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FINAL WELL REPORT

GEOLOGICAL AND ENGINEERING

STATOIL/SAGA/AMOCO/DEMINEX/

TEXAS EASTERN/AMERADA

1 - APR 1980

WELL 34/4-1

LICENSE 057

SANDVIKA, MARCH 1980

Bl.nr. 803. Werner & Co., Oslo

CONTENTS

PART 1

GEOLOGY AND GEOPHYSICS

Bl.nr. 803. Werner & Co., Oslo

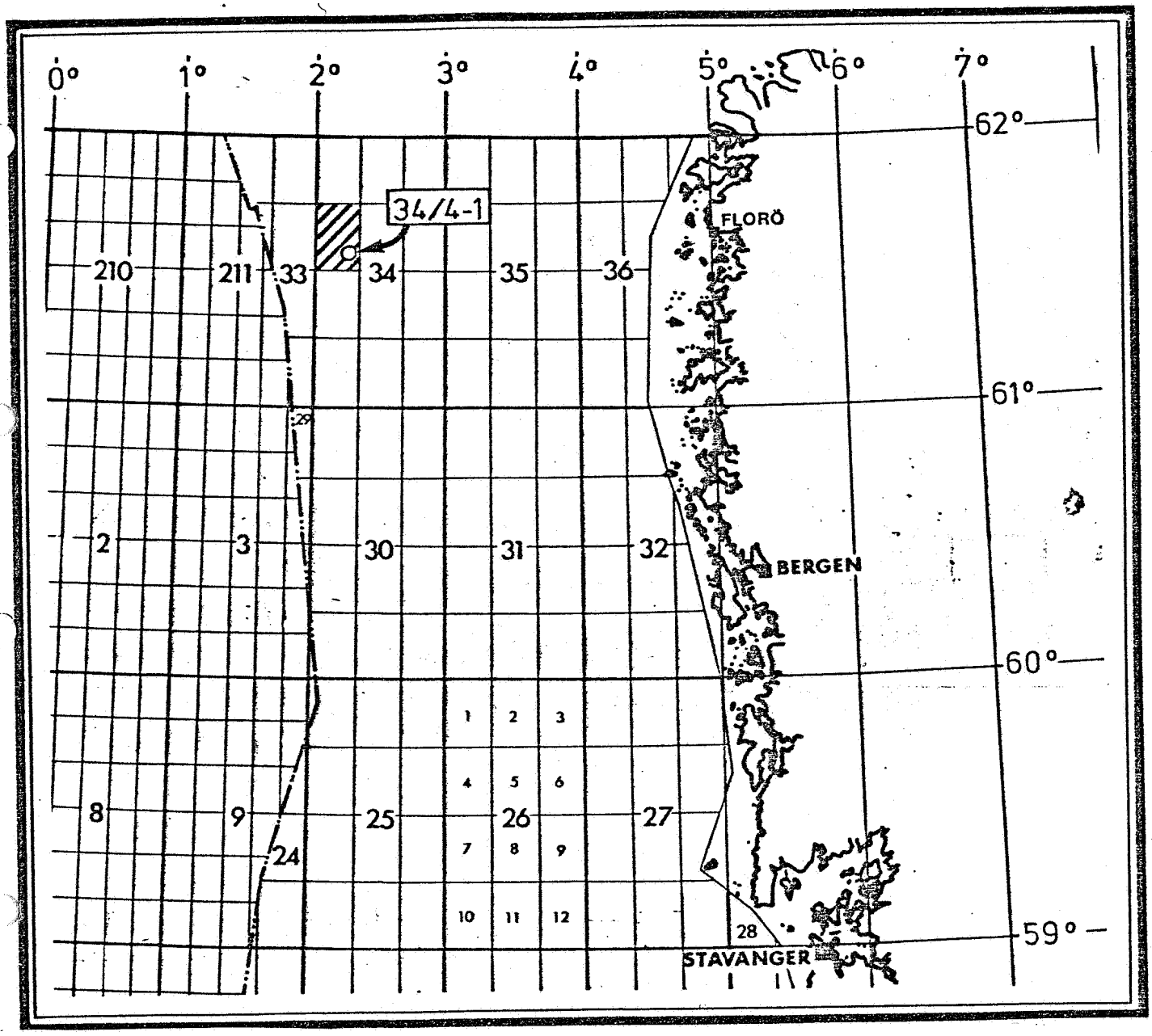


Fig. 1.1 Location of well 34/4-1

1.1. KEY DATA SUMMARY

1.1.1. Geographic Situation

The exploratory well 34/4-1 was drilled in the northern North
./. Sea, approximately 160 km west of Florø (fig. 1.1).

Location coordinates:

Latitude: 61° 32' 49.23" N
Longitude: 02° 16' 23.66" E

Water depth: 377 m.

1.1.2. Objectives

The objective of well 34/4-1 was to test the stratigraphic sequence below the Base Cretaceous Unconformity.

The primary target was the Intra Triassic "Carnian Sandstone", which is known from two wells in block 33/12 where it constitutes more than 100 m silty, argillaceous, partly calcareous cemented sandstone.

The secondary targets were possible reworked Upper Jurassic sandstones immediately below the Unconformity, and by possible sands associated with stratigraphically undefined seismic reflectors between Base Cretaceous and Carnian level.

1.1.3. Sampling

The following samples were collected:

34/4-1 Original hole

3 sets of washed and dried cuttings, and 3 sets of parallel wet cuttings.

10 m	intervals from	530 m	to 1980 m
5 m	intervals from	1995 m	to 2475 m
3 m	intervals from	2475 m	to 2490 m
1 m	intervals from	2490 m	to 2509 m
3 m	intervals from	2514 m	to 2961 m

Canned samples were collected at 30 meter intervals down to 2000 m, below at 15 meter intervals.

One conventional core was cut (core No. 2) (See table 1.1.)

34/4-1 ST

Three sets of washed and dried cuttings, and 3 sets of parallel wet cuttings was collected.

5 m intervals from 2345 m to 2485 m
3 m intervals from 2485 m to 2910 m

9 conventional cores (core No. 3-11) were cut (see table 1.1)
2 runs were made with the CST-tool (table 1.2)

1.1.4. Special Analyses

The following analyses are done on well samples and well log data:

Robertson Research International Ltd.
- Biostratigraphy:
  34/4-1: 530 - 2961 m RKB
  34/4-1 ST: 2343 - 2910 m RKB
- Geochemistry
  34/4-1: 2000 - 2961 m RKB

Schlumberger
- Coriband, including NGT.

Dr. T. Elliott
- Facies analysis of cored Triassic section.

T. Bjærke
- Palynology of the Triassic section.

Geco
- Formation water analysis.
- Formation factor on core plugs.
- Horizontal and vertical porosity/permeability on core plugs.
- Residual fluid saturation measurements.

Institutt for Petroleumsteknologi og Anvendt Geofysikk, NTH
- PVT-analyses

Corelab, Aberdeen
- PVT-analyses

Amoco Research, Tulsa
- Stimulation Study

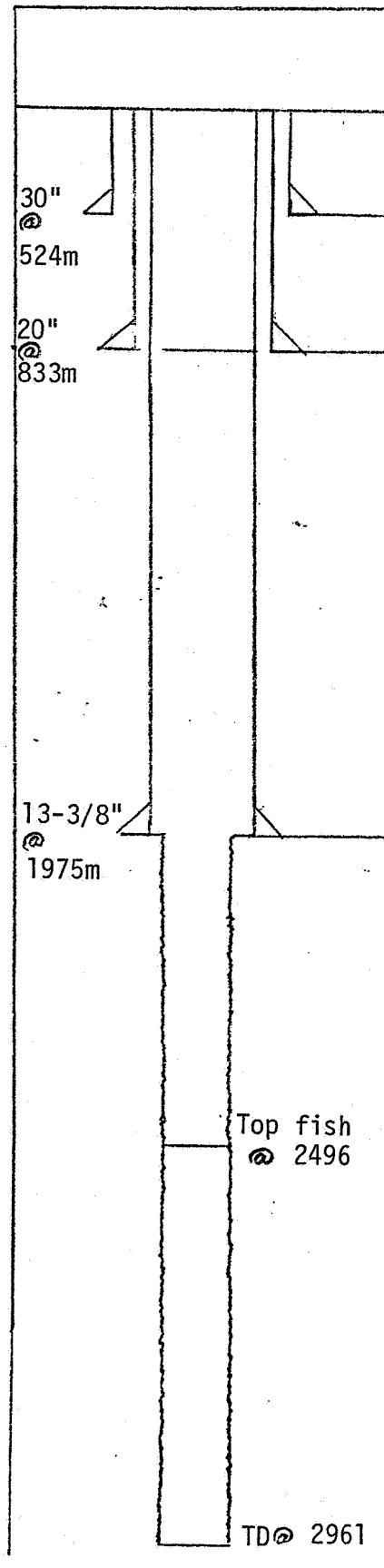
Saga Petroleum
- Petrography and Diagenesis of the Triassic Rocks in Well 34/4-1
- Formation Pressure Evaluation, 34/4-1.
- Test report of well 34/4-1.

Exploration Logging
- Final well report 34/4-1.

Det Norske Veritas
- Determination of specific gravity of 2 oil samples.

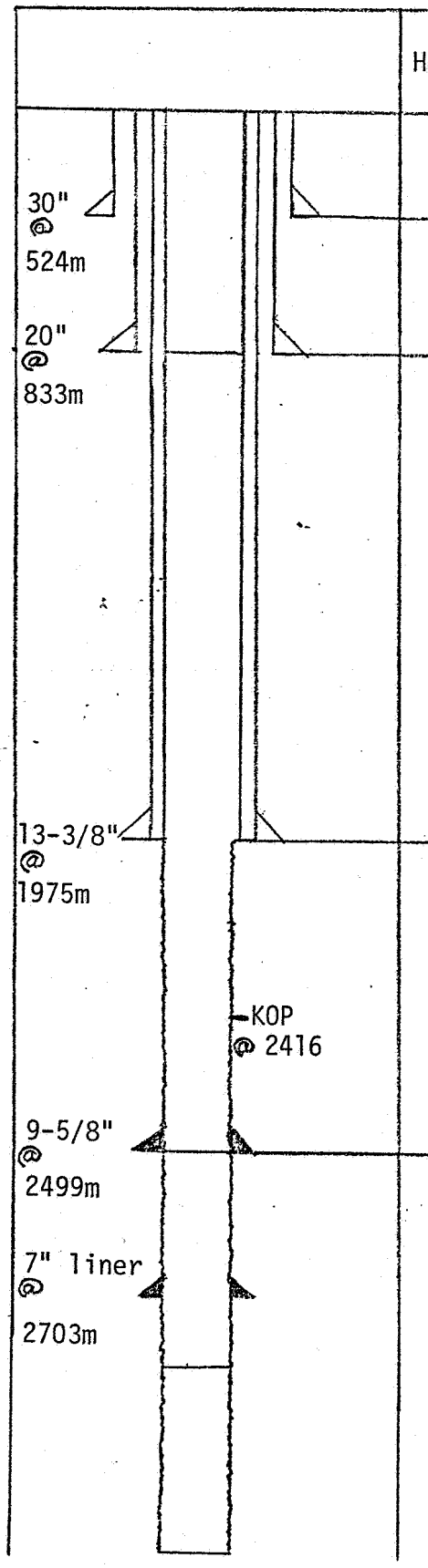
1.1.5

a) Wireline Logging, 34/4-1



Hole Size	Logged Interval m RKB	Type of Log	Run No.	
36"	397 - 521	GR	1	22/7
17½" opened to 26"	521 - 844	ISF-SONIC-GR	1	22/7
17½"	830 - 1988	ISF-SONIC-GR	2	7/8
12-1/4"	1975 - 2494	ISF-SONIC-GR	3	18/9
	1876 - 2493	HDT	1	19/9
	403 - 1975	CBL	1	19/9
		Velocity Survey	1	19/9

b) Wireline Logging, 34/4-1 ST (KOP@ 2416 m RKB)



	Hole Size	Logged Interval m RKB	Type of Log	Run No.	
	12-1/4"	1975 - 2515	ISF-SONIC-GR	4	30/9
		2390 - 2519	FDC-CNL-GR	1	30/9
		2400 - 2518	MSFL	1	1/10
			RFT	1	1/10
			CST	1	1/10
	8-1/2"	2499 - 2669.5	ISF-SONIC-MSFL-SP-GR-CAL	5	18/10
		2500 - 2671	FDC-CNL-GR	2	18/10
			RFT	2	19/10
		2499 - 2914	ISF-SONIC-MSFL-SP-GR-CAL	6	24/10
		2499 - 2915.5	FDC-CNL-GR	3	25/10
		2499 - 2915.5	NGT	1	25/10
		2499 - 2911	DLL	1	26/10
		2499 - 2899	HDT	2	26/10
		1950 - 2499	CBL	2	25/10
			CST	2	26/10
			Velocity Survey	2	26/10

34/4-1

1.1.6. Testing

A. Drill Stem Tests

Two production tests were performed in this well.

