NORSK HYDRO A.S

FINAL REPORT

WELL 15/2-1

LICENCE 048

July 1982.

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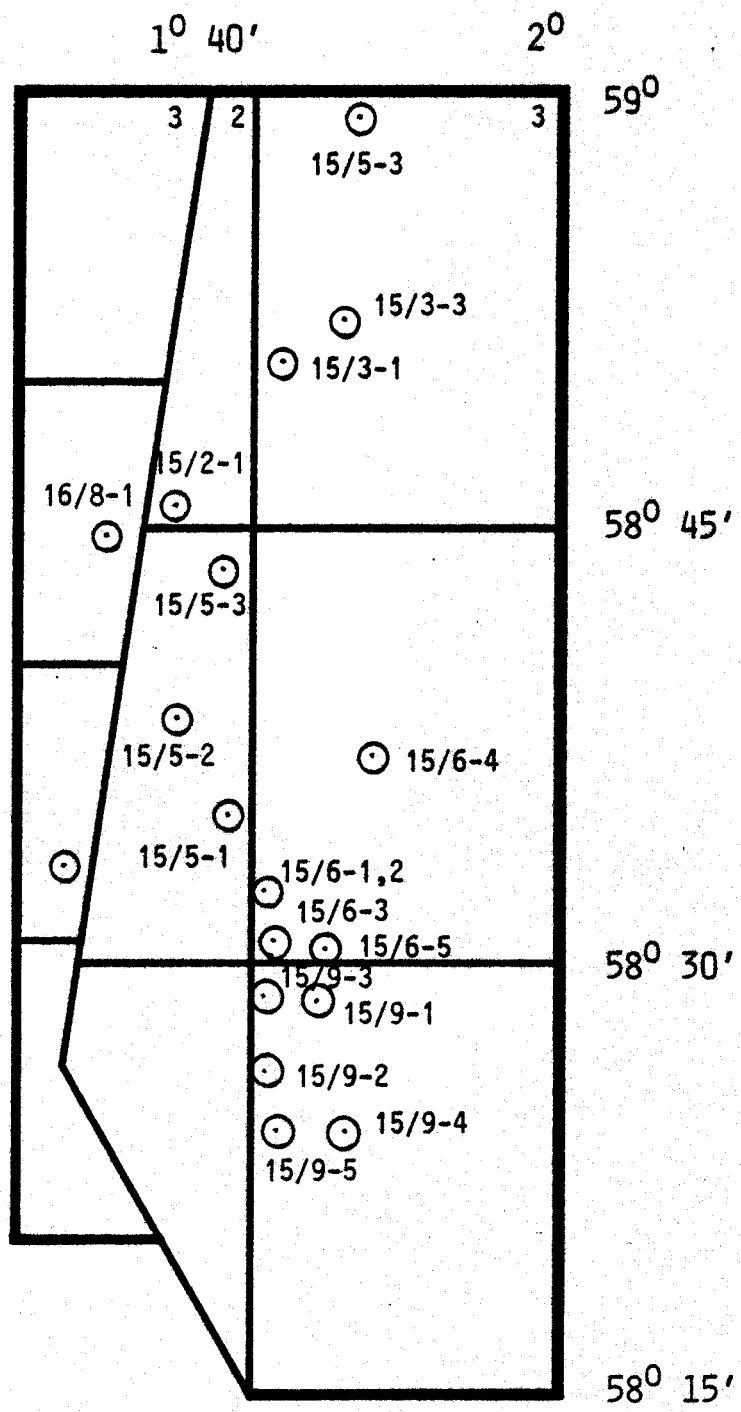
PREFACE

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 Morine Norsk a.s	10.9%

The well 15/2-1 was drilled by Norsk Hydro Produksjon a.s on behalf of the Statoil/Petronord Group.



WELL COORDINATES 15/2-1 : 58°45' 19.30" N
01°35' 40.58" E

Norsk Hydro Drilling Department	LOCATION OF WELL 15/2-1	Gr. no.: 4	Fig.:
		Date: 17/6-1982 Sign: RHL / Hes	Dwg. no.: 21

SUMMARY OF WELL DATA

Location:	58° 45' 19.30" N 1° 35' 40.58" E
Operator:	Norsk Hydro Produksjon a.s
Rig:	Nortrym
Contractor:	Golar Nor a.s
RKB elevation (to MSL):	25 m
Water depth:	109 m
Start of operations:	November 19, 1981
Well spudded:	November 26, 1981
Well permanently abandoned:	February 25, 1982
T.D. (driller):	4600 m
Formation at T.D:	Zechstein salt
Status:	Permanently abandoned

Well data:

Drilling depths:	36" to 196
	26" to 655
	17-1/2" to 2750
	12-1/2" to 3786
	8-3/8" to 4600
Casing depths:	30" set at 196
	26" set at 653
	13-3/8" set at 2737
	9-5/8" set at 3770

All depths are given with reference to RKB.

SECTION A
GEOLOGY

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Geological well summary

1. OBJECTIVES

The objective of the well 15/2-1 was to test the Upper Jurassic, Middle Jurassic and Triassic sandstone reservoirs northwest of and downdip of the salt diapir encountered in the well 15/5-3.

The Upper Jurassic sandstone sequence is of Callovian age and was interpreted as a marine shelf sheet deposit along the western flank of the structure.

The Middle Jurassic Sleipner Formation is mainly fluvial dominated deltaic deposits. On the 15/2-1 location, this reservoir was however believed to be a 20 to 40 m thick marine sandstone sequence deposited during an Early Bathonian transgression, and similar to the Sleipner Formation found in the 15/5-2 well.

The Triassic target was expected to consist of continental, fluvial, fine grained, coarsening up sandstone units of the Skagerak Formation.

The well was planned to be drilled approximately 200 m into the Triassic with planned total depth of 4525 m RKB.

2. RESULTS

No hydrocarbons of any significance were encountered in the well. 129 m of sandstones, siltstones, shales and coal seams of Upper Jurassic Hugin Formation was penetrated at 4356 m. This formation was underlain by 69,5 m of siltstones, sandstones and coal seams of the Middle Jurassic Sleipner Formation. Hydrocarbon shows were reported from both formations. However, wireline log evaluation and core analysis showed very poor reservoir parameters and no moveable hydrocarbons.

The Hugin Formation (4356-4485 m) consisted in the upper part of massive very fine grained sandstones with beds of coal, up to 10 m thick. In the lower part, below 4415 m, the sandstones graded into siltstones and the coal disappeared. RFT pressure measurements were attempted in this interval. No pressure readings were, however, obtained due to tight formation. Wireline log evaluation gave a net sand of 37 m (with a 10% clay matrix cut off), an average porosity of 8% and an average water saturation of 90%.

The Sleipner Formation (4485-4554,5 m) consisted of siltstones grading occasionally to very fine sandstones, interbeds of sandstones and stringers of coal. The wireline logs showed a net sand in this interval of only 10 m with an average porosity of 11% and an average water saturation of 87%.

The well did not penetrate any Lower Jurassic or Triassic rocks, but encountered evaporites of Permian age at 4554,5 m, unconformably underlying the Sleipner Formation.

The well reached a total depth of 4603 m in Zechstein evaporites.

3. STRATIGRAPHY

The biostratigraphic evaluation of the well 15/2-1 was performed by Robertson Research International Ltd. in Wales.

The basic material for the analysis was ditch cuttings in addition to a large number of side wall cores. Chips from conventional cores were also used. The ISF/SONIC log from the whole well was made available to the laboratory by the operator.

The result from this analysis can be summarized as follows: (See also page 5 and 6).

The well commences in the Nordland Group with a rather thick Pleistocene sequence underlain by Pliocene and Miocene rocks with the Utsira Formation identified towards the base.

The Nordland Group rests upon the Hordaland Group of Miocene to Eocene age. Within the lower part of the Group, the Frigg Formation is identified.

Deposits assignable to the Rogaland and Montrose Groups cover most of the Paleocene with the Maureen Formation extending into the Danian. The lower part of the Danian consists of chalky limestones and calcareous shales attributable to the Ekofisk Formation of the Chalk Group.

The Tertiary is considered to rest conformable upon a relatively complete Upper Cretaceous sequence assignable to the Chalk Group of late Maastrichtian to Cenomanian age.

The Hidra Formation, of Cenomanian age, rests conformably upon the Rødby Formation of the Cromer Knoll Group, of Early Cretaceous, Albian age. The Rødby Formation rests upon the Valhall Formation, of Early

Albian to Latest Ryazanian age, which probably contains several minor intra-formational unconformities.

A conformable sequence is envisaged across the Cromer Knoll Group/Humber Group boundary. The Kimmeridge Clay Formation of Late Ryazanian to Oxfordian age rests upon the Heather Formation of Oxfordian to Late Callovian age.

Underlaying the Heather Formation is the Callovian Hugin Formation which rests upon the lithological variable Sleipner Formation of Middle Jurassic age.

A marked unconformity separates the Sleipner Formation from the underlying evaporitic deposits, assigned to the Upper Permian, Zechstein Group. The well terminated within the evaporites of the Zechstein Group.

The chrono- and lithostratigraphy of the well is shown on page 5 and 6. The lithostratigraphic terminology applied is taken partly from Deegan & Scull: "A standard lithostratigraphic nomenclature for the Central and Northern North Sea", 1977 and partly from "The nomenclature for the Southern North Sea" by a Norwegian nomenclature committee.

Norsk Hydro
Oslo - Norway

WELL : 15/2-1

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

CHRONOSTRATIGRAPHY				LITHOSTRATIGRAPHY	
SYSTEM	SERIES / STAGE	DEPTH	THICKNESS	GROUP	FORMATION / MEMBER
	SEA BED	134			
QUATERNARY	PLEISTOCENE	540	406	NORDLAND GROUP	
TERTIARY	PLIOCENE	740	200		705,5 UTSIRA FM
	LATE-MIDDLE MIOCENE	1000	260		826
	EARLY MIOCENE	1130	130	HORDALAND GROUP	
	LATE - OLIGOCENE	1500	370		1428
	EARLY OLIGOCENE - MIDDLE (?) EOCENE	1900	400		FRIGG FM 1824
	MIDDLE - EARLY EOCENE	2055	155		2068
	LATE PALEOCENE		548	ROGALAND GROUP	BALDER FM 2148 SELE FM 2178 LISTA FM 2235,5

Norsk Hydro
Oslo · Norway

WELL: 15/2-1

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

CHRONOSTRATIGRAPHY					LITHOSTRATIGRAPHY	
SYSTEM	SERIES	STAGE	DEPTH	THICKNESS	GROUP	FORMATION / MEMBER
TERTIARY	LATE PALEOCENE				MONTROSE GROUP	HEIMDAL FM
						2494
						MAUREEN FM
			2603			
	EARLY PAL	DANIAN		128		2640
					CHALK GROUP	EKOFISK FM
			2731			2731
CRETACEOUS	UPPER CRETACEOUS	L. MAASTRICHTIAN	2755	24		
		MAASTRICHTIAN		180		TOR FM
			2935			2920
		CAMPANIAN-SANTONIAN		454		FLOUNDER FM
			3389			
		CONIACIAN-TURONIAN		162		3438
						HERRING FM
						3506
			3551			PLENUS MARL FM
						3550.5
		CENOMANIAN		109,5		HIDRA FM
			3660,5			3668
	L. CRET.	ALBIAN		80,5	CROMER KNOLL GROUP	RØDBY FM
			3741			3733
		E. ALBIAN - APTIAN		51		VALHALL FM
			3792			
		EARLY APTIAN		25		
			3817			
		BARREM. - HAUTERIV.		41		
			3858			
		E. VALANGIN - L. RYAZ.				
			3873			
		LATE RYAZANIAN		15		3878
	L. CRET. / U. JUR.		3908.5			
		E. RYAZ - L. VOLGIAN		35,5	HUMBER GROUP	KIMMERIDGE CLAY FM
			3948.5	40		
JURASSIC	UPPER JURASSIC	MIDDLE VOLGIAN-OXFORDIAN		286		
			4234.5			4211
		E. OXFORDIAN		80.5		HEATHER FM
			4315			
		L. CALLOVIAN		55		4356
			4370			
		M. CALLOVIAN		54	VESTLAND GROUP	HUGIN FM
			4424			
		E. CALLOVIAN		61		
			4485			4485
	M. JUR.	BATH. - BAJ.		79.5		SLEIPNER FM
			4554.5			4554.5
PERMIAN	U. PERM.	ZECHSTEIN		45.5	ZECHSTEIN GR.	

T.D. 4603 m

Checked: B. Tollefsen
Date: 16/8-82

4. LITHOSTRATIGRAPHY

This summary is compiled predominantly from ditch cuttings descriptions, assisted by a large number of side wall cores taken from the Eocene Frigg Formation and throughout the well with the deepest sidewall core recovered at 4553 m just above the Permian evaporite sequence. Conventional cores were available from the Callovian Hugin Formation. Lithological interpretations and formation boundaries are based on wireline logs in combination with the material mentioned above.

4.1 QUATERNARY (196-540 m)

NORDLAND GROUP (196-826 m)

196-510 m

This interval consists of clay interbedded with sand.

The clay is soft and sticky and moderately to very sandy and silty. The sand is made up of fine to coarse grained quartz, occasionally gravelly, with abundant rock and shell fragments.

The interval is Pleistocene (196-540 m) of age.

4.2 TERTIARY (540-2731 m)

510-705,5 m

Clay dominates this interval with only occasionally laminations of sand which are very fine to coarse in grain size. Locally abundant shell fragments occur. This interval is predominantly Pliocene (540-740 m) of age.

Utsira Formation (705,5-826 m)

The Utsira Formation is made up of a very fine to medium grained sandstone which is glauconitic and partly calcite cemented. Shell fragments occur throughout the interval. The sandstone is partly argillaceous and silty with thin interbeds and laminations of clay.

The Utsira Formation is Late to Middle Miocene (740-1000 m) of age.

HORDALAND GROUP (826-2068 m)

826-1150,5 m

The upper part of the Hordaland Group is predominantly a clay/claystone interval with rare thin beds of sandstone and rare limestone stringers.

The clay is olive to brownish grey in colour. It becomes more indurated through this sequence and grades into claystone. The claystone is silty and locally it grades into a siltstone which locally is calcareous. The sand is made up of moderately sorted, fine to medium grained quartz. The limestone stringers are white to brownish white, hard and microcrystaline; locally they are very argillaceous.

This upper part of the Hordaland Group is dated Late-Middle Miocene, Early Miocene (1000-1130 m) and Late Oligocene (1130-1500 m).

1150,5-1199 m

This interval differs from the one above and below by its thick sand interbeds. One bed is close to 15 m thick.

The sand consists of very fine to medium grained quartz. The interval is of Late Oligocene age.

1199-1428 m

Claystone dominates this interval and it is similar to the claystone overlying the sand interval except for an increasing occurence of siltstone stringers.

The age for this interval is also Late Oligocene.

Frigg Formation (1428-1824 m)

This is a sandstone interval with interbeds of claystone, stringers of siltstone and occasionally limestone. The interval is easily discerned from the claystones above and below by its log character.

The sand is made up of clear to milky, rarely smoky and pink quartz, which is very fine to medium, occasionally very coarse, subangular to subrounded and poorly sorted. It is loose, but locally moderately hard and calcite cemented. There are traces of pyrite cement, mica and glauconite. The porosity is poor.

The claystone is olive grey to olive black becoming predominantly dark green to greenish black, soft to firm, blocky and subfissile, grading to shale.

The siltstone is olive black, brownish grey to dusky yellowish brown, firm to locally moderately hard. It is argillaceous, very finely sandy, locally glauconitic, micromicaceous and non to moderately calcareous.

The limestone is pale to rarely dusky yellowish brown, hard, microcrystalline and locally dolomitic.

The Frigg Formation is ~~Late Oligocene~~ to Early Oligocene-Middle Eocene (1500-1900 m) of age.

1824-1950 m

This is an interval of shales with occasionally interlaminations of tuff downwards and rare limestone stringers.

The shale is olive black, rarely olive grey or greenish black. It is firm to locally moderately hard, subfissile to fissile, moderately to locally very silty, micromicaceous and non calcareous. The tuff is medium to dark brown, firm to moderately hard, slightly sucrosic, locally blocky and fissile. It has white specs and black shards and is slightly calcareous.

The limestone is light medium grey, firm to hard, chalky and microcrystalline. There is also a few stringers of a dolomitic limestone which is pale to dusky yellowish brown, rarely greyish brown, hard, slightly sucrosic and locally micaceous.

The interval is Early Oligocene-Middle Eocene and Middle-Early Eocene (1900-2055 m) of age.

1950-2068 m

This interval differs from the one above by its varicoloured, occasionally tuffaceous shales.

The shale is grey, brown, green, black, medium bluish grey, firm, blocky and fissile. It is silty, micromicaceous and non calcareous. The tuff is medium bluish grey to dark greenish grey, firm and sucrosic. It has white specs and black shards and is non calcareous. The tuff also consists of yellowish brown, black and greenish black inclusions in a white clay matrix.

The age of this sequence is Middle to Early Eocene.

ROGALAND GROUP (2068-2231 m)

Balder Formation (2068-2148 m)

The Balder Formation is in this well most easily discerned on its bell shaped sonic log motif while it is more difficult to pick from the gamma ray and resistivity logs. It consists of tuffaceous shale with a 15 m thick sand interval and occasionally dolomitic limestone stringers.

The shale is the same as in the interval above, but becomes increasingly tuffaceous and is locally pseudosucrosic.

The tuff is firm and pseudosucrosic, partly made up of white and black inclusions in a greenish black, non calcareous matrix. Partly it consists of greenish black inclusions in a white clay matrix.

The sandstone consists of moderately to well sorted, very fine to coarse, subangular to subrounded, clear to milky quartz grains. It is friable to hard, calcite cemented and has a poor porosity. The dolomitic limestone is similar to the one described in the interval above.

The whole of the Rogaland Group is Late Paleocene (2055-2603 m) of age.

Sele Formation (2148-2178 m)

The Sele Formation consists of shale and claystone with traces of tuffaceous material and occasionally limestone stringers.

The shale is of the same type as in the Balder Formation, while the claystone is dusky yellowish brocn, soft to firm, slightly sticky, moderately to very silty and locally grading to siltstone, very slightly tuffaceous, slightly micromicaceous and non calcareous.

The limestone is white to medium grey in colour, soft to firm and chalky.

Lista Formation (2178-2235,5 m)

This is also a shale/claystone interval with traces of siltstone and sandstone, but differs from the formations above by its lack of tuffaceous material.

The claystone which grades to shale is as described above. The siltstone is dusky yellowish brown to olive black, firm, subfissile, slightly very fine sandy, very argillaceous, micromicaceous and non calcareous.

The sandstone is white, very fine grading siltstone, well sorted, calcite cemented and of poor porosity.

MONTROSE GROUP (2235,5-2640 m)

Heimdal Formation (2235,5-2494 m)

The Heimdal Formation consists mainly of sandstone with occasionally thin claystone interbeds and rare stringers of siltstone and dolomitic limestone.

The sandstone is made up of moderately to well sorted, predominantly medium grained, clear to milky quartz which is subrounded to rounded, occasionally subangular. The sandstone is loose to moderately hard and occasionally calcite cemented.

The claystone is light to dark grey, olive grey to olive black, greenish grey to greenish black and brownish grey to brownish black. It is very soft to firm, locally moderately hard, grading to shale, locally silty, locally micromicaceous and non calcareous.

The siltstone is dusky yellowish brown to brownish black, firm to moderately hard, blocky, locally very fine sandy and occasionally argillaceous. The limestone

is light to pinkish grey, yellowish brown, soft to hard and microcrystalline. The Heimdal Formation is Late Paleocene of age.

Maureen Formation (2494-2640 m)

A sharp change in lithology from sandstone to claystone occur at 2494 m. In the upper part of this interval sand only occurs sporadically as thin beds. From 2572 m sandstone becomes again dominating, claystone occur as interbeds and from 2610 m thin beds of marl are present. Chalky limestones containing rare sand grains, which are considered to be reworked limestone clasts, have been observed throughout the interval.

The claystone is predominantly dark grey and similar to the one above. It is non calcareous in the upper part becoming calcareous downwards and grading into a light grey marl towards the base.

The sandstone is medium to coarse in grain size and occasionally calcite cemented.

The Maureen Formation is of Late Paleocene to Danian (2603-2755 m) age.

CHALK GROUP (2640-3668 m)

Ekofisk Formation (2640-2731 m)

A marked change in lithology occurs at this level, from the clastic deposits of the Montrose Group to the predominantly non clastic deposits of the Chalk Group. The Ekofisk Formation is mainly a limestone/marl interval with rare stringers of siltstone.

The limestone is white to light grey to locally greyish pink and rarely light brownish grey, soft to hard, chalky and argillaceous grading to marl.

The marl is light olive grey, very soft, sticky and locally silty.

The siltstone is dark to dusky yellowish brown, firm, friable and blocky.

The Ekofisk Formation is of Danian age.

4.3 CRETACEOUS (2731-3908,5/3948,5 m)

UPPER CRETACEOUS (2731-3660 m)

Tor Formation (2731-2920 m)

Limestone dominates the Tor Formation. Shale and siltstone stringers occur occasionally.

The limestone is white to locally medium grey, soft to firm, chalky, locally argillaceous and grades occasionally to silty and slightly micromicaceous marl.

The shale is medium grey to greyish black, hard, blocky to fissile and non to very calcareous. The siltstone is greyish black, hard and non calcareous.

The Tor Formation is dated Late Maastrichtian (2731-2755) and Maastrichtian (2755-2935 m).

Flounder Formation (2920-3438 m)

A change from limestone to predominantly marl defines the top of the Flounder Formation. Rare stringers of limestone and shale are locally observed in the interval.

The marl is light grey to olive grey and occasionally glauconitic in the top interval. At 2992 m the marl becomes locally brownish and reddish in colour before changing to predominantly light to medium dark grey downwards.
The limestone is white to light grey, micro to cryptocrystaline and occurs occasionally as a biosparite.

The rare shale laminations are silty, slightly micromicaceous and very calcareous.

The Flounder Formation is Campanian-Santonian (2935-3389) to Coniacian-Turonian (3389-3551 m) of age.

Herring Formation (3438-3506 m)

The Herring Formation is characterised by the change from the marl of the Flounder Formation into a predominantly clean limestone occuring at the top of this interval.

The limestone is very light to light grey, soft to firm. It is argillaceous in the top 10 m of the interval where it grades to marl, becoming cleaner for the rest of the interval.

The Herring Formation is of Coniacian-Turonian age.

Plenus Marl Formation (3506-3550,5 m)

Through this interval the limestone grades into marl and shaly marl.

The limestone is the same as in the overlying Herring Formation. The marl is predominantly medium grey, locally brownish grey, soft to firm and slightly silty. The shale is greyish black to greenish black, moderately hard, blocky to flaky, locally micromicaceous and non to slightly calcareous.

The Plenus Marl is also of Coniacian-Turonian age.

Hidra Formation (3550,5-3668 m)

The shaly marl above grades back into a marly limestone in the Hidra Formation.

The marl is grading to marlstone and is medium light to locally dark grey, rarely moderately brown, soft to hard and locally silty to very fine sandy.

There are also stringers of a white to greenish grey limestone which is hard, microcrystalline, occasionally argillaceous and glauconitic. The shale is dark grey to greyish black, olive black and greenish black. It is hard, blocky to subfissile, locally silty, locally micromicaceous, locally glauconitic and non to moderately calcareous.

The Hidra Formation is predominantly Cenomanian (3551-3660,5 m) of age.

LOWER CRETACEOUS (3660,5-3908,5/3948,5 m)

CROMER KNOLL GROUP (3668-3878 m)

Rødby Formation (3668-3733 m)

In the Rødby Formation the marl grades into calcareous shale with a few limestone stringers.

The shale is dark grey to greyish black, greenish grey to greenish black, firm to hard, blocky, subfissile, slightly to moderately silty, micromicaceous, and non to moderately calcareous, locally very calcareous grading to marl.

The marl is medium light grey to dark grey to locally greyish black, moderately to very hard, locally silty to very fine sandy and micromicaceous.

The limestone is white to light grey, firm to occasionally hard and microcrystalline.

The Rødby Formation is of Albian (3660,5-3741 m) age.

Valhall Formation (3733-3878 m)

3733-3805 m

The upper interval of the Valhall Formation consists predominantly of shale with occasionally thin beds of limestone.

The shale is mainly of the same type as in the Rødby Formation above, but in addition brownish and reddish colours occur. The shale is locally slightly carbonaceous and non to slightly calcareous.

There are traces of sandstone which is white to light to medium grey, silty to very fine in grain size, well sorted, calcite cemented and has a white clay matrix. The dolomitic limestone is dark to dusky yellowish brown, moderately to very hard, brittle, blocky to platy, argillaceous and cryptocrystalline.

There are also traces of a white to very light grey to pinkish grey limestone, soft to hard, locally brittle to friable, locally argillaceous and microcrystalline.

The upper part of the Valhall Formation is dated Early Albian-Aptian (3741-3792 m) and Early Albian (3792-3817 m).

3805-3878 m

In this lower part of the Valhall Formation marls and limestones become once again dominating together with occasional interbeds of claystone/shale.

The limestone/marl is predominantly olive grey in colour, soft to firm and locally silty.

The interbedded claystone and shale is brownish to greyish black of colour, slightly carbonaceous and moderately to very calcareous grading to marl.

This interval is Early Albian, Barremian-Hauterivian (3817-3858 m), Early Valanginian-Late Ryazanian (3858-3873 m) and Late Ryazanian (3873-3908,5 m) of age.

