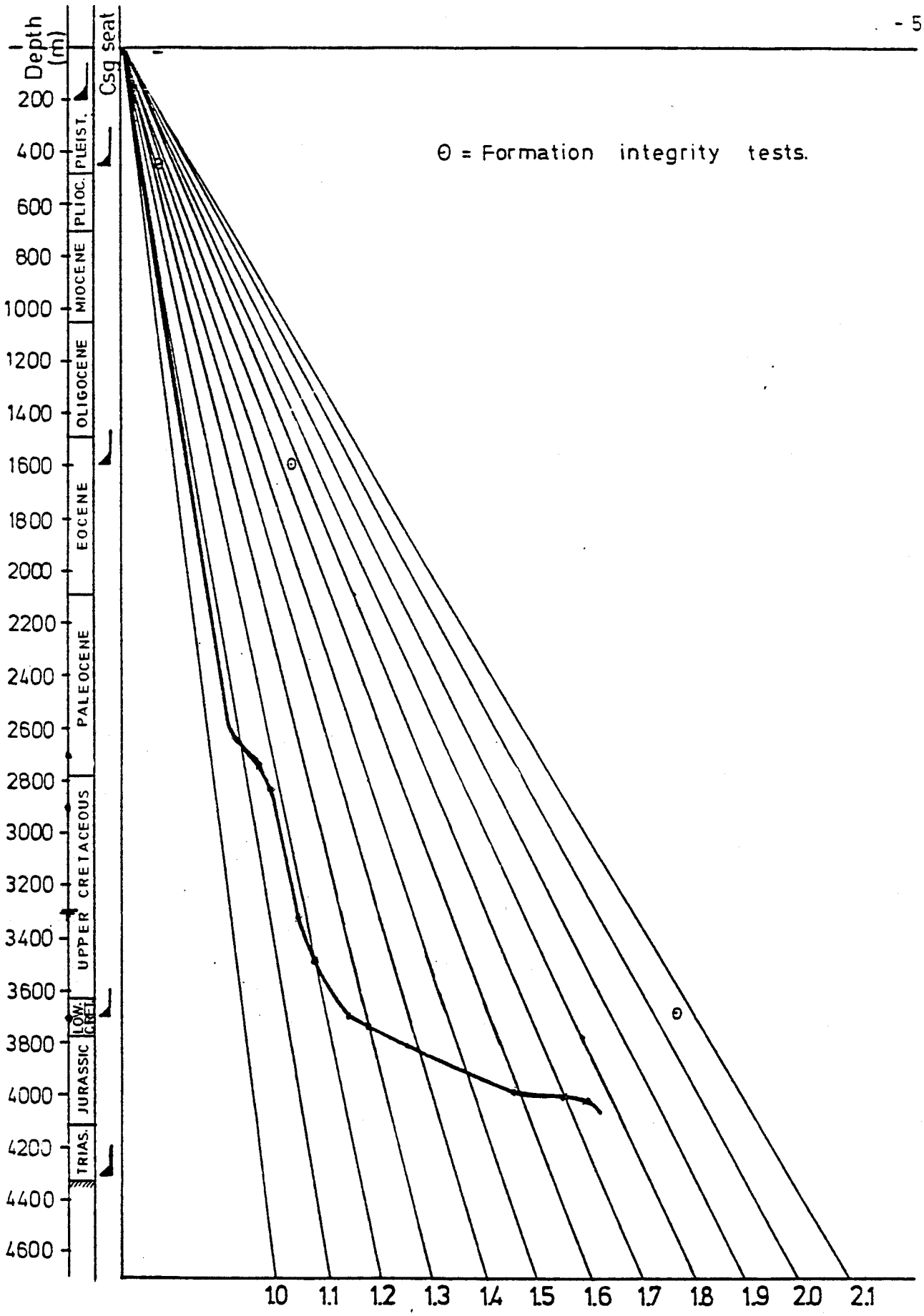
WELLHEAD POSITION : 58° 38' 36.7" N
1° 36' 16.5" E