DST 1 (2608 - 2613 m RKB):

The flow rate was approximately 11 m^3/day (79 bbls/day). A total of 1.65 m^3 (10.4 bbls) was recovered. The produced fluid was salt water (Cl-content 20000 ppm).

Flowing pressure	: 27600 KPa	(4000 psi)
Final close in pressure	: 37900 KPa	(5500 psi)
Estimated res. pressure	: 38300 KPa	(5550 psi)

DST 2 (2510 - 2536 m RKB)

Average final flow of 238 m^3/day of oil (1500 BOPD) through a 1/4" choke at a well head pressure of 17930 KPA (2600 psi).
Average GOR: 120 m^3/m^3 (735 scf/STB). Oil Gravity 0.82 g/cm^3 (41.7° API)
BHT: 94.4° C (202° F)

Flowing pressure	: 35030 KPa	(5079 psi)
Final close in pressure	: 38270 KPa	(5540 psi)
Estimated res. pressure	: 38260 KPa	(5548 psi)

Operator DST report distributed under separate cover.

B. RFT

See table 1.3.

1.1.7 Chronostratigraphic Summary

Tops	Depth (mRKB)	Thickness
Quaternary	402	196
Pleistocene	402	196
TERTIARY	598	1190
Pliocene	598	522
Miocene	1120	91
Oligocene	1211	189
Eocene	1400 (?)	285
Paleocene	1685	103
CRETACEOUS	1788	720
Maastrichtian	1788	72
Campanian	1860	413
Santonian	2273	111
Coniacian	2384	106
Turonian	?	
Albian	2490	5
Aptian	?	
Barremian	2495	13
TRIASSIC	2508	453+
Rhaetian	2508	160
Ladinian	2668	?
Anisian	?	

1.1.8 Lithostratigraphic Summary

Tops	Depth (m RKB)	Thickness
Nordland Gp	402	809
Hordaland Gp	1211	474
Rogaland Gp	1685	103
Balder Fm	1685	30
Lista/Sele FM	1715	73
Shetland Gp	1788	702
Form. E	1788	237 (?)
Form. D	2025 (?)	465 (?)
Cromer Knoll Gp	2490	18
Cormorant Fm	2508	453+

CORE INFORMATION 34/4-1 & 34/4-1 ST

ORIGINAL HOLE

	CUT	RECOVERED	RECOVERY
CORE 1 :	misrun		
CORE 2 :	2509.2 - 2513.0	2509.2 - 2510.6	1.4 m - 28 %

SIDETRACKED HOLE:

	CUT	RECOVERED	RECOVERY	DEPTH CORRECTION	CORRECTED DEPTH (ISF SONIC RUN 6)
CORE 3 :	2516.0 - 2531.8	2516.0 - 2531.8	15.8 m - 100 %	+ 9.0 m	2525.0 - 2540.8
CORE 4 :	2531.8 - 2541.4	2531.8 - 2539.8	8.0 m - 83 %	+ 9.0 m	2540.8 - 2545.8
CORE 5 :	2541.4 - 2557.0	2541.4 - 2544.1	2,7 m - 17 %	+ 22.1 m	2563.5 - 2566,2
CORE 6 :	2557.0 - 2565.5	2557.0 - 2563.0	6,0 m - 71 %	+ 13.0 m	2570.0 - 2576,0
CORE 7 :	2570.8 - 2589.8	2570.8 - 2589.8	19.0 m - 100 %	+ 5.2 m	2576.0 - 2595.0
CORE 8 :	2589.8 - 2608.8	2589.8 - 2608.8	19.0 m - 100 %	+ 5.2 m	2595.0 - 2617.0
CORE 9 :	2608.8 - 2615.3	2608.8 - 2614.7	5.9 m - 91 %	+ 5.2 m	2614.0 - 2619.9
CORE 10 :	2615.3 - 2617.6	2615.3 - 2617.3	2.0 m - 87 %	+ 5.2 m	2620.5 - 2622.5
CORE 11 :	2665.0 - 2674.8	2665.0 - 2674.6	9.6 m - 98 %	+ 7.0 m	2672.0 - 2681.6

TOTAL CUT IN 34/4-1 ST : 106.1 m

RECOVERED : 88.0 m - 83 %

Table 1.1

A total of 60 sidewall cores were attempted, with a recovery of 37 (62%).

Run No. 1

1	2480	Rec	U. Cret.
2	2485		
3	2490		
4	2495	Rec	E. Cret
5	2497	Rec	"
6	2498		
7	2499	Rec	"
8	2500		
9	2501	Rec	"
10	2502		
11	2503	Rec	"
12	2504		
13	2505	Rec	"
14	2506	Rec	"
15	2507	Rec	"
16	2507.5	Rec	Late Triassic
17	2508	Rec	
18	2508.5	Rec	"
19	2509	Rec	"
20	2510	Rec	"
21	2511		
22	2512		
23	2513	Rec	"
24	2514	Rec	"
25	2515	Rec	"
26	2516		
27	2517	Rec	"
28	2518	Rec	"
29	2520		
30	2521		

Table 1.2

Run No. 2

1	2677	Rec	? Middle Triassic
2	2681	Rec	- " -
3	2692	Rec	- " -
4	2702	Rec	- " -
5	2708		
6	2714	Rec	- " -
7	2727.1	Rec	- " -
8	2736.5	Rec	- " -
9	2745	Rec	- " -
10	2754		
11	2768.5	Rec	- " -
12	2775	Rec	- " -
13	2780	Rec	- " -
14	2787		
15	2797.5		
16	2797.5	Rec	- " -
17	2807.5	Rec	- " -
18	2811		
19	2813		
20	2815	Rec	- " -
21	2824		
22	2832	Rec	- " -
23	2839	Rec	- " -
24	2855	Rec	- " -
25	2873.5	Rec	- " -
26	2883		
27	2895		
28	2902		
29	2908		
30	2915	Rec	- " -

Table 1.2. cont.

REPEAT FORMATION TESTER

RUN NO.	TEST NO.	DEPTH (m RKB)	FORM. PRESS. (kPa, psi)	PRESS. GRAD. (SUBSEA) (kPa/m, psi/ft)
1	1	2512	28085 , 5522	15.3 , 0.68
	2	2516	38375 , 5564	15.3 , 0.68
2	1	NO SEAL TO FORMATION		
	2	2541	38435 , 5573	15.3 , 0.68
	3	NO SEAL TO FORMATION		
	4	2567.6	38760 , 5620	15.2 , 0.67
	5	NO SEAL TO FORMATION		
	6	NO SEAL TO FORMATION		
	7	2628	39150 , 5676	15.0 , 0.66
	8	2639.5	39260 , 5692	15.0 , 0.66
	9	NO SEAL TO FORMATION		

Table 1.3

1.2 Stratigraphy

1.2.1 General

The following interpretation is based on cuttings, sidewall cores and conventional cores, and on the reports prepared by Robertson Research and Dr. Trevor Elliott. The lithostratigraphy is according to Deegan and Scull (1977).[1)]

1.2.2 Cormorant Formation (2508 m - TD RKB)

A. Lithology

The Triassic deposits are tentitatively assigned to the Cormorant Formation in spite of the partly uncharacteristic lithology encountered.

The upper part of the sequence is dominated by sandstones: clear to light grey, very fine to medium,occasionally coarse grained, moderate to well sorted, angular, micaceous and frequently calcite cemented. Siltstones, shales and limestones are found interbedded; the shales being light to dark grey, the limestones white and micritic.

From 2745 m and downwards the sediments are more argillaceous. The clay is found both interbedded and interstitial.
The sands, where present, are still generally fine grained and well sorted, but a slight increase in roundness is noted from 2797 m RKB.

Towards the bottom of the sequence, the lithology consits of a red marl, apparently corresponding to the Intra-Triassic seismic reflector at 2894 m. Interbedded sandstone stringers are clear to red-brown, fine to medium grained and fairly well sorted. This lithology continues to TD (2961 m, 2916 m ST RKB).

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1) Deegan, C.E. and Scull, B.J., 1977: A Standard Lithostratigraphic Nomenclature for the Central and Northern North Sea. Institute of Geol. Sciences, Report 77/25, 36 p.

B. Thickness

The total thickness of the Triassic sequence penetrated is 453 m.

C. Boundaries

No Jurassic deposits were penetrated in 34/4-1. Thus the Top Triassic coincides with the Base Cretaceous unconformity (2508 m RKB) where Lower Cretaceous limestones, marls and claystones lie directly on Triassic siltstones.

D. Age

Total lack of microfauna and scarce palynological evidence, make any detailed age-determination difficult.

No age younger than Early Rhaetian is established for the deposits just below the Base Cretaceous Unconformity. The upper 160 m are assigned to the Late Triassic (Early Rhaetian/Norian/Carnian). Middle Triassic age is suggested for the next 150 m.

Due to unsuitable lithologies below 2817 m RKB, no samples were processed from this section for either palynology or micropaleotology. Triassic age is assumed from the incoming of red and orange quartz grains.

E. Depositional Environment

Based on the cored intervals in the Triassic, Dr. T. Elliot has performed analyses of facies and depositional environment.

Unlike the typical continental redbeds generally found in other wells in the area, a definite marine influx is recorded in 34/4-1.

Dr. Elliot has recognized the following 5 intervals (depths - RKB):

2525.0 m - 2556.1 m: High intertidal/supratidal mud-flats and sandflats, alternatively back barrier of a lagoon.

2556.1 m - 2602.7 m: Subtidal sandflats, mouth shoal areas.

2602.7 m - 2616.5 m: Low intertidal/subtidal channels

2616.5 m - 2622.5 m: Fluviale/estuarine channels.

2672.0 m - 2681.6 m: Intertidal channels, possibly estuarine.

This interpretation agrees fairly well with the results obtained from biostratigraphical studies by Robertson Research.

Their interpretation establishes a marginal marine to non-marine, fluvitale/lacustrine environment down to 2617.6 m RKB. The presence of a very weak marine influence is indicated by the occurence of single specimens of Tytthodiscus? faveolus (2545.70 m). Cymatiosphaera sp. (2547.7 m) and Tasmanites sp. (2578.7 m).

From 2617.6 m RKB through the rest of the Triassic sediments, a non-marine, terrestial to fluviatile/lacustrine environment is assigned

1.2.3 Cromer Knoll Group (2490 - 2508 m RKB)

A. Lithology

The Cromer Knoll Gp consists of interbedded grey, soft, calcareous claystones, reddish brown, silty marl and chalky, grey, soft limestones. The lithology is probably equivalent to "Rødby marl".

B. Thickness

The unit thickness is 18 m in this well.

C. Boundaries

The upper boundary to the Shetland Gp is characterized by a gradual downward decrease in gamma ray values and sonic transit time, and a gradual increase in resistivity. The boundary may represent a hiatus.

D. Age

The sediments of the Cromer Knoll Gp probably belong to the late Early Cretaceous, i.e. from Barremian to Aptian - Albian in age. Neocomian age is tentatively suggested for the lowermost beds.

E. Depositional Environment

The depositional environment changes from low energy inner shelf to outer shelf upward through this sequence.

1.2.4. Shetland Gp (1788 - 2490 m RKB)

A. Lithology

This unit consits of a monotonous sequence of gray, soft and partly sticky claystones, with interbeds of partly dolomitic limestones and sandstones.

B. Thickness

The Shetland Gp amounts to 702 m. Tentatively the lower 465 m is assigned to Formation "D", and the upper 237 m to Formation "E".

C. Boundaries

The top of Shetland Gp is picked at a downward increase in resistivity as well as interval velocity. Also, an increase in gamma ray values is evident. The boundary between formation D and E is picked at a less prominent downward increase in resistivity and a decrease in interval transit time.

D. Age

The age of the Shetland Gp ranges from Turonian to Maastrichtian.

E. Depositional Environment

Robertson Research interprets all sediments in the Shetland Gp to have been deposited in an outer shelf environment with an open marine influence.

1.2.5 Rogaland Gp (1685 - 1788 m RKB)

A. Lithology

The Rogaland Gp is characterized by tuffaceous claystones in the upper part (Balder Fm) and silty to sandy partly tuffaceous claystones with interbedded limestone stringers in the lower part (Lista/Sele Fm).

B. Thickness

The Rogaland Gp is 103 m thick, of which the Balder Fm constitutes 30 m and the Lista/Sele Fm 73 m

C. Boundaries

The top and bottom of the Balder Fm are clearly defined on the well logs as both the velocity and resistivity have higher values than in over- and underlying units.

D. Age

The Rogaland Gp is of Paleocene age. Danian beds are apparently missing.

E. Depositional Environment

The Rogaland Gp sediments were laid down in a deep water environment. Volcanism is evident in Late Paleocene.

1.2.6 Hordaland Gp (1211 - 1685 m RKB)

A. Lithology

Semiconsolidated claystones are typical of the Hordaland Gp. Due to a very high content of smectite clays, swelling easily occur which results in caving. This caving can be misinterpreted as "spalling shale" indicative of underbalanced drilling.

Towards the base traces of tuff occur. Limestone stringers occur throughout.