4.4 JURASSIC (3908,5/3948,5-4554,5 m)

UPPER JURASSIC (3908,5/3948,5-4485 m)

HUMBER GROUP (3878-4485 m)

Kimmeridge Clay Formation (3878-4211 m)

A marked change in lithology takes place at the top of this interval where calcareous shales and marls in the Valhall Formation is underlain by brownish black, carbonaceous claystones of the Kimmeridge Clay Formation. Stringers of limestone and occasionally sandstone occur throughout the interval.

The claystone is dusky yellowish brown to brownish black, soft to firm, locally grading to shale, locally earthy , locally blocky to subfissile, silty, micromicaceous, carbonaceous, locally pyritic and very slightly calcareous.

The sandstone is dark to dusky yellowish brown, silty to very fine in grain size and subangular. It is calcite cemented, has a light to dark grey clay matrix and is without visible porosity. Another kind of sandstone is white to light grey, also greyish brown to moderately brown, very fine to coarse with subrounded to rounded grains. It is calcite cemented and without visible porosity.

The limestone is white to light to medium grey, locally moderately brown to black, moderately hard, friable, blocky, micropyritic and is crypto to microcrystalline.

The Kimmeridge Clay Formation is dated Late Ryazanian, Early Ryazanian-Late Volgian (3908,5-3948,5 m) and Middle Volgian -Oxfordian (3948,5-4234,5 m).

Heather Formation (4211-4356m)

The Heather Formation is also a claystone sequence, but the claystone is less carbonaceous and the formation has a higher frequency of limestone stringers. Stringers of siltstone are also common in the interval.

The claystone is brownish grey to dusky yellowish brown to brownish black and black. It is soft to firm, locally moderately hard, blocky, locally sticky, moderately to very silty to locally sandy, locally slightly carbonaceous and micromicaceous and slightly to very calcareous. The limestone is light to medium grey, hard, blocky, crypto to microcrystalline, locally argillaceous and partly dolomitic. Occasionally the limestone is seen as white and coarse crystalline.

The Heather Formation is predominantly Early Oxfordian (4234.5-4315m) to Late Callovian (4315-4370m) of age.

VESTLAND GROUP (4356-4554.5m)

Hugin Formation (4356-4485m)

4356 - 4418 m

The top of the Hugin Formation is marked by thin beds of coal and carbonaceous shale overlying an appr. 29 m thick massive sandstone. This sandstone is in turn overlying a 10 m thick massive coal. The section below the coal is interbedded sandstones and siltstones with stringers of coal. The sandstone is predominantly dusky yellowish brown, hard and well cemented with silica and partly dolomite. It consists of very fine quartz grains grading into silt size. In the top interval thin beds of medium to coarse grained quartz occur. Mica and carbonaceous material occur throughout the sandstone.

The siltstone is brownish black, hard, carbonaceous and very argillaceous grading to shale. This upper part of the Hugin Formation is dated Late Callovian to Middle Callovian (4370-4424m).

4418-4485 m

The lower part of the Hugin Formation is mainly a siltstone interval with thin beds of sandstone, shale and stringers of dolomitic limestone.
The top of the interval is marked by a thick dolomite bed.

The siltstone is medium dark grey to greyish black, dusky brown to brownish black, locally light brown to dusky yellowish brown, moderately hard, brittle and blocky, subfissile to fissile. It is locally very argillaceous, grading to shale, occasionally it is very fine sandy, micromicaceous, slightly to moderately carbonaceous and non to locally very calcareous.

The sandstone is light to medium light grey to light brown. It consists of moderately sorted, very fine to occasionally medium grained, clear to milky quartz, which are subangular to subrounded. It is hard and silica cemented, locally with calcite cement. There are traces of a clay matrix and the porosity is poor.

The shale is olive grey to olive black, moderately hard, blocky, silty, micromicaceous, locally carbonaceous and non calcareous. The stringers of dolomitic limestone are light olive grey in colour, hard, microcrystalline and locally argillaceous. The dolomite bed marking the top of the interval is slightly sandy.

The age of this lower part of the Hugin Formation is mainly Early Callovian (4424-4485m).

MIDDLE JURASSIC (4485-4554.5m

Sleipner Formation (4485-4554.5m)

The Sleipner Formation consists of mainly the same lithology as the lower part of the Hugin Formation. However, no dolomite/limestone stringers are seen

through this interval and stringers of coal occur frequently.

The siltstone and sandstone are similar to those above. The coal seams are predominantly black and hard, but also argillaceous grading into carbonaceous shale.

The interval is of Bathonian - Bajocian (4485-4554.5m), age.

4.5 PERMIAN (4554.5-.4603m (TD)

UPPER PERMIAN (4554.5-4603m (T.D.))

ZECHSTEIN GROUP (4554.5-4603m (T.D.))

The Permian is represented by an evaporite sequence.

The topmost meter is anhydrite which is white to locally pale brown with shale laminations.

The next 24 meters down to 4580 m consist of halite which is clear to white, occasionally pale to dark brown in colour and medium to coarse crystalline.

The bottom interval down to T.D. (4603m) is mostly carnallite which is distinguished as orthorombic crystals in the cuttings. Shale and halite occur in the middle of the carnallite sequence.

The evaporite sequence is of Zechstein age, (4554.5-4603m).

5. HYDROCARBON SHOWS

Evaluation of hydrocarbon shows at the wellsite was carried out in a conventional manner. Below the 30" casing shoe a complete hydrocarbon total gas recorder was operational together with a gas chromatograph for automatic and continuous gas analysis. C1 through C4 was recorded as ppm by volume.

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

5.1 GAS RECORD

196 - 390 m

In this interval, which consists of Pleistocene clay with interbeds of sand, traces to 0.02% methane (C1) was recorded.

390 - 670 m

This interval consists of sand and sandy clay of Pleistocene and Pliocene age. 0.1-2.4% C1 was recorded with generally high readings in the clays.

670 -730 m

This interval consists of Pliocene clays and the uppermost part of the Utsira Formation sand. 0.02-0.08% C1 was recorded with the highest gas readings in the sand.

730 - 870 m

In the Miocene Utsira Formation and underlying sandy clays a total gas of 0.06-0.4% C1 was recorded with peak readings in the sand.

870 - 1955 m

This interval consists of clays of ages ranging from Eocene to Miocene and of the Eocene Frigg Formation sands. A total gas of 0.005-0.1% C1 was recorded with the highest readings in the Frigg Formation.

1955 - 3460 m

This interval covers the rest of the Tertiary sequence and most of the Upper Cretaceous. Traces to 0.2% C1 and occasional traces of ethane (C2) were recorded.

3460 3900 m

The upper part of this interval are the marls and limestones of the Upper Cretaceous Hidra, Plenus Marl and Herring Formations. The lower part of the interval are the shales and marly limestones of the Lower Cretaceous Valhall and Rødby Formations. 0.01-0.04% C1 through C3 (propane) with occasionally traces of IC4 (Iso-buthane) were recorded.

3900 - 4170 m

This interval covers most of the Upper Jurassic Kimmeridge Clay Formation. A total gas of 0.01 -0.44% C1 - C3 with occasionally traces of NC4 were recorded.

4170 - 4507 m

This interval comprises the Upper Jurassic Heather and Hugin Formations with shale, sandstone and thick coal beds and the upper part of the Middle Jurassic Sleipner Formation siltstones. Total gas readings of 0.01 - 0.16% mainly C1 with occasional traces of C2 to NC4 were recorded.

4507 - 4603 m (TD)

This interval covers the basal 50 m of the Sleipner Formation with siltstones and coal seams overlying the Permian Zechstein evaporite. Recorded total gas remained very low reading 0.01 - 0.04% C1, with occasionally traces of C2 and C3.

5.2 OIL STAIN AND FLUORESCENCE

2800 - 2835 m

The cuttings from this limestone dominated interval had very slight traces of dull to bright yellow cloudy fluorescence cut.

3815 - 3922 m

Shows were reported on cuttings both from the Lower Cretaceous marly limestones and from the underlying shales of the Kimmeridge Clay Formation. The marly limestones showed traces of yellow to bluish white crush cut. The shale showed slowly streaming, yellowish white fluorescence crush cut, while the cuttings from sample 3922 m showed 50% yellow fluorescence and locally fast streaming, strong, yellow to bluish white fluorescence cut and a yellow fluorescence residue. A sidewall core taken in a sandstone stringer at 3815 m showed yellowish white fluorescence and a slowly streaming milky white fluorescence cut.

4020 -4040 m

Weak shows were reported from sandstone stringers in this interval of the Kimmeridge Clay Formation. The sandstones gave a weak, bluish white fluorescence and instant streaming, bluish white fluorescence cut.

4365 - 4500 m

Shows were reported from the three cores taken in the Upper Jurassic Hugin Formation. Both oil and gas were bleeding from the first core while the two others showed bleeding gas and had a brown oil stain. The cores showed a yellow to white and bluish white fluorescence. This gave a fast streaming, bluish white fluorescence cut and a bluish white fluorescence residue.

Weak shows were also reported from cuttings from the sandstone stringers in the Middle Jurassic Sleipner Formation. The cuttings gave a weak yellow to white and bluish white fluorescence, a bluish white to yellow fluorescence crush cut and a bluish white to yellow fluorescent residue.

6. CORING

6.1 CONVENTIONAL CORES

A total of three cores were cut in the well, all three in the Callovian Hugin Formation.

Core No. 1 was cut from 4365 to 4373 m. 7.35 m (92%) were recovered consisting of predominantly very fine occasionally medium to very coarse, silica cemented sandstone with abundant white clay matrix and very poor porosity. The core showed poor hydrocarbon shows.

Core No. 2 was cut from 4375 to 4390 m. 15 m (100%) were recovered consisting of very fine sandstone grading to siltstone. It is micaceous and carbonacesous with very poor porosity. Coal beds occured at the base of the core from 4389.3 m. Poor hydrocarbon shows were observed in the core.

Core No. 3 was cut from 4390 to 4405 m. 11 m (73%) were recovered. The core consisted of a ten meter thick coal sequence with sand and shale at the base. The sandstone at the base showed a moderate good oil show but was of poor porosity.

Detailed description of the cores are found in Appendix 1.

6.2 SIDEWALL CORES

Sidewall cores were taken from 1429 m in the Oligocene sequence and throughout the well with the deepest side wall core recovered at 4554 in the Middle Jurassic interval. A total of 8 runs were made with a recovery of 149 out of a total of 240, 35 were misfires, 22 were lost and 34 were empty.

A detailed description of the sidewall cores are given in Appendix 2.

7. WIRELINE LOGGING

The following list is a summary of the wireline logs run in well 15/2-1 and shows the dates, logged intervals and run number of each log.

Log	Date	Logged interval	Run No
ISF/BHC/GR/SP	28-29.11.81	134 - 653 m	1
" " " "	17.12.81	653 - 2748,5 m	2
" " " "	12.01.82	2736 - 3786 m	3
" " " "	10.02.82	3770 - 4451 m	4
" " " "	14.02.82	4451 - 4601 m	5
FDC/CNL/GR/CAL	17-18.12.81	653 - 2750 m	1
" " " "	12.01.82	2736 - 3785 m	2
" " " "	10.02.82	3769,5- 4452 m	3
" " " "	14.02.82	4451 - 4603 m	4
HDT	13.01.82	2736 - 3785 m	1
"	15.02.82	3765 - 4560 m	2
CST	18.12.81	1429 - 2748 m	1
"	18.12.81	1429 - 2705 m	2
"	13-14.01.82	3537,5- 3781 m	3
"	14.01.82	2764 - 3520 m	4
"	15.02.82	3770 - 4554 m	5
"	15-16.02.82	3770 - 4354 m	6
"	16.02.82	3770 - 4114,5 m	7
"	16.02.82	3844,5- 4516 m	8
RFT	10.02.82	4365,3- 4417,5 m	1
"	10-11.02.82	4416,3- 4419 m	2
CBL/VDL	14.01.82	400 - 2734,5 m	1
" "	16.02.82	2246 - 2763 m	2
VSP	15.02.82	710 - 4550 m	1

8. SPECIAL STUDIES

The biostratigraphic evaluation of the well has been performed by the laboratories of Robertson Research International Ltd. in Wales. The result of this evaluation are contained in the report:

> Norsk Hydro 15/2-1 Norwegian North Sea
> Well: Biostratigraphy of the interval
> 200m - 4600 m T.D.

A geochemical source rock analysis is undertaken by the laboratories of Robertson Research International Ltd. in Wales. The results of this study is not yet available.

APPENDIX I

CORE DESCRIPTIONS

(Cores 1-3)

Norsk Hydro

Well no.	Core report	Core no's
15/2-1		1

Interval	Area	Cut	Date
4365 - 4369.5 m	Norwegian North Sea	4365 - 4373 m	Feb. 3, 1982
Scale	**Well R.K.B.**	**Recovery**	**Geologist**
1:25	25 m	4365 - 4372.35 m (92%)	Gustavsen/Midtkandal

Depth scale	Re-covery	Lithological column	Depths	Lithological descriptions	Shows
4365			4365	**Sst:** dusky yel brn, vf, mod hd - hd, scat m - vcrs qtz grains, subrnd, mica (musc), wh non calc mtx (kaolin), carb - abn carb, no vis por.	Bleeding gas and oil, yel - wh flu, fast strmg bl - wh flu cut, bl - wh flu cut resd.
4366					
				Sst: clr qtz, m -vcrs, ang - subang, wh non calc mtx (kaolin + silica) erosive surfaces	
4367			4367.25		
			Sealed sample		
			4367.45	— occ bioturb. — plant remains —small faults (syn sed?) — small scale x-bdg.	
4368					
				— small scale fining upward. sequences. —erosive surfaces.	
6369					
4369.5					

Norsk Hydro

Well no.	Core report	Core no's
15/2-1		1

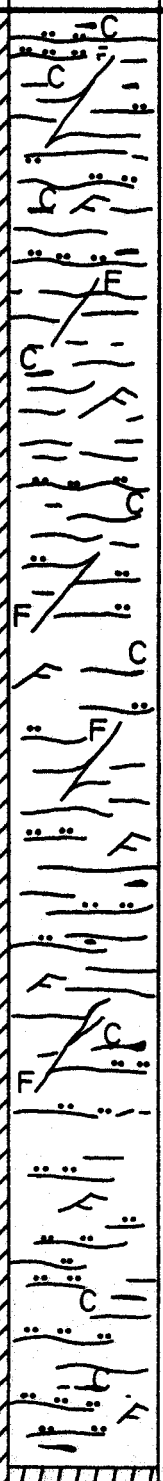
Interval	Area	Cut	Date
4369.5 - 4373 m	Norwegian North Sea.	4365 - 4373 m	Feb. 3, 1982
Scale	**Well R.K.B.**	**Recovery**	**Geologist**
1:25	25 m	4365 - 4372.35 m (92%)	Gustavsen/Midtkandal

Depth scale	Re-covery	Lithological column	Depths	Lithological descriptions	Shows
4370				**Sst:** clr qtz, m - v crs, ang - subang, wh non calc mtx, (kaolin + silica).	Bleeding gas and oil, yel - wh flu, fast strmg bl - wh flu cut, bl - wh flu cut resd.
				Sst: dusky yel brn, vf, scat m - vcrs qtz grains, mod hd - hd, subrnd, mica (musc), wh non calc mtx (kaolin), carb - abn carb, no vis por.	
			4370.95		
4371		Sealed sample			
			4371.20		
				— plant remains. — small scale x-bdg. — occ bioturb.	
4372					
			4372.35		
		Not recovered			
4373			4373		

Norsk Hydro

Well no.	Core report	Core no's
15/2-1		2

Interval	Area	Cut	Date
4375 - 4380 m	Norwegian North Sea	4375 - 4390 m	Feb. 5, 1982
Scale	**Well R.K.B.**	**Recovery**	**Geologist**
1:25	25 m	4375 - 4390 m (100%)	Gustavsen/Midtkandal

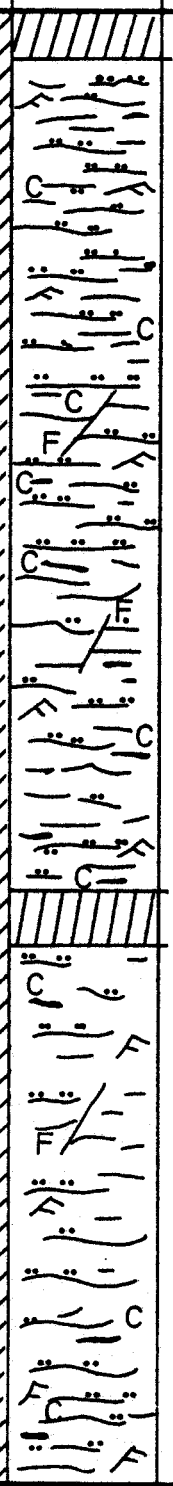
Depth scale	Re-covery	Lithological column	Depths	Lithological descriptions	Shows
4375				**Sst:** dusky yel brn, vf - slty, hd, subrnd, mica (musc), occ carb, silic cmt, well srtd, no vis por. — abn slty wavy lam. — tr. plant debris. — small scale syn sed. faults, 1-10 cm off-set. — small scale x-bdg, occ herring bone x-bdg (?) and reactivation surfaces. — occ load structures.	Bleeding gas, brown oil stain, yel - wh flu, bl - wh flu cut, bl - wh flu resd.
4376					
4377					
4378					
4379					
4380			4379.95		

Norsk Hydro

Well no.	Core report	Core no's
15/2-1		2

Interval	Area	Cut	Date
4380 - 4385 m	Norwegian North Sea	4375 - 4390 m	Feb. 5, 1982
Scale	**Well R.K.B.**	**Recovery**	**Geologist**
1:25	25 m	4375-4390 m (100%)	Gustavsen/Midtkandal

Depth scale	Re-covery	Lithological column	Depths	Lithological descriptions	Shows
4380				**Sst:** dusky yel brn, vf - slty, hd, subrnd, mica (Musc), occ carb, silic cmt, well srtd, no vis por.	Bleeding gas, patchy brn oil stain, yel - wh flu, bl - wh flu cut, bl - wh flu resd.
4381				— abn slty wavy lam. — tr plant debris. — small scale syn sed faults, 1-10 cm off - set. — small scale x - bed. — occ herring bone x - bdg (?) and reactivation surfaces. — occ load structures.	
4382					
4383			4383.0 Sealed sample 4383.20		
4384					
4385					



Norsk Hydro

Well no.	Core report	Core no's
15/2-1		2

Interval	Area	Cut	Date
4385 - 4390 m	Norwegian North Sea	4375 - 4390 m	Feb. 5, 1982
Scale	**Well R.K.B.**	**Recovery**	**Geologist**
1:25	25 m	4375 - 4390 m (100%)	Gustavsen/Midtkandal

Depth scale	Re-covery	Lithological column	Depths	Lithological descriptions	Shows
4385				**Sst:** dusky yel brn, vf - slty, hd, subrnd, mica (Musc), occ carb, silic cmt, well srtd, no vis por.	Bleeding gas, patchy brn oil stain, yel - wh flu, bl - wh flu cut, bl - wh flu resd.
4386				— slty wavy lam. — tr plant debris. — small scale x - bdg.	
4387					
4388					
			4388.80		
4389			4389.00		
			4389.30		
			4389.50	**Coal:** blk, firm - hd, shiny, vit, occ slty. **Sst:** a/a.	
			4389.75	**Coal:** a/a.	
4390					

Norsk Hydro

Well no.	Core report	Core no's
15/2-1		3

Interval	Area	Cut	Date
4390 - 4395 m	Norwegian North Sea	4390 - 4405 m	Feb. 5, 1982
Scale	**Well R.K.B.**	**Recovery**	**Geologist**
1:25	25 m	4390 - 4401 m (73%)	Kalgraff/Henderson

Depth scale	Re-covery	Lithological column	Depths	Lithological descriptions	Shows
4390				**Coal:** blk - gy blk, hd, brit, loc vit w/ conch - sub conch frac (vitrain), loc glossy - slty appearance (fusain/ durain), occ fibrous, loc pyr, rr calc concr 1 - 2 cm.	Slow bleeding gas, up to 20% patchy bl wh - yel flu on cracks, fast strong strmg bl wh flu cut, bl wh flu resd.
4391					
4392					
4393					
4394					
4395					

Norsk Hydro

Well no.	Core report	Core no's
15/2-1		3

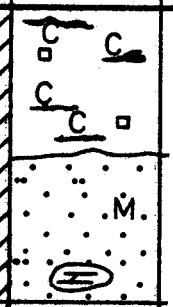
Interval	Area	Cut	Date
4395 - 4400 m	Norwegian North Sea	4390 - 4405 m	Feb. 5, 1982
Scale	**Well R.K.B.**	**Recovery**	**Geologist**
1:25	25 m	4390 - 4401 m (73%)	Kalgraff/Henderson

Depth scale	Re-covery	Lithological column	Depths	Lithological descriptions	Shows
4396 4397 4398 4399 4400				**Coal:** blk - gy blk, hd, brit, loc vit w/ conch - sub conch frac (vitrain), loc slty appearance, occ earthy band, (fusain/durain), loc pyr, rr calc concr 1 - 2 cm.	Slow bleeding gas, up to 20% patchy bl wh - yel flu on cracks, fast strong strmg bl wh flu cut, bl wh flu resd.
			4399.60 4399.80	**Slst:** brn gy, hd, brit, v arg, micro mic, loc coaly lam, slickenslided surfaces 5 - 10° dip.	tr v slow bl wh flu crsh cut, yel - bl wh flu resd.

Norsk Hydro

Well no.	Core report	Core no's
15/2-1		3

Interval	Area	Cut	Date
4400 - 4405 m	Norwegian North Sea	4390 - 4405 m	Feb. 5, 1982
Scale	**Well R.K.B.**	**Recovery**	**Geologist**
1:25	25 m	4390 - 4401 m (73%)	Kalgraff/Henderson

Depth scale	Re-covery	Lithological column	Depths	Lithological descriptions	Shows
			4400.50	**Sh:** gy blk, hd, brit, blky - plty, bit, tr micromica, pyr, coaly.	Weak yel flu on frac, fast strmg bl wh flu cut, bl wh flu resd.
			Sealed sample	**Sst:** lt brn gy, vf - slt, hd, brit, subang - subrnd, micro-mica, arg, non calc, loc dol concretion 10 cm, silic cmt, mod srt, v pr - no vis por.	100% weak yel flu. v slow weak yel flu crsh cut, yel flu resd.
4401			4400.80 4401.00		Slow bleeding gas.
4402					
4403		Not recovered			
4404					
4405			4405		

APPENDIX 2

SIDEWALL CORE DESCRIPTIONS

(Runs 1-8)

Norsk Hydro

SERVICE COMPANY:	Schlum
ASKED:	30
SHOT:	30
LOST:	2
EMPTY:	1
SAMPLES RECOVERED:	9
Misfire:	18
GEOLOGIST:	Henderson/Midtkandal

SIDE WALL CORES DESCRIPTION

WELL:	15/2-1	RUN N°:	1
LICENCE:	048	PAGE N°:	1 of 2
		DATE:	Dec. 18, 1981

tr : trace - M : medium - G : good

N°	DEPTHS m	REC cm	LITHOLOGY	Fluorescence tr M G	CUT
1	2748	2.5	**Lst,** lt gy, wh, mod hd - sft, loc chky, loc microxln..		
2	2743	1	**Lst,** lt gy - mlt gy, mod hd, brit, blky - plty, arg, loc microxln.		
3	2738	1.5	**Lst,** lt gy, m lt gy, mod hd, loc sft - mod hd, brit - firm, loc plty, arg - v arg, loc microxln.		
4	2733	1	**Lst,** m lt gy, firm, fri, microxln, slty, v arg, Mrly.		
5	2731.5	0	Empty.		
6	2730.5	4.5	**Mrl/Clyst,** m dk gy - olv gy, mod hd - firm, fri, v arg, v calc, sl slty, microxln calcite.		
7	2728	3	**Mrl/Clyst,** m dk gy - olv gy, mod hd - firm, fri, v arg, v calc, sl slty, microxln calcite.		
8	2725		Lost.		
9	2722	3	**Mrl/Clyst,** dk grn gy - m dk gy, firm - mod hd, fri, v arg, sl slty, v calc-mrl.		
10	2719	2	**Mrl,** lt gy - grn gy, firm, loc micro-mic.		
11	2713	4	**Sst,** lt olv gy, clr qtz, f - vf, lse, subang, loc sl arg, glau, non calc, mod srt, gd vis por, no show.		
12	2705		Lost, in hole.		
13	2695		Misfire.		
14	2685		Misfire.		
15	2675		Misfire.		
16	2665		Misfire.		
17	2660		Misfire.		
18	2655		Misfire.		

Norsk Hydro

SERVICE COMPANY:	Schlum
ASKED:	30
SHOT:	30
LOST:	2
EMPTY:	1
SAMPLES RECOVERED:	9
Misfire:	18
GEOLOGIST:	Henderson/Midtkandal

SIDE WALL CORES DESCRIPTION

WELL:	15/2-1	RUN N°:	1
LICENCE:	048	PAGE N°:	2 of 2
		DATE:	Dec. 18, 1981

tr : trace - M : medium - G : good

N°	DEPTHS m	REC cm	LITHOLOGY	Fluorescence				CUT
					tr	M	G	
19	2650		Misfire.					
20	2645		Misfire.					
21	2641		Misfire.					
22	2636		Misfire.					
23	2626		Misfire.					
24	2616		Misfire.					
25	2603		Misfire.					
26	2590		Misfire.					
27	2571		Misfire.					
28	1502		Misfire.					
29	1442		Misfire.					
30	1429		Misfire.					

