V-630 .3

BP NORWAY LIMITED U.A

DRILLING COMPLETION REPORT

WELL 7/12-9

Document No: 90.R.72.0177

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EXECUTIVE SUMMARY

The objective of the well was to prove a mobile oil column which provides sufficient reserves to support the economic development of S.E. Ula. A secondary objective was to locate the well so it could be used as an injector at a later date.

The well was drilled to a depth of 3830m, successfully using a new Ester mud (Petrofree) in the 17 1/2" & 12 1/4" hole sections. The 6" hole was plugged back and two tests were performed across the Ula formation.

The production test flowed oil at approximately 900 bbl/day with a 280 psi wellhead pressure for 13 hours. To initiate water injection, a surface wellhead pressure of 6500 psi was required to fracture the formation. A stabilised injection rate of 12,900 bbl/day (9bbl/min) was achieved with a wellhead pressure of 4,500 psi.

The well was plugged back and suspended with a corrosion cap over the wellhead. The total operational time was 63 days.

A protective steel wellhead cover has since been placed over the corrosion cap.

The objectives of the well were achieved.

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SECTION 1

GENERAL DATA

1.1 GENERAL WELL DATA

Well name	: 7/12-9	
Well type	: Delineation	
NPD classification	: Exploration	
Licence number	: PLO 19A	
Licences	: BP Norway Limited U.A	57.5%
	SP Exploration	15.0%
	Den Norske Stats Oljeselskap A/S	12.5%
	Norske Conoco A/S and Conoco Norway Inc. A/S	10.0%
	Pelican and Company A/S	5.0%
Operator	: BP Norway Limited U.A	
Location	: UTM Co-ordinates are metres, UTM zone 31 N. Geographical Co-ordinates are based on ED 50 International Spheroid.	
Area	: Norwegian Offshore Continental Shelf	
Block	: 7/12	
Field	: Ula	
Well location	: 6325620.5m N, 492867.5m E 57deg. 04' 21.52" N 02 deg. 52' 56.51" E	
Top of Ula reservoir (Zone 2A)	: 3700.5m TVD (Logger's depth) 3675.9m TVD Sub Sea.	
Rig	: Ross Isle	
Drilling Contractor	: Ross Drilling Co. A/S, Sandefjord	

Dates

	Time	Date
Rig on hire to BP (from Phillips 2/7-19)	15.30	14.03.90
Spudded 7/12-9	21.15	17.03.90
Reached TD	06.45	01.05.90
Completed testing	01.00	12.05.90
Well suspended	03.00	15.05.90
Rig under tight tow (to well 2/7-22)	22.00	15.05.90

Depths

Water depth	: 68.3m
RKB to seabed	: 91.8m
Total depth (BRT MD)	: 3820m
Total Depth (BRT TVD)	: 3817m
Well Completion Status	: Suspended
Directional	: Vertical

Casing

Size	Type	Depth (BRT) m MD	Cemented (MD BRT)
30"	310 lb/ft X52	166	To seabed
20"	133 lb/ft X56	949	To seabed
13 3/8"	68 lb/ft K55	2342	505m
10 3/4"	55.5 lb/ft N80	151	
9 5/8"	47 lb/ft C-95	3680	1180m
7" Liner	29 lb/ft L80	3735.5	3606 - 3735.5

Wellhead

Drill-Quip Universal wellhead system 15,000 psi.

Mud

Hole Size	Interval (m MD BRT)	Mud Type	Mud weight (SG)
36"	91 -170	Seawater and high viscosity slugs	1.05
26"	170 - 950	Seawater and high viscosity slugs	1.05
17 1/2"	950 - 2350	Petrofree	1.20 - 1.55
12 1/4"	2350 - 3684	Petrofree	1.55 - 1.58
8 1/2"	3684 - 3742	Low Tox Oil Based Mud	0.90 - 0.93
6"	3742 - 3820	Low Tox Oil Based Mud	1.40 - 1.41

Cores

	Interval Cored	Recovery	
No.	m MD BRT	m	%
1	3689 - 3721.5	32.5	100

Perforations

Perforated Interval	Number of runs	Type of Guns used
3719m to 3701m	2	2 7/8" Enerjets

Suspension

Plug no.	Top of Plug (m BRT)	Bottom of Plug (m BRT)	Remarks
1	3733	3820	Plug back 6" hole. Hard cement dressed to 3620m.
2	3732	-	7" Baker (model -NI) Bridge plug.
3	3355	3724	Plug back 7" liner. Squeeze cement. Load tested 10,000 lbs.
4	3353	-	9 5/8" Baker Bridge plug.
5	130	330	Top plug

The suspension fluid is inhibited seawater, (sea water treated with Ancopac and Hydrochem) between 3355m to 430m.