B. Thickness

The thickness of this unit is 474 m.

C. Boundaries

The upper boundary to the Nordland Gp is a very well defined unconformity, evident from seismics and well logs as well as mineralogical data. Both formation velocity and resistivity decreases when entering the Hordaland Gp from the Nordland Gp.

D. Age

The age of this interval spans from Early Eocene to Oligocene. The age of the unconformity which constitutes the upper boundary is probably Intra Chattian.

E. Depositional Environment

The sediments were deposited in a deep water environment, partly reducing conditions and hot climate.

1.2.7 Nordland Gp (402 - 1211 m RKB)

A. Lithology

The Nordland Gp consists mainly of unconsolidated claystones with two sand beds, 30 m and 15 m thick, in the lowermost part. The claystones are mainly grey, partly sticky and non-calcareous. Traces of quartz sand grains, metamorphic rock fragments (phyllites, schists), shell fragments, microfossils, pyrite, mica and lignite appear throughout.

B. Thickness

The unit comprises 809 m. Altogether the thickness of the Cenozoic, including Rogaland Gp, Hordaland Gp and Nordland Gp, is 1391 m.

C. Boundaries

The upper boundary is the sea bed.

D. Age

The Nordland Gp sediments are largely of Pliocene age with thin Miocene beds at the base and up to 200 m of Quaternary sediments at top.

The unconformity at 1120 m RKB is probably of Late Miocene age.

E. Depositional Environment

The sediments were deposited in a marine outer shelf environment, in a temperate climate and oxydizing conditions.

1.3 Structural Setting

Well 34/4-1 is located on the NE culmination of the Statfjord, Murchison and 34/7 structural trends. The structure is part of the rotated fault block systems on the Tampen Spur.

Closure is defined by a major down-to-the-east fault zone. The arcuate nature of the faults combined with the west dipping beds in the pre Cretaceous, provides closure to the east and north.

Closure to the west is provided by the base Cretaceous Unconformity which is dipping gently to the west. Although the structure at Base Cretaceous raises southwards into block 34/7, the Triassic strata has no element of northerly dip. The south structural elevation is a result of increased section successively including more Upper Triassic and Jurassic. The nature of the south seal is partly stratigraphic. The Cretaceous constitutes sufficient seal.

A hiatus ranging from Late Triassic to Early Cretaceous, combined with an apparent leaching of the Triassic sands, indicate subareal exposure of the crest of the structure. The plane top of the structure is also non-typical for the structural configuration of the rotated faultblocks on the Tampen Spur.

1.4 Sample Analyses

1.4.1. Sidewall Core Description.

Run 1: Attempted 30, recovered 18.

Run 2: Attempted 30, recovered 19.

Depth in meters	Description
2480	Claystone, dark grey to olive grey, very calcareous, slightly micaceous, firm.
2495	Marl, reddish brown, soft to firm.
2497	Marl a.a., traces of silt, grey, loose.
2499	Limestone, chalky, yellowish grey, soft.
2501	Limestone, medium grey to light olive grey, micaceous, soft to firm.
2503	Limestone, very light grey, soft to firm, grey streaks of claystone.
2505	Limestone, micritic, offwhite, soft to firm, alternating with claystone, dark grey, soft, very calcareous.
2506	Claystone, dark grey to olive grey, soft, slightly calcareous and micaceous, with very thin streaks of yellowish grey limestone.
2507	Claystone, olive grey, soft to firm, highly micaceous, weakly to moderately calcareous. Interbedded with grey siltstone.

Depth in meters	Description
2507.5	Siltstone, yellowish grey, hard and friable, micaceous, calcite cemented.
2508.5	Siltstone a.a.,
2509	Siltstone a.a
2510	Limestone, silty and sandy, yellowish grey, firm to friable, micaceous.
2513	Sandstone, yellowish grey, very fine to fine, angular, micaceous, moderately calcareous, interbedded with light brown claystone.
2514	Claystone, olive grey, interbedded with siltstone, and sandstone, very fine to fine, yellowish grey, friable.
2515	Siltstone, yellowish grey, firm, calcite cemented, alternating with claystone, yellowish grey to dark grey.
2517	Siltstone a.a.
2518	Siltstone a.a., and sandstone, yellowish grey, very fine to medium, angular to subrounded, poorly sorted, loose to friable, calcite cemented.
2677	Sandstone, white to yellowish grey, fine to medium, angular, well sorted, micaceous, calcite cemented, partly argillaceous.
2681	Sandstone a.a.

Depth in meters	Description
2692	Sandstone, white to yellowish grey, lime to medium - occasionally coarse, mainly angular, friable, well sorted, slightly micaceous and calcite cemented.
2702	Sandstone, white to yellowish grey, fine to medium, angular, well to very well sorted, micaceous, calcite cemented.
2714	Sandstone, white to yellowish grey, very fine to fine, angular, very well sorted, micaceous, calcite cemented.
2727.5	Sandstone a.a.
2736.5	Sandstone a.a., friable.
2745	Sandstone white to olive grey, very fine to fine, partly silty, angular, very well sorted, slightly calcite cemented. Interbedded with claystone, white to olive grey, blocky, micaceous.
2768.5	Sandstone, white to olive grey, very fine to medium, angular, well sorted, slightly micaceous, calcite cemented.
2775	Sandstone a.a., with biotite.
2780	Shale, dark grey, soft to firm, moderately calcareous. Interbedded with sandstone, white to olive grey, very fine to fine, angular, micaceous, moderately calcite cemented.

Depth in meters	Description
2797.5	Sandstone, white to light grey, fine to medium, angular, well sorted, calcite cemented; scattered red stained grains, biotite, greenish chlorite alternating with shales, dark grey, silty and sandy, soft, moderately calcareous.
2807.5	Sandstone, yellowish grey, very fine to fine, subangular to subrounded, well sorted, micaceous, calcite cemented, occ. green chlorite flakes
2815	Sandstone a.a.
2832	Sandstone a.a.
2839	Sandstone a.a.
2855	Sandstone a.a.
2873.5	Sandstone a.a.
2915	Siltstone, greyish red, grading into very fine sand, argillaceous, slightly calcite cemented.

1.4.2. Wellsite core description

./. See enclosure.

The following reports are distributed under separate cover:

.....next page

Prepared by:	Report:	Completed:
Robertson Research International Ltd.	Saga Petroleum 34/4-1 Norwegian North Sea Well: Biostratigraphy of the interval 530 m - 2961 m and Saga Petroleum 34/4-1 ST Norwegian North Sea well: Biostratigraphy of the interval 2343 m - 2910 m.	January 1980
" " "	Report on a geochemical evaluation of the interval 2005 m to 2961 m in the Saga 34/4-1 well, Norwegian North Sea.	February 1980
Schlumberger	Computer processed interpretation, Coriband incl. NGT	30.11.1979
Exploration Logging Ltd.	Final well report 34/4-1	January 1980
Geco	Formation water analysis, well 34/4-1	31.1.1980
"	Evaluation of core data, well 34/4-1 (Formation factor and porosity reduction data)	1.2.1980
"	Core analysis results, well 34/4-1 (Horizontal and vertical porosity/permeability on core plugs and residual fluid saturation measurements)	October 1979
Institutt for petroleumsteknologi og anvendt geofysikk, NTH	PVT - analysis	March 1980

Prepared by:	Report:	Completed:
Corelab, Aberdeen	PVT - analysis	March 1980
Amoco Research, Tulsa	Stimulation study	Scope and timing not decided
Det norske Veritas	Determination of spesific gravity of 2 oil samples	25.10.1979
Dr. T. Elliott	Triassic Facies well 34/4-1	March 1980
T. Bjærke	Palynology of the Triassic section	May 1980
Saga Petroleum	Petrography and diagenesis of Triassic rocks in well 34/4-1	May 1980
" "	Formation pressure evaluation, 34/4-1	March 1980
" "	Test report of well 34/4-1	18.1.1980

1.5. Hydrocarbon Evaluation

1.5.1. Log Evaluation, Triassic

Schlumberger performed a normal Coriband log interpretation from 2505 m (rkb) to TD. The early versions were unacceptable and it was decided to incorporate the NGT log in the subsequent Coriband evaluation. This markedly imporved hydrocarbon bearing bed resolution. At present further studies are under way to better incorporate the NGT in the Coriband program. Formation Factor Analysis on core plugs are also being performed to check the resistivity readings. The below calculations must therefore be taken as preliminary.

The following cut off criteria has been applied. Porosity < 12 %, $V_{clay} > 70$ % and $S_w > 70$ %. Applying these parameters the lowest contributing zone in the well is from 2566 - 2568.5 m (rkb). DST 1 (2608 - 2613 m (rkb)) produced water only. Core plug measurements indicates better permeabilities than the DST calculations show.

Further petrophysical studies will be presented in separate reports.

A tentative OWC has been assumed at 2618 m (rkb) and has resulted in the following reserve parameters in the interval 2509 - 2618 m (rkb).

Net pay/gross sand = 0.22

Net sand/gross sand = 0.52

In the net pay section the following log parameters apply.

$\phi_{ave} = 15$ % $S_{wave} = 56$ %

The log derived porosities are generally lower than the core plug measurements.

Schlumberger net porosity meters from CPI listing : 12.4 m

Schlumberger net hydrocarbon meters from CPI listing : 2.6 m

1.5.2. Geochemical Evaluation

A geochemical evaluation of the interval 2005 m to 2961 m was performed by Robertson Research, with the following conclusions:

1. Oil-prone organic matter, if present, would be early mature over the Cretaceous interval from 2005 to 2505 metres and early to middle mature over the Triassic interval from 2505 to 2961 metres.
2. Any Jurassic sediments which were deposited and subsequently eroded were of no great thickness.
3. Migrant hydrocarbons have been detected over most of the analysed section. In the Cretaceous claystone section these are considered due to vertical migration from a presumed accumulation between about 2500 and 2700 metres.
4. No potential source rock horizons have been identified in either the Cretaceous or Triassic intervals.
5. Oil extracted from four samples appears to have been generated from sapropelic source rocks at fairly advanced levels of maturity. The composition of the deepest sample is unusual and suggests that alteration processess, possibly water flushing, are occurring.

1.6 Well Velocity Survey

The well velocity survey was carried out by SSL, London. Two well geophone surveys were run in the well - one in the original hole and one in the side tracked hole.

The data was digitally recorded on magnetic tape as well as on light-sensitive paper. This data was processed together with the Schlumberger sonic logs to produce a seismic calibration log.

The seismic section through the well is attached with the interval-velocity curve inserted. A time depth curve based on the check-shots is also attached.

Synthetic Seismograms

The velocity data combined with the Schlumberger density log was used for processing of synthetic seismogram. In addition to a zerophase and minimumphase, Ricken pulse, a best estimate of the pulse in the Statoil 76 reprocessed data through the well was used. The estimated pulse gives a reasonably good fit to the migrated seismic section. The synthetics indicates that the well is drilled on the downthrown side of the small Top Paleocene fault.

1.7 Conclusion.

The exploratory well 34/4-1 was the first well to be drilled under License 057.

The well penetrated Tertiary, Cretaceous and Triassic rocks as predicted, and meets the requirements set in the work programme for License 057.

The Triassic target proved geologically different from what was expected, with significant non red sand development of apparent marine tidal origin.

The prognosed "Carnian sandstone" may possibly be included in the penetrated sequence, but paleostratigraphic breakdown of the Triassic is difficult and in part inconclusive. The well is suggested to terminate in Middle Triassic rocks.

Secondary target for the well was reworked Upper Jurassic sediments immediately below Base Cretaceous. Such deposits were not established.