Norsk Hydro

SERVICE COMPANY:	Schlum
ASKED:	30
SHOT:	30
LOST:	1
EMPTY:	1
SAMPLES RECOVERED:	28
Misfire:	0
GEOLOGIST:	Henderson/Midtkandal

SIDE WALL CORES DESCRIPTION

WELL:	15/2-1	RUN N°:	2
LICENCE:	048	PAGE N°:	1 of 3
		DATE:	Dec. 18, 1981

tr : trace - M : medium - G : good

N°	DEPTHS m	REC cm	LITHOLOGY	Fluorescence tr M G	CUT
31	2705	0,5	**Mrl,** m lt gy - grn gy, firm - mod hd.		
32	2695	1	**Lst,** lt gy - m lt gy, mod hd, loc sft, arg, microxln.		
33	2685	1	**Clyst,** m dk gy, mod hd, blky, brit, calc.		
34	2675	2	**Lst,** lt - v lt gy, mod hd - firm, arg, microxln.		
35	2665	2	**Lst/Mrl,** lt - v lt gy, firm, fri, arg, loc arg lam, loc microxln.		
36	2660	1	**Lst,** v lt gy, mod hd - hd, brit,, sl arg, microxln.		
37	2655	1.5	**Mrl,** m lt gy - lt olv gy, firm, fri, slty.		
38	2650	2.5	**Clyst/Mrl,** olv gy - m dk gy, firm, fri, slty, v calc - mrl.		
39	2645	1.5	**Clyst,** olv gy - m dk gy, firm, fri, slty, micromic, v calc, grdg **Mrl.**		
40	2641	3	**Mrl/Clyst,** olv gy - m dk gy, firm - fri, slty, tr micro-mic, v calc-mrl.		
41	2636	4	**Clyst,** olv gy - m gy, mod hd, brit, blky, slty, v calc.		
42	2626	2	**Clyst,** olv gy, sft - mod hd, slty, v calc.		
43	2616	4	**Sst,** brn gy - olv gy, clr qtz, f - vf, fri - lse, subang, slty, v arg mtx, non calc, tr glau, pr srt, pr vis por, no show.		
44	2603	3	**Clyst,** olv gy - dk grn gy, mod hd, blky - plty, sl slty, tr micro mic, calc.		
45	2596	1	**Sst,** lt olv gy - lt brn gy, clr qtz, vf - slt, lse, subang - subrnd, slty, v arg mtx, non calc, mod - pr srt, pr vis por, no show.		

Norsk Hydro

SERVICE COMPANY:	Schlum
ASKED:	30
SHOT:	30
LOST:	1
EMPTY:	1
SAMPLES RECOVERED:	28
Misfire:	0
GEOLOGIST:	Henderson/Midtkandal

SIDE WALL CORES DESCRIPTION

WELL:	15/2-1	RUN N°:	2
LICENCE:	048	PAGE N°:	2 of 3
		DATE:	Dec. 18. 1981

tr : trace - M : medium - G : good

N°	DEPTHS m	REC cm	LITHOLOGY	Fluorescence				CUT
46	2590	2.5	**Sst,** lt olv gy - lt brn gy, clr qtz, vf - slt, lse, subang - subrnd, slty, v arg mtx, non calc, mod - pr srt, pr vis por, no show.					
47	2580	2	**Sst,** lt olv gy - lt brn gy, clr qtz, vf - slt, lse, subang - subrnd, slty, v arg mtx, non calc, mod - pr srt, pr vis por, no show.					
48	2571	0	Empty.					
49	2543	3	**Clyst,** gy blk - olv blk, mod hd - hd, loc firm, brit, blky - plty, tr micro-mic, non calc.					
50	2140	4	**Sst,** olv gy, clr qtz, f - slt, fri - lse, subang - subrnd, slty, arg, tr micro-mic, non calc, pr srt, fair vis por, no show.					
51	2105	2	**Sst,** lt gy, clr qtz, f - vf, lse, subang - subrnd, non calc, mod - well srt, gd vis por, no show.					
52	2076	5	**Clyst,** olv gy - olv blk, mod hd, blky - plty, tr micro-mic, non calc.					
53	1930	5	**Clyst,** olv gy - olv blk, mod hd, blky - plty, tr micro-mic, non calc.					
54	1632		Lost in hole.					
55	1602	4	**Sst,** olv gy, clr qtz, f - vf, pred f, lse, subang - subrnd, tr glau, sl arg, sl slty, mod - well srt, gd vis por, no show.					
56	1547	3	**Sst,** olv gy, clr qtz, f - vf, pred f, lse, subang - subrnd, tr plau, sl arg, sl slty, mod - well srt, gd vis por, no show.					
57	1502	4.5	**Sst,** pl - dk yel brn, clr qtz, f - vf, pred f, lse, subang - subrnd, tr glau, slty, sl arg, mod - well srt, gd vis por, no show.					

Norsk Hydro

SERVICE COMPANY:	Schlum
ASKED:	30
SHOT:	30
LOST:	1
EMPTY:	1
SAMPLES RECOVERED:	28
Misfire:	0

SIDE WALL CORES DESCRIPTION

WELL:	15/2-1	RUN N°:	2
LICENCE:	048	PAGE N°:	3 of 3
		DATE:	Dec. 18, 1981

GEOLOGIST: Henderson/Midtkandal

tr : trace - M : medium - G : good

N°	DEPTHS m	REC cm	LITHOLOGY	Fluorescence				CUT
58	1455	3	**Sst,** lt gy, clr qtz, slt - f, pred vf, lse, subang - subrnd, tr glau, mod - pr srt, gd vis por, no show.					
59	1442	3	**Sst,** lt gy, clr qtz, slt - f, pred v f, lse, subang - subrnd, tr glau, mod - pr srt, gd vis por, no show.					
60	1429	4	**Sst,** lt gy, clr qtz, f - vf, lse - fri, subrnd - subang, wh calc mtx, tr glau, rr tr micro-mic, mod srt, no vis por, dull yel min flu.					

Norsk Hydro

SERVICE COMPANY:	Schlum
ASKED:	30
SHOT:	30
LOST:	1
EMPTY:	2
SAMPLES RECOVERED:	27
Misfire:	0
GEOLOGIST:	Kalgraff/Tollefsen

SIDE WALL CORES DESCRIPTION

WELL:	15/2-1	RUN N°:	3
LICENCE:	048	PAGE N°:	1 of 2
		DATE:	Jan. 14, 1981

tr : trace - M : medium - G : good

N°	DEPTHS m	REC cm	LITHOLOGY	Fluorescence			CUT
61	3781	4	**Sh,** dk gy - gysh blk, brnsh gy, mod hd - firm, subfis, micro-mica, non calc.				
62	3779	6	**Sh,** dk gy - gysh blk, firm, subfis - fis, sl slty, micro-mic, non calc.				
63	3771	5.5	**Sh,** A/A.				
64	3765.5	3	**Sh,** A/A.				
65	3760	5	**Sh,** gysh brn - dsky brn, firm, subfis - fis, micro-mica, non calc, v calc in part.				
66	3753.5	4	**Sh,** dk gy - gyish blk A/A.				
67	3750	4	**Sh,** dk gy - gysh blk, mod hd - firm, subfis, micro-mica, non calc.				
68	3746	3	**Sh,** gysh brn - dusky brn, firm, subfis, sl slty, sl micromic, non calc.				
69	3741	4	**Sh,** dk grnsh gr, mod hd, fis, slty - v slty, sl micro-mica, non calc, tr gysh - dusky brn A/A.				
70	3736	4	**Sh,** dk gy - m dk gy, firm, sl slty, subfis, micro-mica, non calc.				
71	3727.5	3.5	**Sh,** dk gy - mdk gy, gysh brn, firm, subfis, micro-mica, calc.				
72	3720	2	**Mrl/Sh,** dk gy - mdk gy, mod hd, fis, mica, loc v-calc.				
73	3714.5	0	Empty.				
74	3709,5	1	**Mrl,** dk gy - mdk gy, mod hd, subfis, slty, mica, v calc.				
75	3705	2	**Mrl,** A/A.				
76	3697	2	**Mrl,** mgy, mod hd, firm, slty, micro-mica, v calc.				
77	3690.5	3.5	**Mrl,** dk gy - m dk gy, subfis - fis, mod hd, slty, micro-mic, v calc.				
78	3687	2.5	**Mrl,** mgy - grn gy, subfis, firm, slty, micro-mic, v calc.				

Norsk Hydro

SERVICE COMPANY:	Schlum
ASKED:	30
SHOT:	30
LOST:	1
EMPTY:	2
SAMPLES RECOVERED:	27
Misfire:	0
GEOLOGIST:	Kalgraff/Tollefsen

SIDE WALL CORES DESCRIPTION

WELL:	15/2-1	RUN N°:	3
LICENCE:	048	PAGE N°:	2 of 2
		DATE:	Jan. 14, 1982

tr : trace - M : medium - G : good

N°	DEPTHS	REC	LITHOLOGY	Fluorescence				CUT
	m	cm			tr	M	G	
79	3669	1	**Mrl.** dk gy - olv blk. subfis. firm. mod hd. slty. micro-mica.					
80	3660,5	2	**Sh/Mrl.** gysh blk - dk gy. mod hd. subfis. sl slty. micro-mica. v calc-mrl.					
81	3655		Lost in hole.					
82	3650	3	**Mrl.** dk gy. subfis. mod hd. v slty. mica.					
83	3645	1	**Mrl.** mgy. subfis. mod hd. slty. micro-mica.					
84	3635	1	**Mrl.** mgy. subfis - firm. mod hd. slty. - mica.					
85	3626.5	1	**Mrl.** A/A.					
86	3598	2.5	**Mrl.** A/A.					
87	3581	2	**Mrl.** A/A.					
88	3557.5	2.5	**Mrl.** mdk - dk gy. else A/A.					
89	3550	0	**Empty.**					
90	3537.5	2	**Mrl.** dk gy. else A/A.					

VM 82036

Norsk Hydro

SERVICE COMPANY:	Schlum
ASKED:	30
SHOT:	30
LOST:	0
EMPTY:	7
SAMPLES RECOVERED:	8
Misfire:	15
GEOLOGIST:	Tollefsen/Kalgraff

SIDE WALL CORES DESCRIPTION

WELL:	15/2-1	RUN N°:	4
LICENCE:	048	PAGE N°:	1 of 2
		DATE:	Jan. 14. 1982

tr : trace - M : medium - G : good

N°	DEPTHS m	REC cm	LITHOLOGY	Fluorescence				CUT
					tr	M	G	
91	3520	0	Empty.					
92	3507	2	**Mrl,** m gy. firm. blky. slty.					
93	3497	2.5	**Mrl,** m gy. mod hd - hd. blky. sl slty. grdg arg Lst.					
94	3481	2	**Lst,** m gy. hd. micro-xln. arg. sl slty.					
95	3460	0	Empty.					
96	**3434.5**	**2**	**Mrl,** m gy - m dk gy. firm - mod hd. blky - subfis. sl slty.					
97	3422	1.5	**Mrl,** m dk gy. firm. blky.					
98	3400	1	**Mrl,** a/a.					
99	3389	2.5	**Mrl,** m gy. mod hd - firm. subfis - blky. sl slty. v sl mica. tr v weak blsh wh crush cut.					
100	3382	0.5	**Mrl,** m dk gy. firm. blky. sl micro-mica.					
101	3375.6	0	Empty.					
102	3346.5	0	Empty.					
103	3307	0	Empty.					
104	3296.5	0	Empty.					
105	3284	0	Empty.					
106	3205		Misfire.					
107	3172.5		Misfire.					
108	3137.5		Misfire.					

Norsk Hydro

SERVICE COMPANY:	Schlum
ASKED:	30
SHOT:	30
LOST:	0
EMPTY:	7
SAMPLES RECOVERED:	8
Misfire:	15
GEOLOGIST:	Tollefsen/Kalgraff

SIDE WALL CORES DESCRIPTION

WELL:	15/2-1	RUN N°:	4
LICENCE:	048	PAGE N°:	2 of 2
		DATE:	Jan. 14, 1981

tr : trace - M : medium - G : good

N°	DEPTHS m	REC cm	LITHOLOGY	Fluorescence				CUT
					tr	M	G	
109	3088		Misfire.					
110	3067		Misfire.					
111	3030		Misfire.					
112	3021.5		Misfire.					
113	2984		Misfire.					
114	2967		Misfire.					
115	2935		Misfire.					
116	2909		Misfire.					
117	2877		Misfire.					
118	2830		Misfire.					
119	2802.5		Misfire.					
120	2764		Misfire.					

Norsk Hydro

SERVICE COMPANY:	Schlum
ASKED:	30
SHOT:	30
LOST:	3
EMPTY:	5
SAMPLES RECOVERED:	22
Misfire:	0
GEOLOGIST:	Skogen/Kalgraff

SIDE WALL CORES DESCRIPTION

WELL: 15/2-1	RUN N°: 5
LICENCE: 048	PAGE N°: 1 of 2
	DATE: Feb. 15, 1982

tr : trace - M : medium - G : good

N°	DEPTHS m	REC cm	LITHOLOGY	Fluorescence			CUT
121	4554	2.5	**Sh,** brngy - olvgy, frm - mod hd, subfis, micromic, slty, carb, non calc. **Coal,** blk, mod hd, brit, granular.				
122	4552	2.3	**Sh,** brn blk - olv blk, hd, subfis, misromic, slty, occ grdg **slst,** v carb in pts, non calc.				
123	4548	2.6	**Sh,** brn gy - olv gy, mod hd, occ hd, blky - subfis, micromic, non calc.				
124	4546	3.4	**Sst,** dusky yel brn, vf, hd - v hd, subang - subrnd, mica, carb, silic cmt, mod srtd, no vis por.				
125	4543	1.8	**Sh** grdg to **slst,** brngy - olvgy, frm - mod hd, blky, micromic, carb, non calc.				
126	4535	1.9	**Sh/Slst,** brngy - olvgy, frm - mod hd, blky, micromic, carb, non calc.				
127	4528.5	1.6	**Slst,** brngy - olvgy, frm - mod hd, blky, micromic, carb, non calc.				
128	4521	3.6	**Sh/Slst,** brngy - olvgy, frm - mod hd, blky, micromic, carb, non calc.				
129	4516		possibly only mud cake.				
130	4505.5	3	**Slst,** brngy, hd - v hd, blky, mica, carb, non calc.				
131	4494.5	0.9	**Sh,** dusky yel brn, frm - mod hd, blky, micromic, slty, v carb, non calc.				
132	4490		Lost.				
133	4485	1	**Slst,** pl yel brn - brngy, frm, blky, mica, carb, grdg to vf **sst,** non calc.				
134	4481	0	Empty.				
135	4476.5	0	Empty.				
136	4462	0	Empty.				
137	4456		Lost in hole.				
138	4451	1.6	**Slst,** pl yel brn - brngy, frm, blky, mica, carb, grdg to vf **sst,** non calc.				

Norsk Hydro

SIDE WALL CORES DESCRIPTION

WELL: 15/2-1	RUN N°: 5
LICENCE: 048	PAGE N°: 2 of 2
	DATE: Feb. 15, 1982

SERVICE COMPANY: Schlum
ASKED: 30
SHOT: 30
LOST: 3
EMPTY: 5
SAMPLES RECOVERED: 22
Misfire: 0
GEOLOGIST: Skogen/Kalgraff

tr : trace - M : medium - G : good

N°	DEPTHS m	REC cm	LITHOLOGY	Fluorescence	CUT
139	4446	2.4	**Sh,** dusky yel brn - brn blk, mod hd, subfis, micromic, carb, non calc.		
140	4442.5		Lost in hole.		
141	4435	3	**Slst,** brngy, occ brn blk, hd - v hd, blky, micromic, carb, non calc. **Slst** thinly lam w microveins of qtz.		
142	4428	0	Empty.		
143	4424	2.3	**Sh,** brn blk - blk, mod hd - hd, blky - subfis, micromic, v carb, coaly in pts, non calc.		
144	4415	1.2	**Sst,** v lt gy - pnkish gy, vf - f, hd, subang, mica, carb, silic cmt, mod - w srtd, no vis por. Dull yel wh sptty flu, v slow bl wh cut.		
145	4410.5	1.9	**Slst,** brngy, mod hd - hd, blky, micromic, carb, occ grdg to vf **sst,** non calc.		
146	4407	2	**Sst,** v ltgy - pnkish gy, vf - f, hd, subang, mica, carb, silic cmt, mod - w srtd, no vis por. Dull yel wh sptty fluor, v slow bl wh cut.	X	
147	4364.5	2.1	**Slst,** dusky yel brn - brn blk, frm, blky, mica, carb, occ grdg to vf **sst.**		
148	4460.5	0	Empty.		
149	4358.5	.9	**Sh,** brn blk - blk, hd, blky, micromic, v carb, non calc.		
150	4357	4.1	**Sh,** brn blk - blk, hd, blky, micromic, v carb, non calc. "Hapin" 4356 m Heather		

VW 82036

Norsk Hydro

SERVICE COMPANY:	Schlum
ASKED:	30
SHOT:	30
LOST:	2
EMPTY:	8
SAMPLES RECOVERED:	20
Misfire:	0
GEOLOGIST:	Kalgraff/Skogen

SIDE WALL CORES DESCRIPTION

WELL:	15/2-1	RUN N°:	6
LICENCE:	048	PAGE N°:	1 of 2
		DATE:	Feb. 15-16, 1982

tr : trace - M : medium - G : good

N°	DEPTHS m	REC cm	LITHOLOGY	Fluorescence	trMG	CUT
151	4354	2.2	**Sh,** dusky yel brn - dusky brn, mod hd, blky, subfis, micromic, sl calc. Heather			
152	4352	1	**Sh,** dusky yel brn - dusky brn, mod hd, subfis - fis, micromic, non - sl calc.			
153	4345	0	Empty.			
154	4341.5	3	**Slst,** dusky brn - brn blk, frm - sft, subfis - fis, micromic, v arg grdg **sh,** non calc.			
155	4334.5	1.9	**Sh,** dusky yel brn - dusky brn, frm - sft, subfis - fis, micromic, non calc.			
156	4325	2.7	**Slst,** dusky brn - brn blk, frm - sft, subfis - fis, micromic, non calc. Bl wh flu crush cut.			
157	4317	0	Empty.			
158	4311		Lost.			
159	4306	2.6	**Sh,** dusky yel brn - dusky brn, frm, subfis, micromic, non calc.			
160	4296	1.9	**Sh,** dusky yel brn - dusky brn, frm, subfis, micromic, non calc.			
161	4288		Lost in hole.			
162	4280	1.9	**Sh,** brn blk - dusky yel brn, frm, subfis - fis, micromic, sl calc.			
163	4272	2	**Clyst,** mdkgy - dkgy, sft, subfis, sl micromic, v calc.			
164	4262	2.1	**Sh,** brnblk - dusky yel brn, frm, subfis - fis, micromic, non calc.			
165	4254.5	0	Empty.			
166	4249	0	Empty.			
167	4242.5	1.4	**Sh,** brnblk - dusky yel brn, frm, subfis - fis, micromic, occ v calc.			
168	4234.5	0	Empty.			

VW 82036

Norsk Hydro

SERVICE COMPANY:	Schlum
ASKED:	30
SHOT:	30
LOST:	2
EMPTY:	8
SAMPLES RECOVERED:	20
Misfire:	0
GEOLOGIST:	Kalgraff/Skogen

SIDE WALL CORES DESCRIPTION

WELL:	15/2-1	RUN N°:	6
LICENCE:	048	PAGE N°:	2 of 2
		DATE:	Feb. 15-16, 1982

tr : trace - M : medium - G : good

N°	DEPTHS m	REC cm	LITHOLOGY	Fluorescence tr M G	CUT
169	4222	0	Empty.		
170	4218	1	**Sh,** dusky yel brn - dusky brn, frm, subfis - fis, micromic, v calc in pts.		
171	4213	1.6	**Sh,** brn blk - blk, sft, subfis, micromic, sl calc.		
172	4208.5	0	Empty. Heavy		
173	4203	2	**Sh,** dusky yel brn - dusky brn, mod hd - frm, fis, micromic, calc. Lt [illegible]		
174	4198.5	0	Empty.		
175	4184	2.2	**Sh,** brnblk - dusky brn, frm, subfis - fis, sl micromic sl calc.		
176	4180	2.2	**Slst,** brnblk - dusky yel brn, mod hd - frm, fis, v micromic, v arg grdg **sh,** non calc.		
177	4166	2.4	**Sh,** brnblk - dusky yel brn, frm, subfis, sl micromic, calc.		
178	4157	2	**Sh,** brn blk - dusky brn, mod hd, subfis - fis, sl calc in pts.		
179	4145	1.5	**Slst,** dusky yel brn - brn blk, mod hd - frm, fis, micromic, v calc.		
180	4131	2.5	**Sh/Slst,** gy blk - brnblk, mod hd - frm, subfis, sl micromic, non calc.		

Norsk Hydro

SERVICE COMPANY:	Schlum
ASKED:	30
SHOT:	30
LOST:	6
EMPTY:	5
SAMPLES RECOVERED:	19
Misfire:	0
GEOLOGIST:	Kalgraff/Skogen

SIDE WALL CORES DESCRIPTION

WELL:	15/2-1	RUN N°:	7
LICENCE:	048	PAGE N°:	1 of 2
		DATE:	Feb. 16, 1982

tr : trace - M : medium - G : good

N°	DEPTHS m	REC cm	LITHOLOGY	Fluorescence tr M G	CUT
181	4114.5	1	**Sh,** brn blk - dusky brn, hd - mod hd, blky, subfis, sl micromic, calc.		
182	4103		Lost in hole.		
183	4089.5		Lost in hole.		
184	4083	0	Empty.		
185	4067.5	0	Empty.		
186	4055	.5	**Sh,** brn blk, frm, blky - subfis, micromic, calc.		
187	4043	2	**Sh,** brnblk - dusky brn, mod hd - hd, blky, fis, micromic, calc.		
188	4030.5	2.5	**Sh,** brn blk, mod hd, blky, earthy, micromic, occ slty, calc.		
189	4016.5	3.2	**Sh,** brn blk - dusky brn, mod hd - hd, subfis - fis, micromic, occ v slty, grdg **slst,** non - sl calc.		
190	3997.5		Lost in hole.		
191	3974	1.5	**Sh,** brnblk - dusky brn, hd - mod hd, fis, micromic, occ v slty, grdg **slst,** non calc.		
192	3960	0	Empty.		
193	3948.5	2	**Slst,** dusky yel brn - dusky brn, frm, subfis - fis, micromic, occ v arg, grdg **sh.** Lenses sst: vf.		
194	3937.5		Lost in hole.		
195	3927	0	Empty.		
196	3918	1	**Sh,** brnblk - dusky brn, mod hd, blky, subfis - fis, micromic, non calc.		
197	3908.5	2	**Slst,** brnblk, mod hd, blky, fis, micromic, sl calc.		
198	3897	.5	Bits of **sh** in mud cake.		

W# 82036

Norsk Hydro

SERVICE COMPANY:	Schlum
ASKED:	30
SHOT:	30
LOST:	6
EMPTY:	5
SAMPLES RECOVERED:	19
	Misfire: 0
GEOLOGIST:	Kalgraff/Skogen

SIDE WALL CORES DESCRIPTION

WELL:	15/2-1	RUN N°:	7
LICENCE:	048	PAGE N°:	2 of 2
		DATE:	Feb. 16, 1982

tr : trace - M : medium - G : good

N°	DEPTHS m	REC cm	LITHOLOGY	Fluorescence				CUT
199	3892	1	**Sh,** brn blk - dusky brn, hd - mod hd, blky, subfis-fis, non calc.					
200	3889		Lost in hole.					
201	3880		Lost in hole.					
202	3877	3	**Sh,** brn blk - dusky yel brn, hd - mod hd, blky, subfis - fis, micromic, non-sl calc.					
203	3873	2	**Lst,** lt olv gy, mod hd, blky, micro xln, occ arg, no vis por.					
204	3866	2	**Lst,** mdkgy, olvgy, frm, blky, microxln, occ v arg, grdg **mrl,** micromic, no vis por.					
205	3858	1.8	**Lst/Slst,** lt olvgy, mod hd, blky, mocroxln, v arg, micromic, no vis por.					
206	3844.5	0	Empty.					
207	3839	1.2	**Lst/Slst,** mdkgy - dkgy, frm, blky, v arg, occ micromic, no vis por.					
208	3815	3	**Sst,** mdkgy - olvgy, vf, grdg **slst,** lse, subrnd - subang, v arg, mica, calc cmt, mod srtd, no vis por. Wh yel flu, slow mlky wh cut.					
209	3798.5	1	**Limy sst,** mdkgy, vf, subrnd, w srtd, v calc grdg **lst,** occ grdg **slst.** Wh flu (min).					
210	3789.5	3.5	**Slst,** dusky brn - dusky yel brn, frm, subfis, micromic, v calc.					