BP NORWAY LIMITED U.A.
LOCATION PLAT WELL 7/12-9

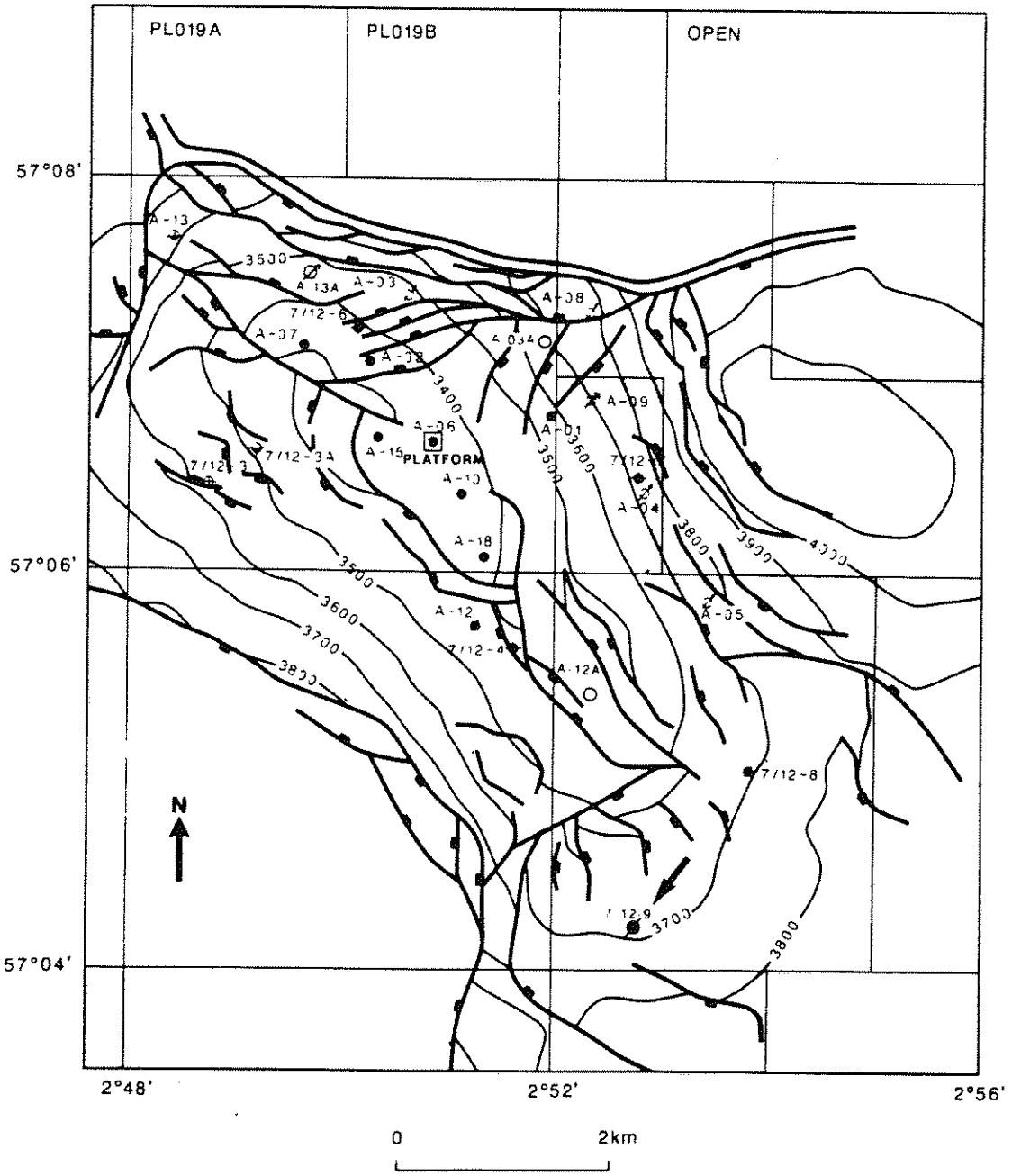
COUNTRY NORWAY
AREA NORTH SEA

LICENCE NO. 019A
BLOCK NO. 7/12
FIELD ULA
SEMI-SUB RIG ROSS ISLE
WELLHEAD UTM CO-ORDINATES
6 325 667.16 mN
492 916.56 mE

RIG CENTRE CO-ORDINATES
LAT. 57°04'21.52"N
LONG. 2°52'56.51"E
6 325 620.5 mN
492 867.5 mE

ROTARY TABLE ELEVATION 57m AMSL

TOP RESERVOIR UTM CO-ORDINATES
6 325 654.61 mN
492 911.98 mE



Ref.:	**ULA FIELD:**	Fig.: 1
Date: JUNE 1990	**TOP RESERVOIR DEPTH MAP**	Drg.no.: 17725

1.3 GEOLOGICAL SUMMARY

For details of the Geological Summary for well 7/12-9 refer to the attached Composite Log and the "Geological Completion Report" for well 7/12-9. Document No. NOCS 7/12-9 W28.

1.4 DRILLING RESUME AND EVALUATION

Summary

The Ross Isle was on contract to BP from 1530 hrs on 14th March 1990 when the last anchor was racked at the previous location (2/7-19). After a tow lasting 7 hours, 47 hours were spent waiting on weather before anchor laying could commence at the 7/12-9 location.

The well was spudded at 21.15 hrs on17 March 1990.

A new synthetic ESTER based mud system called PETROFREE, supplied by Baroid had its first field trial in this well (17 1/2" and 12 1/4" hole sections). The trial was a success.

A single core was taken from 3689 - 3721.5m in the Ula reservioir. The well was logged from the 20" casing shoe to TD although the logs in the 17 1/2" hole section would not pass 2326m (section TD was at 2350m). After plugging back the 6" hole section a single production and water injection test was performed in the Ula reservoir.

Total well depth was 3820m.

In addition to the plug across the 6" hole section two further cement plugs and two bridge plugs were set to suspend the well. The lower cement plug (in the 7" liner and up above the liner top) was dressed off and load tested to 10,000lbs. The well was left full of treated seawater. A plug type corrosion cap was run.