The Triassic sandstones contained oil over a column of more than 100 m. Two production tests were performed, the upper oil test flowing 240 m^3 oil/day (1500 BOPD) at a wellhead pressure of 17930 kPa (2600 psi).
API gravity was 41^o and GOR 120 m^3/m^3

PART 2

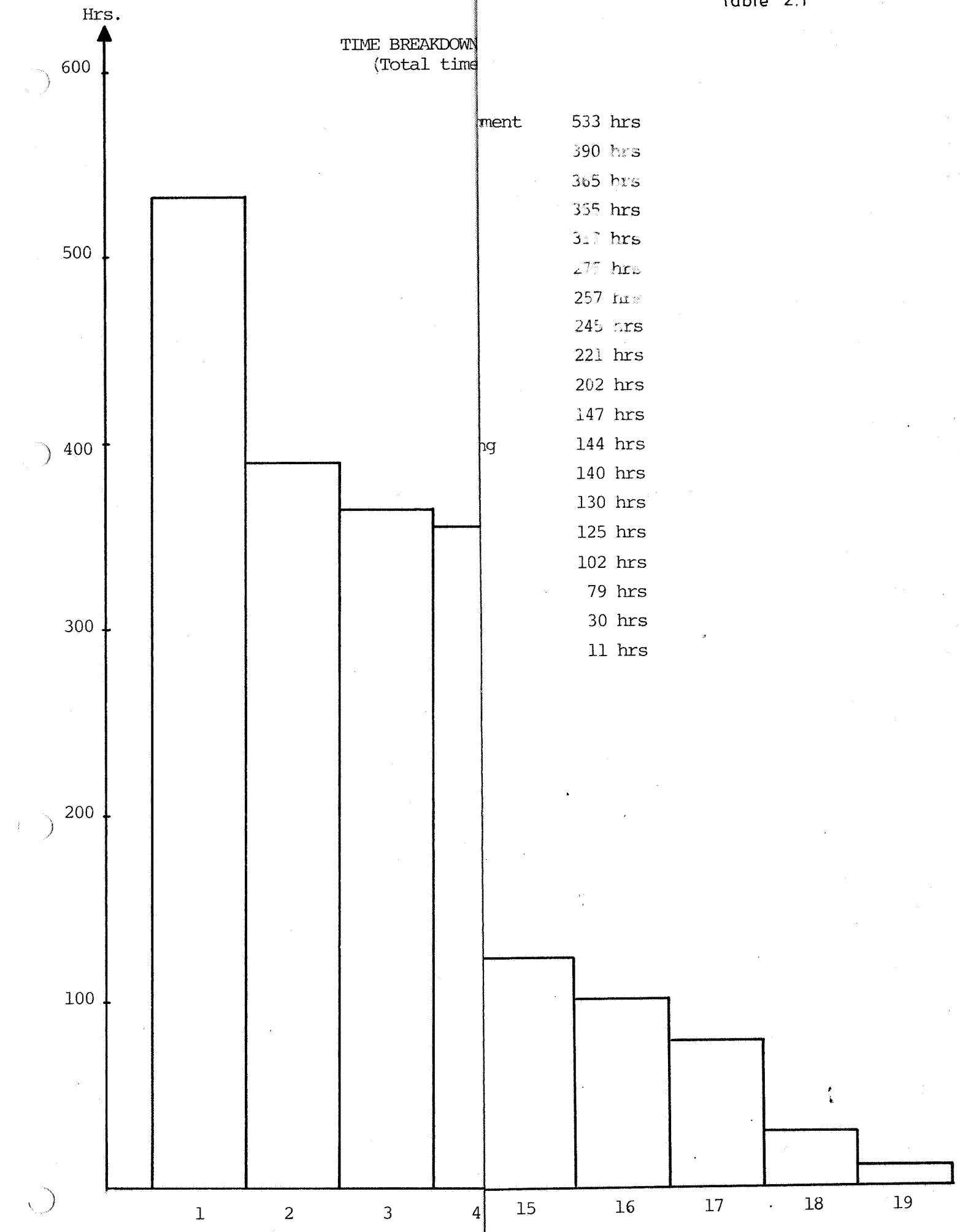
DRILLING AND ENGINEERING

Bl.nr. 803. Werner & Co., Oslo

2.1 PERTINENT INFORMATION

Well	:	34/4-1
Classification	:	Wildcat
Rig	:	Byford Dolphin
Rig heading	:	315^{o}
Rotary Kelly Bushing elevation	:	25m
Rotary Kelly Bushing to Seabed	:	402m
Water depth	:	377m
Total depth	:	2916m sidetracked hole
Date rig on location	:	July 4, 1979
Spud date	:	July 11, 1979
Date abandoned	:	Dec. 20, 1979
Date rig released	:	Dec. 20, 1979
Total days from mobilization to release of rig	:	170 days
Present status	:	Well final plugged and abandoned

table 2.1

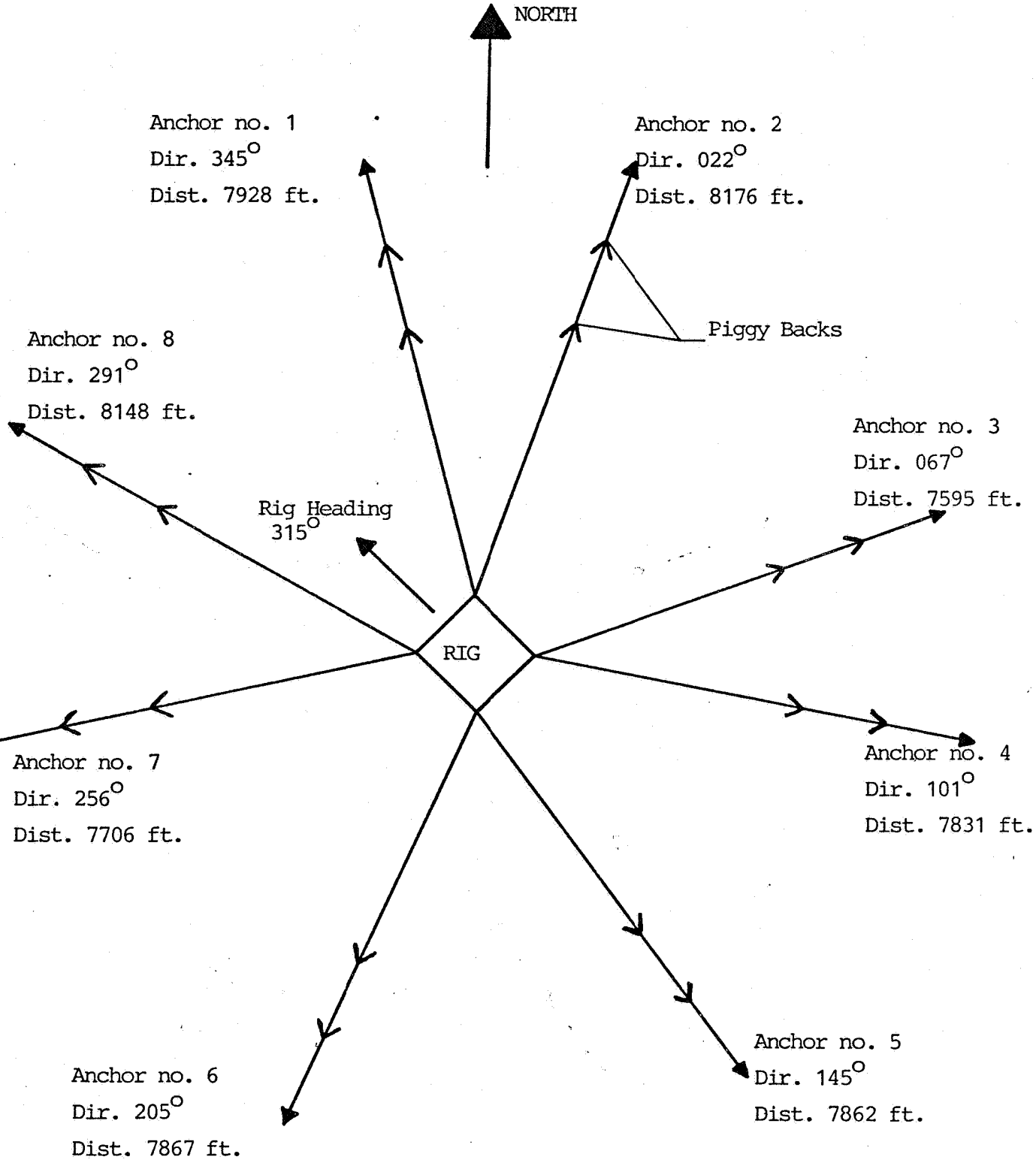


TIME BREAKDOWN
(Total time

ment 533 hrs
390 hrs
365 hrs
355 hrs
[illegible] hrs
[illegible] hrs
257 hrs
245 hrs
221 hrs
202 hrs
147 hrs
ng 144 hrs
140 hrs
130 hrs
125 hrs
102 hrs
79 hrs
30 hrs
11 hrs

ANCHOR PATTERN FOR WELL 34/4-1

Final fix: 61° 32' 49,23" N
02° 16' 23,66" E



Distance between piggy back anchors: 1500 ft.

Fig. 2.1

2.2. DRILLING

2.2.1 HIGHLIGHTS OF DRILLING INTERVALS

The following is a short summary of the drilling activities for each hole interval. For more detailed information, see Daily Activity Report, section 2.3.

36 inch hole: Spudded well at 16.30 hrs on July 11, 1979. Drilled to 524 m using 20 inch bit and 36 inch hole opener. Drilled hole with seawater while slugging with viscous mud. Displaced hole with viscous mud.
Landed and cemented 30 inch casing at 524 m.

26 inch hole: Ran 20 3/4 inch B.O.P. - stack and 24 inch riser. Drilled 17 ½ inch hole from 524 m to 845 m using mud. Logged hole and opened to 26 inch using underreamer. Displaced mud in riser with seawater and pulled B.O.P. - stack and riser.
Landed and cemented 20 inch casing at 833 m.
Ran 20 3/4 inch B.O.P. - stack and 24 inch riser.
Drilled 2 m of new hole and tested formation to 11.3 ppg equivalent mud weight.

17½ inch hole: Drilled 17½ inch hole from 847 m to 1991 m and logged.
Landed and cemented 13 3/8 inch casing at 1975 m.
Pulled 20 3/4 inch B.O.P. - stack and 24 inch riser.
Ran 13 5/8 inch B.O.P. - stack and 16 inch riser.
Drilled 3 m new hole and tested formation to 16.0 ppg equivalent mud weight.

12 1/4inch hole: Drilled 12 1/4 inch hole to 2962 m. Got stuck. Backed off drillpipe at 2484 m and sidetracked 12 1/4 inch hole from 2416 m to 2515 m. Logged hole.
Landed and cemented 9 5/8 inch casing at 2501 m.
Drilled 1 m new hole and tested formation to 15.4 ppg equivalent mud weight.

8½ inch hole: Drilled and cored 8½ inch hole from 2516 m to 2910 m.
Logged hole.
Landed and cemented 7 inch liner with shoe at 2703 m and liner hanger at 2185 m.
Conducted two drill stem tests.
Plugged and final abandoned well.

BIT & HYDRAULIC WELL DATA
WELL 34/4-1

Bit No.	Size	Make	Type	Jets	Depth out (mts)	Drilled (mts)	Hours	Mtrs / hr.	Accum drlg. hrs	Weight 1000 lbs.	R P M	Vert. dev	Pump press.	Pump SPM		Mud			Dull Cond.		
														No.1	No.2	Weight	Viscosity	Water loss	T	B	G
1	20	HTC	OSC 3A	3-20	524	122	25½	4,8	25½	8/10	70/100	½	1500	110	110	Sea Water		run	w/36"		H.O.
2	26	HTC	OSC 3	3-20	524	-	3	-	28½	Drill	cement	in	30"	casing		Sea Water					
3	17½	SMF	TS2	3-20	845	321	26½	12.1	55	4/15	85/110	½	2200	105	115	9,8	65	20	2	2	I
3	17½	SMF	TS2	3-20		Run with 26"		underreamer													
4	17½	HTC	OSC 3A	3-18	1223	378	31½	12.0	86½	20/30	90/110	½	3000	95	95	10.6	38	19	5	6	I
5	17½	smith	DGJ	2-20 1-18	1430	207	9	23.0	95½	25/30	90/110	½	3000	100	95	11.2	43	8	2	3	I
6	17½	smith	DGJ	2-20 1-18	1991	561	31	18.1	126½	25/30	90/110	1	3000	80	80	13.0	50	8	5	2	I
7	12 1/4	HTC	XIG	3-14	2138	147	11½	12.8	138	20/30	70/90	½	3000	50	60	14,8	48	9	5	5	I
8	12 1/4	HTC	XIG	3-15	2378	240	23	10.4	161	20/35	100/120	1	3000	50	55	14,8	55	6	6	6	I
9	12 1/4	HTC	XIG	3-15	2468	90	9	10.0	170	20/35	100/120	2	3000	50	55	14.9	54	7	4	4	I
10	12 1/4	HTC	XIG	3-15	2509	41	7½	5.5	177½	20/35	100/120	1½	3000	50	45	14.9	51	7	5	3	I
11	12 7/32	CHR	C22	None	No core, lost outer barrel before reaching bottom.																
11A	12 7/32	CHR	C22	None	2513	4	8½	0.5	186	30	110/130	1½	1500	-	70	14.8	55	6	New cond.		
12	12 1/4	HTC	J22	3-15	2962	489	103½	4.7	289½	30	60	2	3000	40	45	14.8	47	4.6	lost in hole		
13	12 1/4	HTC	XIG	3-15		Drill cement and polish plug.													6	2	I
14	12 1/4	HTC	XIG	3-18	2416	73	10½	7.0	300	3	Turbo	1 3/4	2900	-	102	14,7	60	6.6	3	3	I
15	12 1/4	HTC	XIG	None	2456	40	13½	3.0	313½	20	Turbo	4½	3000	-	95	14.8	54	6.8	3	4	I
16	12 1/4	HTC	XIG	3-16	2515	59	9	6.6	322½	30	120	6½	2700	-	115	14,7	55	6	3	3	I
17	8½	HTC	XIG	3-16	2516	1	½	2.0	323	20	100	6½	2800	90	-	14.7	55	5.3	5	3	I
18	8 15/32	CHR	C18P	None	2531	15	6½	2.3	329½	10	100		1300	45	-	14.8	45	6			
18A	8 15/32	CHR	C18P	None	2541	10	4½	2.2	334	15	100		1300	45	45	14.8	47	7			
18B	8 15/32	CHR	C18P	None	2557	16	8½	1.9	342½	15	90/110		1300	50	-	14.8	60	5.2			
18C	8 15/32	CHR	C18P	None	2566	9	4½	2.0	347	15	110		1300	50	-	14.6	60	5.2			
19	8½	HTC	XIG	3-13	2570	Corrected depth. Circulate and cond mud & ream.															
18D	8 15/32	CHR	C18P	None	2589	19	7½	2.5	354.5	15/20	120		1300	-	40	14.6	60	6			
18E	8 15/32	CHR	C18P	None	2608	19	7	2.7	361.5	15/20	120		1300	-	40	14.6	60	6	15% wear		
18F	8 15/32	CHR	C18P	None	2615	7	4	1.8	368.5	15/20	120		1300	-	40	14.6	62	4.6	45% wear		
18G	8 15/32	CHR	C18P	None	2617	2	2	1.0	370.5	10/20	120		1300	-	40	14.6	55	5	50% wear		

Table 2.2.