VW 82036

Norsk Hydro

SERVICE COMPANY:	Schlum
ASKED:	30
SHOT:	30
LOST:	7
EMPTY:	5
SAMPLES RECOVERED:	16
Misfire:	2
GEOLOGIST:	Skogen/Kalgraff

SIDE WALL CORES DESCRIPTION

WELL:	15/2-1	RUN N°:	8
LICENCE:	048	PAGE N°:	1 of 2
		DATE:	Feb. 16, 1982

tr : trace - M : medium - G : good

N°	DEPTHS m	REC cm	LITHOLOGY	Fluorescence tr M G	CUT
211	4516	0	Empty.		
212	4419	1	**Sst,** mdkgy - olvgy, vf, frm - mod hd, subrnd, mica, sl arg, carb, poss kaolin cmt, mod - w srtd, v dol, grdg **dol.**		
213	4481	2	**Slst,** brn blk - dusky yel brn, mod hd - frm, blky, occ v arg, grdg **sh,** micromic, carb, calc.		
214	4476.5		Lost in hole.		
215	4462		Lost in hole.		
216	4456	1	**Sh,** brn blk - dusky brn, hd, fis, splntry, micromic, sl calc.		
217	4442.5	0	Empty.		
218	4428	0	Empty.		
219	4405	3	**Slst,** dusky yel brn - dusky brn, mod hd, blky, micromic, grdg vf **sst,** carb, sl calc, no vis por.		
220	4360.5		Lost in hole.		
221	4345		Lost in hole.		
222	4317	1	**Sh,** brn blk - dusky brn, mod hd, fis - subfis, micromic, non calc.		
223	4311	3	**Sh,** brn blk - dusky yel brn, mod hd, blky, subfis, micromic, sl calc, carb.		
224	4288	2.5	**Sh,** a/a.		
225	4254.5		Lost in hole.		
226	4249	2.5	**Sh,** brn blk - dusky yel brn, mod hd, blky, subfis, micromic, carb, sl calc.		
227	4234.5	2.5	**Sh,** a/a.		
228	4222		Lost in hole.		

W# 82036

Norsk Hydro

SERVICE COMPANY:	Schlum
ASKED:	30
SHOT:	30
LOST:	7
EMPTY:	5
SAMPLES RECOVERED:	16
	Misfire: 2
GEOLOGIST:	Skogen/Kalgraff

SIDE WALL CORES DESCRIPTION

WELL:	15/2-1	RUN N°:	8
LICENCE:	048	PAGE N°:	2 of 2
		DATE:	Feb. 16, 1982

tr : trace - M : medium - G : good

N°	DEPTHS m	REC cm	LITHOLOGY	Fluorescence tr M G	CUT
229	4208.5		Lost in hole.		
230	4198.5	2	**Sh,** brn blk - dusky yel brn, mod hd, blky, subfis, micromic, carb, sl calc.		
231	4103	5	**Sh,** a/a.		
232	4089.5	1	**Sh,** a/a.		
233	4083	0	Empty.		
234	4067.5		Misfire.		
235	3997.5	0	Empty.		
236	3937.5	2.5	**Sh,** brn blk - dusky yel brn, mod hd, blky, subfis, micromic, carb, sl calc.		
237	3927	2	**Sh,** a/a.		
238	3889		Misfire.		
239	3880	4.5	**Sh,** brn blk - dusky yel brn, mod hd, blky, subfis, micromic, carb, sl calc.		
240	3844.5	3	**Lst,** olvgy - lt olvgy, frm, fri, sl micromic, carb, sl arg, grdg **mrl** in pts.		

APPENDIX 3

WELL SUMMARY

GEOLOGICAL WELL SUMMARY

RFT RESULTS

WELL SUMMARY

Cord: 58°45'19.57"N, 01°35'40.54"E
Line: 753228 SP: 321
Depths datum: R.K.B.
Rig: Nortrym
Water depth: 109m R.K.B. elev: 25m
Stopped in: Permian Zechstein salt

Spudded: Nov. 26, 1981
Started drilling: Nov. 26, 1981
At T.D: Feb. 14, 1982
Completed: Feb. 25, 1982
T.D. Driller: 4600m T.D. Logger: 4603m

WELL 15/2-1

COUNTRY Norway

OPERATOR NORSK HYDRO PRODUKSJON a.s.

LICENCE 048

OWNED BY STATOIL, N.H., ELF, TOTAL

TARGETS

Middle Jurassic Sleipner Formation sands.

RESULTS

Plugged and Abandoned with oil shows in the Hugin Fm.

Upper Jurassic Hugin Formation: 4356 - 4485m

Middle Jurassic Sleipner Formation: 4485 - 4554.5m

CASING

30"	at	196m
20"	at	653m
13 3/8"	at	2737m
9 5/8"	at	3770m

CORES

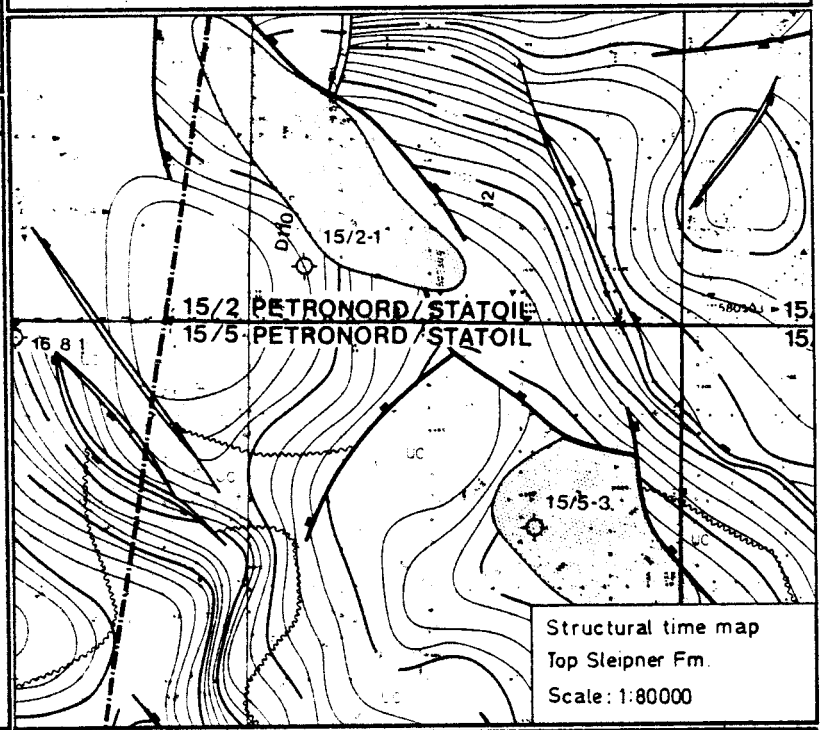
1	Cut: 4365 - 4373m Rec: 4365 - 4372.4m
2	Cut: 4375 - 4390m Rec: 4375 - 4390m
3	Cut: 4390 - 4405m Rec: 4390 - 4401m

GAS RECORD

190 - 390m: tr - 0.02% C1
390 - 670m: 0.1 - 2.40% C1
670 - 730m: 0.02 - 0.02% C1
730 - 870m: 0.06 - 0.40% C1
870 - 1955m: 0.005 - 0.1% C1
1955 - 3460m: tr - 0.20% C1
occ tr C2
3460 - 3900m: 0.007 - 0.03% C1
0.001 - 0.009% C2
≤ 0.005% C3
≤ 0.002% C4
3900 - 4170m: 0.01 - 0.31% C1
0.002 - 0.006% C2
0.001 - 0.05% C3
tr - 0.02% C4
4170 - 4507m: 0.007 - 0.13% C1
≤ 0.016% C2
0.01% C3
occ trs C4
4507 - 4600m: 0.004 - 0.035% C1
tr - 0.005% C2
tr - 0.002% C3

CST

1	1429 - 2748m Rec: 9
2	1429 - 2705m Rec: 28
3	3537.5 - 3781m Rec: 27
4	2764 - 3520m Rec: 8
5	4357 - 4554m Rec: 22
6	4131 - 4354m Rec: 20
7	3789.5 - 4114.5m Rec: 19
8	3844.5 - 4516m Rec: 16



Structural time map
Top Sleipner Fm.
Scale: 1:80000

LOGS

ISF/	134 - 653m	1	RFT	4365.3 - 4417.5m	1
BHC/	653 - 2748.5m	2		4416.3 - 4419m	2
GR/SP	2736 - 3786m	3			
	3770 - 4451m	4	CBL/	400 - 2734.5m	1
	4451 - 4599m	5	VDL	2246 - 3763m	2
FDC/	653 - 2750m	1	VSP	710 - 4550m	1
CNL/	2736 - 3785m	2			
GR/CAL	3770 - 4451m	3			
	4450 - 4600m	4			
HDT	2736 - 3785m	1			
	3770 - 4565m	2			

OIL SHOWS

2800 - 2835m: Marly limestone, very slight traces of dull to bright yellow cloudy fluorescent cut.
3815 - 3922m: Marly limestones (Lower Cretaceous) and shales (Upper Jurassic). In Limestones traces of yellow to bluish white crush cut. In shales slowly streaming yellowish white fluorescent cut.
4020 - 4040m: Sandstone stringers, weak bluish white fluorescence, instant streaming bluish white fluorescent cut.
4365 - 4500m: From the three cores, sandstone. Bleeding oil and gas from core #1. Cores #2 and 3 showed bleeding gas and brown oil stain. All three cores: Yellow to white to bluish white fluorescence, fast streaming bluish with fluorescent cut, bluish white fluorescent residue. Sandstone stringers below cored interval, weak yellow to white and bluish white fluorescence, yellow to bluish white fluorescent crush cut, yellow to bluish white fluorescent residue.

Checked:
Date:

GEOLOGICAL WELL SUMMARY

①

LOCATED ON LINE: 753228
SP: 321
CORDINATES: 58°45'19.57"N 01°35'40.54"E
WATER DEPTH: 109 m

WELL 15/2-1

DEPTH (m RKB)	LITHO-SECTION	SYSTEM	SERIES	GAS	DESCRIPTIONS
					25 m SEA LEVEL
50, 100					
					134 m SEA BED
150, 200		QUATERNARY	RECENT		30" 196 m
196					Cly: m gy, olv gy, v sft, stky, mod-v sdy, slty, mod calc
250, 300, 350, 400, 450, 500			PLEISTOCENE	tr-0,02% C1	Sd: clr-mlky Qts, v abn rock frags, f-pbly, loc abn shell frags
510				0,1-2,4 % C1	Cly: olv gy-dk grn gy, stf, stky slty, bec sdy, non calc.
550, 600, 650		TERTIARY	PLIOCENE		20" 653 m
700				0,05% C1	706 Sd: clr Qtz rock frags, v f-v crs, loc abn shell frags
750, 800, 850			MID-LATE MIOCENE	0,06-0,4% C1	
826					
900, 950, 1000, 1050, 1100, 1150			LATE OLIG.	0,005-0,1% C1	930 Cly: olv gy-brn gy-dusky yel brn, v sft, bec frm, grdg Clyst, slty, loc sdy, micromic, non-sl calc
1200, 1250					Sd: clr Qtz, f-m
1300, 1350, 1400, 1450, 1500, 1550, 1600, 1650, 1700, 1750, 1800, 1850, 1900, 1950, 2000, 2050, 2100, 2150, 2200, 2250, 2300, 2350, 2400, 2450, 2500		TERTIARY	EARLY OLIGOCENE	0,005-0,1 % C1	1430 Sd: clr-mlky Qtz, v f-m, loc calc and pyr cmtd, mic, glauc
			MIDDLE? EOCENE		Clyst: olv gy-olv blk, bec dk grn gy-grn blk, sft-frm, blky, subfis, grdg Sh, slty, micromic, noncalc Sd: a/a
					1824 Sh: olv blk, frm, subfis-fis, mod-v slty, micromic, noncalc tr Tuff: m bl gy, dk grn gy, sucr wh specs, blk shards
			EARLY-MID EOCENE		1950 Sh: varicol, gy, brn, grn, blk, m bl gy, frm, blky, fis, slty, wh specs, blk shards, micromic, noncalc tr Tuff: a/a
					2068 Strgrs of Lst/Dol: pl-dusky, yel brn, wh-dk gy, microxln, chky Sh: varicol a/a, tuff, frm, fis, loc pseudo sucr, wh specs, blk shards micromic, noncalc 2148 br Tuff: a/a
			LATE PALAEOCENE	tr-0,2 % C1, occ tr C2	2178 2231 Sst: clr-mlky Qtz, m, lse-mod hd, loc calc cmtd
					Strgrs of Lst/Dol: Lt gy-pnk gy, m-dk yel brn, sft-hd, microxln

LOCATED ON LINE: 753 228
SP: 321

WATER DEPTH: 109 m

WELL 15/2-1

DEPTH	LITHO-SECTION	SYSTEM/SERIES	STAGES	GAS	DESCRIPTIONS
2500–2550		TERTIARY			Clyst: gy, grn gy, olv gy, brn gy, v sft-frm, loc mod hd, grdg Sh, micromic, noncalc
2600–2650		TERTIARY	DANIAN		2640 Lst: wh-lt gy-loc gy pnk, sft-frm-hd, chky, arg, grdg Mrl
2700	13 3/8" 2737m	TERTIARY	DANIAN		2731 Mrl: lt olvgy, v sft, stky, loc slty
2750–2800		CRETACEOUS	LATE MAA. / MAASTRICHTIAN	tr-0,2% C1, occ tr C2	Lst: wh-m gy, sft-frm, chky, arg, loc grdg Mrl
2850–2900		CRETACEOUS	MAASTRICHTIAN		Mrl: lt-dk gy, sft-frm slty, sl micromic
2950		CRETACEOUS	MAASTRICHTIAN		2925 Mrl: lt-dk gy, dv gy, sft-frm-loc mod hd, slty, sl-micromic, tr glauc
3000–3050		CRETACEOUS	CAMPANIAN		2992 Lst: wh-lt gy, mod-v hd, crypto-microxln, trs biosparite
3100–3150		CRETACEOUS	CAMPANIAN		Mrl: pl-gy rd-m brn-brn gy, bec pred lt-dk gy, sft-frm-hd, grdg Mrl st, loc blky, loc slty
3200–3250		CRETACEOUS	SANTONIAN		
3300–3350		CRETACEOUS	SANTONIAN		
3400		CRETACEOUS	TUR-CON.		
3450		CRETACEOUS	TURONIAN	0,01-0,04% C1, C2, occ tr C3-C4	3438 Lst: v lt-lt gy, sft-frm, sl slty, arg, grdg Mrl in top of intv, microxln
3500		CRETACEOUS	TURONIAN		3506 Lst:, a/a
3550		CRETACEOUS	TURONIAN		Mrl: m gy, bec brn gy, sft-frm, sl slty 3550,5 Sh: gy blk-grn blk, hd, blky-flky, loc micromic non-sl calc
3600		CRETACEOUS	CENOM.		Mrl/Mrlst: m gy sft-hd, loc slty-v f sdy
3650		CRETACEOUS	CENOM.		Mrl/Lst: lt gy, sft-frm, loc slty-v f sdy
3700		L.CRET.	ALBIAN		3668 Strgrs Lst: wh, grngy, hd, microxln

DEPTH	LITHO-SECTION	SYSTEM/SERIES	STAGES	GAS	DESCRIPTIONS
3734		L.CRET.	ALB.		Mrl/Mrlst: m gy-gy blk mod-vhd, occ slty-v f sdy, micromic
3750–3800	9 5/8" 3770m	L.CRET.	ALB. / APT.		Sh: dk gy-gy blk, grn gy-grn blk, frm-hd, blky, subfis, slty, micromic vari-calc, loc grdg Mrl
3805		L.CRET.	APT.		Sh: a/a + m brn-brn blk, loc sl carb, non-loc sl carb
3850		L.CRET.	BAR. / HAUT.		
3878		UPPER JURASSIC	L. VOLG. / RYAZ.		Clyst: brnsh blk-dusky yelsh brn, firm, occ earthy, carb micro-mic, non-occ sl calc. Tr Sst and Lst
3900–4000		UPPER JURASSIC	L. VOLG. / RYAZ.		
4050–4100		UPPER JURASSIC	MID VOLGIAN	0,01-0,44% C1-C3, tr C4	Clyst: a/a, pred brnsh blk strgs Sst: wh-lt gy, v f-crs, calc cmt, pr por, fair shows.
4150–4200		UPPER JURASSIC	OXFORDIAN		
4211		UPPER JURASSIC	OXFORDIAN		Clyst: brnsh blk, bcm slty-v slty, occ calc
4250–4300		UPPER JURASSIC	EARLY OXFORD.		Occ strgs Lst/Dol: lt-m gy, mod hd, brit, crypto-xln. Tr Sst and Slst
4350		UPPER JURASSIC	LATE CALLOV.		4363 Sst: dusk yel brn, pred vf, occ m-v crs, hd, silic cmt pr por, gd shows.
4365 CORE No 1-3		UPPER JURASSIC	MID CALLOV.		4391,5 Coal w/intbds of Sst
4400–4405		UPPER JURASSIC	MID CALLOV.	0,01-0,16% C1, occ tr C2-C4	Sst w/strgs of Coal 4418
4450		UPPER JURASSIC	EARLY CALLOVIAN		Slst grdg Sh w/thin strgs of Sst and Coal
4485		UPPER JURASSIC	EARLY CALLOVIAN		Tr Lst
4500–4550		MID JURASSIC	BAJ. / BATH.	0,01-0,04% C1, occ tr C2-C3	4554,5 Anhy: 4556 4580 Halite 4600 Carnallite
4550–4600		PERM			
4600–4650		PERM			T.D. logger 4603 m
4650–4700		PERM			T.D. Driller 4600 m
4700–4750		PERM			
4750–4800		PERM			
4800–4850		PERM			
4850–4900		PERM			
4900–4950		PERM			

RFT RESULTS

	Depth (m)	PH I	PH A	PF	COMMENTS
1/1	4365.5	11985	11992	-	Tight formation
2/1	4367.7	12004	12008	33	"
3/1	4369	12012	12017	38	"
4/1	4406.8	12126	12132	300	"
5/1	4407.7	12130	12135	98	"
6/1	4408	12129	12132	-	Seal Failure
1/2	4419	12235	12244	120	Tight formation
2/2	4417.5	12235	12243	12144	Tight/seal failure
3/2	4416.7	12237	12237	-	Seal failure
4/2	4416.3	12236	12238	12164	Tight/seal failure

SECTION B

OPERATIONS

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1. LOCATION SURVEY

During the period from September 15 to 25, 1981 Fairfield Auqatronics performed a site survey for the planned well location 15/2-1.

The coordinates for the well were given as:

Lat. 58° 45' 20.9" N
Long. 1° 35' 38.0" E

which was the centre of the surveyed area of 3.4 km^2.

Survey work was carried out using Fairfield Aquatronics High Resolution Geophysical Systems Package.

The Seabed Features Map was prepared from the side scan sonar data, and showed the seabed to be of an even reflectivity but with numerous small patches of higher reflectivity concentrated in the SE of the survey area. An obstruction of unknown origin of a height of approximately 1.5 m above seabed is situated 1.100 m to the west of the proposed well location.

The proposed well location is situated on the axis of an unfilled channnel and the superficial sediments are 27 m thick.

The three seabed samples taken in the survey area show that the seabed consists of soft silty fine sands and these are probably farily characteristic for the superficial sediments.

A possible indication of shallow gas was identified within the survey area at a depth of 560 m below seabed. At its closest point this occurs 850 m to SW of the well.

2. POSITIONING AND ANCHORING OF THE RIG

To accurately position Nortrym for drilling the well 15/2-1 A/S Geoteam was employed in the period November 18 to 29, 1981 to utilize Decca Pulse 8 and a Magnavox satellite positioning system (MX-1502).

The well was to be spudded within a circle of radius 50 m centered on the planned coordinates

Lat 58° 45' 20,9" N
Long 1° 35' 38,0" E

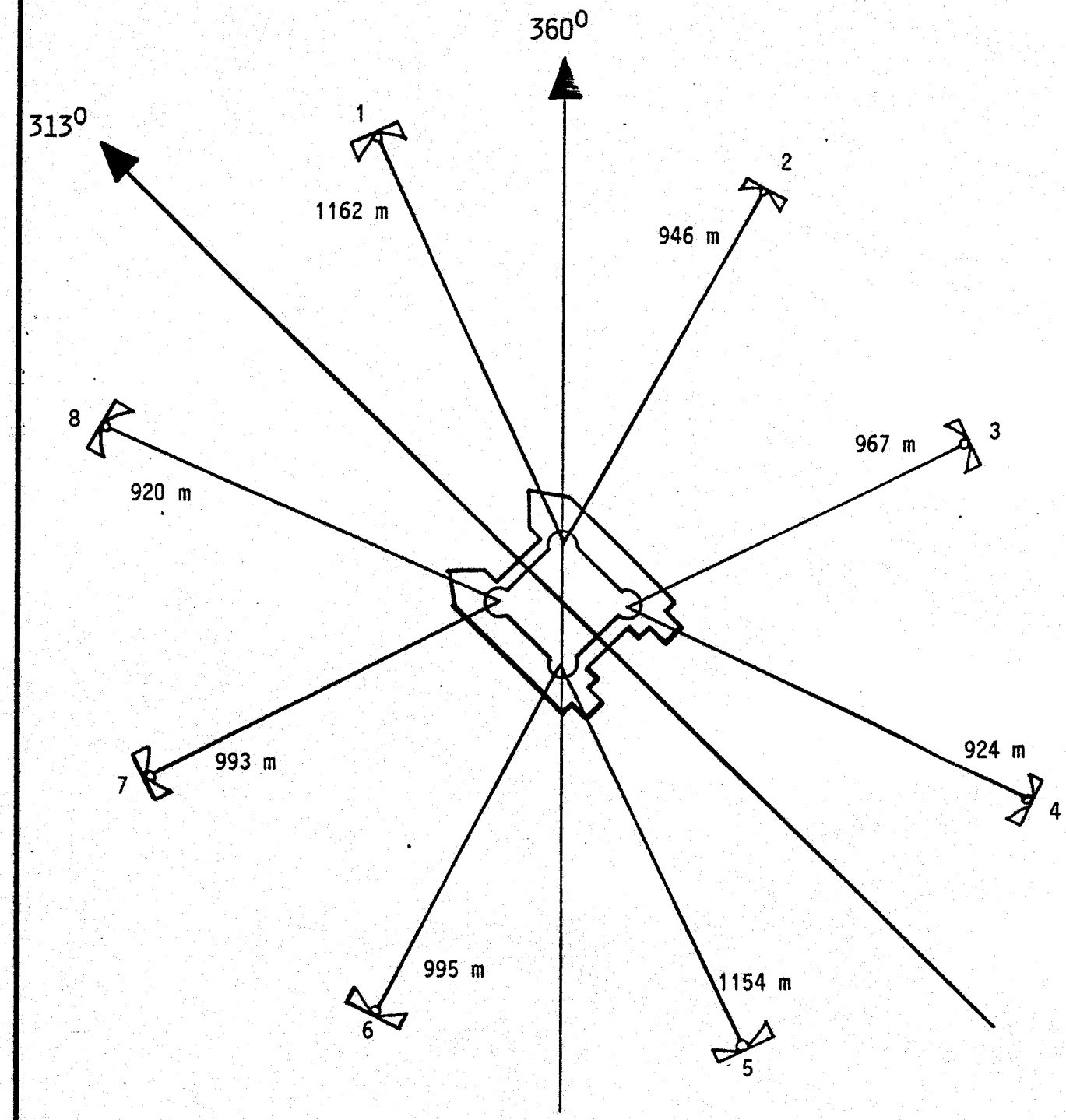
The final well coordinates were found to be

Lat 58° 45' 19,30" N
Long 1° 35' 40,58" E

The rig heading was 313° and the deviation from the intended location was 64,5 m in direction 140,1°. The last anchor was set on November 23 without any problem and tension tested as shown below prior to spudding on 26 November . The mooring line pattern is showed in Fig. .

ANCHOR STATUS

	TENSION (KN)	LENGTH (M)	DIR (DEG)
1	1179	1162	333
2	1179	946	018
3	1179	967	063
4	1223	924	108
5	1179	1154	153
6	1157	995	198
7	1179	993	243
8	1112	920	288



HEADING: 313°

WELL COORDINATES: 58°45' 19.30" N
01°35' 40.58" E

Norsk Hydro Drilling Department	MOORING LINE PATTERN NORTRYM WELL 15/2-1	Gr. no.: 4	Fig.: B-1
		Date: 17/6-1982 Sign: RHL / Hes	Dwg. no.: 20

3. OPERATION RESUME

3.1 Summary

Nortrym left its previous location 33/5-2 the November 19 and reached the 15/2-1 location on November 22, 1981 . The well was spudded at 04.00 on November 26, 1981.

A 36" hole was drilled to 196 m and the 30" casing was landed and cemented with the shoe at 196 m. After having run the riser, a 17-1/2" pilot hole was drilled down to 655 m. ISF/SONIC/GR/SP logs were run before the 17-1/2" pilot hole was underreamed to 26". The hole was conditioned and a high viscousity pill was placed on bottom before the riser was displaced to seawater. After observing the well to be stable, the riser was pulled. A 26" bit wiper trip was then made before running, landing and cementing the 20" casing from 653 m back to seabed .

After the BOP was installed and tested to full working pressure the 20" casing shoe was drilled out and a leak off test was performed, resulting in a leak off at an equivalent mud weight of 1.72 rd.

The 17-1/2" hole was then drilled to 2750 m where ISF/SONIC and FDC/CNL/GR/CAL logs were run. The 13-3/8" casing was run, landed at 2737 m and cemented up to 2525 m.

The BOP was tested prior to drilling out of 13-3/8" shoe. The 13-3/8" casing was also tested before drilling through the cement. The leak off test performed at 2769 m resulted in a leak off at an equivalent mud weight of 1.59 rd after having squeeze cemented the casing shoe.

The 12-1/4" hole was then drilled with turbine to 3786 m where the mud weight was raised to 1.49 rd and ISF/SONIC/GR, FDC/CNL/GR, HDT, 2 CST and CBL/VDL logs were run.

Most of the 12 1/4" section was successfully drilled with a turbine diamond bit combination.

Before running 9-5/8" casing a wiper trip was made. The 9-5/8" casing was landed at 3770 m, cemented and tested. A leak off test below the 9-5/8" casing shoe resulted in a leak off at an equivalent mudweight of 2.04 rd.