36" Hole

Programme was: Drill 36" hole in one pass. Take Totco surveys while drilling the section. Ensure hole angle was kept below 1 degree. Pump viscous slugs every single or more often if hole conditions dictate.

Seabed was tagged at 91.8m. The section was drilled to a TD of 168m (36" hole) in a single pass with a 26" bit and 36" hole opener. A 30 bbl hi vis pill was pumped every single. Maximum weight on bit required was 5,000lbs. Four Totco surveys were taken indicating a maximum hole deviation of 3/4 degree. The drilling of the section took a total of 8 3/4 hours.

At the TD of the section 200 bbls of hi vis mud was circulated around the hole. The well was displaced to 300 bbls of 1.20 sg mud. After waiting one hour a wiper trip to 15m below the seabed was carried out. Hole condition was good; 0.4m of fill was seen when running back to bottom. The hole was displaced again to 1.20 sg mud prior to pulling out to run conductor. No returns to seabed were observed at any time after the well was first displaced to weighted mud.

30" Conductor

Programme: Run conductor to 170m. Cement to seabed using G neat cement accelerated with liquid $CaCl_2$. Use 300% excess.

A total of 5 joints of 30 " conductor (including one with a welded on guide shoe) were run. All connectors were Hunting Lynx SA except for a Hunting Merlin DIF between the 30" housing extension and the top joint. The shoe was at 166m BRT.

Due to difficulties in making up the 8 round connection of the 5 1/2" GRP casing to be used as a cement stinger, only one joint of GRP casing was used along with four joints of HWDP. The conductor was run on HWDP until the PGB was 1m above seabed; no fill was encountered. The conductor was not washed down so as to avoid disturbing the seabed and impairing ROV visibility.