BIT & HYDRAULIC WELL DATA

WELL 34/4-1

Bit no.	Size	Make	Type	Jets	Depth out (mts)	Drilled (mts)	Hours	Mtrs./ hr.	Accum drlg. hrs.	Weight 1000 lbs	R P M	Vert. dev.	Pump press	Pump SPM		Mud			Dull. Cond.		
														No.1	No.2	Weight	Viscosity	Water loss	T	B	G
20	8½	HTC	J22	3-12	2665	48	9	5.3	379.5	20/30	60	6½	2900	-	80	14.7	55	6	2	2	I
21	8 15/32	CHR	C22	None	2675	10	5	2.0	384.5	18	60/90		1000	-	40	14.8	52	6	good		
20rr	8½	HTC	J22	3-11	2810	135	35	3.9	419.5	20/30	60		3000	36	36	14.7	56	5	4	4	I
22	8½	HTC	J22	3-11	2910	100	26½	3.8	446	20/30	60	8½	3000	72	-	14.8	52	5	1	1	I
23	8½	Smith	SVH	None	Drill	Cement															
24	8½	HTC	WR7																		
25	8½	Smith	SVH	Drill on junk																	
26	8½	HTC	XIG																		
27	5 7/8	HTC	OWV																		
28	8½	SEC	H77	Run with csg. scraper																	
29	5 7/8	HTC	OWV																		
30	8½	HTC	XIG	Drill rubber bull nose																	
31	5 7/8	HTC	OWV	Circulating																	

Table 2.2. Continued

Mudrecap

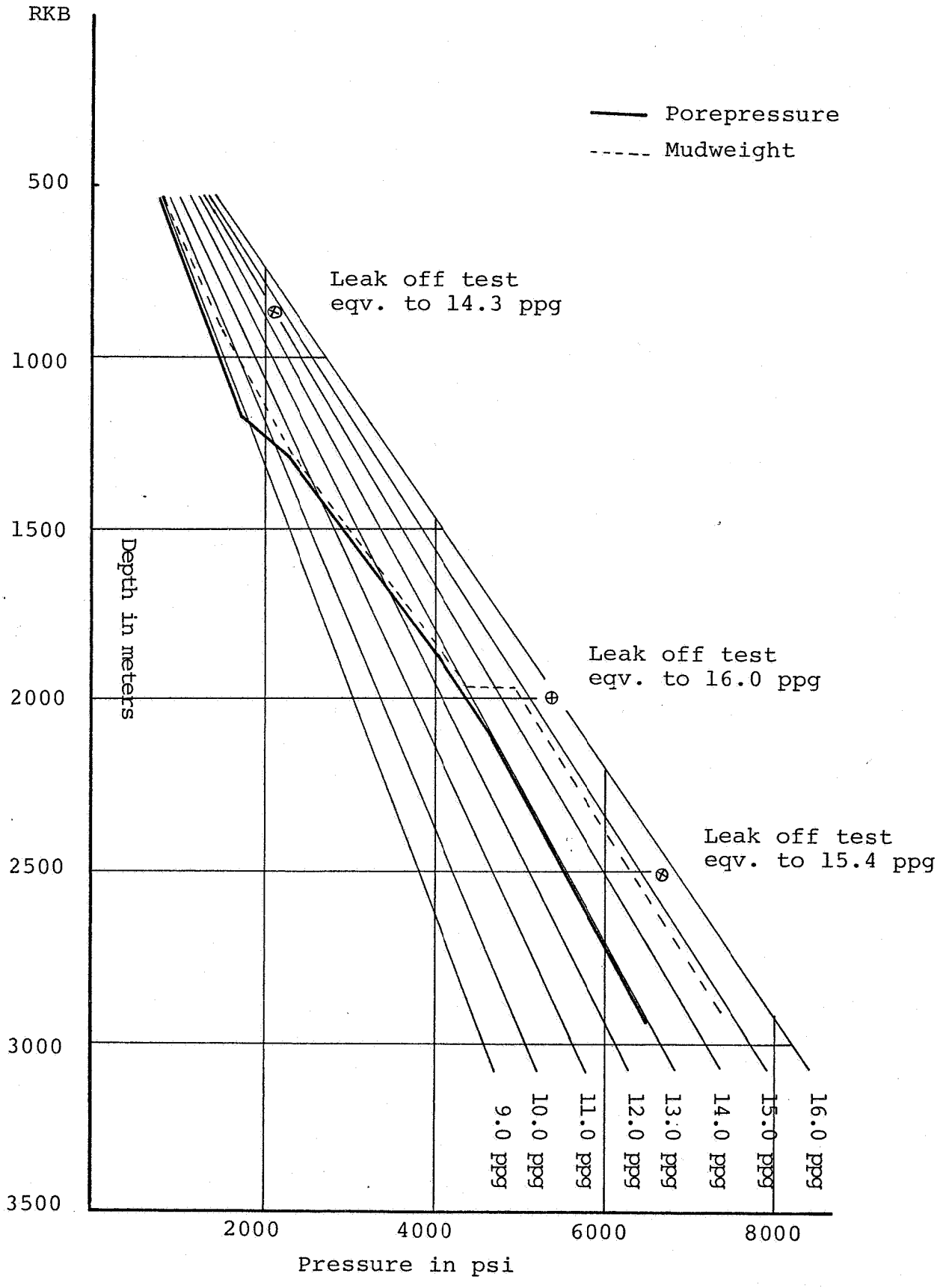
Casing Interval		Total	30"	20"	13 3/8"	9 5/8"	7"	Testing
Material	Unit/Weight	Quantity	Quantity	Quantity	Quantity	Quantity	Quantity	Quantity
Mil Bar	M Ton	2906,6		52,6	628	1449	513	261
Mil Gel	50 Kg	2663	275	843	382	683	330	150
Drispac Reg.	50 Lbs	252			49	120	42	41
Drispac Su.Lo.	50 Lbs	294			74	141	62	17
CMC Hv	25 Kg	180	10		160		10	
CMC Lv	25 Kg	123			7	116		
Unical	25 Kg	754			227	327	113	42
Lubrisal	55 Gal	59			4	42	13	
MD Detergent	55 Gal	30	2			26	2	
Drilling Detergent	25 Kg	27					27	
Alvar Detergent	25 Kg	50			26	24		
Caustic Soda	50 Kg	278		18	154	28	63	15
Caustic Soda	25 Kg	75				75		
Gypsum	50 Kg	339			339			
Bicarbonate	50 Kg	104				82	6	16
Soda Ash	50 Kg	100	12	2	5	73	8	
Nut Plug F	25 Kg	46				20	26	
Mica M	25 Kg	70				50	20	
W.O. Defoamer	5 Gal	9			7		1	1
Flosal	50 Lbs	383	231	121	15	16		
Sodium Nitrate	50 Kg	28				5	10	13
Mil Spot	50 Lbs	25				25		
Mil Free	55 Gal	1						1
$CaCl_2$	50 Kg	16						16
Lime	25 Kg	2	2					
Fiber Tex	40 Lbs	2				2		
Detergent Soap	40 Kg	25			25			
Salt Water Gel.	25 Kg	336	170	84	82			

Table 2.3.

Casing Interval		Total	30"	20"	13 3/8"	9 5/8"	7"	Testing
Material	Unit/Weight	Quantity	Quantity	Quantity	Quantity	Quantity	Quantity	Quantity
Mil Bar	M Ton	2906,6		52,6	628	1449	513	261
Mil Gel	50 Kg	2663	275	843	382	683	330	150
Drispac Reg.	50 Lbs	252			49	120	42	41
Drispac Su.Lo.	50 Lbs	294			74	141	62	17
CMC Hv	25 Kg	180	10		160		10	
CMC Lv	25 Kg	123			7	116		
Unical	25 Kg	754			227	327	113	42
Lubrisal	55 Gal	59			4	42	13	
MD Detergent	55 Gal	30	2			26	2	
Drilling Detergent	25 Kg	27					27	
Alvar Detergent	25 Kg	50			26	24		
Caustic Soda	50 Kg	278		18	154	28	63	15
Caustic Soda	25 Kg	75				75		
Gypsum	50 Kg	339			339			
Bicarbonate	50 Kg	104				82	6	16
Soda Ash	50 Kg	100	12	2	5	73	8	
Nut Plug F	25 Kg	46				20	26	
Mica M	25 Kg	70				50	20	
W.O. Defoamer	5 Gal	9			7		1	1
Flosal	50 Lbs	383	231	121	15	16		
Sodium Nitrate	50 Kg	28				5	10	13
Mil Spot	50 Lbs	25				25		
Mil Free	55 Gal	1						1
$CaCl_2$	50 Kg	16						16
Lime	25 Kg	2	2					
Fiber Tex	40 Lbs	2				2		
Detergent Soap	40 Kg	25			25			
Salt Water Gel.	25 Kg	336	170	84	82			

Table 2.3. Cont.

DIAGRAM SHOWING
ASSUMED POREPRESSURE VS DEPTH DURING DRILLING



SPERRY-SUN INTERNATIONAL
MAGNETIC MULTISHOT SURVEY

SAGA PETROLEUM CO. A/S
34/4-1

MSA-365-NOR
24 OCTOBER 1979

TOTAL DEPTH	DIRECTION DEG MIN	ANGLE DEG MIN	VERTICAL DEPTH	LATITUDE METRES	DEPARTURE METRES	VERTICAL SECTION	DOG LEG
1028	TIE COORDINATES		1028.20	0.36 N	0.23 W	0.03	0.00
1057	N 31 0 W	0 15	1056.50	0.41 N	0.26 W	0.03	0.27
1085	N 13 0 W	0 20	1084.80	0.55 N	0.31 W	0.07	0.13
1113	N 3 0 W	0 20	1113.10	0.71 N	0.33 W	0.14	0.06
1170	N 3 0 W	0 30	1169.70	1.12 N	0.36 W	0.36	0.09
1198	N 8 0 W	0 40	1198.00	1.41 N	0.39 W	0.50	0.19
1226	N 2 0 E	0 45	1226.29	1.75 N	0.40 W	0.69	0.16
1255	N 1 0 E	0 40	1254.59	2.10 N	0.39 W	0.89	0.09
1311	N 2 0 W	0 30	1311.19	2.68 N	0.40 W	1.22	0.09
1340	N 6 0 W	0 10	1339.49	2.84 N	0.40 W	1.31	0.36
1368	N 18 0 W	0 15	1367.79	2.94 N	0.43 W	1.35	0.10
1396	N 63 0 W	0 10	1396.09	3.02 N	0.48 W	1.35	0.19
1424	S 88 0 W	0 15	1424.39	3.04 N	0.58 W	1.28	0.14
1453	S 72 0 W	0 55	1452.68	2.97 N	0.86 W	1.01	0.73
1481	S 66 0 W	1 25	1480.98	2.75 N	1.39 W	0.45	0.55
1509	S 61 0 W	1 0	1509.27	2.49 N	1.93 W	-0.14	0.46
1538	S 47 0 W	0 30	1537.57	2.29 N	2.24 W	-0.51	0.57
1566	S 8 0 E	0 30	1565.87	2.08 N	2.31 W	-0.69	0.50
1594	S 28 0 E	0 40	1594.16	1.81 N	2.21 W	-0.76	0.28
1623	S 33 0 E	0 45	1622.46	1.51 N	2.04 W	-0.79	0.11
1651	S 58 0 E	0 45	1650.76	1.26 N	1.78 W	-0.72	0.35
1679	S 88 0 E	0 55	1679.06	1.15 N	1.39 W	-0.47	0.50
1707	S 88 0 E	0 50	1707.35	1.14 N	0.96 W	-0.13	0.09
1736	S 80 0 E	0 45	1735.65	1.10 N	0.57 W	0.17	0.15
1764	S 73 0 E	0 45	1763.95	1.01 N	0.22 W	0.41	0.10
1792	S 70 0 E	0 45	1792.24	0.89 N	0.15 E	0.63	0.04
1821	N 81 0 E	0 30	1820.54	0.85 N	0.44 E	0.85	0.43
1849	N 87 0 E	0 30	1848.84	0.88 N	0.69 E	1.07	0.06
1877	S 61 0 E	0 30	1877.14	0.82 N	0.92 E	1.22	0.30
1934	S 67 0 E	0 30	1933.74	0.61 N	1.36 E	1.46	0.03
1950	N 77 0 E	0 40	1949.74	0.60 N	1.52 E	1.59	0.75
1991	N 56 0 E	0 30	1990.93	0.75 N	1.90 E	1.99	0.20
2019	N 41 0 E	1 0	2018.93	1.01 N	2.16 E	2.35	0.58
2048	N 39 0 E	1 0	2047.93	1.40 N	2.49 E	2.84	0.04
2076	N 42 30 E	0 33	2075.92	1.68 N	2.73 E	3.20	0.49
2104	N 40 0 E	1 0	2103.92	1.97 N	2.98 E	3.57	0.49
2132	N 40 0 E	0 33	2131.92	2.26 N	3.22 E	3.94	0.49
2161	N 41 0 E	0 33	2160.92	2.47 N	3.40 E	4.21	0.01
2189	N 43 0 E	0 30	2188.91	2.66 N	3.57 E	4.46	0.06
2217	N 55 30 E	0 30	2216.91	2.82 N	3.76 E	4.70	0.12