The mud weight was increased to 1.60 rd before starting drilling the 8-3/8" hole section. The following cores were cut in this section.

Core No.	1:	4365 m to 4373 m
" "	2:	4375 m to 4390 m
" "	3:	4390 m to 4405 m

At 4438 m the drilling operation was interrupted as the riser had to be pulled to change out a leaking ball joint.

After drilling 8-3/8" hole down to 4450 m intermediate, GR/ISF/SONIC, FDC/CNL, HDT and 4 CST logs were run. While drilling the 8-3/8" hole the mudweight had been raised to 1.89 rd. The well was drilled to a total depth of 4600 m before final logging consisting of ISF/SONIC, FDC/CNL, HDT, Velocity survey, 4 CST and CBL.

The well was plugged back in accordance with Fig. . Last anchor was pulled on February 25, 1982.

Norsk Hydro

Weekly drilling report

Week	Weeks Progress	Report no.	Page	of
47		1 - 4	7	

Area	Well	Rig
North Sea	15/2-1	Nortrym

Casing							
	Size						
	Setting depth (m)						

Date	Depth (m) / Progress (m)	Pore Press grad (r.d.)	Mud Dens grad (r.d.)	Detailed operation
19.11				Left location 33/5-2 at 11.00 hrs. Under way to 15/2-1 location.
20.11				Under way to 15/2-1 location.
21.11				Under way to 15/2-1 location.
22.11				Arrived the location 15/2-1 at 23.000 hrs. Dropped anchor No. 5.

920 HK B 6-82. 4000.

Norsk Hydro

Weekly drilling report

Week	Weeks Progress	Report no.	Page	of
48		5 - 11	8	

Area	Well	Rig
North Sea	15/2-1	Nortrym

Casing							
	Size	30"					
	Setting depth (m)	196					

Date	Depth (m) / Progress (m)	Pore Press grad (r.d.)	Mud Dens grad (r.d.)	Detailed operation
23.11			1.04	Set anchor No. 1, 4, 3, 2, 6, 7, 8 and ballasted the rig to 68' draft.
24.11			1.04	Waiting on weather.
25.11			1.04	Ran in the hole with 26" bit and 36" holeopener, tagged seabed at 134 m from RKB.
26.11	196		1.04	Drilled the 36" hole from 134 m to 196 m. Ran the 30" casing and cemented same at 196 m. Rigged up and ran he 21" riser.
27.11	388		1.08	Ran in the hole with 17 1/2" bit and tagged cement at 184 m. Drilled cement and shoe to 196 m and new formation to 388 m.
28.11	665		1,13	Drilled the 17 1/2" pilot hole from 388 m to 473 m. Dropped survey. Drilled from 473 m to 665 m. Circulated and spot 21 m^3 high viscous mud. Dropped survey. Spotted 40 m^3 high viscous pill. Dropped multishot and pulled out to the shoe. Retrieved the multishot and flow checked for 15 min. Pulled out of the hole. Ran logs: ISF/SONIC/GR/SP
29.11	665		1.13	Underreamed the 17 1/2" hole to 26" from 194 m to 581 m. Had a gas peak of 16 units at 581 m.

1920 HK B 6-82. 4000.

Norsk Hydro

Weekly drilling report

Week	Weeks Progress	Report no.	Page	of
49	2	12 - 18	9	

Area	Well	Rig
North Sea	15/2-1	Nortrym

Casing							
	Size	30"	20"				
	Setting depth (m)	196	665				

Date	Depth (m) / Progress (m)	Pore Press grad (r.d.)	Mud Dens grad (r.d.)	Detailed operation
30.11	665		1.04	Underreamed the 17 1/2" hole to 26" from 581 m to 665 m. Spotted 47 m^3 high viscous mud. Pulled out of the hole with the 26" underreamer. Pulled the 21" riser and made a 26" wiper trip.
01.12	665		1,04	Had tight hole, reamed and washed from 498 m to 665 m. Pulled out of the hole. Ran the 20" casing to 653 m and started to cement.
02.12	665		1,04	Finished cementing and tested the casing to 69 bar. Ran the 18 3/4" BOP and tested same to 690 bar on rams, choke and kill valves and to 240 bar on annular preventer.
03.12	665		1,04	Finished testing the BOP. Ran the wear bushing. Ran in the hole with 17 1/2" bit and drilled out of the 20" casing to 653 m.
04.12	1167		1,08	A pressure integrity test was run showing an equivalent leak of off 1,72 rd. Drilled the 17 1/2" hole from 665 m to 1167 m.
05.12	1457		1,13	Drilled the 17 1/2" hole from 1167 m to 1345 m. Made a wiper trip. Got stuck at 1215 m. Max overpull was 667 kN. Worked pipe free at 1084 m. Ran to the bottom and drilled from 1345 m to 1457 m.
06.12	1701		1,13	Drilled the 17 1/2" hole from 1457 m to 1485 m. Pulled out of the hole for bit change. Had tight spot at 1235 m and 970 m. Max overpull was 311 kN. Ran in the hole with bit No. 6. Drilled from 1484 m to 1490 m. Circulated and conditioned the mud. Drilled 17 1/2" hole from 1490 m to 1701 m.

1920 HK B 6-82. 4000

Norsk Hydro

Weekly drilling report

Week	Weeks Progress	Report no.	Page	of
50	3	19 - 25	10	

Area	Well	Rig
North Sea	15/2-1	Nortrym

Casing							
	Size	30"	20"				
	Setting depth (m)	196	665				

Date	Depth (m) / Progress (m)	Pore Press grad (r.d.)	Mud Dens grad (r.d.)	Detailed operation
07.12	1895		1,13	Drilled the 17 1/2" hole from 1701 m to 1876 m. Made a 17 stands wiper trip. Max overpull was 490 kN. Ran in the hole to 1868 m. Had to ream and wash tight spots from 1706 m to 1725 m and from 1790 m to 1809 m. Had 8 m fill. Reamed and washed to 1876 m. Drilled from 1876 m to 1895 m.
08.12	2093		1,13	Drilled the 17 1/2" hole from 1895 m to 2093 m. Pulled out of the hole. Tight hole from 1914 m to 1640 m. Max overpull was 578 kN. Reamed and washed from 1904 m to 1876 m.
09.12	2127		1,20	Ran in the hole with bit No. 7, 17 1/2". Reamed and washed from 1680 m to 2093 m. Increased the mud weight from 1,13 rd to 1,20 rd. Lost circulation when drilling at 2099 m. Circulated to condition the hole. Drilled from 2099 m to 2127 m.
10.12	2277		1,21	Drilled the 17 1/2" hole from 21 27 m to 2188 m. Made a wiper trip. Had maximum overpull of 222 kN. Drilled the 17 1/2" hole from 2188 m to 2277 m.
11.12	2344		1,20	Drilled the 17 1/2" hole from 2277 m to 2344 m and pulled out of the hole. Maximum overpull was 355 kN. Retrieved wearbushing and tested the BOP.
12.12	2469		1,20	Set the wearbushing. Ran in the hole with bit number 8. Had 19 m fill. Reamed and washed from 2325 m to 2344 m. Drilled the 17 1/2" hole from 2344 m to 2469 m.
13.12	2550		1,20	Drilled 17 1/2" hole from 2469 m to 2550 m and pulled out of the hole. Ran in the hole with bit no. 9. Had 20 m fill. Reamed and washed from 2530 m to 2550 m.

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Weekly drilling report

Week	Weeks Progress	Report no.	Page	of
51	4	26 - 32	11	

Area	Well	Rig
North Sea	15/2-1	Nortrym

Casing							
	Size	30"	20"	13 3/8"			
	Setting depth (m)	196	665	2737			

Date	Depth (m) / Progress (m)	Pore Press grad (r.d.)	Mud Dens grad (r.d.)	Detailed operation
14.12	2663	1,07	1,20	Drilled the 17 1/2" hole from 2550 m to 2663 m.
15.12	2694	1,07	1,20	Drilled the 17 1/2" hole from 2663 m to 2692 m. Pulled out of the hole with bit number 10. Reamed a bridge at 2638 m. Had 4 m fill. Drilled the 17 1/2" hole from 2692 m to 2694 m.
16.12	2738	1,07	1,20	Drilled the 17 1/2" hole from 2694 m to 2738 m. Had pump problems due to high viscous mud.
17.12	2750	1,07	1,20	Drilled the 17 1/2" hole from 2738 m to 2750 m. Pulled out of the hole. Had maximum overpull of 133 kN at 1620 m. Ran electric logs. Run no. 1: ISF/SONIC Run no. 2: FDC/CNL/GR/CAL
18.12	2750	1,07	,120	Ran electric logs FDC/CNL. Made a conditioning trip with 17 1/2" bit. Washed and reamed to bottom. Pulled out of the hole.
19.12	2750	1,07	1,20	Retrieved the wear bushing. Ran 140 joints of 13 3/8" casing.
20.12	2750	1,07	1,20	Finished running 13 3/8" casing and landed same at 2737 m.

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Weekly drilling report

Week	Weeks Progress	Report no.	Page	of
52	5	32 - 35	12	

Area	Well	Rig
North Sea	15/2-1	Nortrym

Casing							
	Size	30"	20"	13 3/8"			
	Setting depth (m)	196	665	2737			

Date	Depth (m) / Progress (m)	Pore Press grad (r.d.)	Mud Dens grad (r.d.)	Detailed operation
21.12	2750	1,07	1,21	Attempted to screw 13 3/8" casing running tool out of the hanger. Applied left hand torque and found 13 3/8" csg. backed out 2 joints under rotary table. Screwed the string togtether and unscrewed the running tool. Pulled out of the hole. Ran in the hole with EZ drill packer and sat the packer at 2695 m read from depth indicator.
22.12	2750	1,07	1,20	Pulled out of the hole. EZ drill packer was still attached to the setting tool. Ran in the hole with EZ-drill packer on the drill pipe. Packer prematurely sat at 2041 m. Cemented the 13 3/8" casing through the EZ drill packer at 2041 m. Installed the seal assembly. Tested the BOP to 345 bar on rams choke and kill valves and 240 bar on annular preventors.
23.12	2750	1,07	1,21	Installed the wear bushing. Ran in the hole with 12 1/4" bit and drilled through EZ drill packer at 2041 m. Tagged the rest of EZ drill packer at 2622 m. Drilled through the packer and continued to drill cement from 2622 m to 2670 m.
24.12	2758	1,07	1,19	Drilled cement from 2670 m to 2678 m. Tested the 13 3/8" casing to 255 bar. Pulled out of the hole. Ran in the hole with bit no. 12. Drilled cement, float collar and float shoe to 2737 m. Drilled 12 1/4" hole from 2748 m to 2758 m. Ran a leak off test at 2758 m resulting in an equivalent leak off of 1,47 rd. Pulled out of the hole.

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Weekly drilling report

Week	Weeks Progress	Report no.	Page	of
52	5	36 - 38	13	

Area	Well	Rig
North Sea	15/2-1	Nortrym

Casing							
	Size	30"	20"	13 3/8"			
	Setting depth (m)	196	665	2737			

Date	Depth (m) / Progress (m)	Pore Press grad (r.d.)	Mud Dens grad (r.d.)	Detailed operation
25.12	2762	1,07	1,22	Ran in the hole with open ended drill pipe to 2755 m. Displaced a balanced cement plug consisting of 14,1 ton neat cement. 1,90 rd. Pulled out of the hole to 2500 m. Hooked up and tested the surface lines to 206 bar. Hung pipe off on upper pipe ram and squeezed 13 3/8" casing shoe. Pulled out of the hole. Ran in the hole with bit no. 13, 12 1/4". Tagged cement at 2679 m. Drilled cement from 2679 m to 2751 m. Drilled the 12 1/4" hole from 2758 m to 2762 m.
26.12	2764	1,07	1,22	Drilled the 12 1/4" hole from 2762 m to 2764 m. Ran a leak off test resulting in an equivalent leak off pressure of 1,56 rd. Pulled out of the hole. Ran in hole with open ended drillpipe. Pumped 17,2 ton cement of 1,9 rd. Pulled out of the hole to 2500 m. Hung off pipe on upper pipe ram, and squeezed 13 3/8" casing shoe. Pulled out of the hole with open ended drill pipe. Ran in the hole with bit no. 14. Tagged cement at 2633 m. Drilled cement from 2633 m to 2679 m.
27.12		1,07	1,21	Drilled cement from 2679 m to 2739 m. Ran a leak off test with an equivalent pressure of 1,71 rd. Drilled 12 1/4" hole from 2769 m to 2793 m. Pulled out of the hole

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Weekly drilling report

Week	Weeks Progress	Report no.	Page	of
53	6	39 - 45	14	

Area	Well	Rig
North Sea	15/2-1	Nortrym

Casing							
	Size	30"	20"	13 3/8"			
	Setting depth (m)	196	665	2737			

Date	Depth (m) / Progress (m)	Pore Press grad (r.d.)	Mud Dens grad (r.d.)	Detailed operation
28.12	2857	1,07	1,23	Ran in the hole with turbine and bit no. 14, 12 1/4". Drilled from 2793 m to 2857 m.
29.12	2960	1,10	1,23	Drilled the 12 1/4" hole from 2857 m to 2960 m.
30.12	3036	1,10	1,24	Drilled the 12 1/4" hole from 2960 m to 3036 m.
31.12	3099	1,10	1,25	Drilled the 12 1/4" hole from 3036 m to 3099 m.
01.01.82	3180	1,10	1,25	Drilled the 12 1/4" hole from 3099 m to 3180 m.
02.01	3257	1,10	1,25	Drilled the 12 1/4" hole from 3099 m to 3257 m.
03.01	3331	1,15	1,25	Drilled the 12 1/4" hole from 3257 m to 3351 m.

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Weekly drilling report

Week	Weeks Progress	Report no.	Page	of
1	7	46 - 52	15	

Area	Well	Rig
North Sea	15/2-1	Nortrym

Casing							
	Size	30"	20"	13 3/8"			
	Setting depth (m)	196	665	2737			

Date	Depth (m) / Progress (m)	Pore Press grad (r.d.)	Mud Dens grad (r.d.)	Detailed operation
04.01	3360	1,15	1,25	Drilled 12 1/4" hole from 3331 m to 3360 m. Pulled out of the hole. Maximum overpull was 200 kN at 3268 m. Retrieved the wearbushing. Tested the BOP and drill floor equipment to 345 bar on rams, choke and kill valves and to 240 bar on annular preventors.
05.01	3372	1,15	1,25	Installed the wear bushing. Ran in the hole with bit no. 16. Drilled the 12 1/4" hole from 3360 m to 3372 m. Pulled out of the hole. Ran in the hole with turbine and bit no. 17.
06.01	3423	1,15	1,25	Continued to run to the bottom. Had 2 m fill. Reamed and washed from 3370 m to 3372 m. Drilled 12 1/4" hole from 3372 m to 3423 m.
07.01	3511	1,25	1,25	Drilled the 12 1/4" hole from 3423 m to 3511 m.
08.01	3585	1,25	1,25	Drilled the 12 1/4" hole from 3511 m to 3585 m.
09.01	3653	1,35	1,40	Drilled the 12 1/4" hole from 3585 m to 3606 m. Weighted up the mud to 1,35 rd. Drilled from 3606 m to 3625 m. Increased mud weight to 1,40 rd. Worked the pipe and circulated due to tight hole. Maximum overpull was 371 kN. Inceased the mud weight to 1,43 rd. Drilled the 12 1/4" hole from 3625 m to 3644 m. Had tight hole. Worked the pipe and circulated. Maximum overpull was 311 kN. Drilled from 3644 m to 3652 m. Had tight hole while circulating for survey.
10.01	3724	1,35	1,44	Pulled out of the hole. Pipe came free at 3278 m. Maximum overpull was 380 kN. Ran in the hole. Tagged bottom at 3653 m. Drilled the 12 1/4" hole from 3653 m to 3724 m.

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Weekly drilling report

Week	Weeks Progress	Report no.	Page	of
2	8	53 - 58	16	

Area	Well	Rig
North Sea	15/2-1	Nortrym

Casing							
	Size	30"	20"	13 3/8"	9 5/8"		
	Setting depth (m)	196	665	2737	3770		

Date	Depth (m) / Progress (m)	Pore Press grad (r.d.)	Mud Dens grad (r.d.)	Detailed operation
11.01	3786	1,43	1,45	Drilled the 12 1/4" hole from 3724 m to 3786 m. Circulated bottom up for samples.
12.01	3786	1,43	1,48	Pulled out of the hole to casing shoe. Maximum overpull was 222 kN. The pipe came free at 3700 m. Ran in the hole. Had 5 m fill. Reamed and washed from 3781 m to 3786 m. Raised the mudweight to 1,48 rd. Pulled out of the hole. Maximum overpull was 222 kN. The pipe came free at 3350 m. Ran out of the hole and laid down the turbine. Ran logs: Run no. 1: ISF/SONIC/GR Run no. 2: FDC/CNL/GR Sticking problem from 3700 m to 2970 m. Ran in the hole for a wiper trip.
13.01	3786	1,43	1,48	Ran in the hole with 12 1/4" bit to 3760 m. Reamed and washed from 3760 m to 3786 m. Pulled out of the hole. Maximum overpull was 220 kN. Ran HDT. Could not pass 3700 m. Pulled out of the hole and removed centralizer. Ran HDT. Found that deviation did not function properly when back in casing after logging. Ran back in hole and recorded deviation. Ran CST no. 1. Had failure of GR. Fired shot on basis of cable length.
14.01	3786	1,43	1,49	Ran CST no. 1 and no. 2. Ran CBL/VDL in 13 3/8" casing. Made a wiper trip with 12 1/4" bit and junk sub. Had no drag or fill.
15.01	3786	1,43	1,49	Pulled out of the 12 1/4" hole. Maximum overpull was 178 kN. Retrieved the wear bushing. Started to run 9 5/8" casing.
16.01	3786	1,43	1,49	Ran and landed 9 5/8" casing at 3770 m. Mixed and pumped the cement. Displaced the cement. The plug did no bump. Installed the seal assembly.

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Norsk Hydro

Weekly drilling report

Week	Weeks Progress	Report no.	Page	of
2	8	59	17	

Area	Well	Rig
North Sea	15/2-1	Nortrym

Casing							
	Size	30"	20"	13 3/8"	9 5/8"		
	Setting depth (m)	196	665	2737	3770		

Date	Depth (m) / Progress (m)	Pore Press grad (r.d.)	Mud Dens grad (r.d.)	Detailed operation
17.01	3786	1,43	1,51	Tested BOP to 690 bar on rams, choke and kill valves and to 240 bar on annular preventors. Set wear bushing and pulled out of the hole. Tested the casing to 420 bar. Ran in the hole with bit no. 18.

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Norsk Hydro

Weekly drilling report

Week	Weeks Progress	Report no.	Page	of
3	9	60 - 65	18	

Area	Well	Rig
North Sea	15/2-1	Nortrym

Casing							
	Size	30"	20"	13 3/8"	9 5/8"		
	Setting depth (m)	196	665	2737	3770		

Date	Depth (m) / Progress (m)	Pore Press grad (r.d.)	Mud Dens grad (r.d.)	Detailed operation
18.01	3790	1,43	1,48	Ran in the 9 5/8" casing with 8 3/8" bit. Tagged the cement at 3714 m. Drilled cement, float collar and shoe. Ran in the hole to 3786 m. Drilled the 8 3/8" hole from 3786 m to 3790 m. Hung off pipe on lower pipe ram and performed a leak off test equivalent to 1,99 rd. Pulled out of the hole. Ran in the hole with open ended drill pipe. Tested surface lines to 483 bar. Set a balanced plug from 9 5/8" casing shoe to 3684 m. Displaced the cement.
19.01	3796	1,43	1,47	Had no pressure build up after squeezing the cement. Maximum pressure 214 bar. Bled back 1,83 m^3. Pulled out of the hole. Ran in the hole with bit no. 19, 8 3/8". Tagged cement at 3784 m. Drilled cement fill from 3784 m to 3790 m. Drilled from 3790 m to 3796 m. Performed leak off test equivalent to 2,04 rd. Circulated and raised the mud weight to 1,60 rd.
20.01	3810	1,43	1,75	Pulled out of the hole. Ran in the hole with turbine and bit no. 19. Reamed tight hole at bottom. Had maximum overpull on 534 m at 3796 m. Drilled the 8 3/8" hole from 3796 m to 3810 m. Increased the mud density to 1,75 rd. Had severe torque problems while drilling from 3796 m to 3802 m.
21.01	3889	1,55	1,75	Drilled the 8 3/8" hole from 3810 m to 3887 m.
22.01	3943	1,70	1,85	Drilled the 8 3/8" hole from 3889 m to 3933 m. Increased the mud density to 1,85 rd due to increased pore pressure. Drilled the 8 3/8" hole from 3933 m to 3943 m.
23.01	4001	1,75	1,85	Drilled the 8 3/8" hole from 3943 m to 4001 m. Pulled out of the hole and changed to rock bit for improved cutting evaluation.

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Norsk Hydro

Weekly drilling report

Week	Weeks Progress	Report no.	Page	of
3	9	66	19	

Area	Well	Rig
North Sea	15/2-1	Nortrym

Casing							
	Size	30"	20"	13 3/8"	9 5/8"		
	Setting depth (m)	196	665	2737	3770		

Date	Depth (m) / Progress (m)	Pore Press grad (r.d.)	Mud Dens grad (r.d.)	Detailed operation
24.01	4008	1,75	,185	Continued to pull out of the hole. Retrieved the wearbushing. Tested the BOP to 690 bar on rams, choke and kill valves and to 240 bar on annular preventors. Set the wear bushing. Ran in the hole with bit no. 21. Tagged bottom at 3996 m. Reamed and washed from 3996 m to 4001 m. Had 560 units trip gas. Drilled the 8 3/8" hole from 4001 m to 4008 m.

1920 Hk 15-6-82 1000

Norsk Hydro

Weekly drilling report

Week	Weeks Progress	Report no.	Page	of
4	10	67 - 72	20	

Area	Well	Rig
North Sea	15/2-1	Nortrym

Casing							
	Size	30"	20"	13 3/8"	9 5/8"		
	Setting depth (m)	196	665	2737	3770		

Date	Depth (m) / Progress (m)	Pore Press grad (r.d.)	Mud Dens grad (r.d.)	Detailed operation
25.01	4038	1,75	1,85	Drilled the 8 3/8" hole from 4008 m to 4038 m. Started to pull out of the hole.
26.01	4073	1,75	1,85	Continued to pull out of the hole. Ran in the hole with turbine and bit no. 22. Drilled the 8 3/8" hole from 4038 m to 4073 m. Packing element in the slip joint started to leak with increasing heave. Loast a total of 43 m^3 mud over the slip joint. Pulled out of the hole to hang off the pipe.
27.01	4084	1,75	1,85	Hung the pipe off on middle pipe-ram. Pulled out of the hole. Displaced the riser with seawater. Replaced the split seal assembly on the slip joint. Displaced the riser with mud. Retrieved the drilling string from the BOP and ran in the hole. Drilled the 8 3/8" hole with turbine from 4073 m to 4084 m.
28.01	4130	1,78	1,85	Drilled the 8 3/8" hole from 4084 m to 4123 m. Changed gates and seats on demco stand pipe valves on mud pump no. 2. Drilled the 8 3/8" hole from 4123 m to 4130 m. Pulled out of the hole to 3500 m due to weather conditions, and hung off on tool joint on the middle pipe ram. Displaced the riser with seawater waiting on weather.
29.01	4172	1,78	1,89	Waiting on weather. Displaced riser with mud and retrieved the string from the BOP. Ran in the hole and drilled from 4130 m to 4155 m. Weighted up mud from 1,85 to 1,89 rd. Drilled the 8 3/8" hole from 4155 m to 4172 m.
30.01	4244	1,78	1,89	Drilled the 8 3/8" hole from 4172 m to 4237 m. Dropped a survey while moving pipe, got stuck at 4234 m. Worked the pipe and jarred the pipe free. Maximum overpull was 623 kN. Pulled 5 stands to 4075 m. Ran in the hole, washed and reamed from 4211 m to 4237 m. Drilled the 8 3/8" hole from 4237 m to 4244 m.

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Norsk Hydro

Weekly drilling report

Week	Weeks Progress	Report no.	Page	of
4	10	73	21	

Area	Well	Rig
North Sea	15/2-1	Nortrym

Casing							
	Size	30"	20"	13 3/8"	9 5/8"		
	Setting depth (m)	196	665	2737	3770		

Date	Depth (m) / Progress (m)	Pore Press grad (r.d.)	Mud Dens grad (r.d.)	Detailed operation
31.01.	4305	1,78	1,89	Drilled the 8 3/8" hole from 4244 m to 4292 m. Had failure on the rotary table. Pulled out of the hole to 3750 m. Found the pinion on the rotary table side of floating shaft worn out. Repared the rotary table. Ran in the hole to 4292 m. Drilled the 8 3/8" hole from 4292 m to 4305 m.