W.H.: WELLHEAD

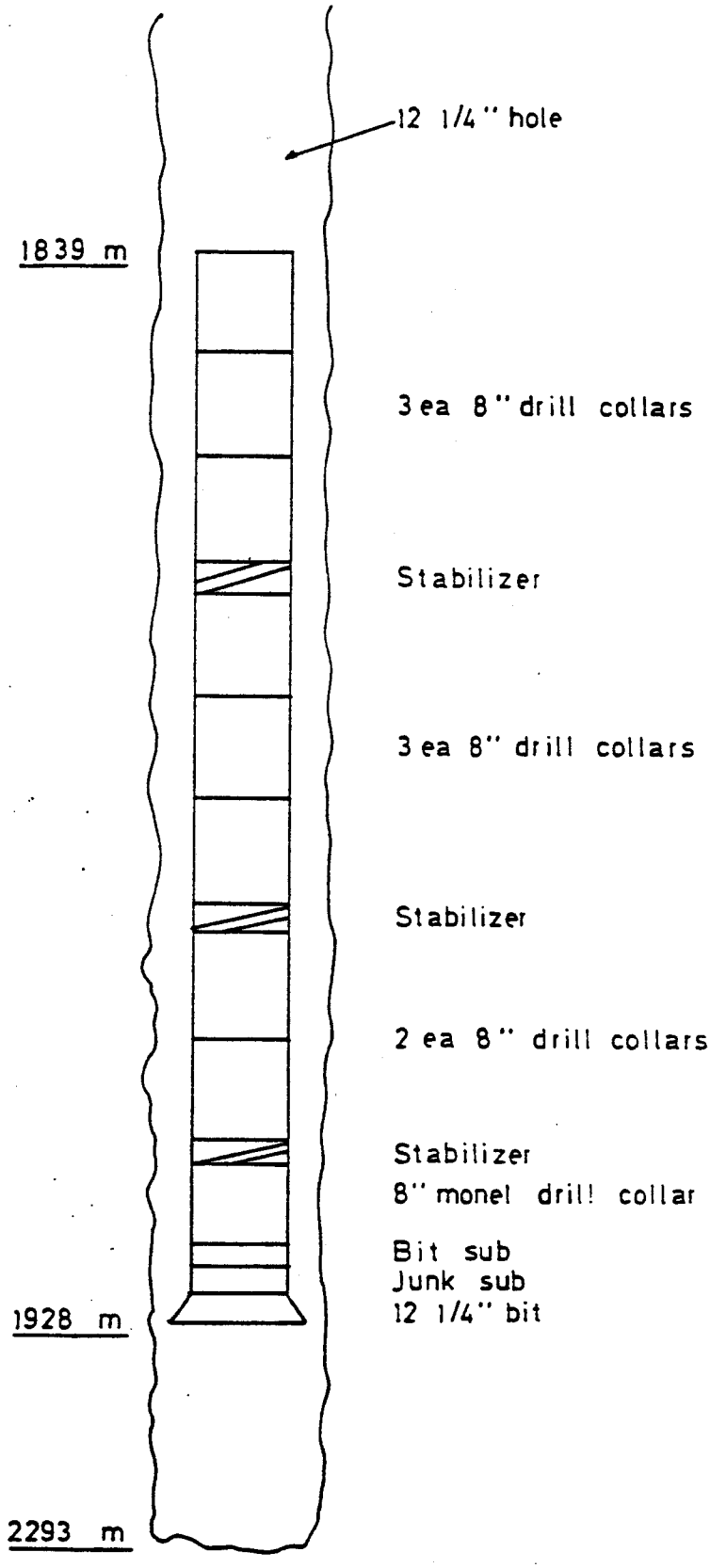
A: 3 WEIGHTS, BUOY W/SIGNAL LIGHTS AND REFLECTOR

B: 3 WEIGHTS, BUOY W/SIGNAL LIGHTS.

NORSK HYDRO DRILLING DEPT.	MARKING BUOY SYSTEM WELL 15/5 - 2 (HORIZONTAL VIEW)	GR.NO. 4	FIG. A-4
		DATE: 8.3.1979 SIGN: TSK/HES	DWG.NO. 27



Norsk Hydro a.s Drilling Dept.	Pore pressure and formation intergrity test result on well 15/5-2	Gr. no. 4	Fig. A-5
		Date : 30/1-1979 Sign : TSk/Hes	Dwg. no. 35



Norsk Hydro Drilling Dept.	Fish left in the hole on well 15/5- 2	Gr. no. 4	Fig. A-6
		Date: 8/3-1979 Sign: TSk/Hes	Dwg. no. 36

Norsk Hydro

Oslo - Norway

DRILLING PROGRESS, WELL: 15/5-2 .