SPERRY-SUN INTERNATIONAL
MAGNETIC MULTISHOT SURVEY

SAGA PETROLEUM CO. A/S
34/4-1

MSA-365-NOR
24 OCTOBER 1979

TOTAL DEPTH	DIRECTION DEG MIN	ANGLE DEG MIN	VERTICAL DEPTH	LATITUDE METRES	DEPARTURE METRES	VERTICAL SECTION	DOG LEG
2246	N 57 0 E	1 0	2245.91	3.03 N	4.07 E	5.08	0.53
2274	N 67 0 E	1 7	2273.91	3.27 N	4.53 E	5.59	0.24
2302	N 67 30 E	1 15	2301.90	3.49 N	5.06 E	6.15	0.15
2331	N 66 0 E	1 25	2330.89	3.76 N	5.68 E	6.81	0.18
2359	N 63 0 E	1 39	2358.88	4.08 N	6.36 E	7.55	0.27
2387	N 52 0 E	1 45	2386.87	4.53 N	7.06 E	8.38	0.37
2415	N 37 0 E	2 0	2414.85	5.18 N	7.69 E	9.27	0.60
2444	N 36 30 E	2 30	2443.83	6.10 N	8.37 E	10.35	0.53
2472	N 38 30 E	2 15	2471.80	7.02 N	9.07 E	11.46	0.29
2528	N 48 0 E	7 0	2527.61	10.16 N	12.29 E	15.90	2.61
2556	N 53 0 E	6 55	2555.40	12.32 N	14.91 E	19.28	0.67
2585	N 54 0 E	7 35	2584.17	14.50 N	17.85 E	22.94	0.71
2613	N 59 0 E	7 55	2611.91	16.57 N	21.00 E	26.71	0.82
2642	N 56 45 E	7 55	2640.64	18.70 N	24.38 E	30.70	0.33
2671	N 57 30 E	8 5	2669.35	20.89 N	27.77 E	34.73	0.21
2699	N 57 0 E	7 55	2697.08	23.00 N	31.05 E	38.62	0.20
2728	N 59 0 E	8 15	2725.79	25.16 N	34.51 E	42.70	0.46
2757	N 56 30 E	8 20	2754.49	27.39 N	38.04 E	46.87	0.39
2784	N 56 30 E	8 40	2781.19	29.59 N	41.37 E	50.86	0.38
2813	N 56 30 E	8 55	2809.85	32.04 N	45.07 E	55.29	0.26
2842	N 57 45 E	8 40	2838.51	34.44 N	48.79 E	59.72	0.33
2871	N 55 0 E	8 50	2867.17	36.89 N	52.46 E	64.13	0.47
2899	N 56 15 E	8 35	2894.85	39.28 N	55.96 E	68.37	0.34
2910	N 55 30 E	8 20	2905.73	40.19 N	57.30 E	69.99	0.76

THE DOGLEG SEVERITY IS IN DEGREES PER ONE HUNDRED FEET.
THE VERTICAL SECTION WAS COMPUTED ALONG N 54 57 E

BASED UPON MINIMUM CURVATURE TYPE CALCULATIONS. THE BOTTOM HOLE DISPLACEMENT IS 69.99 METRES, IN THE DIRECTION OF N 54 57 E
BOTTOM HOLE DISPLACEMENT IS RELATIVE TO WELLHEAD.
VERTICAL SECTION IS RELATIVE TO WELLHEAD.
0 - 2472 METRES SURVEYED BY EASTMAN WHIPSTOCK.

THIS IS TO CERTIFY SEA BED OF LOCATION 34-4-1 HAS BEEN INSPECTED BY U.T.V. AND DECLARED FREE OF DEBRE.

W Williamson — CAPTAIN

John S Brodie — RIG SUPT.

BYFORD DOLPHIN

DEC 16-79 — DATE.

2.3 Technical Drilling problems - well 34/4-1

General

When the "Byford Dolphin" in May, 1979 was selected to go on a three well contract for Saga, this was the only rig available that with relative ease could be rigged to drill in 1500 ft. of water.

The "Byford Dolphin" was built in 1973 under the name "Deep Sea Driller", and in March 1976 it went onto the shoreline rocks while under way to Bergen harbour during a storm. Badly damaged it was salvaged and set on bottom off a Norwegian fjord. About one year later, it was put in a Norwegian shipyard and rebuilt. During this three year period of downtime it seems that some of the equipment had been badly maintained and was not well checked before the rig left the shipyard. This also showed to be true during drilling of the first hole.

The rig arrived location 34/4-1 on July 4, 1979 and ran a total of 24 anchors. During the towout and anchoring period, the drilling crew were working on realigning the travelling block and compensator and after finished anchoring, about a day and a half was spent on finishing the block and compensator realignment. However, this was a one time operation and only gave minor problems later during the well.

Cementing Equipment

When the 30" casing was run in place, about a day and a half was spent before the casing was successfully cemented. This was partly because of rigs bulk system not able to deliver enough cement and partly because of problems with the cement unit.

The bulk system on this rig is like those on most Aker H-3 rigs, not perfect. When heavy cement such as 15.9 - 16.0 PPG cement are to be mixed, problems with delivery are encountered. The bulk system was somewhat modified then, but on later cement jobs there were problems also.

The cement unit on the "Byford Dolphin" was a B.7 unit, double pump with a precision slurry blender and had never before been in use. Saga had very good experience with this type of equipment from previous operations. On

the two first cement jobs, there were problems with the unit. During the cementing of the 30" casing, the safety burst plate on the surge tank had to be repaired and a fan belt broke and had to be repaired.

On this type of cement unit, there are two mixing/transfer centrifugal pumps, one connected to each main pump (with one always as a standby pump). While cementing the 20" casing, both of these pumps broke down, and the cement already pumped had to be displaced. One of the pumps were repaired after some downtime and the cement job completed. Later both pumps were permanently repaired, and the cement unit gave no more problems after this.

BOP System

On the first installation of the 24" riser and 20 3/4" B.O.P. - stack on the 30" housing, a lot of work had to be done to the stack and the riser before it could be run.

The lower riser package could not latch onto the B.O.P. stack because of misalignment, and this was due to kill and choke hoses being bent in the same direction. This was corrected and also various leaks in pods were repaired. The safety flood valve was installed for the first time and the ball joint had to be taken apart and repaired due to leaks.

When the stack and riser was to be run, it was discovered that the spider was too small for the rotary table, and a support frame had to be built. Also the spider had to be split for every connection, and buoyancy can adapters had to be taken off every riser joint as it was run. All this made the running for the riser slow. Total initial installion took approximately three and a half days. A new spider was manufactured and sent to the rig, and later installations of the riser took an average of a half day.

When the 21 1/4" B.O.P.-stack was installed on the 20" wellhead housing, it showed that the choke line was plugged, and the B.O.P.-stack had to be pulled. The choke valve and flex hose was removed. Mud and rust scale were cleaned out. Probably the plugging of the choke valve and flex hose had occurred when drilling the 26" hole. One and a half day was lost. Standard procedures are to flush through the choke and kill line every day.

After the 17 1/2" hole was drilled and the 13 3/8" casing to be landed in the 20" wellhead housing, the 13 5/8" wellhead would not go through the 21 3/8"x 20 3/4" I.D. Regan ball joint in the BOP stack.

The wellhead used was manufactured by National Supply Company with an O.D. of 20 3/4" and should go through the ball joint. A new wellhead was taken to a workshop to have 1/8" machined off the diameter before it was shipped to the rig. The casing was pulled back to the surface and the wellhead changed out. When running back in hole, the new wellhead landed in the 20" wellhead housing. Two days were lost on this operation. 21 1/4" I.D. is API standard for 2000 psi BOP's to be used on 20" wellhead housing. 20 3/4" I.D. is not API standard. Wetco and Koomey wellheads 20 3/4" O.D. x 13 5/8" wellhead housing are not standard.
The 21 1/4" BOP stack was gaged on the rig to ensure the 20 3/4" National wellhead to pass through the stack and ball joint. The measure showed 21 3/8" at top of ball joint, and the stack being 21 1/4" API, it appeared o.k.

After the 21 1/4" B.O.P.-stack was pulled, it was dismantled and the 20 3/4" ball joint and parts with the less I.D. shipped to shore and the I.D. increased to 21". Also the O.D. of all 13 5/8" wellheads will be reduced with 1/16". The Regan ball joint is 21 3/8" I.D. at the top, but is reduced to 20 3/4" I.D. at the wear bushing on the low end. Also the upper body of the 21 1/4" B.O.P. was 20 2/4" I.D. Both wear bushing and upper body are now 21" I.D.

A total of ten days was spent on the initial installation of the 13 5/8" B.O.P.-stack when a maximum of two days should have been used. This goes back on the same problems as mentioned earlier, bad maintenance of equipment. Even though this stack was checked by specialists and pressure tested before the rig left the shipyard, two days were spent on rigging up and pressure testing the stack.

When the stack was landed and latched onto the 13 5/8" wellhead, it appeared that the stack would not hold more than 5000 psi and a leak in the resiliant ring was discovered. The reason for this will never be known, as when pulling the stack, the ring was left on the wellhead and later it was jetted off the wellhead and lost. It is, however, probable that improper installation of resiliant ring in the lower Auto-Lock connector caused the problem.

After having pulled the stack, it was pressure tested again, and found to be leaking again. About three days were spent on repairing leaks and on removing the resiliant ring from the wellhead.

When the 13 5/8" B.O.P.-stack was installed the second time, all functions were tested according to program. The 13 5/8" B.O.P.-stack was left installed on the 13 5/8" wellhead for 103 days, was function tested every day and pressure tested every week and did not give any further problems. This is the same B.O.P.-stack used on the Deep Sea Saga for 24 months of successful operation.

Electrical System

During the first month of the 12 1/4" hole section, a total of two days were lost due to problems with the S.C.R.-electrical system. Service engineers were sent to the rig several times during this period, and finally they solved the problems. The last 85 days of operation the S.C.R.-system was trouble free.

Hole Problems/Fishing

After drilling the 12 1/4" hole to 2740 m, it was decided to do a wiper trip to the casing shoe. The hole was tight and it was not possible to pull the bit above 2616 m. After working the jars and reaming for a day and a half it was decided to drill ahead till the bit was worn out.

At a depth of 2962 m the bit was worn out and we attempted to pull out the drillstring with the same result, the bit could not be pulled above 2612 m. At this time, two "trouble shooters" and a jet cutter had arrived on the rig. It was then decided to cut the drill collars. Five drill collars, bit and three stabilizers were left in hole. When pulling out of hole, the drill string became stuck with the bottom of the drill collars at 2631 m. The string then was backed off above the drill collars at 2486 m. Attempts were made to wash over the part left in hole with no success.

A cement plug was laid on top of the fish and the hole was sidetracked and drilled TD 2515 m where 9 5/8" casing was set. Total time lost on this was approximately seventeen days.

When drilling the original hole, some problems occurred, such as excessive torque and drag. On the next hole drilled in this block, if hole problems occur, it will be Saga procedure to ream every single and make frequent wiper trips. In addition, the section that is judged to give hole problems may be underreamed.

Hole Problems/Junk

When the 7" liner was set and cemented in place and the landing string pulled out of hole, junk was found in the wellhead. A casing scraper was run in. The junk was pushed to the top of cement above the liner. Attempts were made to fish out the junk but finally it milled out. Approximately one week was lost on this, and as only steel cuttings were recovered, there was never any firm evidence as to the exact nature of the junk. Probably it was something lost from the rig floor. This will be watched closely on later operations.

Completion Test String

As the well was to be tested and the test string was run in hole for the first time, the Baker subsea test tree would not go through the 13 5/8" B.O.P.-stack. The riser was then at a 2^{o} angle, and the rig was moved onto position, but still the test tree would not go through the B.O.P.-stack. The test string was pulled and a dummy run was made with the test tree, and it passed through the B.O.P.-stack with no restriction.