The cement recipe was changed prior to the job to include a lead and a tail slurry. The lead consisted of G neat at 1.90 sg while the tail was G neat at 1.98 sg. Both were accelerated with D77 to the equivalent of 2% BWOC CaCl2. The higher density tail was used in order to reduce the thickening time. No returns to seabed were seen while pumping the 60 bbls of seawater before the cement job or during the cement job itself. The cement was displaced with 56 bbls of seawater and the string shut in. After waiting on cement for 4 3/4 hours the string was opened up with no back flow. There was no wellhead movement when the weight was slackened off. Observation of the bullseyes showed PGB angle to be 1/2 degree.

Due to the lack of returns during the cement job, a top up job was carried out. Six joints of 2 7/8" tubing with a diverter sub was run in on drillpipe. The ROV was used to guide the tubing into the annulus. Top of cement was tagged at 128m (36m below seabed). Seawater was pumped and returns to seabed observed. A 30 bbl LCM pill was pumped prior to pulling back 2m. 100 bbls of cement slurry were pumped and displaced. The tubing was pulled back and re-run down the opposite side of the annulus. A further 100 bbls of slurry were pumped.

Vibration of the 30" housing was noted with the collars in the 30" housing when drilling the 17 1/2" pilot hole for the following hole section. This stopped once the collars were beneath the housing , but still gave some cause for concern regarding the integrity of the 30" cement job. A second remedial job was therefore carried out. 2 7/8" tubing was run through the mousehole while opening the next hole section up to 26". Top of cement was tagged at 15m below seabed. A 30 bbl hi vis pill was pumped and displaced. 100 bbls of cement slurry to the same recipe as the lead of the primary job was pumped and displaced. Only 1/2 hour of rig time was lost by doing the job in this way; drilling was stopped whilst the cement was pumped.

17 1/2" Pilot Hole for 26"

Programme : Drill 17 1/2 pilot hole riserless to 950 m

The 17 1/2" section was drilled riserless in two passes and one bitrun using sea water and high viscosity slugs. The Teleco tool failed at the start of the run thus Totco surveys were taken every 90 m. Maximum deviation was 1 1/4 degree. At 591 m the planned wiper trip to the shoe was extended to surface to change out the MWD tool. The new MWD tool also failed to work.

Minor amount of shallow gas was observed at 677 m. Bubbles were seen at the wellhead and below the moon-pool but quickly disappeared. Seawater was pumped throughout this period, and the next section was drilled at a slow ROP with the ROV observing the wellhead. No further gas was encountered. The hole was completed without further problem. At TD the hole was displaced with 750 bbls of 1.20 sg high viscosity mud. Hole conditions during trip were good.

26 " Hole

Programme: Open 17 1/2" hole to 26" using a rock bit

The 17 1/2 " hole was opened to 26" using a SS33SGJ4 rock bit. At 820m due to bad weather conditions the bit was tripped as full power had to be assigned to the thrusters. Prior to the trip the hole was displaced with 750 bbls of 1.20 sg high viscosity mud to cover the clay section . This left the loose sands at the top of the section exposed to sea water during the 49 hours WOW. When drilling resumed, the hole had to be reamed from the shoe, taking 18 hours. The total time lost due to this WOW, and mud pump repairs was 73 hours.

At TD a short wiper trip was taken to 800m. During the trip out several tight spots were met which required back reaming and in turn circulating out the heavy mud. It was decided to run back to bottom. During the final trip hole conditions showed a marked improvement.

20" Casing and Cementing

Programme:Run the 20" 133 lbs X-56, Vetco RL-4S casing on a Dril-Quip 18 3/4" wellhead to a setting depth of approx. 950m BRT. Cement in one stage using G+8% Bentonite lead slurry tailed in by 100m of G neat. Run the 18 3/4", 15M BOP.

The 26" hole section was drilled riserless and the hole displaced to 1.20 sg mud prior to POOH.

71 joints of 20" casing were run on the wellhead housing. Prior to running the casing, the wellhead and the pup joints were made up to the 18 3/4" hydraulic running tool complete with a top BJ sub sea launch cement plug on a launching mandrel. A joint of 5" S135 was installed immediately above the running tool and the whole assembly racked in the mast on 5" HWDP.

The casing was run without difficulty. The Dart autofill floats worked correctly throughout, and the wellhead housing landed blind as both the ROV and the rig camera were out of action. This fact generated one problem in that on hydraullically locking the wellhead to the 30" housing, no sub sea corroboration could be given that the surface pressure was acting at the wellhead. It was discovered later, on repairing the ROV, and prior to doing the cement job, that the hydraulic running tool had not activated at the wellhead. A second attempt was made and locking confirmed on the sub sea gauge by the ROV.