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Norsk Hydro

Weekly drilling report

Week	Weeks Progress	Report no.	Page	of
5	11	74 - 78	22	

Area	Well	Rig
North Sea	15/2-1	Nortrym

Casing							
	Size	30"	20"	13 3/8"	9 5/8"		
	Setting depth (m)	196	665	2737	3770		

Date	Depth (m) / Progress (m)	Pore Press grad (r.d.)	Mud Dens grad (r.d.)	Detailed operation
01.02	4365	1,76	1,91	Drilled the 8 3/8" hole from 4305 m to 4365 m. Circulated bottom up for samples. Started to pull out of the hole for coring.
02.02	4365	1,76	1,89	Finished pulling out of the hole and sat the turbine in the derrick. Retrieved wear bushing. Tested BOP and surface equipment to NH standard. Sat the wear bushing. Ran in the hole with core barrel no. 1 to 3750 m.
03.02	4373	1,78	1,89	Continued to run in the hole with core barrel. Reamed and washed tight hole from 4335 m to bottom. Cut core no. 1 from 4365 m to 4373 m. Pulled out of the hole. Recovered core no. 1, 92%. Found core catcher cracked. Half core catcher was left in the hole. Ran in the hole with bit no. 23, and junk basket.
04.02	4390	1,78	1,89	Continued to run in the hole with new 8 3/8" bit and junk basket. Tagged bottom at 4373 m and worked the junk basket. Dropped survey. Pulled out of the hole. Ran in the hole with core barrel no. 2. Had 2 m fill at bottom. Cut core no. 2 from 4375 m to 4390 m. Lost 900 psi pump pressure and stopped coring. Pressure tested surface equipment, OK. Pulled out of the hole and checked for washout in the drill string.
05.02	4405	1,78	1,89	Continued to pull out of the hole with core barrel no. 2. Recovered core no. 2, 100% recovery. Did not find any washouts. Made up core head no. 3 and ran in the hole. Reamed and washed from 4385 m to bottom at 4390 m. Cut core no. 3 from 4390 m to 4405 m. Pulled out of the hole. Recovered core no. 3, 73% recovery.

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Weekly drilling report

Week	Weeks Progress	Report no.	Page	of
5	11	79 - 80	23	

Area	Well	Rig
North Sea	15/2-1	Nortrym

Casing							
	Size	30"	20"	13 3/8"	9 5/8"		
	Setting depth (m)	196	665	2737	3770		

Date	Depth (m) / Progress (m)	Pore Press grad (r.d.)	Mud Dens grad (r.d.)	Detailed operation
06.02	4421	1,78	1,89	Made up bit no. 24, 8 3/8" and ran in the hole. Tagged bottom at 4405 m. Drilled 8 3/8" hole from 4405 m to 4421 m. Dropped survey. Unable to retrieve survey because of failure on survey catcher. Pulled out of the hole and retrieved survey. Ran in the hole with bit no. 25.
07.02	4438	1,78	1,89	Ran in the hole with bit no. 25. Drilled the 8 3/8" hole from 4421 m to 4438 m. Started to loose mud from 4434 m. Circulated 9,5 m^3 lost circulation material. While circulating and rigging up TV observed losses of 4,8 m^3/hr. Found leak in ball joint with TV. Pulled out of the hole. Pipe got stuck at 4424 m. Worked pipe free. Had 494 kN overpull. Continued to pull out of the hole to 3682 m. Closed middle pipe ram. Observed annulus for flow for 15 min, lost 1 m^3. Opened middle pipe ram and observed annulus for 15 min. Lost 0,6 m^3. Had a total mud loss of 30,5 m^3 in 24 hrs.

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Norsk Hydro

Weekly drilling report

Week	Weeks Progress	Report no.	Page	of
6	12	81 - 83	24	

Area	Well	Rig
North Sea	15/2-1	Nortrym

Casing							
	Size	30"	20"	13 3/8"	9 5/8"		
	Setting depth (m)	196	665	2737	3770		

Date	Depth (m) / Progress (m)	Pore Press grad (r.d.)	Mud Dens grad (r.d.)	Detailed operation
08.02	4438	1,78	1,89	Ran in the hole and hung the string off on middle pipe ram. Pulled out of the hole. Displaced the riser with seawater. Laid down diverter and disconnected lower marine riser package. Rigged down the kill and choke lines and laid down the slip joint. Pulled the lower marineriser package. Rigged down the flex hoses, beacon, bulls eye and dismantled and laid down ball joint. Installed the overhauled ball joint. Laid down bottom riser joint which was badly worn. Repeared same. Nippled up ball joint flex hoses, beacon, bulls eye and changed out AX ring. Press tested the ball joint and ran the riser and lower marine riser package.
09.02	4449		1,89	Waited on weather. Had 45 knots wind. Rigged up slip joint, kill and choke lines. Ran the TV. Landed the lower marine riser package. Tested kill and choke lines. Installed the diverter. Displaced the riser with mud. Hung off pipe on lower pipe ram. Tested the AX ring on lower marine riser package. Ran in the hole. Pipe got stuck at 4425 m. Worked the pipe free. Tagged bottom at 4438 m. Had 2 m fill. Drilled the 8 3/8" hole from 4438 m to 4449 m.
10.02	4450	1,78	1,89	Drilled the 8 3/8" hole from 4449 m to 4450 m. Pulled out of the hole. Ran logs: No. 1: GR/ISF/SONIC from 3770 m to 4450 m. No. 2: FDC/CNL/GR from 3770 m to 4450 m. No. 3: RFT. Had to pull out of the hole due to tool failure. Repaired and ran tool again but was not able to get pressure readings due to low permeable formations.

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Norsk Hydro

Weekly drilling report

Week	Weeks Progress	Report no.	Page	of
6	12	84 - 87	25	

Area	Well	Rig
North Sea	15/2-1	Nortrym

Casing							
	Size	30"	20"	13 3/8"	9 5/8"		
	Setting depth (m)	196	665	2737	3770		

Date	Depth (m) / Progress (m)	Pore Press grad (r.d.)	Mud Dens grad (r.d.)	Detailed operation
11.02	4456	1,78	1,89	Pulled RFT tool out of the hole. Retrieved wear bushing. Rigged up jet sub, 1 std. heavy weight drill pipe and test tool and ran in the hole. Tested the BOP to 690 bar on rams, choke and kill valves and to 240 bar on annular preventor. Repaired valve no. 8 on the choke manifold. Pulled the test plug out of the hole and set the wear bushing. Tested surface equipment. Replaced valve 23 on choke manifold from 10.000 psi to 5000 psi valve. Made up the turbine and bit no. 26. Ran in the hole and tagged bottom. Had 1 m fill. Washed to TD. Drilled the 8 3/8" hole from 4450 m to 4456 m.
12.02	4523	1,78	1,89	Drilled the 8 3/8" hole from 4456 m to 4498 m. Had 5 bbl gain. Shut the well in. Had no pressure build up. Changed wash pipe on kelly. Drilled the 8 3/8" hole from 4498 m to 4510 m.
13.02	4580	1,78	1,88	Dropped and retrieved the survey. Drilled the 8 3/8" hole from 4523 m to 4542 m. Circulated for samples. Dropped and retrieved the survey. Drilled the 8 3/8" hole from 4542 m to 4546 m. Repaired leak in slip joint. Drilled the 8 3/8" hole from 4546 m to 4560 m. Circulated for samples. Drilled the 8 3/8" hole from 4560 m to 4580 m. Circulated and conditioned mud.
14.02	4600	1,78	1,90	Circulated and conditioned the mud. Drilled the 8 3/8" hole from 4580 m to 4600 m. Circulated and conditioned the mud. Pulled out of the hole. Serviced and laid down the turbine. Ran logs: Run no. 1: ISF/SONIC Run no. 2: FDC/CNL

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Norsk Hydro

Weekly drilling report

Week	Weeks Progress	Report no.	Page	of
7	13	88 - 92	26	

Area	Well	Rig
North Sea	15/2-1	Nortrym

Casing							
	Size	30"	20"	13 3/8"	9 5/8"		
	Setting depth (m)	196	665	2737	3770		

Date	Depth (m) / Progress (m)	Pore Press grad (r.d.)	Mud Dens grad (r.d.)	Detailed operation
15.02	4600		1,90	Ran logs: Run no. 3: HDT. Broke and laid down core barrel. Ran velocity survey. Made two CST runs.
16.02	4600		1,89	Made third CST run. Ran CBL log. Made fourth CST run. Ran in hole with 21 joints of 3 1/2" drill pipe and 5" drill pipe to 4547 m. Circulated and conditioned mud.
17.02	3720		1,61	Mixed and pumped plug no. 1. Pipe got stuck at 4217 m. Worked the pipe free, had 800 KN overpull. Pulled out of hole to 3820 m. Mixed and pumped plug no. 2. Top of cement was at 3720 m. Tested the cement plug to 138 bar.
18.02				Pulled out of the hole to 610 m. Circulated and reduced mud weight to 1,50 rd. Pulled out of the hole. Ran in the hole with open ended drill pipe to the wellhead. Tested the wireline BOP to 69 bar. Pressured annulus to 35 bar. Perforated the 9 5/8" casing with 1 11/16" gun at 150 m. Had 17 bar pressure drop. Bled off the pressure in annulus and observed the well. Pulled out of the hole. Retrieved the wear bushing. Ran in the hole and cut 9 5/8" casing at 596 m. Pulled out of the hole and tried to pull the 9 5/8" casing with casing spear. Had 1000 KN overpull. Pulled out of the hole. Ran in the hole with jar in the string.
19.02	573			Attempted to retrieve 9 5/8" casing. Had 1110 kN overpull. Pulled out of the hole. Ran in the hole with casing cutter. Cut the 9 5/8" casing at 593 m. Pulled out of the hole. Ran in the hole with spear and jarred on casing. Casing came free with 1110 KN overpull.

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Norsk Hydro

Weekly drilling report

Week	Weeks Progress	Report no.	Page	of
7	13	93 - 94	27	

Area	Well	Rig
North Sea	15/2-1	Nortrym

Casing							
	Size	30"	20"	13 3/8"	9 5/8"		
	Setting depth (m)	196	665	2737	3770		

Date	Depth (m) / Progress (m)	Pore Press grad (r.d.)	Mud Dens grad (r.d.)	Detailed operation
				Pulled the 9 5/8" casing out of the hole. Ran in the hole to 600 m. Mixed and pumped plug no. 3 and squeezed 6 m^3 cement into the 9 5/8" x 13 3/8" annulus. Pulled out of the hole. Perforated 13 3/8" casing at 553 m. Observed for pressure build up.
20.02	545			Pulled out of the hole. Ran in the hole to 554 m. Sat a balanced cement plug from 554 m to 450 m and squeezed 8,4 m^3 into the 13 3/8" x 20" annulus. Pulled out of the hole. Perforated 13 3/8" casing at 155 m. Observed for flow. Ran in the hole with 13 3/8" casing cutter and cut 13 3/8" casing at 284 m. Pulled out of the hole and retrieved 36 joints of 13 3/8" casing. Found the casing cut at the same level as the 9 5/8" casing. Ran in the hole and washed inside the BOP. Pulled out of the hole. Ran in the hole to 384 m, mixed and pumped plug no. 5. Plug was set from 384 m to 184 m.
21.02	184			Pulled out of the hole. Washed inside the BOP. Pulled out of the hole. Displaced the riser with seawater. Laid down diverter. Pulled the BOP. Changed out H-4 connector with collet connector.

1920 HK 8.6.82 4.000

Norsk Hydro

Weekly drilling report

Week	Weeks Progress	Report no.	Page	of
8	14	95 - 98	28	

Area	Well	Rig
North Sea	15/2-1	Nortrym

Casing							
	Size	30"	20"	13 3/8"	9 5/8"		
	Setting depth (m)	196	665	2737	3770		

Date	Depth (m) / Progress (m)	Pore Press grad (r.d.)	Mud Dens grad (r.d.)	Detailed operation
22.02	184			Hooked up guide frame and TV. Ran in the hole with 20" casing cutter. Cut the 20" casing at 139 m. Pulled out of the hole. Marks on cutter arms indicated that both 20" and 30" casings were cut. Ran in the wellhead and tried to pull the wellhead. Had 2225 KN overpull. Pulled out of the hole. Ran in the hole with 42" sweep cutters. Tried to cut 20" and 30" casings at 139 m. Had no positive torque indication. Pulled out of the hole. Ran in the wellhead and tried to pull the same. Had 2225 kN overpull.
23.02	184			Pulled out of the hole. Ran in the hole with 32" casing cutter. Tried to cut 20" and 30" casing at 137 m. Pulled out of the hole. Ran in the wellhead and tried to pull the same. Had 2225 kN overpull. Pulled out of the hole. Ran in the hole with 42" cutter. Tried to cut 20" and 30" casing at 137 m. Pulled out of the hole. Ran in the wellhead and treid to pull the same. Had 2225 kN overpull. Pulled out of the hole and rigged up to run explosive charge.
24.02	184			Ran in the hole with explosive charge below 18 3/8" housing running tool. Dived scorpio and stabbed charge in wellhead. Severed the casing at 140 m. Pulled the 20" casing from 139 m. The lock ring in 18 3/4" housing had failed. Therefore the 30" housing came free. Detonated new charge at 137 m. Retrieved permanent guide base with guidelines. The seabed was inspected and no obstruction above ocean floor after retrieval of permanent guide base was seen. Pulled anchor no. 2, 3 and 1.
25.02				Waited on weather to pull remaining anchors. Pulled anchor 4, 6, 8 and 5. Rig under way to new location at 15.00 hrs.

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3.3 Time Distribution

The total time spent to move the rig to the location, drill and to permanently plug and abandon the well 15/2-1 was 98,2 days (2356 hrs). The time distribution is shown in table and fig. .

The operation can be divided as follows:

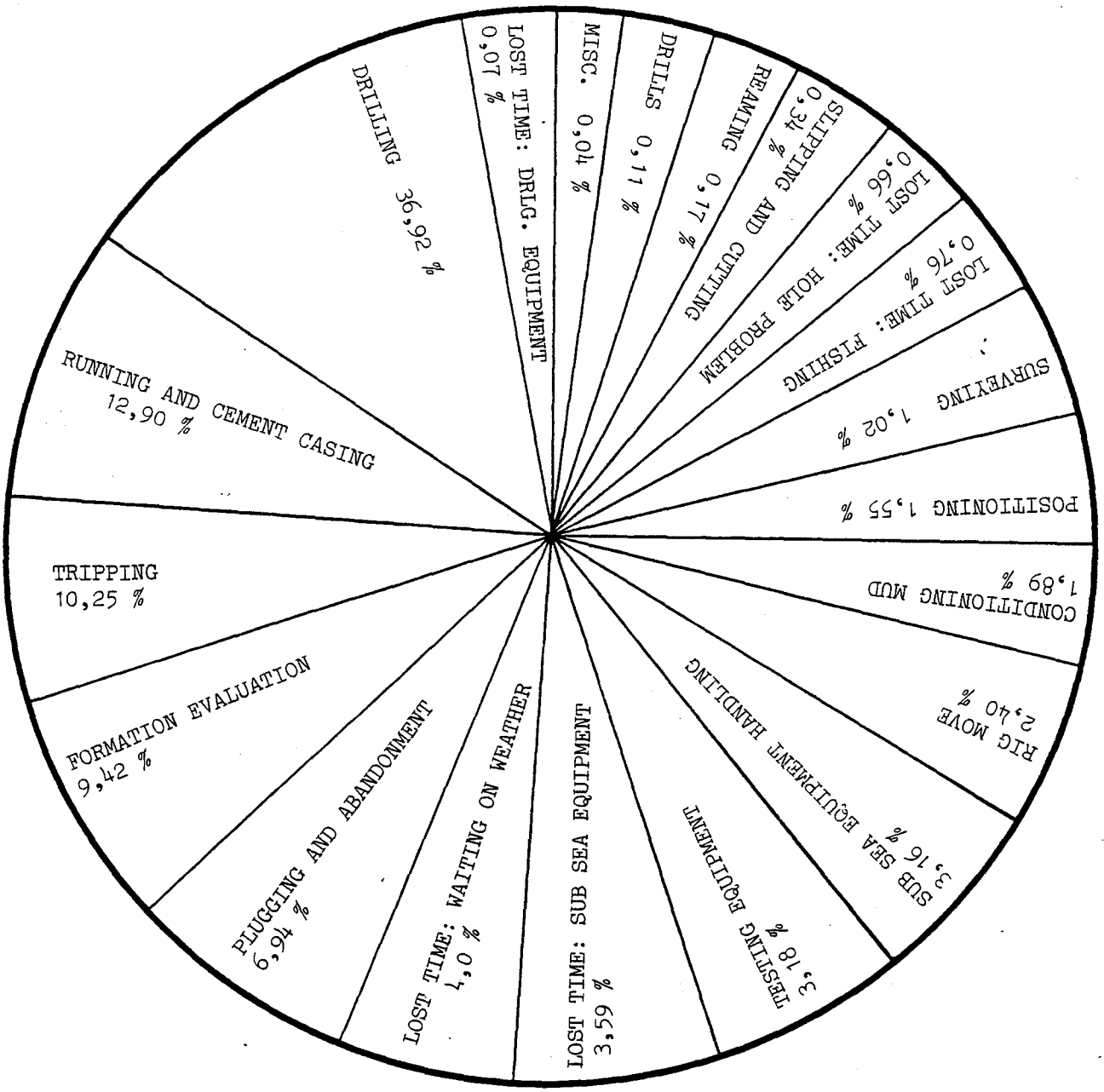
1.	Drilling of the well to TD:	1741,25 hrs.
2.	Formation evaluation:	222,00 "
3.	Lost time:	229,25 "
4.	Plugging and abandonment:	163,50 "

TABLE B-1

TIME BREAK DOWN

		Hours	%
1.	Rig move	56.00	2,40
2.	Positioning	36,50	1,55
3.	Drilling	869,75	36,92
4.	Tripping	241,50	10,25
5.	Surveying	24.00	1,02
6.	Conditioning mud	44,50	1,89
7.	Reaming	4,00	0,17
8.	Slipping and cutting drilling line	8,00	0,34
9.	Sub sea equipment handling	74,50	3,16
10.	Testing equipment	75,00	3,18
11.	Running and cementing casing	304,00	12,90
12.	Formation evaluation	222,00	9,42
13.	Drills	2,5	0,11
14.	Lost time: Drlg. equipment	16,75	0,70
15.	Lost time: Sub sea equipment	84,50	3,59
16.	Lost time: Fishing	18,00	0,76
17.	Lost time: Hole problem	15,50	0,66
18.	Lost time: Mooring system	-	-
19.	Lost time: Wo weather	94,50	4,00
20.	Lost time: Wo equipment	-	-
21.	Lost time: Wo orders	-	-
22.	Plugging and abandonment	163,50	6,94
23.	Misc.	1	0,04
		2356 hours	100%

= 98 days 4 hrs.



Norsk Hydro Drilling Department	TIME DISTRIBUTION WELL 15/2-1	Gr. no.:	Fig.: B-2
		Date: Sign: PAn/EF	Dwg. no.:

HOLE DEVIATION

DEPTH M	INCLINATION DEGREES	DIRECTION DEGREES
196	0	
284	1/4	162
397	1/4	94
481	3/4	132
594	1/2	127
698	1/2	137
783	1/4	228
896	1/2	218
981	1/4	185
1094	1/2	205
1179	1/2	121
1292	3/4	120
1405	3/4	104
1490	1/2	10
1603	1/2	351
1716	3/4	379
1800	3/4	0
1885	1	376
1999	3/4	351
2083	1	120
2196	1	118
2281	1	117
2394	1/2	114
2507	1/4	212
2592	1	261
2692	3/4	211
2750	1/4	274
2924	3/4	24
3028	3 3/4	31
3171	4	5
3275	4 1/2	3

DEPTH M	INCLINATION DEGREES	DIRECTION DEGREES
3360	5 1/2	5
3464	5	8
3558	4 1/2	4
3653	4 1/4	353
3786	6	348
3887	6	332
4038	1/4	359
4285	6 1/4	358
4375	3/4	255
4421	8 1/4	16

4. PERMANENT ABANDONMENT OF THE WELL

The abandonment program is shown in fig. and was carried out as follows:

Plug 1:

Set a cement plug in two stages from 4525 m to 4310 m.

Plug 2:

Set a cement plug across 9 5/8" casing shoe from 3720 m to 3820 m.

Plug 3:

Squeezed cement into 9 5/8" x 13 3/8" annulus from 593 m to 693 m.

Plug 4:

Squeezed cement into 13 3/8" x 20" annulus from 593 m to 653 m, and set a plug inside 20" casing from 574 m to 593 m.

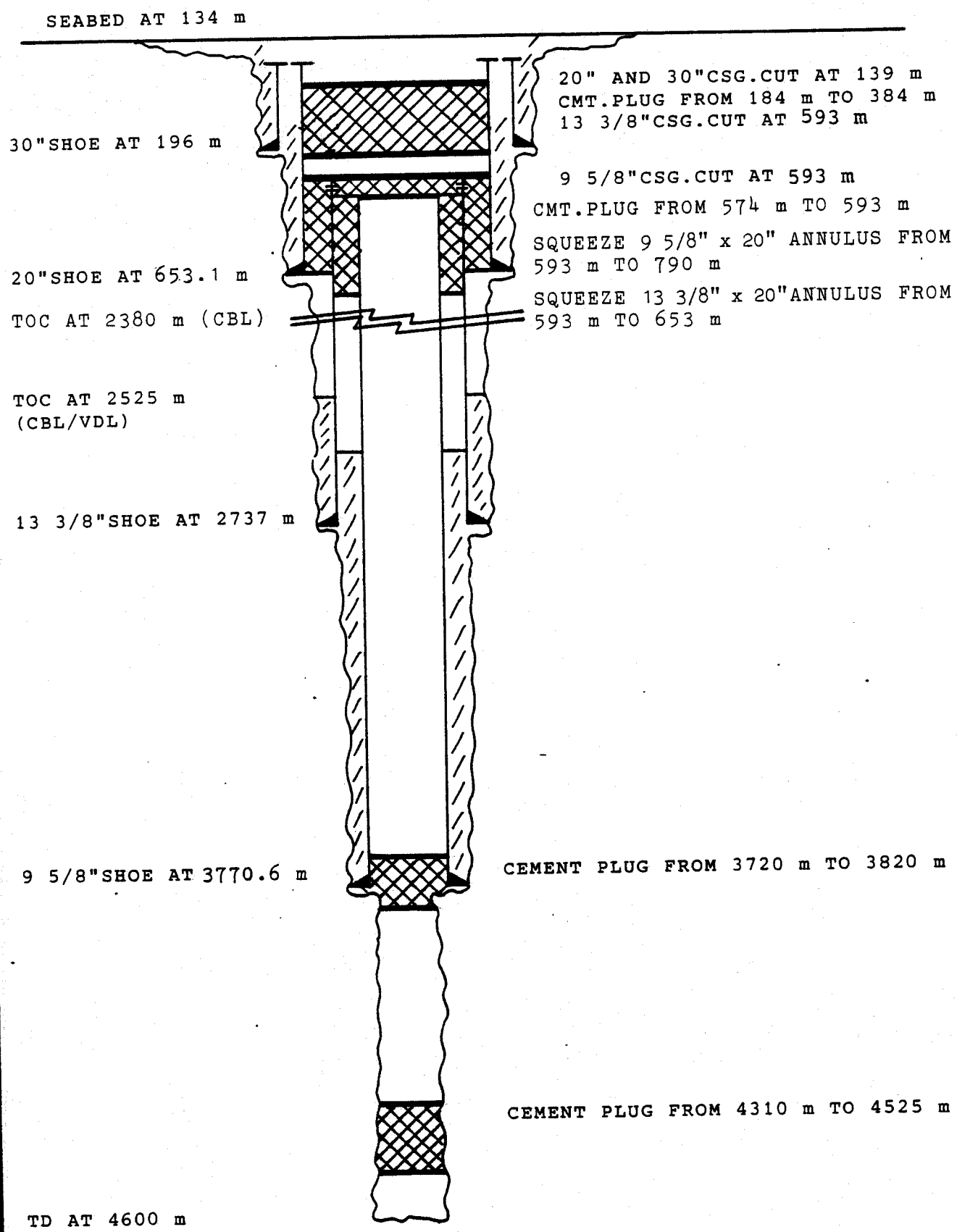
Plug 5:

Set a cement plug from 184 m to 384 m inside 20" casing.

Casing/Wellhead removal

Cut 9 5/8", 13 3/8", 20" and 30" casing more than 2,5 m below seabed.

The seabed was inspected by the sub sea TV on the rig after pulling the permanent guide base. No obstructions above ocean floor was found.