The test string was then made up again and rerun into the hole. This time several attempts were made with atabilizers both above and below the test tree, but still it would not go through B.O.P.-stack. The well was then tested with the test tree landed above the B.O.P.-stack with three five inch rams closed on drill pipe below the subsea tree.

On the second test, a different type of subsea test tree (Otis) was used, but this would not go through the B.O.P.-stack either and the second test was performed in the same way as the first test. A total of three and a half days were lost.

Since the subsea test tree went through the stack with no restriction on the dummy runs, but was stopped when the full weight of the test string was under it, we believe it is possible that the test tree was pulled into the side of the B.O.P.-stack and hung up in it. This again means that even though the hole position indicator and slope indicators on the guide base, stack and riser showed that everything was in line, something was deviated. About the only reasonable explanations for this is that the hole position indicator and the slope indicators were giving false readings or that the riser was at an angle somewhere above the B.O.P.-stack. The last of these possibilities is the most reasonable, as in this water depth there might be currents running in different directions at different depths, and thereby forcing the middle of the riser out of angle or into some type of a s-shape.

Thus again, the landing string and test tree are forced to one of the sides of the B.O.P.-stack. On next test a slimmer test tree will be used if one is available.

TV Equipment

After the 30" casing was cut off and to be retrieved to the surface, the underwater television would not work, and it was not possible to stab into the 30" wellhead housing with the retrieving tool. The fault was found in the TV cable and it had to be repaired on the rig as no new cable was available. A service man was sent to the rig, and after three days of down time, the UTV was back in operation and the 30" housing retrieved.

Later the TV cable was replaced with a new one and the contractor has one more cable that will be as back-up in their warehouse on the rig.

Miscellaneous

During the 170 days it took to drill well 34/4-1, there also were spent some time on minor dailures on equipment such as rotary motor, drawworks, 16" slip joint and electro-magnetic brake. Also, a total time of 14 days was lost waiting on weather. Most of the equipment problems were seen in the beginning of the well, and during the last 70 days of operation very few equipment failures were seen. The TV failure in the end is excepted.

The operation in the beginning also was slower because of unexperienced people. During the operation on 34/4-1, the crew became better and did a good job in the end of the well.

2.4. D A I L Y A C T I V I T Y R E P O R T

July 4: Arrived location at 11.00 Hrs.
Ran anchors no. 1-4-5-8

July 5: Ran anchors no. 2-3-6-7
Piggy backed anchors no. 1-3-5-8

July 6: Piggy backed anchors no. 2-4-6-7
Reran anchor no. 1

July 7: Reran and piggy backed anchors no.1
Realign travelling blocks

July 8: Align travelling blocks
Lost anchor chain no.5
Retrieve same.

July 9: Retrieve anchor chain no. 5

July 10: Reran and piggy backed anchor no.5
Picked up drill pipe and ran temporary guide base

July 11: Landed temporary guide base and picked up BHA.
Spudded and drilled 36" hole to 447 m.

July 12: Drilling 36" hole to 524 m. Displaced hole with viscous mud.

July 13: Ran 9 joints 30", grade B, 1" wall casing with Baker float shoe, Vetco squnch joint connectors and National 30" well head housing, total casing string length 121,91 m. Problems with cement unit.

July 14: Circulate while working on cement unit. Attempt to cement casing. No success due to cement unit not able to keep weight of cement correct.

July 15: Circulate while working on cement unit.
Cement 30" casing with 1685 sxs class "G" cement.
Casing shoe at 521 m and well head housing at 400 m.

July 16: Waiting on cement
Picked up 26" bit and BHA and drill cement and float shoe. Rig to run 20 3/4" B.O.P. -stack and 24" riser.

July 17: Move 20 3/4" B.O.P. -stack to spider beams and work on same.

July 18: Work on B.O.P. -stack and riser connectors.

July 19: Run 20 3/4" B.O.P. -stack and 24" riser. Land and latch B.O.P., -stack Overpull with 20.000 lbs.

July 20: Retrieve B.O.P. -safety tool and pick up new B.H.A.
Drill 17½" hole from 524 m to 535 m.

July 21: Drilling 17½" hole to 800 m.

July 22: Drilling to 845 m.
Drop deviation survey and P.O.O.H.
Logging, ISF sonic/gramma ray.

July 23: R.I.H. and displace hole to seawater.
Observe hole for flow. P.O.O.H. and Pick up new B.H.A.
Underream with 26" underreamer to 653 m.

July 24: Underreamed hole to 845 m. Drop deviation survey and P.O.O.H. Displaced riser to seawater.
Run B.O.P. safety tool.

July 25: Pull 20 3/4" B.O.P. -stack and 24" riser.

July 26: Rig and run 33 joints 20", J-55, 94 lbs/ft casing with Vetco "L" connectors, Baker float shoe and collar and with National 20" well head housing.
Landed casing with shoe at 833 m and housing at 399 m.
Attempt to cement casing, cement unit failure.

July 27: Cemented 20" casing with 2308 sxs class "G" cement.
Rigged ti and started running 20 3/4" B.O.P. -stack and 24" riser.

July 28: Run and land B.O.P. -stack.
Unable to pressure test.
Start pulling B.O.P. -stack and riser.

July 29: Finish pull stack and riser.
Work on and test B.O.P. -stack.
Work on motion compensator .

July 30: Work on motion compensator and blocks.
Rig and start running 20 3/4" B.O.P. -stack and 24" riser.

July 31: Run and land 20 3/4" B.O.P. -stack and 24" riser.
Overpull 40.000 lbs. Tested B.O.P. -stack.
Make up B.H.A.

Aug. 1: R.I.H. and drilled out cement and float collar and shoe.
Drilled 17½" hole to 84 m. Tested formation to 11.3 ppg equipvalent mud weight.
Worked on rotary table and mud pumps.
Drilled 17½" hole to 862 m.

Aug. 2: Drilled to 1187 m.

Aug. 3: Drilled to 1223 m. Trip for bit change. Drilled to 1301 m.

Aug. 4: Drilled to 1430 m.
P.O.O.H. to 20" casing shoe and perform leak off test no. 2 Equivalent to 14.3 ppg mud weight. P.O.O.H.

Aug. 5: Rig up Schlumberger and attempt to log. Could not get through 1211 m. R.I.H. and drilled to 1652 m.

Aug. 6: Drilled to 1711 m. Take deviation survey.
Drilled to 1971 m.

Aug. 7: Drilled to 1991m. P.O.O.H. and logged ISF -sonic/gamma ray. R.I.H.

Aug. 8: Circulate and condition hole.
Drop deviation survey and P.O.O.H.
Rig to and start run 13 3/8" casing.

Aug. 9: Finished running 130 joints 13 3/8", N-80, 72 lbs/ft csg.
Not able to land casing. Try to pull csg, hole swabbing.
Try to break circulation, no returns.

Aug. 10: Displace 323 barrels water into riser.
Well flowing a total of 69 bbls.
Shut bag preventor and bull head 80 barrels mud into annulus. Open bag preventor and displaced riser with mud. Observe for flow, well static.
Circulate while waiting for new well head.

Aug. 11: Circulate while waiting on well head.
Pull out, change well head and R.I.H.
Land 13 3/8" casing with shoe at 1975 m, ECP at 791 m and well head at 399 m.
Cement casing with 3100 sxs class "G" cement.

Aug. 12: Set ECP and circulate riser free for cement. Circulated and cleanded riser while W.O.C.
Attempt to pressure test casing, no success.

Aug. 13: R.I.H. with open ended tubing and lay 200 sxs class "G" cement on top of float collar. Squeeze cement into collar.
P.O.O.H. and displace riser with seawater.
Prepare to pull 20 3/4" B.O.P. -stack and 24" riser.

Aug. 14: Pulled 20 3/4" B.O.P. -stack and 24" riser. Moved stack to cellar deck.

Aug. 15: Work on and function test 13 5/8" B.O.P. -stack.

Aug. 16: Pressure test 13 5/8" B.O.P. -stack and rig to run same

Aug. 17: Rig to start running 13 5/8" B.O.P. -stack. Pull same due to leaking choke valve. Repair choke valve and start running stack.

Aug. 18: Run 13 5/8" B.O.P. -stack and 16" riser. Land and overpull with 80.000 lbs.

Aug. 19: Instal diverter. Attempt to test B.O.P. -stack, test plug leaking. Pressure test 13 3/8" casing.
Wash well head with water and attempt to pressure test B.O.P. -stack.

Aug. 20: Observed leak at resialiant ring at well head connector. Rig to pull and pull 13 5/8" B.O.P. -stack and 16" riser. Resialiant rign left on well head, fish for same.

Aug. 21: Test 13 5/8" B.O.P. -stack on spider beams, repair leaks on stack.

Aug. 22: Repair leaks in stack.
R.I.H. with jet sub and clean and wash well head free.

Aug. 23: Repair choke valves and test same.
Rig to and start running 13 5/8" B.O.P. -stack and 16" riser.

Aug. 24: Run and land 13 5/8" B.O.P. -stack.
Overpull with 90.000 lbs. Test B.O.P. -stack

Aug. 25: Test B.O.P. -stack.
Make up B.H.A., R.I.H. and drilled cement to 1892 m.

Aug. 26: Drilled cement, float collar and shoe and formation to 1994 m. Test formation to 16.0 ppg equivalent mud weight. Drilled 12 1/4" hole to 2072 m.

Aug. 27: Drilled to 2135 m and circulate bottoms up. Drop deviation survey and start P.O.O.H.
Failure on power to draw works motors, repair same.

Aug. 28: Repair S.C.R. system.

Aug. 29: Finish repair S-C-R- system and P.O.O.H.
Make up B.H.A. and R.I.H.
Drilled 12 1/4" hole to 2305 m.

Aug. 30: Drilled to 2378 m
Trip for bit change.

Aug. 31: Attempt to break circulation, no return. Pull into 13 3/8" casing shoe and attempt to clean bit and stabilizers.
Unable to get full returns.
P.O.O.H. and lay down stabilizers.
R.I.H. and ream to 2192 m.

Sept. 1: Ream to bottom and take deviation survey. Drilled to 2468m, dropped deviation survey and P.O.O.H. for bit change.

Sept. 2: Change bit, R.I.H. and drilled to 2509m.
Dropped deviation survey and P.O.O.H. to core.
Pull bore protector and run test plug.

Sept. 3: Test B.O.P.-stack. Pull test plug and run bore protector. Make up core barrel and R.I.H.
Power failure on draw works while R.I.H.

Sept. 4: Coring. P.O.O.H. and discovered outer barrel left in hole. Make up fishing assembly and R.I.H.

Sept. 5: Screw into fish and recover same.
Service core barrel, R.I.H. and cut core. Stop coring due to lost circulation.

Sept. 6: Pump lost circulation materials.
Finish coring, 2509m - 2513m.
P.O.O.H. and recover core. Make up B.H.A.

Sept. 7: Make up new B.H.A.
R.I.H. and drill while taking flow cheks to 2597m.

Sept. 8: Drilled to 2740m.
Started on wiper trip, hole very tight.

Sept. 9: Working tight hole and remaing up to 2620m. Ream and wash to 2740m and pull out again.
Could not get through 2620m.

Sept. 10: Ream up to 2616m. Try to jar loose, string kept falling free. Run back to bottom and drill to 2770m.

Sept. 11: Drilled to 2864m.

Sept. 12: Drilled to 2944m.

Sept. 13: Drilled to 2961m. P.O.O.H., unable to pull above 2612m. Rig up Schlumberger.

Sept. 14: Run in with jet cutter and cut drill collars at 2913m and at 2904m.
P.O.O.H., got stuck at 2643m.
Run freee point indicator, unable to pass 1980m.
Schlumberger left spring inside drill pipe.

Sept. 15: Push obstruction to 2314m, got partly stuck. Make up circulating head and circulate and work stuck pipe.
Run in with collar locator, pipe free of obstructions.

Sept. 16: Run free point indicator, pipe stuck on top of drill collars, 2500m.
Run in with string shot and back off pipe one joint above drill collars.
P.O.O.H., lost one single back in hole.

Sept. 17: Prepare to and test 13 5/8" B.O.P.-stack.
R.I.H. with overshot and fish out single lost in hole.

Sept. 18: Pick up and R.I.H. with wash pipe.
Wash over fish one joint. Unable to stab back over fish after connection.
P.O.O.H. and lay down wash pipe.
Rig up Schlumberger and logged ISF, GR and SRT.

Sept. 19: Logged dipmeter, CBL and velocity survey.
Make up B.H.A.

Sept. 20: Trip in hole to circulate and condition.
Electrical failure while P.O.O.H.
R.I.H. with open ended tubing and lay 314 sxs class "G" cement on top of fish.

Sept. 21: P.O.O.H
Pick up B.H.A. and R.I.H.
Tag cement at 1502m. Drill and ream cement to 2070m.

Sept. 22: Ream cement to top of fish, 2484m.
Cement not firm enough to kick off.
P.O.O.H. and run in with open ended tubing. Lay 314 sxs class "G" cement on top of fish and P.O.O.H.