OPERATOR : Norsk Hydro

COORDINATES : 58° 38' 36.7" N
1° 36' 16.5" E

SPUD IN : August 16, 1978

WELL COMPL.: December 12, 1978

RIG : Treasure Seeker

WATER DEPTH : 120.5 m MSL

RKB to MSL : 25 m

RKB to SEABED: 145.5 m

Scale 1 : 5000

DAYS → 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30

DEPTHS m RKB	LITHO SECTION	SYST./SERIES CASING	STAGES	SHOWS	DESCRIPTIONS, OBS	MUD MATERIALS	MUD W.T. SP. GR.	DEPTH RKB
					25 m SEA LEVEL	Barite Bentonite Caustic Soda Lime Soda Ash Spersene	1,05	0
					145.5 m SEA BOTTOM Drilled with return to seabed.			
		30" 195m			194 Cly, m-m dk gy olvgy, sft-firm, silty, sl stky, sl-mod calc. Occ intbds of Sd: qtz, clr, occ fros, vf-crs, occ v crs, ang-subrnd, pr srtd, w/dk gy-dk grn-blk lithic frags. Tr Lst, wh, hd, chky. Tr shell frags and Pyr.	Barite Bentonite Spersene Caustic Soda Drilling Magconol Soda Ash	1,08 1,14 1,16	
		20" 454m			480			
					Abn shell frags, Tr Glau and Lig.		1,13	
					700	Barite Bentonite Caustic Soda Spersene XP - 20 CMC - LV Lime		
					758 Sd, clr, lse, vf-f, ang-subrnd, mod well srtd, w/occ layers of Cly. a/a. Tr shell frags, Pyr, Glau and Mica			
					910 Cly, olv gy-olv grn, sft, sl calc, silty. Tr Sd, clr, vf-f, subang mod srtd. Tr shell frags, Mica, Glau.		1,13	
					1060			
					Sd, clr, vf-m, occ crs, ang-subang, pr srtd, w/lithic frags. Below 1250 m lam of Slst, mgy, brn-gy, brn-grn, firm, micro mic, v arg, mod calc.		1,16	
					Sst, clr, wh, mod hd, vf-m, ang-subrnd, mod srtd, calc cmt. Cly, a/a but bcm ind grdg to Clyst.			
					1500 Clyst, olv grn-olv gy, firm, silty, non-sl calc. Strgs of Lst, lt gy-brn, mod hd, arg, silty, micro-xln.		1,16	
		13 3/8" 1598m			1603 Sst, clr, vf-vcrs, lse and hd, ang-subrnd, pr srtd. Intbd w/ Clyst/Sh, olv-dk grn gy, grn blk, non calc, silty in pts. Occ strgs of Lst, wh-lt gy, firm-hd, dol. Tr Pyr, Glau.		1,20	
					1783 Sh, m-dk gy, gy blk, micro mic, occ silty, pyr, non calc w/strgs of Lst and occ Sst, a/a.	Barite Bentonite Caustic Soda Spersene XP - 20 CMC - LV Magcolube Drilling/ Detergent Lime Drispac Soltex Resinex	1,20	
					1871 Sd, qts, clr, f-crs, lse, w/ intbds of Dol/Lst.			
					1916 Sh, lt-dk gy, occ grn gy, gy brn, sl silty, non calc w/ strgs of Dol/Lst. Tr Pyr			
					2063 Sh, rd brn, gy, gy grn, gy blue, sft-hd, non calc, occ w/blk carb specs. 2100 2128 Tr Tuff. Sh, lt-mgy, gy brn else a/a. Tr Pyr.		1,21	
					2204			
					2252 Sd, clr, lse, f, occ vf and m, ang, mod srtd. Tr of Sst, clr, wh, vf, grdg to slt, ang-subang, mod srtd, calc cmt, no vis por. Minor intbds of Sh, var gy, sft-firm, blky-fis, occ sl calc, occ grdg to Clyst. Strgs of Lst/Dol. Tr Pyr, Glau.		1,26	
					Sh, a/a, incr in Cly, m gy-brn gy, sft, non calc.		1,27	
					2606 Cly, a/a w/ minor Sh a/a.			
					2650		1,26	
					2705 Lst, wh, crm, mod hd, micro-xln and lt gy, sft, arg, grdg to Mrlst and tr of Sh, m dk gy-blk, firm, occ silty, calc.		1,26 1,27	
					2782 Lst, a/a but pred cln, occ chky, occ grdg to Mrl, lt-m gy, sft-firm. Minor thin intbds of Sh, lt-dk gy, w/blk lam, firm-hd, subfis, calc. Tr Glau, Pyr.		1,27	
					2967 Mrlst, lt-m rd brn, minor lt gy, hd, v arg, intbd w/			

DRILLED 36" HOLE

RAN 30" CASING

OPENED 17 1/2" PILOT HOLE TO 26"

RAN 20" CASING, 21" RAISER AND 18 3/4" BOP STACK

RAN LOG

DRILLED 17 1/2" HOLE

DRILL STRING UNSCREWED

RAN LOGS AND 13 3/8" CASING

SIDETRACKING

34 36 38 40 42 44 46 48

WOW

DRILLED 12 1/4 HOLE

REAMED TIGHT HOLE

DRILLSTRING STUCK

RIH WITH TURBINE REAMED TO BOTTOM

Norsk Hydro

Oslo - Norway

DRILLING PROGRESS, WELL: 15/5-2 .