Norsk Hydro Drilling Department	PERMANENT ABANDONMENT WELL 15/2 - 1	Gr. no.: 4	Fig.: B-3
		Date: 17/6-1982 Sign: RHL / Hes	Dwg. no.: 15

5. PORE PRESSURE AND FORMATION INTEGRITY

5.1 Pore pressure

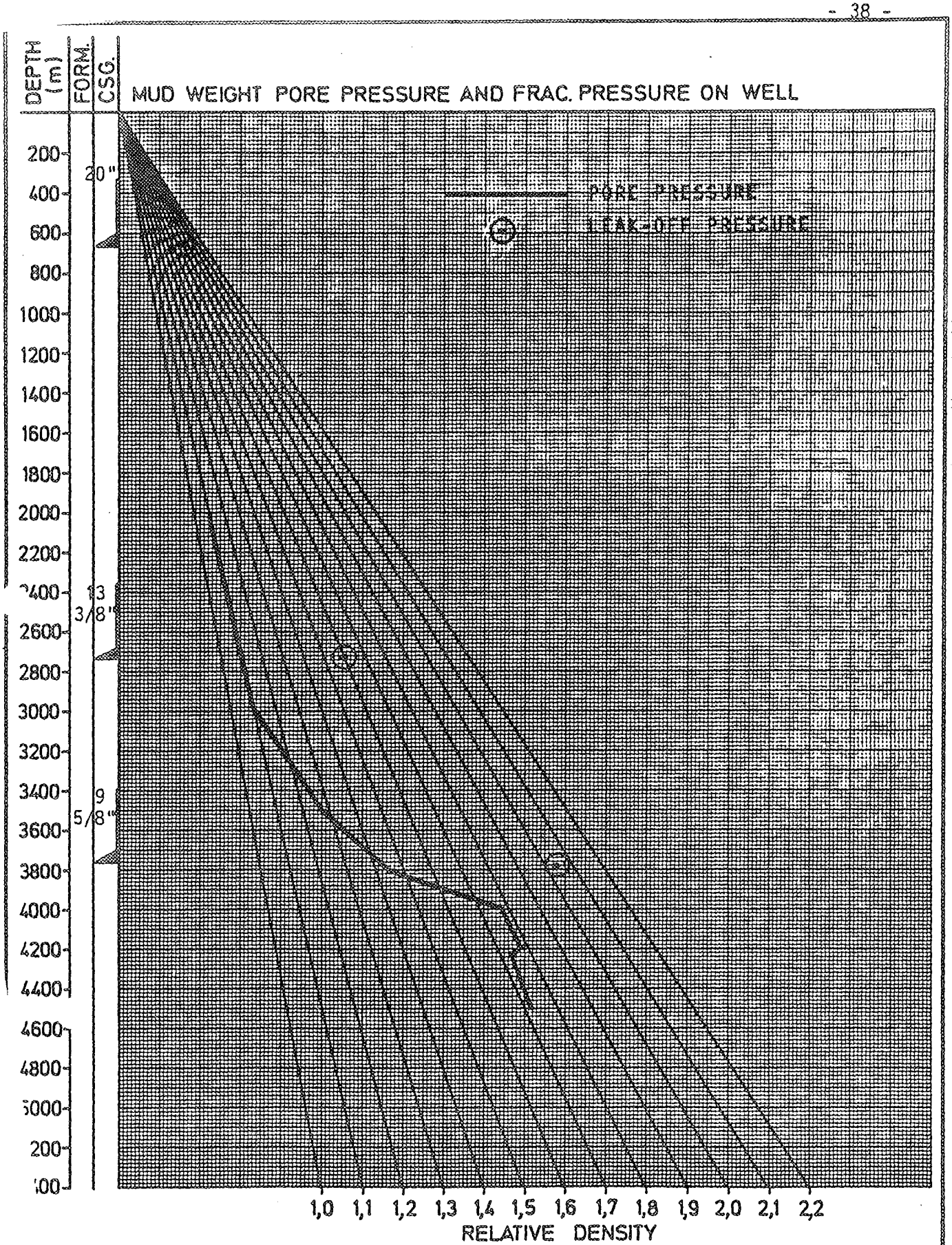
Pore pressure detection was performed from 1800 m - 4200 m on the rig. Parameters used were D_c-exp., gas, shale density and other pressure detection parameters. Because of the use of diamond turbodrilling some of the D_c-exponent values are totally out of reality though they are in this table.

Depth (m)	PP from D_c exp (rd)	PP from Sonic log (rd)	PP reported (rd)	Most possible (rd)	Mw used (rd)
2000	1,08	-	1,08	1,08	1,13
2500	1,10	-	1,10	1,10	1,20
3000	1,10	-	1,10	1,10	1,24
3500	1,20	-	1,28	1,28	1,25
3800	1,47	1,45	1,47	1,46	1,75
3850	1,50	1,48	1,55	1,55	1,75
3900	1,60	-	1,60	1,60	1,75
3950	1,63	-	1,74	1,74	1,85
4000	1,63	1,77	1,75	1,77	1,85
4100	1,66	1,77	1,76	1,77	1,85
4200	1,66	1,77	1,78	1,77	1,89
4300	1,66	1,73	1,80	1,73	1,89
4500	1,72	1,60	1,80	1,72	1,89

5.2 Formation integrity test

The following table shows the formation integrity test results:

	Casing depth (m)	Open hole depth (m)	Leak off (rd equiv. mud weight)
20"	655	670	1,72
13 3/8"	2737	2769	1,59
9 5/8"	3770	3795	2,04



Norsk Hydro ng Department	PORE PRESSURE AND LEAK-OFF PRESSURE RESULT WELL 15/2-1	Gr. no.: 4 Date: 29/7-1982 Sign: RHL / Hes	Fig.: B-4 Dwg. no.: 20

6. MATERIALS REPORT

6.1 Casing and wellhead

A Vetco 18 3/4" 1000 bar WP housing wellhead system was used and the 30", 20", 13 3/8" and 9 5/8" casing string were set as shown in Table.

Table

Casing composition

Size	Grade	Weight lbs/ft	Lenght m	Threads	Setting depth m
30"	B	309,7	63,18	ATD-RB	196
20"	X-52	133	6,93	LX	
20"	X-52	133	11,21	LX-Butt	
20"	K-55	133	407,37	Butt	
20"	X-52	133	11,21	LS-Butt	
20"	X-52	133	83,41	LS	653
13 3/8"	N-80	72	2603,34	Butt	2737
9 5/8"	Q-125	58,4	3,91	Butt/VAM	
9 5/8"	Q-125	58,4	1754,43	VAM	
9 5/8"	P-110	53,5	1,02	VAM/Butt	
9 5/8"	P-110	47	1878,09	Butt	

BIT RECORD

WELL NO.: 15/2-1

BIT NO.	SIZE	MAKE	TYPE	SERIAL NO.	JETS 32 ND.	DEPTH OUT M	M DRLG.	HRS. DRLG.	M/HR	ACC. DRLG. HRS.	WEIGHT KN	RPM	PRESS. BAR	OUTP. G/MIN	SPM		BIT COND				REMARKS
															1	2	T	B	G	OTHER	
1	26	Smith	DSJ	BE 8857	24x24x24	196	62	5	12.5	5	24/65	50/70	48		75	75	2	1	I		
	36	Servo	HO														1	1	I		
2	17½	Smith	SDS	AX 5426	22x22x22	665	469	23				150			110	110	1	1	I		
3	17½	Smith	DSJ	AX 2984	22x22x22	665	469	18,5				120					2	7	I		
	26	Servo	U/R			665	469	18.5	25.4	46.5			158		100	100					
4	26	Smith	DSJ	BE 8851		665	---------	WIPER	TRIP	----------	----------						4	7	I		
5	17½	Smith	SDS	WR 401	22x22x22	1484	819	54		100.5		50/150	218		100	100	7	4	I		
6	17½	Smith	SDS	AX 5369	24x24x24	2093	609	40,5	15	141	266	150	220		92	92	7	8	9/16		
7	17½	Sec	M44N	926520	24x24x24	2344	251	43,5					114/214		82	82	8	8	1/4		
8	17½	Sec	M44N	926423	24x24x24	2550	206	25,5	8	210	266/311		114/214			80	5	5	1/8		
9	17½	Sec	M44N	926423	24x24x24	2492	142	36,5	3.9	246.5	290		214		80	80	4	6	1/8		
10	17½	Sec	M44N	902188	24x24x24	2750	58	32.5	1.8	279	300		124		-	115	3	3	I		
RR10	17½	Sec	M44N	902188	24x24x24	----------	----------	WIPER	TRIP	----------	----------										
11	12 1/4	Reed	S21G	932385	14x14x14	2698	76 m cmt	12.5	6,1	291.5	22/66	40/70	137		-	100	4	7	I		
12	12 1/4	Reed	S21G	932351	14x14x14	2758	39 cmt + 8	3+5,5	1.5	300	33/66	60/70	206		65	65	3	3	I		
13	12 1/4	Reed	S21G	932384	14x14x14	2764	72 cmt + 6 m	4/3,5	1.7	307.5	177	70	206		65	65	2	2	I		
14	12 1/4	Sec	S44G	866745	14x14x14	2793	131 cmt + 29	9/11	2.6	327.5	89/177	60/120	207		65	65	3	5	I		
15	12 1/4	Acc	Lynx	18218	TFA 1.0	3360	567	162,5	3.5	490	133/177	60/100 600/680	276		65	65	60%		1/16		
16	12 1/4	Smith	FVH	WW 842	13x13x13	3372	12	5,5	2.2	495.5	222	80/100	121/241		59	59	1	1	I		Marl
17	12 1/4	Dia-boart	LX13	7081646		3786	414	127,5	3.2	623	133/200	100/300	275		58	58	50%		I		
18	8 3/8	Sec	5433	806831	12x12x12	3790	56 cmt 4m rock	4,5/1,5	2.7	629	45	90	255		96		1	3	I		

BIT RECORD

WELL NO.: 15/2-1

BIT NO.	SIZE	MAKE	TYPE	SERIAL NO.	JETS 32 ND.	DEPTH OUT M	M DRLG.	HRS. DRLG.	M/HR	ACC. DRLG. HRS.	WEIGHT KN	RPM	PRESS. BAR	OUTP. G/MIN	SPM		BIT COND				REMARKS
															1	2	T	B	G	OTHER	
19	8 3/8	Sec	M44NG	929912	12x12x12	3796	6	1/3	2.0	633	53	100	200/269		40	40	2	2	I		
20	8 3/8	Dia-boart	LX 13	4000837	TFA 1,0 sq "	4001	205	69	3.0	702	177	50/600	283		50	40			I		
21	8 3/8	STC	F2	AF6923	11x11x12	4038	37	27	1.4	729	178	70	240		80		1	4	1/16		
22	8 3/8	Dia-boart	LX13	7900129	TFA 1,0 sq "	4364	326	103	3.2	832	133	70/560	282		98		30%		I		
NCB1	8 3/8	XL	CB403 SP4	7081575	TFA 1,0 sq "	4373	8	7,5	1.06	840	53/107	80/100	124		58		20%		I		Core no. 1
NB23	8 3/8	Sec	M44NG	929877	11x11x11	4375	2	1	2	841		100	240		72		5	2	I		
NCB2	8 3/8	XL	CB403 9J	7081682	TFA 1,0 sq "	4390	15	5	3	846	133	120	213		80		5%		I		Core no. 2
RRCB2	8 3/8	XL	CB403 9J	7081682	TFA 1,0 sq "	4405	15	7	2.14	853	89/111	120/130	172		75		40%		I		Core no. 3
24	8 3/8	STC	F3	CC-6829	11x11x11	4422	17	10,5	1.52	863½	133/155	60/60	262		76		2	3	I		
25	8 3/8	STC	F3	CC-6799	11x11x11	4450	28	23,5	1.2	887	177	45	262		75		2	4	I		
26	8 3/8	Dia-boart	LX13	7081548		4600	150	40,5	3.7	9257	177/111	70	283		98		30%		1/16		+ Salt

DAILY MUD PROPERTIES

DATE	DEPTH	SP.GR. WT.	VIS SEC.	CORR. 115°F PV	YP	GELS PASCALS 0	10	PH BLACK STRIP	FLUID LOSS 100PSI API	500PSI 300°F HP HP	CL CACL NACL MG/1	ALKALINITY PF	PM	MF	CA PPM	RETORT % OIL	% SOL	% WATER	BBL CEC
23.11		1,04		12	34	18	43	10,5											
24.11		1,04		17	46	20	48	10,3											
25.11		1,04		13	29	18	39	10,2											
26.11		No mud	check mixing new mud.																
27.11	386	1,08		4	2	1	1	8,8											
28.11	665	1,04		14	27	13	21	8,8											
29.11	587	1,20		4	8	2	3	8,8											
30.11	665	1.04		5	7	2	4	7,4											
01.12		Mixing	new mud																
		End of	20" Section																
02.12	665	1,04		12	17	3	6	10,5	16,2		11000	,47		1,08	160				
03.12	653	1,04		11	15	3	5	10,5	16,8		11000	,52		1,1	160				
04.12	1168	1,11		12	14	5	8	10	14,2		14000	,21		,75	160	0	7	93	
05.12	1438	1,13		20	23	11	38	9,3	9,4		16300	,15		,95	180	3	9	88	
06.12	1700	1,13		11	15	6	20	10,2	11,6		16000	,30		,85	120	3	6	91	
07.12	1900	1,13		13	20	8	24	9,8	11,2		15000	,27		,77	180		10	90	17,5
08.12	2093	1,13		9	21	7	33	10	14,2		16500	,17		,60	220	1	8	91	14,5
09.12	2120	1,20		12	26	8	22	10,5	12,6		16500	,4		1,0	200		11	89	15
10.12	2270	1,21		14	25	7	18	10	10,6		17000	,22		,80	280		12	88	17,5
11.12	2344	1,20		13	22	6	21	10,5	11		16000	,2		,1	260		12	88	16,5
12.12	2458	1,20		16	24	10	27	10,5	10,2		16450	,4		,1	220	0	13	87	16,5
13.12	2550	1,20		14	22	8	22	10,3	11,4		17000	,4		,9	250	0	11	89	16,1
14.12	2660	1,20		14	23	9	25	10,5	11		17400	,4		,1	260	0	11	89	16
15.12	2692	1,20		14	22	9	22	10,5	11,2		17500	,4		,1	260	0	11	89	16
16.12	2737	1,20		15	22	8	18	10,5	11,4		17600	,4		1,3	200	0	10,5	89,5	16
17.12	2750	1.20		15	22	8	18	10,5	11,1		17600	,4		1,0	240	0	10	90	16
18.12	2750	1,21		18	41	18	46	10,2	10,8		17000	,42		,97	280	0	11,5	88,5	17,5
19.12	2750	1,21		19	44	19	49	10,2	11.0		17500	,39		,95	280	0	11	89	17,5

DATE SPUD: DATE T.D.:

DAILY MUD PROPERTIES

DATE	DEPTH	SP.GR. WT.	VIS SEC.	CORR. 115°F PV	YP	GELS PASCALS 0	10	PH BLACK STRIP	FLUID LOSS 100PSI API	500PSI 300°F HP HP	CL CACL NACL MG/1	ALKALINITY PF	PM	MF	CA PPM	RETORT % OIL	% SOL	% WATER	BBL CEC
20.12	2750	1,20		18	39	7	44	10,1	11,4		17000	,37		,91	260	0	11	89	16
21.12	2750	1,21		17	19	11	32	10	11,6		17500	,34		,86	280	0	10.5	89,5	16
22.12	2750	1,20		17	12	8	25	10	12		18000	,32		,91	250	0	10	90	15
		END OF 17 1/2" SECTION																	
23.12	2625	1,23		19	20	10	41	11,2	14,6		18000	,71		,36	420	0	11	89	15
24.12	2758	1,22		15	10	2	11	11,6	16,2		18000	1,21		3,25	460	0	11	89	17.5
25.12	2764	1,22		22	18	4	14	11,9	19.6		18500	2,78		4,08	600	0	12	88	20
26.12	2712	1,20		18	11	2	11	11,8	19.0		18500	2,57		3,96	680	0	11	89	22.5
27.12	2793	1,22		18	12	2	11	11,7	13,6		18700	2,42		3,87	560	1.5	12.5	86	25
28.12	2860	1,22		19	11	2	10	11,7	11,5	23,8	18300	1,6		3,1	440	2	12	86	27.5
29.12	2960	1,24		19	12	2	7	11,4	10,7	24,4	18700	1,4		2,3	400	2	13	85	27.5
30.12	3037	1,24		20	16	2	10	11,1	10,2	22,6	18500	,8		1,64	420	2	13	85	27.5
31.12	3100	1,25		21	16	2	9	11,1	10,4	24,8	18700	,7		1,73	440	2	13.5	84,5	27.5
01.01	3185	1,25		19	12	2	8	10,9	10	25,2	19000	,7		1,47	480	1.5	13	85.5	27.5
02.01	3257	1,25		18	15	2	9	10.6	10.2	25	18500	,62		1.45	450	1.5	13	85.5	27.5
03.01	3333	1.25		18	15	2	11	10,6	9,8	24,3	18400	,5		1,6	420	1.5	13	85.5	85.5
04.01	3357	1.25		18	16	2	9	10.4	9.9	24.7	18500	,5		1,3	410	1	13	86	27.5
05.01	3372	1.25		17	15	2	11	10.4	10.4	24.5	18500	.45		1.0	410	1	13	86	26.5
06.01	3423	1.25		17	15	2	9	10.3	9.8	25	18500	.5		1.1	340	1	13	86	26
07.01	3515	1.30		16	16	3	9	10.1	10	24.3	18500	.43		1.0	310	0	14	86	26
08.01	3587	1.30		19	18	2	10	10.2	9.3	24.0	18500	.4		1.0	320	0	14	86	26
09.01	3653	1.43		21	18	2	12	10.1	9.3	24.6	18400	.5		1.2	305	0	16	84	25
10.01	3725	1.44		21	19	2	12	9.8	9.3	24.5	18500	.5		1.2	300	0	17	83	25
11.01	3786	1.44		22	19	3	14	9.7	8.6		18500	.4		1.0	300	0	17	83	24.5
12.01	3786	1.48		22	18	3	13	9.5	9	25	18500	.4		.95	370	0	17	83	26
13.01	3786	1.48		22	20	3	15	9.6	9	24	18500	.45		1.0	360	0	17	83	25
14.01	3786	1.49		23	20	3	15	9.2	9.4	25.3	18.500	.45		.95	370	0	17	83	26

DATE SPUD:

DATE T.D.:

DAILY MUD PROPERTIES

DATE	DEPTH	SP.GR. WT.	VIS SEC.	CORR. 115°F PV	YP	GELS PASCALS 0	10	PH BLACK STRIP	FLUID LOSS 100PSI API	500PSI 300°F HP HP	CL CACL NACL MG/1	ALKALINITY PF	PM	MF	CA PPM	RETORT % OIL	% SOL	% WATER	BBL CEC
15.01	3786	1.49		30	40	12	42	8.8	10.6	29.4	19000	12		1.01	440	0	18	82	30
16.01	3770	1.51		35	41	15	51	8.8	11.4		19000	14		0.98	420	TR	18.5	81.5	32.5
			END OF 12 1/4" HOLE SECTION																
17.01	3786	1.51		27	20	8	39	8.8	11.8		18700	18		1.06	440	0	18	82	32.5
18.01	3790	1.48		19	8	3	12	10.3	12.2		1900	52	1.04	1.62	510	1	18	81	32.5
19.01	3794	1.60		35	10	3	21	10.8	9.6		18500	90	2.02	1.94	560	1	23	76	37.5
20.01	3809	1.75		40	12	4	18	10.6	8.4	28.4	18700	63	1.23	1.54	510	TR	29	71	40.0
21.01	3889	1.76		49	30	5	22	10.5	7.0	22.6	19200	51	1.01	1.64	490	TR	30	70	37.5
22.01	3945	1.85		50	25	6	18	10.6	6.3	18.2	19000	62	0.94	1.91	410	0.5	33	66.5	40
23.01	4001	1.85		46	18	5	15	10.6	6.0	16.4	19200	66	1.26	2.02	440	1.5	30	68.5	35
24.01	4007	1.85		47	19	5	17	10.5	6.2	16.8	19000	56	1.73	1.72	460	1.5	30	68.5	35
25.01	4039	1.85		45	22	5	21	10.5	5.8	14.4	18700	62	1.61	1.94	480	1	31	68	32.5
26.01	4073	1.85		44	20	5	18	10.7	5.6	14.0	19000	76	2.07	2.12	460	1	30.5	68.5	30
27.01	4085	1.86		39	14	4	12	10.7	5.8	14.8	19200	72	1.97	2.06	440	1	29	70	27.5
28.01	4130	1.86		45	22	5	15	10.6	5.4	14.2	19000	63	1.84	1.98	420	1	30.5	68.5	30
29.01	4174	1.89		46	24	4	16	10.6	5.5	14.3	19000	55	1.85	1.87	420	1	32	67	29.5
30.01	4244	1.90		47	11.5	2.5	8.5	10.3	4.7	13.9	19000	56	1.79	1.76	385	1	32	67	29
31.01	4306	1.89		46	12	2	9	10.3	4.7	13.6	19000	5	1.75	1.6	385	1	32	67	28.5
01.02	4364	1.89		40	11	2	11	10.5	4.8	13.9	19000	65	1.65	1.9	295	1	31	68	27.5
02.02	4364	1.89		41	11	2	10	10.5	4.8	13.9	19000	60	1.60	1.7	295	1	31	68	27
03.02	4371	1.89		42	12	2	10	10.4	5.0	14.2	19000	55	1.60	1.6	305	1	32	67	27
04.02	4390	1.89		44	12	2	9	10.3	5.1	14.3	19000	6	1.65	1.55	320	1	32	67	27
05.02	4407	1.89		41	10	2	8	10.3	5.1	14.3	19000	45	1.55	1.43	330	2	31	67	27
06.02	4421	1.89		35	10	2	8	10.4	4.6	14.2	18900	55	1.60	1.45	330	2	31	66.5	25
07.02	4437	1.89		37	11	2	9	10.3	4.7	14.2	19000	5	1.50	1.45	340	2	31	66.5	27
08.02	4437	1.89		38	10	2	9	10.5	4.7	14.4	19000	55	1.65	1.57	350	2	31	66.5	27
09.02	4448	1.88		35	10	2	10	10.5	4.7	14.3	18700	45	1.55	1.7	350	2	31	67	25

DATE SPUD:

DATE T.D.:

DAILY MUD PROPERTIES

DATE	DEPTH	SP.GR. WT.	VIS SEC.	CORR. 115°F PV	YP	GELS PASCALS 0	10	PH BLACK STRIP	FLUID LOSS 100PSI API	500PSI 300°F HP HP	CL CACL NACL MG/1	ALKALINITY PF	PM	MF	CA PPM	RETORT % OIL	% SOL	% WATER	BBL CEC
10.02	4450	1.89		36	11	2	10	10.4	4.8	14.5	18600	.45	1.55	1.6	350	2	31	67	24
11.02	4456	1.89		36	12	3	11	10.5	4.9	14.7	18700	.45	1.50	1.35	370	1	31	68	24
12.02	4524	1.89		36	12	5	15	10.6	5.1	15.4	19000	.58	1.50	1.46	400	.5	31.5	68	27.5
13.02	4529	1.89		35	27	10	36	10.6	4.9	19.4	25000	.68	1.86	1.72	460	.5	31	67.5	25
14.02	4600	1.90		42	18	5	24	10.7	4.8	17.8	28000	.61	1.74	1.58	480	.5	32	67.5	27.5
15.02	4600	1.90		50	25	5	31	10.1	4.4	17.2	27000	.5	1.32	1.38	480	.5	32.5	67	27.5
16.02	4600	1.89		47	21	5	31	10.2	4.6	17.8	27000	.56	1.38	1.46	480	.5	32	67.5	27.5
17.02	3720	1.61		10	3	1	3	7.8	N/C							TR	21	79	

DATE SPUD:

DATE T.D.:

6.2 Bottom Hole Assemblies

BIT NO:	BIT SIZE	BOTTOM HOLE ASSEMBLY
1	26"	Bit - H.O. - X/O - Stab - Monel - Stab - 5 x 9 1/2 DC - X/O - 3 x 8" DC - X/O
2	17 1/2"	Bit - NB. Stab - Monel - Stab - 2 x 9 1/2" DC - XO 6 x 8" DC - X/O - 15 x HWDP
3	17 1/2"	Bit - U. Ream - NB. stab - Monel - Stab 17 1/2" - 2 x 9 1/2" DC - Stab 17 1/2" - 3 x 9 1/2" DC - X/O - 6 x 8" DC - X - O - 4 x HWDP
4	26"	Bit - NB Stab - Monel - Stab 17 1/2" - 2 x 9 1/2" DC - Stab 17 1/2 - 3 x 9 1/2" DC - X/O - 6 x 8" DC - X/O - 15 x HWDP
5	17 1/2"	Bit - NB stab - Monel - Stab - 2 x 9 1/2" DC - Stab 17 1/2" - 3 x 9 1/2" DC - X/O - 9 x 8" DC - X/O - 12 x HWDP
6	17 1/2"	Same as for bit run no. 5
7	17 1/2"	Bit - NB Stab - monel - Stab 17 1/2 - 2 x 9 1/2" DC - Stab 17 1/2" - 3 x 9 1/2" DC - X/O - 12 x 8" DC - X/O - 15 x HWDP
8	17 1/2"	Same as for bit run no. 7
9.	17 1/2"	Same as for bit run no. 7
10	17 1/2"	Same as for bit run no. 7
11	12 1/4"	Bit - Junk sub - Bit sub - Monel - 16 x 8" DC - Jars - 3 x 8" DC - X/O - 15 HWDP

12	12 1/4"	Same as for bit run no. 11
13	12 1/4"	Same as for bit run no. 11
14	12 1/4"	Same as for bit run no. 11
15	12 1/4"	Bit - Turbine - X/O - pin sub - NB stab - Monel - Stab - 1 x 8" DC - Stab - 1 x 8" DC - Stab - 14 x 8" DC - Jars - 3 x 8" DC - X/O - 15 HWDP
16	12 1/4"	Same as for bit run no. 15
17	12 1/4"	Same as for bit run no. 15
RR16	12 1/4"	Bit - Junk sub - NB stab - Monel - Stab - 1 x 8" DC - Stab - 1 x 8" DC - Stab - 14 x 8" DC - Jars - 3 x 8" DC - X/O - 15 HWDP
18	8 3/8"	Bit - Junk sub - Bit sub - Monel - 5 x 6 1/2" DC - X/O - 33 HWDP - X/O - X/O - jar - jar - X/O - 5 HWDP
19	8 3/8"	Same as for bit run no. 18
20	8 3/8"	Bit - Bit sub - Turbin - X/O - Stab - Monel - 5 x 6 1/2" DC - X/O - 33 HWDP - X/O - X/O - Jar - Jar - X/O - 5 HWDP
21	8 3/8"	Bit - NB stab - Monel - Stab - 1 x 6" DC - Stab - 2 x 6 1/2" DC - Stab - 2 6 1/2" DC - X/O - 33 HWDP - X/O - Jar - Jar - X/O - 5 HWDP
22	8 3/8"	Bit - bit sub - Turbine - X/O - Stab - Monel - 5 x 6 1/2" DC - X/O - 33 HWDP - X/O - Jars - X/O - 5 HWDP

Core 1	8 3/8"	Core head - Core barrel - X/O - Stab - Monel - 5 x 6 1/2" DC - X/O - 33 HWDP - X/O - Jars - X/O - 5 HWDP
23	8 3/8"	Bit - Junk sub - NB sub - Monel - 5 x 6 1/2" DC - X/O - 33 HWDP - Jar - Jar - X/O - 5 HWDP
Core 2	8 3/8"	Same as for core run no. 1
24	8 3/8"	Bit - NB stab - Monel - Stab - 1 x 6 1/2" DC - Stab - 2 x 6 1/2" DC - Stab - 2 x 6 1/2" DC - Stab - 2 x 6 1/2" DC - X/O - 33 HWDP - X/O - Jars - X/O - 5 x HWDP
25	8 3/8"	Same as for bit run no. 24
26	8 3/8"	Bit - Bit sub - Turbine - X/O - Circ sub - X/O - Stab - Monel - 5 x 6 1/2" DC - X/O - 33 HWDP - X/O - Jar - Jar - X/O - 5 HWDP

6.3 Cement reports

30" Casing

The 30" casing was set at 196 m and cemented to seabed.