Sept. 23; Finish P.O.O.H. and change out kelly while W.O.C.
R.I.H. and tag cement at 2327m
Drill hard cement to 2343m and P.O.O.H.

Sept. 24: Pick up turbine and P.O.O.H. R.I.H. and orient turbine. Drilled to 2354m when turbine stopped rotating. P.O.O.H. Make up limber B.H.A.

Sept. 25: R.I.H. attempt to kick off, no success. Circulate at 2416m and start P.O.O.H.
Prepare to test 13 5/8" B.O.P.-stack.

Sept. 26: Tested B.O.P.-stack and finished P.O.O.H.
Pick up new turbine and R.I.H.

Sept. 27: P.O.O.H. due to turbine failure.
Pick up new turbine.
Work on electro magnetic brake and R.I.H.

Sept. 28: R.I.H. and start drilling. Drilled to 2456m while taking surveys.
K.O.P. 2416m.
P.O.O.H.

Sept. 29: Lay down turbine and pick up B.H.A.
R.I.H. and reamed to bottom.
Drilled to 2493m.

Sept. 30: Drilled to 2515 and circulated out samples. Made wiper trip and circulate and condition hole. P.O.O.H. to log.
Rig Schlumberger and logged ISF/Sonic/GR and CNL/FDC/Caliper.

Oct. 1: Logged RFT and CST.

Oct. 2: Made conditioning trip in hole with bit and junk sub. Rig to and run 9 5/8" casing.

Oct. 3: Run 173 joints of 9 5/8", N-80, 47 lbs/ft casing. Landed casing with shoe at 2501m, ECP no. 1 at 2414m, ECP no. 2 at 1959m and casing hanger at 400m. Cement casing with 930 sxs class "G" cement. Bump plug and set ECP's. Attempt to test casing, no success.

Oct. 4: Back out running tool and P.O.O.H.
Run and set 9 5/8" pack off.
Attempt to test 9 5/8" casing, no success.
Prepare to and test 13 5/8" B.O.P.-stack.

Oct. 5: Make up new B.H.A. and R.I.H. to top of float collar. Circulate and condition mud. Attempt to test casing, no success. P.O.O.H.
Pick up RTTS packer and R.I.H.

Oct. 6: R.I.H. to top of float collar, test casing and P.O.O.H. R.I.H. and drill cement, shoe and 1m of formation to 2516m. Test formation to 15.4 ppg equivalent mud weight.

Oct. 7: P.O.O.H and lay down junk sub.
Pick up reverse circulation junk basket and R.I.H.
Circulate and work basket and P.O.O.H.
Start back in hole with reverse circulation junk basket.

Oct. 8: Work basket and P.O.O.H.
Pick up core barrel and R.I.H.
Cut core no. 3 from 2516m to 2531m and P.O.O.H.

Oct. 9: Finish P.O.O.H. and recover core no. 3
R.I.H. and cut core no. 4 from 2531m to 2541m.
P.O.O.H. and recover core no. 4.
Change slip joint packing.

Oct. 10: Replace slip joint packing.

Oct. 11: Finish replace slip joint packing.
R.I.H. and cut core no. 5 from 2541m to 2557m.

Oct. 12: P.O.O.H. and recover core no. 5
R.I.H. and cut core no. 6 form 2557m to 2565,5m, core jammed.
P.O.O.H. and recover core no. 6.

Oct. 13: Pick up new B.H.A. and R.I.H.
Drilled 8 1/2" hole to 2570m and P.O.O.H.
Pick up core barrel and R.I.H.
Change out bent kelly.

Oct. 14: Change out bent kelly and slip joint barrel
R.I.H. and cut core no. 7 from 2570m to 2586m.

Oct. 15: Finish cut core no. 7 to 2589m, P.O.O.H. and recover core.
R.I.H. and cut core no. 8 from 2589m to 2608m.

Oct. 16: P.O.O.H. and recover core no. 8
Prepare to and attempt test B.O.P.-stack, leak in choke manifold.
R.I.H. and cut core no. 9 from 2608m to 2615m, core jammed. P.O.O.H. and recovered core no. 9

Oct. 17: Test 13 5/8" B.O.P.-stack.
R.I.H. and cut core no. 10 from 2615m to 2617m, core jammed.
P.O.O.H. and recovered core no. 10.
R.I.H. with 8 1/2" bit.

Oct. 18: Drilled to 2665m and P.O.O.H.
Rig up Schlumberger and logged ISF, Sonic, GR, MSFL, FDC, CNL.

Oct. 19: Logged, run RFT
Pick up core barrel, R.I.H. and cut core no. 11 from 2665m to 2668m.

Oct. 20: Cut core no. 11 to 2675m and start P.O.O.H.
W.O.W.
Finish P.O.O.H. and recover core no. 11
R.I.H. with 8 1/2" bit.

Oct. 21: Drilled to 2760m. Wiper trip.

Oct. 22: Drilled 2810m and made trip for bit change.

Oct. 23: Drilled to 2896m.
Wiper trip to 9 5/8" casing shoe.

Oct. 24: Drilled to 2901m.
Wiper trip and circulate and condition hole.
P.O.O.H.

Oct. 25: Rig up Schlumberger and logged ISF, Sonic' GR, MSFL, FDC, CNL.
W.O.W.

Oct. 26: Logged DLL, GR, velocity survey and CST.
Made conditioning trip.

Oct. 27: Trip in hole with 9 5/8" casing scraper.
Rig and start running 7" liner.

Oct. 28: Run 7" liner to 9 5/8" casing shoe and hang off to W.O.W.

Oct. 29: W.O.W.

Oct. 30: W.O.W.

Oct. 31: W.O.W.

Nov. 1: W.O.W.

Nov. 2: Displace riser to mud and R.I.H. with liner.
Slips and liner hanger set. P.O.O.H. and install new shear pins in liner hanger and R.I.H.
Set liner with shoe at 2703 m, ECP at 2277 m and liner hanger at 2185 m.

Nov. 3: Circulate and cement liner with 225 sxs class "G" cement. Set ECP and liner hanger pack off and P.O.O.H. to 1293 m. W.O.W.

Nov. 4: Finish P.O.O.H.
Repair compensator hoses
W.O.W.

Nov. 5: W.O.W.
R.I.H. with 8½" bit and 9 5/8" casing scraper, not able to pass well head due to junk.
Attempt to fish for junk, no success.

Nov. 6: R.I.H. with impression block, push fish to 2123 m and P.O.O.H. R.I.H. with 8½" bit and drill cement 2118 m to 2164 m. P.O.O.H.
R.I.H. with flat bottom mill and junk basket.

Nov. 7: Mill on junk and P.O.O.H.
R.I.H. with reverse circulation junk basket and work on junk. P.O.O.H.
R.I.H. with 8½" bit.

Nov. 8: Drill on junk, 2164 m to 2165 m. P.O.O.H.
R.I.H. with reverse circulation junk basket and work on junk. P.O.O.H.
R.I.H. with 8½" bit and drill junk 2166 - 2167 m. P.O.O.H.

No. 9: R.I.H. with new 8½" bit and drill on junk. P.O.O.H.
R.I.H. with 8½" tapered mill and mill on junk.
Work on sub and P.O.O.H.

Nov. 10: Pick up 4 3/4" drill collars and R.I.H. with 5 7/8" bit, Drill cement 2167 m to 2182 m.
Pressure test 9 5/8" casing and 7" liner.
Continue R.I.H., obstruction at 2445 m, wash down to 2681 m. P.O.O.H.
R.I.H. with 8½" bit and 9 5/8" casing scraper.

Nov. 11: R.I.H. to liner top and rotate and wash. P.O.O.H.
R.I.H. with 5 7/8" bit and 7" casing scraper to 2670 m.
Circulate and P.O.O.H.
Making space out runs for sub sea test tree.

Nov. 12: Space out SSTT.
Make up test tools and R.I.H.
Rinse all connection and externally pressure test all connections.

Nov. 13: R.I.H. with test string and rinse and pressure test all connecitons.

Nov. 14: Pick up SSTT and continue in hole. Obstruction at 2488 m.
Work pipe to 2503 m. Shear APR. valve, circulate and P.O.O.H.

Nov. 15: Rig up Schlumberger and run gauge ring and junk basket.
Could not get below 2184 m. Run CBL, not able to pass 2497 m. R.I.H. with 5 7/8" bit and 7" casing scraper to 2660 m. Reverse circulate and P.O.O.H.

Nov. 16: P.O.O.H. and run CBL to 2658 m.
Run gauge ring to 2655 m.
Test B.O.P. -stack . Lost rubber off stab in sub.
R.I.H. with 8½" bit and work rubber down.

Nov. 17: Work rubber to top of liner and drill on same. P.O.O.H.
R.I.H. with 5 7/8" to 2663 m.
Circulated rubber out.

Nov. 18: P.O.O.H. and run gauge ring and junk pusher.Perforate 2608 m to 2613 m.
Run test string and test all connections.

Nov. 19: R.I.H with test string SSTT.
Sub sea test tree would not go through B.O.P. -stack
P.O.O.H. and break down one single below test tree.

Nov. 20: R.I.H., test tree would still not go through B.O.P. -stack. P.O.O.H. made dummy run with test tree, tree landed in well head.

Nov. 21: R.I.H. with test string, pressure testing every connection.
Sub sea test tree would not go through B.O.P. -stack
P.O.O.H.

Nov. 22: Made several attempts to land test tree, no success.
Make up all surface equipment and pressure test same.
Set packer at 2589 m and land test tree on upper ram in B.O.P. -stack. Conduct DST no. 1

Nov. 23: Conduct DST no. 1
P.O.O.H. and lay down test tools.
R.I.H. with gauge ring and junk pusher.

Nov. 24: Run gauge ring to 2602 m. Set cement retainer at 2600 m.
R.I.H. with stinger to top of retainer.
Circulate and condition mud. Sting into retainer and attempt to pump into formation, no success.
Lay 25 sxs class "G" cement on top of cement retainer and P.O.O.H.

Nov. 25: R.I.H. with 5 7/8" bit and casing scraper and dress off cement plug to 2550 m.
Circulate and P.O.O.H.
Made drummy run with Otis SSTT, tree landed in well head.

Nov. 26: Waiting on orders.
Perforate 2510 m to 2536 m.
R.I.H. with test string, pressure testing every connection externally.

Nov. 27: Continue R.I.H. with test string and SSTT. Make up all surface equipment and pressure test.
Set packer at 2490 m and land test tree.
Conduct DST no. 2

Nov. 28: Conduct DST no. 2
While well final shut in, opened reverse circulating valve and cleaned out test string.
Power failure on draw works.

Nov. 29: P.O.O.H. and lay down test tools.
Set cement retainer at 2505 m.
Pressure test retainer.
R.I.H. with stinger to top of retainer. Circulate and sting into retainer. Establish feed in rate.

Nov. 30: Squeeze 25 sxs class "G" cement below retainer and laid 25 sxs cement on top of retainer.
P.O.O.H. and laid 60 sxs class "G" cement from 2005 m to 1945 m. P.O.O.H.

Dec. 1: Set 9 5/8" bridge plug at 1952 m and pressure test.
Perforate at 550 m with pressure on annulus.
Cut 9 5/8" casing at 783 m, pull and lay down casing.

Dec. 2: Set 13 3/8" bridge plug at 780 m and pressure test same.
R.I.H. with open ended tubing and lay 450 sxs class "G" cement plug from 645 m to 450 m.
Cut 13 3/8" casing at 411 m. Pull cut off casing loose with riser tensioner and 13 3/8" spear.

Dec. 3: W.O.W. to pull 13 5/8" B.O.P. -stack and 16" riser.

Dec. 4: W.O.W.

Dec. 5: W.O.W.

Dec. 6: W.O.W.
Pull B.O.P. -stack and riser.

Dec. 7: Set B.O.P. -stack back on cellar deck.
R.I.H. with 30" cutting tool and attempt to stab into well head, no success, reposition rig.

Dec. 8: Cut 20" and 30" casing at 407 m.
Retrieve cut off 20" casing.
Attempt to pull 30", no success.

Dec. 9: Cut 30" casing at 403,5 m.
Not able to stab back into well head with retrieving tool due to UTV failure.
Work on UTV.

Dec. 10: Work on UTV

Dec. 11: Work on UTV

Dec. 12: Work on UTV
Attmept tp stab into 30" well head to retrieve same.

Dec. 13: Stabbed into and pulled 30" well head half way. W.O.W.

Dec. 14: W.O.W. to finish pull 30" well head.

Dec. 15: Attempt to pull temporary Guide Base.

Dec. 16: Attempt to and pull temporary Guide Base. Pull anchors No's. 2,6 and 8.

Dec. 17: W.O.W. to pull anchors

Dec. 18: W.O.W.
Pull anchors no's. 1,4 and 5.

Dec. 19: W.O.W. to pull anchors.

Dec. 20: W.O.W.
Pull anchors No's. 3 and 7
Last anchors bolstered at 19.30 Hrs.