(CONTINUED)

DEPTHS m RKB	LITHO SECTION	SYST./SERIES CASING	STAGES	SHOWS	DESCRIPTIONS, OBS
3050		UPPER CRETACEOUS	SANTON.-CAMPAN.		Lst, wh, crm, lt brn rd, firm, crypto xln, often arg, grdg to Mrlst a/a.
3060					Mrlst, pred lt-m gy, minor rd brn a/a, firm, v arg, occ grdg to Sh. Occ intbds of Lst, crm, wh, hd, micro-crypto xln, cln and arg, occ st dol.
3100					
3150					
3200					
3250					Sh, dk gy hd, calc w/ intbds of Mrlst, lt-dk gy, sft-mod hd, w/ arg lam.
3293					Mrlst, lt-m gy, minor lt brn and rd brn, grdg downwards to Lst, wh, lt gy, sft and hd Tr Sh, dk gy, rd brn, occ silty, tr carb, calc and non calc.
3300					
3350					
3400					
3450					Lst, lt-m gy, chky, calcilutite, and micro-xln, occ arg.
3500			TURONIAN-CONIACIAN	C1, occ tr C2	
3507					Mrlst, lt-m gy, sft-firm, intbd w/ Lst, wh lt gy, sft-hd, micro-xln, chky, in pts grdg to Mrlst, a/a. Tr Sh, a/a.
3550					
3588			CENOM.		Mrlst, lt gy, pink, rd brn sft-firm, occ silty grdg to Lst.
3600					
3637					
3650	9 5/8"				
3689			ALB.		Sh, lt-dk gy, lt gy grn, rd brn, micro-mic, non-
3696m		LOWER CRET.	APT. BARR.	C1-C3, occ C4	
3701					
3711					
3750			KIMM. VOLG. HAUT.		
3759 (M2)					
3774					Sh, dk brn, brn blk, sft-firm, earthy, silty, carb, n-sl calc, vf pyr.
3800					
3814					
3831					Sh, dk brn-dk gy, firm-mod hd, blky-fis, occ earthy, silty, carb, sl-mod calc
3850			OXFORD.		
3894		UPPER JURASSIC			intbd w/ stgs of Lst, m-dk brn, micro-xln, arg and Dol, dk brn, hd-v hd.
3900					
3950			CALLOV.	C1-C3	
3960					Sh, a/a intbd w/ Coal, blk, firm-hd, shiny, occ shly and silty and Sist, lt-m brn, hd, blky, non calc.
4000			M-L. BATH.		
Core 1					
Core 2			BAJOC.	C1-C3 C1-C4	
4037			E. BATH.		Sst, wh-lt brn, vf-f, occ m and crs-vcrs, ang-subrnd, fri-hd, calc, occ silic cmtd, mod-well srtd, pr-mod por.
4050					
4100		MIDDLE JURASSIC			
4113					Sst, pale yelsh brn, yelsh gy, occ grnsh gy, occ rd stained, vf-m, in pt silty, ang-subrnd, lse-fri, silic and calc cmt, occ mic, pr-well srt, pr-fair por. Intbds of Sh, brnsh gy, gysh rd, dusk brn, lt-dk gy, micro-mic, sl-non calc In places grdg to Sist, gysh rd, fri-hd, non calc. Tr of Lst and Dol.
4150					
4200					
4250	7" liner	TRIASSIC		C1-C3 C1-C4	
4300m					
4300				C1 occ C2	
T.D. 4326 m (LOGGER)					
4350					
4400					
4450					
4500					

MUD MATERIALS	MUD WT. SP. GR.
	1.27
	1.30
	1.30
	1.34
	1.40
Barite	1.40
Bentonite	
Spersene	1.44
Caustic Soda	
XP-20	
CMC-LV	1.44
Bit lube	1.63
Lime	1.80
Drispac	1.82
Soda Ash	
Resinex	
	1.82
	1.90
	1.90

DEPTH RKB

DAYS →

Scale 1 : 5000

48 50 52 54 56 58 60 62 64 66 68 70 72 74 76

3000

PULLED OUT WITH TURBINE TESTED THE BOP.

3500

RAN LOGS AND 9 5/8" CASING

DRILLED 8 3/8" HOLE

80 82 84 86 88 90 92

SCALE CHANGE

4000

CUT TWO CORES

92 96 100 104 108 112 116 120 124

RAN INTERMEDIATE LOG

WOW, RAN LOGS, 7" LINER, PULLED BOP, WOW, PULLED ANCHORS AND TEMPORARY P&A

4500