Slurry	Composition	Total used
Lead slurry		
Class "G" cement		17,06 ton
Yield	1,11 m^3/ton	
Sea water	0,63 m^3/ton	10,80 ton
Caustic	9,48 kg/ton	162 kg
Econolite	0,15 m^3/ton	2,7 m^3
Density	1,68	
Thickening time	3:30 hrs. at 7°C	
Spacer slurry		
Class "G" cement		6,4 ton
Yield	0,80 m^3/ton	
Sea water	0,48 m^3/ton	3,2 ton
Caustic	0,72 kg/ton	5 kg
Density	1,87	
Thickening time	4:30 hrs. at 7°C.	
Tail in slurry no. 1 (4% $CaCl_2$)		
Class "G" cement		10,87 ton
Yield	0,83 m^3/ton	
$CaCl_2$	0,096 m^3/ton	1,05 m^3
Sea water	0,42 m^3/ton	4,6 m^3
Density	1,87	
Thickening time	1:55 hrs. at 7° C.	

Slurry	Composition	Total used
Tail in slurry no. 2 (6% $CaCl_2$)		
Class "G" cement		5,97 ton
Yield	0,85 m^3/ton	
$CaCl_2$	0,143 m^3/ton	0,85 m^3
Sea water	0,39 m^3/ton	2,4 m^3
Density	1,87	
Thickening time	0,52 hrs. at 7° C.	

20" Casing

The 20" casing was set at 653 m and cemented to seabed.

Slurry	Composition	Total used
Lead slurry		
Class "G" cement		109 ton
Yield	1,46 m^3/ton	
Seawater	1,09	121 m^3
Econolite	0,05	5,9 m^3
Density	1,50	
Thickening time	8:0 hrs at 30° C.	
Tail slurry		
Class "G" cement		13,9 ton
Yield	0,77 m^3/ton	
Fresh water	0,43 m^3/ton	6,0 m^3
$CaCl_2$	0,024 m^3/ton	
Density	1,90	0,34 m^3
Thickening time	5:00 hrs. at 30° C.	

13 3/8" Casing

The 13 3/8" casing was set at 2737 m and cemented 100 m back in 20" casing.

Slurry	Composition	Total used
Lead slurry		
Class "G" cement		50,8 ton
Yield	1,41 m^3/ton	
Fresh water	1,05 m^3/ton	53,4 m^3
Econolite	0,0044 m^3/ton	2,26 m^3
Density	1,50	
Thickening time:	7:00 at 57° C.	
Tail slurry		
Class "G" cement		29,5 ton
Yield	0,77 m^3/ton	
Fresh water	0,42 m^3/ton	12,7 m^3
CFR-2L	0,027 m^3/ton	0,763 m^3
Density	1,89	
Thickening time	4:20 hrs. at 57° C.	
Squeeze slurry no. 1		
Class "G" cement		14,4 ton
Yield	0,77 m^3/ton	
Fresh water	0,42 m^3/ton	6,36 m^3
Density	1,90	
Squeeze slurry no. 2		
Class "G" cement		17,20 ton
Yield	0,77 m^3/ton	
Fresh water	0,42 m^3/ton	7,73 m^3
CFR-2L		0,233 m^3
Density	1,92	

9 5/8" Casing

The 9 5/8" casing was set at 3770 m and cemented 100 m back in 13 3/8" casing.

Slurry	Composition	Total used
Lead slurry		
Class "G" cement		40,42 ton
Yield	1,21 m^3/ton	
Fresh water	0,81 m^3/ton	36,7 m^3
Econolite	0,035 m^3/ton	1,46 m^3
CFR-2L	0,026 m^3/ton	1,06 m^3
HR-6L	0,022 m^3/ton	0,91 m^3
Density	1,58	
Thickening time	6:00 hrs. at 73° C.	
Tail slurry		
Class "G" cement		1,40 ton
Yield	0,77 m^3/ton	
Fresh water	0,36 m^3/ton	6,5 m^3
CFR-2L	0,0257 m^3/ton	0,37 m^3
HR-6L	0,0027 m^3/ton	0,04
FL-1	0,071 m^3/ton	1,01f
Density	1,69	
Thickening time	5:09 hrs. at 73° C.	
Squeeze slurry		
Class "G" cement		4,2 ton
Yield		
Fresh water		1,52 m^3
CFR-2L		0,08 m^3
FL-1		0,30 m^3
HR-6L		0,03 m^3
Density	1,90	
Thickening time		

ABANDONMENT PLUGS

Plug no. 1 from 4310 m to 4525 m.

Slurry	Composition	Total used
1st stage		
Class "G" cement		6,2 ton
Yield	0,76 m^3/ton	
Fresh water	0,34 m^3/ton	2,80 m^3
CFR-2L	0,026 m^3/ton	0,16 m^3
FL-2	0,071 m^3/ton	0,44 m^3
HR-12L	0,011 m^3/ton	0,066 m^3
Density	1,89 m^3/ton	
Thickening time	5:23 hrs. at 110° C.	
2nd stage		
Class "G" cement		8,0 ton
Yield	0,77 m^3/ton	
Fresh water	0,43 m^3/ton	3,56 ton
CFR-2L	0,026 m^3/ton	0,20 m^3
FL-2	0,071 m^3/ton	0,57 m^3
HR-12L	0,011 m^3/ton	0,085 m^3
Density	1,90	
Thickening time	5:23 hrs. at 110° C.	

Plug no. 2 from 3720 m to 3820 m.

	Composition	Total used
Class "G" cement		7,1 ton
Yield	0,77 m^3/ton	
Fresh water	0,43 m^3/ton	3,25 m^3
Density	1,90	
Thickening time	3:30 hrs. at 77° C.	

Plug no. 3 squeezed 9 5/8" x 13 3/8" annulus from 593 m to 780 m.

Slurry	Composition	Total used
Class "G" cement		9,8 ton
Yield	0,77 m^3/ton	
Sea water	0,46 m^3/ton	4,52 m^3
Density	1,90	
Thickening time	3:00 hrs. at 35° C.	

Plug no. 4

Squeezed 13 3/8" x 20" annulus from 593 to 653 m.

Class "G" cement		11,85 ton
Yield	0,78 m^3/ton	
Sea water	0,43 m^3/ton	5,46 ton
Density	1,90	
Thickening time	3:00 hrs. at 35° C	

The excess cement (not squeezed into annulus) from plug no. 3 and 4 is 2,4 m^3. This amount of cement will form a plug inside 20" casing from 574 m to 593 m.

Plug no. 5 from 184 m to 384 m.

	Composition	Total used
Class "G" cement		44,9 ton
Yield	0,79 m^3/ton	
Salt water		21,3 m^3
$CaCl_2$	0,048 m^3/ton	2,15 m^3
Density	1,90	
Thickening time	3:00 hrs. at 37° C	

6.4 Mud report

36" hole section, 30" casing

The hole was drilled to 196 m, using seawater with returns to seabed. 5 m^3 high viscosity pills were pumped on each connection. Before running 30" casing, 30 m^3 high viscosity mud was spotted in the well. The 30" casing was run and cemented without any problems.

Materials used in this section:
Bentonite, Caustic Soda and Bicarbonat of Soda.

26" hole section, 20" casing

The riser was run before the 17 1/2" pilot hole was drilled. The shoe was drilled out with sea water, from 184 m to 196 m. In the start of this section, mud was lost over the shakers. Tight hole problems appeared from 498 m to 665 m, TD. The hole was reamed with seawater and high viscosity pills were spotted on each 3rd connection. The hole was displaced to high viscosity mud before the casing was run and cemented without any problems.

The mud used in this section contained:
Bentonite, Barite, Caustic Soda, Lime, Milol. 351R and XC-polymer.

17 1/2" hole section, 13 3/8" casing

The hole was drilled to 2750 m, with Shale Trol mud system.

This system contained:
Bentonite, Barite, Milpol. 302, Milpol. 351L, Milpol. 351R, Shaletrol 202, Caustic Soda and Soda Ash.

At 2000 m the mud weight was increased to 1,2. This mud weight was used during the rest of this section.

Because of tight hole problems, it was necessary to ream, wash and to wiper trip quite frequently. It was also necessary to flush the flowline due to gumbo plugging the line. Mud detergent was used to reduce drag/torque and to avoid bit balling problems. Around 2750 m, serious viscosity problems were encountered (ref. report 109:15/2-1:09). The Funnel Viscosity increased to 300 + sec./qt.

High viscosity mud was psotted before logging and the casing was thereafter run and cemented.

12 1/4" hole section, 9 5/8" casing

12 1/4" hole was drilled from 2750 m to 3786 m and the mud system was converted from a polymer system to a dispersed system, by adding lignosulfonate.

Materials used in this section:
Barite, Bentonite, Caustic Soda, Sodium Bicarbonate, Unical, Ligcon and Drispac R., Chemtrol X, Mil Mica X, Mil Mica M, Milplug M and LD-8 were also added bacause of hole problems.

In this section the mud weight was raised from 1,2 rd to 1,5 rd. The hole was turbine drilled from 2739 m to 3372 m with no apparent problems. However, because of the experienced hole problems after turbine drilling, reaming and washing was necessary. No problems appeared during logging and running casing.

8 3/8" hole section

This hole was drilled 3770 m to 4365 m, using the same system as in 12 1/4" hole section. LD-8 was spotted to reduce torque in the beginning of this section. Valnut F, Mil Mica F, Mil Mica M and Drispac R were used in the end of this section to reduce water loss. Down to 4000 m mud weight was increased to 1,9. This mud weight was used during the rest of this section. Some drilling problems were encountered: The drillpipe became temporarily stuck at 4234 m and tight hole was experienced from 4335 m to TD. The hole was reamed and washed before logging at TD (4600 m). The well was thereafter abandoned.

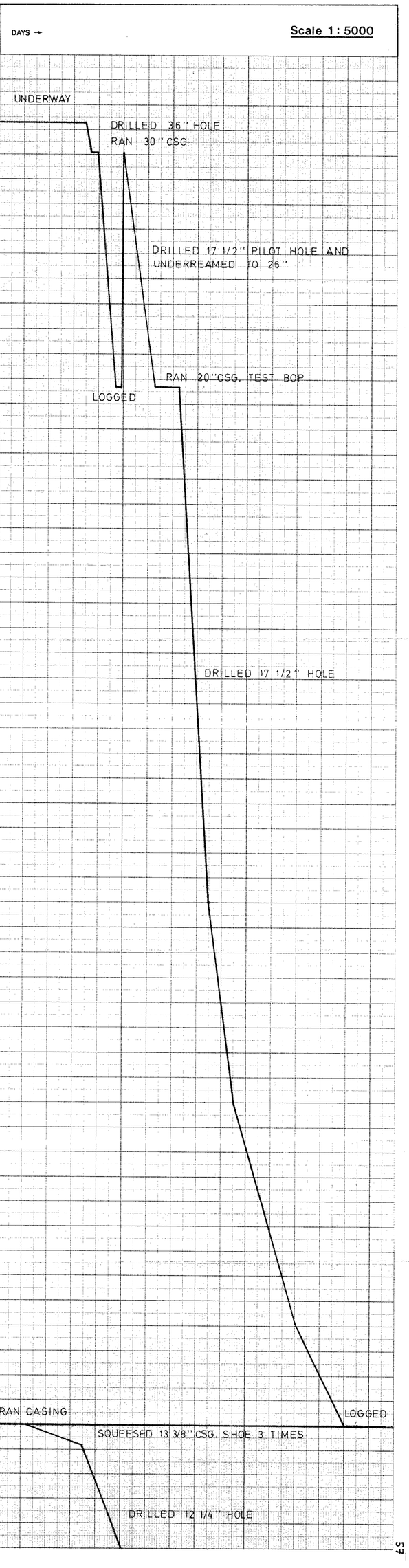
Norsk Hydro

Oslo - Norway

DRILLING PROGRESS, WELL 15/2-1

OPERATOR	: NORSK HYDRO a.s	SPUD IN	: 26.11.1981	WATER DEPTH	: 109 m
COORDINATES	: 58° 45' 19.30" N	WELL COMPL.	: 25.02.1982	RKB to MSL	: 25 m
	: 1° 35' 40.58 E	RIG	: NORTRYM	RKB to SEABED	: 134 m

DEPTHS RKB	LITHO SECTION	SYST./SERIES	CASING	STAGES	SHOWS	DESCRIPTIONS, OBS	MUD MATERIALS	MUD WT. SP. GR.
m RKB						25 m SEA LEVEL		
50, 100								
150–1000		QUATERNARY	30" 196 m	RECENT		134 m SEA BED; 136 Cly: m gy, olv gy, v sft, stky, mod-v sdy, slty, mod calc	Bentonite Caustic Sodium-bicarbonate	1,04
1000–1500		TERTIARY		PLEISTOCENE	tr-0,02% C1	510 Sd: clr-mlky Qts, v abn rock frags, f-pbly, loc abn shell frags; Cly: olv gy, dk grn gy, sft, stky slty, bec sdy, non calc	Barite Bentonite Caustic Sodium-bicarbonate	1,08
1500–2000		TERTIARY	20" 653 m	PLIOCENE	0,1-2,4% C1	706 Sd: clr Qtz rock frags, v f-v crs, loc abn shell frags	Barite Bentonite Milpol Shaletrol Caustic X-L - polymer Sodium-bicarbonate Drispac Unical	1,04
2000–2500		TERTIARY		MID-LATE MIOCENE	0,05-0,47% C1	826; 930 Cly: olv gy-brn gy-dusky yel brn, v sft, bec frm, grdg Clyst, slty, loc sdy, micromic, non-sl calc		
2500–3000		TERTIARY		LATE OLIG.	0,005-0,1% C1	Sd: clr Qtz, f-m		1,08
		TERTIARY		EARLY OLIGOCENE	0,005-0,1% C1	1430 Sd: clr-mlky Qtz, v f-m, loc calc and pyr cmtd, mic, glauc		1,13
		TERTIARY		MIDDLE? EOCENE	0,005-0,1% C1	Clyst: olv gy-olv blk, bec dk grn gy-grn blk, sft-frm, blky, subf-s, grdg Sh, slty, micromic, noncalc; Sd: a/a		
		TERTIARY		EARLY-MID EOCENE		1824 Sh: olv blk, frm, subfis-fis, mod-v slty, micromic, noncalc tr Tuff m bl gy, dk grn gy, sucr wh specs, blk shards; 1950 Sh: varicol, gy, brn, grn, blk, m bl gy, frm, blky, fis, slty, wh specs, blk shards, micromic, noncalc tr Tuff: c/a		
		TERTIARY		LATE PALAEOCENE	tr-0,2% C1, occ tr C2	2068 Strgrs of Lst/Dol: pl-dusky, yel brn, wh-dk gy, microxln, chky Sh: varicol a/a, tuff, frm, fis, loc pseudo sucr, wh specs, blk shards micromic, noncalc; 2148 abr Tuff: a/a; 2178; 2231 Sst: clr-mlky Qtz, m, lse-mod hd, loc calc cmtd		1,21
		TERTIARY				Strgrs of Lst/Dol: lt gy-pnk gy, m-dk yel brn, sft-hd, microxln		1,20
		TERTIARY		DANIAN		2640 Lst: wh-lt gy-loc gy pnk, sft-frm-hd, chky, arg, grdg Mrl		
		CRETACEOUS	13 3/8" 2737 m	MAASTRICHTIAN	tr-0,2% C1, occ tr C2	2737 Mrl: lt olvgy, v sft, stky, loc slty; Lst: wh-m gy, sft-frm, chky, arg, loc grdg Mrl		1,22
		CRETACEOUS				Mrl: lt-dk gy, sft-frm slty, sl micromic		1,23
		CRETACEOUS				2925 Mrl: lt-dk gy, dv gy, sft-frm-loc mod hd, slty, sl-micromic, tr glauc; 2982		1,24



Norsk Hydro

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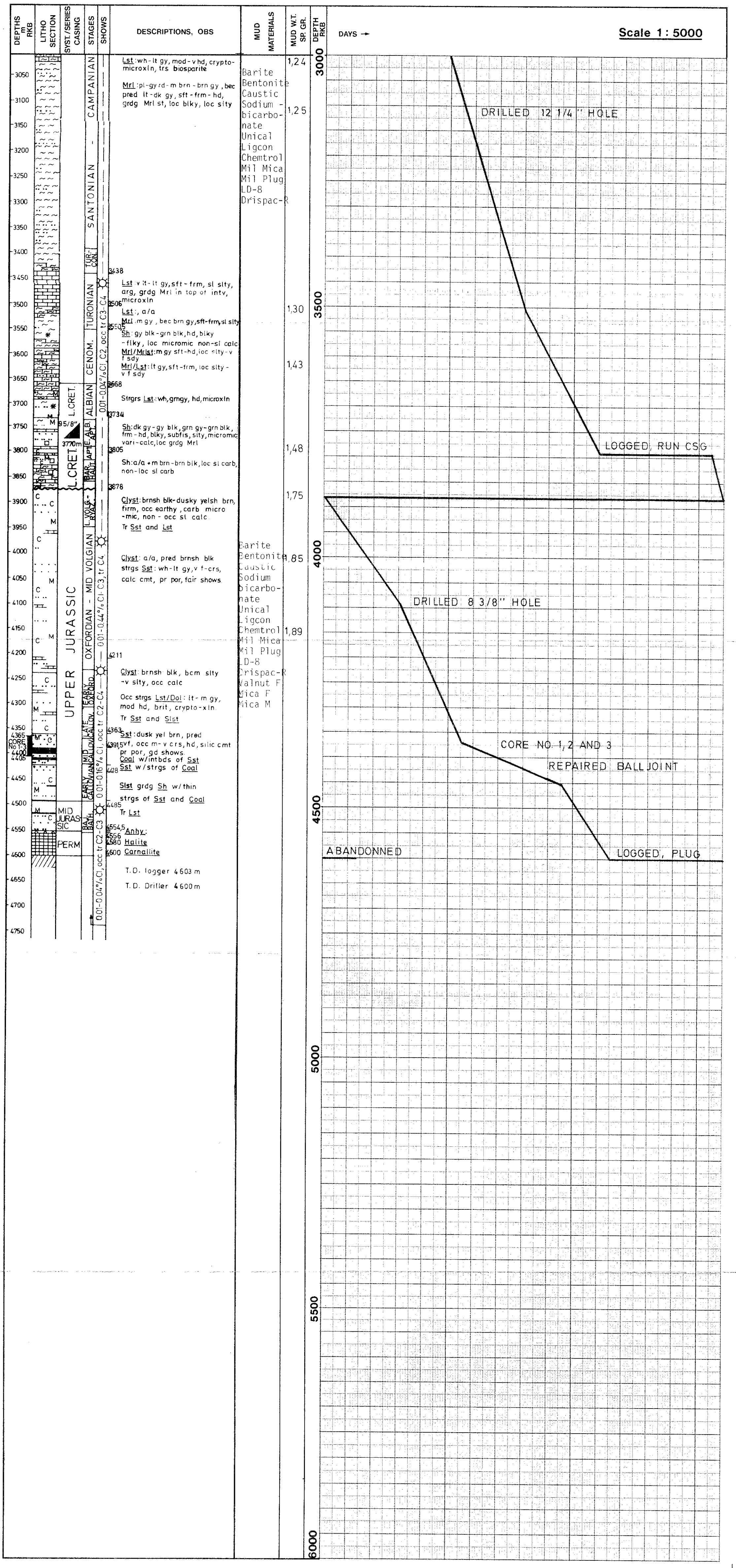
DRILLING PROGRESS, WELL 15/2-1

(CONTINUED)



ESTIMATED FINAL Cost Report

Period from	to	Total operation days	Sign.	Date
19.11.81 11.00 hrs.	25.2.82 15.00 hrs.	98,166	TSt	14.5.82
Well no.	Acc.no.	Rig name		
15/2-1	31500	Nortrym		
Orig.budg.dated	M.Nkr.	Based on		Oper.days
1.10.81	101		110	

Sub. no.	Item	Cost in period 1000 Nkr.	Cumulative costs 1000 Nkr.	Budget revision 1000 Nkr.	Costs in % of budget	Remarks
	LOCATION EXPENSES:					
105	Site-survey		430	500		
106	Resurvey		-	200		
120	Locationing		60	200		
125	Location Clean-up		-	200		
130	Miscellaneous		-	200		
	RIG:					
210	Rig Contract		48.000	55.000		
212	Reimbursables		500	400		
	SUPPLIES:					
310	Bits		1.400	1.500		
311	Coring Equipment		200	400		
312	Drilling Tools		2.000	1.800		
313	Fishing Tools		-	-		
320	Casing		4.700	5.100		
321	Casing Equipment		250	250		
322	Test Tubing & Equipment		-	-		
330	Mud Products		3.300	2.800		
332	Cement		1.150	1.100		
340	Wellheads		1.600	1.000		
395	Fuel and Greases		5.000	5.000		
398	Miscellaneous		350	300		
	SERVICES:					
405	Helicopter		2.050	1.700		
410	Supply and Standby Ships		6.000	5.000		
415	Mud Engineering		365	350		
420	Mud Logging		960	1.100		
425	Cementing		670	750		
430	Logging		4.750	5.000		
431	Velocity Services		-	100		
435	Fishing		-	-		
440	Fishing Tool Rentals		-	-		
444	Casing Services		305	300		
445	Casing Cutting		125	150		
446	Tubular Inspection		50	100		
450	Coring		100	100		
455	Testing		-	-		
460	Test Tool Rentals		345	300		
470	Diving		475	550		
475	Radioservice		225	175		
480	Meteorological Service		35	40		
485	Catering		215	350		
490	Miscellaneous		250	270		
	OPERATORS COSTS:					
510	Mobilization Costs		740	825		
519	Rig Insp. NT. Febr. 1981		1.615	2.000		
515	Repair Costs		-	-		
520	Insurance		-	-		
530	Base		1.470	1.760		
540	Laboratory Studies		300	300		
550	Onshore Drilling Supervision		980	1.100		
555	Onshore Geological Supervision		220	550		
560	Offshore Drilling Supervision		1.430	1.430		
570	Offshore Geological Supervision		750	550		
580	Exploration Assistance		100	100		
595	Miscellaneous		100	100		
	Total		93.565	101.000		

1925 HK 12.79 1000

C. Formation evaluation

Hugin and Sleipner formation

Log interpretation was performed over the intervals 4356-4485 m, Hugin formation, and 4485-4554.5 m, Sleipner formation.

The following logs were used, FDC/CNL, GR and ISF/SONIC. Due to sticking on FDC/CNL, the Sonic log was used to calculate average porosities.

Two cores were cut, core no 1, 4365-4373 m and core no 2 4375-4390 m. Routine core analysis were performed, 3 plugs per m on both cores. The analysis show that the formations are of low porosity with very low permeability. Traces of residual oil are reported.

37 m of sandstone with a clay content below 40% were found in the Hugin formation. In the Sleipner formation 10 m of sandstone were found. Both formations are water bearing, and the average porosity is very low. The results are shown in Tab. 1.

Two RFT-runs were performed and 10 tool settings/pressure tests were attempted in the Hugin formation. All tests showed the formation to be tight, which confirms the results of the log interpretation. The RFT results are listed in Tab. 2.

WELL 15/2-1

Results from log interpretation and core analysis:

Formation	Hugin	Sleipner
Top , m RKB	4356	4485
Base , m RKB	4485	4554,5
Sandstone thickness, m	37	10
Average porosity, %		
logs	8	11
cores	8.9	
Average water saturation logs,%	90	87
Average permeability cores, md	0.348	

The intervals with a clay content below 40% are defined as sandstone.

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Results from RFT-test run 1 and 2

Depth (m)	P_{H1}	P_{H2}	P_{form}	Comments
4365,3	11985	11992	-	Tight formation
4367,7	12004	12008	33	"
4369	12012	12017	38	"
4406,8	12126	12132	300	"
4407,7	12130	12135	98	"
4408	12129	12132	-	Seal Failure
4419	12235	12244	120	Tight formation
4417,5	12235	12243	12144	Tight/seal failure?
4416,7	12237	12237	-	Seal failure
4416,3	12236	12238	12164	Tight/seal failure?

P_{H1} = Hydrostatic pressure before pre-test
P_{H2} = " " after "

Texas Tech

Completion Log

Well **15-1**

Core Recovery
Core Analysis
Drill Stem Test
Mud Log
Electric Log
Completion Report
Completion Log
Completion Log
Completion Log