Prior to the cement job, a 300 bbl hi-vis pill was pumped around, chased by seawater. Theoretically the flow rate was sufficient to trip the floats.

1335 bbls of G+8% lead slurry @ 1.58 sg was pumped followed by 180 bbls of G Neat tail slurry @ 1.90 sg. The subsea plug sheared out at 1740 psi and after 3.5 bbls. The plug was displaced with seawater and bumped according to programme. On bleeding off pressure the floats did not hold. The plugs were rebumped and 500 psi held for 3 1/4 hours.

On recovering the running tool, the 18 3/4" 15M BOP was run without event and subsequently tested to 5000 psi - OK.

The shoe track was drilled out with sea water by the bit and the assembly used for the 17 1/2" section.

17 1/2" Hole

Programme: Drill the 17 1/2" hole from the 20" shoe to approx. 2340m BRT in one pass using the novel PETROFREE mud system at 1.40 - 1.60 sg.

The Petrofree mud was pre-mixed ashore but not weighted with Barite. Barite was added on the rig to raise the mud weight to 1.20 sg prior to displacing it to the hole. Following the cleaning of the casing, the well was circulated to PETROFREE mud by pumping a 30 bbls hi-vis spacer followed by PETROFREE, and displaced @ 4-5 bbls/minute. This gave a good clean interface at surface. 2m of new hole were drilled to 958m before the leak-off test was performed. A low LOT was obtained at 1.57 sg EMW, so drilling continued to 1008m when a second LOT was performed. This EMW was acceptable at 1.77 sg. The increased value of this LOT could be because a filter cake had built up in the open hole section. When the first LOT was performed the formation had only been exposed to PETROFREE mud for 11 hours, having originally been drilled with seawater to 956m, leaving a 7m sump of 26" diameter.

The section was drilled in two bit runs with the same Security SS44 bit. It could have been achieved in one pass if the Teleco MWD tool had not failed at 1333m. The assembly was pulled to change out the MWD as it was estimated that it was quicker to POOH to change the MWD than to drop and recover surveys. Unfortunately the second MWD also failed after taking surveys to 1914m. However, the decision was made to drill to 2350m TD BRT without further surveys based on the fact that the well was being drilled on a developed field, of known stratigraphy and bottom hole conditions, and with little likelyhood of angle building, given the assembly in use. The single shot recovered at the section TD was 1 degree, thus justifing the decision.

Since the novel PETROFREE mud was being used for the first time, 2 wiper trips (1248m and 1771m) were made, with a third trip at 1313m to change out the MWD tool, to determine the condition of the hole. All three trips showed essentially clean hole, with only occassional tight spots where a maximum of 50 K lbs overpull was permitted. The hole was virtually always clean on the way in with no fill on bottom. With hindsight, no wiper trips were neccessary. The quality of hole produced by the PETROFREE mud was evidenced by the fact that at 1771m, the wiper trip was pulled without circulating bottoms up as the shale dump chute was blocked. Even with approx. 15 MT of cuttings in the annulus the string was pulled to the 20" shoe without any serious problems. It is unlikely that this would have been possible with water based mud.

During drilling, the ROP was restricted to approximately 30m/hr, due to the flow rate of 900 - 700 GPM. With a greater flow rate the ROP could have been much higher, say 50m/hr if 6 5/8" DP had been in use. Hole cleaning was not a problem at this ROP, with the mud Yield Point between 30 - 45.

A single logging run was made at TD. The logs were RIH without difficulties other than the fact that they would not pass 2326m. The caliper showed good hole, mainly in gauge. Average hole diameter was estimated at 18.2" based on the integrated hole volume from the logs.

No wiper trips were made before logs or before running the casing. The trial Petrofree mud provided typical OBM performance in terms of hole conditions throughout the section. The Ester On Cuttings figures (at 12.9%) were higher than might be expected for an OBM.

13 3/8" Casing and Cementing

Programme: Run 13 3/8" casing to 2340m BRT. String to consist of 72 lb/ft N80 and 68 lb/ft K55 Buttress casing. Cement in a single stage to 200m inside the 20" casing shoe. Use G+8% bentonite at 1.58 sg lead slurry tailed in with 300m G neat at 1.90 sg. Both slurries to be retarded with D 81 liquid retarder.

A single log (DIL/LSF/PCD/GR) was run after drilling the 17 1/2" hole. The log would not pass 2326m. Due to the small (1 1/2") standoffs used on the tool this did not give cause for concern over the condition of the hole.

A total of 125 joints of N80 casing and 55 joints of K55 casing were run. The K55 was run simply to use up old stock; it did not compromise the casing design. The N80 casing was run at the top and bottom of the string with the cross-over points at 1229m BRT and 522 m BRT. Weatherford auto fill float equipment was run (shoe and collar). After running 74 joints, excessive backflow through the pipe was occurring. The float equipment was tripped by breaking circulation and pumping at 10 bbls/min. The string was filled every 5 joints thereafter. A total of three bow spring centralisers were run over the casing collars between the 1st and 2nd, the 3rd and 4th, and 4th and 5th joints in the hole. Rigid centralisers were run over the casing collars on the first two joints inside the 20" casing.

The casing string was run in hole on 5" S-135 drillpipe. Top and bottom sub sea plugs were run. The casing took weight with the shoe at 2339m and was therefore circulated down to the setting depth of 2342m. 1 1/2 times casing volume was circulated prior to the cement job. The planned one times casing volume was exceeded due to delays in weighing up the spacer.

The programmed top of cement was raised in order to leave as little of the Petrofree mud behind the casing as possible, on economic grounds. Theoretical top of cement was raised to 470m (this would leave the top of spacer at the wellhead).

140 bbls of XC polymer spacer at 1.59 sg were followed by 60 bbls of Dowell Schlumberger 3001 spacer. A total of 751 bbls of lead slurry at 1.62 sg were mixed at a rate of 7.2 to 9 BPM. This was followed by 144 bbls of tail slurry at 1.90 sg which was mixed at 7 to 7.5 BPM.

The first ten barrels of the displacement were freshwater pumped by the cement unit. The top plug was picked up after 5 3/4 bbls with 1700 psi. The displacement continued with the rig pumps. Mud was pumped at 100 SPM (11.8 BPM). After 7320 strokes the standpipe pressure started to rise and losses were observed. On slowing the pumps down to 80 SPM the losses decreased. The plug was bumped with 1500 psi after 9161 strokes. This was 100 strokes earlier than calculated using a 96% pump efficiency. The casing had been calipered prior to running to aid the accurate calculation of displacement figures. The average ID of the 68 lb/ft casing was found to be 12.488" and of the 72 lb/ft casing 12.432". This compares with API figures of 12.415" and 12.347" respectively).

When running in the flush and mill tool to clean up the seal area in the wellhead prior to running the seal assembly, very viscous mud was found in the bottom of the riser with a 60/40 Ester/water ratio. Two hours were spent conditioning the mud in the riser. This was as a result of the reaction between the XC polymer spacer and the Petrofree mud. It is thought that this viscosifying of the mud during the displacement caused the rise in standpipe pressure and subsequent losses. Total losses during the displacement totalled 32 bbls.

The seal assembly was set without problem.

The casing was later pressure tested to 2250 psi.

12 1/4" Hole

Programme: Drill the 12 1/4" hole from 13 3/8" shoe to approx. 3700m BRT section TD at optimum ROP and in as few bit runs as possible.

As the 13 3/8" casing was cemented with two sub sea launch wiper plugs containing a lot of aluminium, the casing was drilled out with an XDG mill tooth bit. Drilling out of the subsea plugs took 2 hours 40 minutes. The rest of the shoe track took around 50 minutes to drill.

Having drilled 3m of new hole a leak off test gave a result of 2.13 sg EMW, a figure higher than expected. The mill tooth bit was pulled.

An Eastman Christensen R426 PDC bit was run on a stiff BHA to start drilling at 2353m. This assembly drilled very fast, ROP being restrained to approximately 100m/hr instantaneous penetration, with 200 RPM and very little WOB. The Teleco MWD did not function from the start with a flow rate of approx. 690 GPM (min. for tool 550 GPM). It was decided therefore to drill ahead with single shot surveys at 200 - 300m intervals.

The first survey was dropped at 2662m, and recovered at the 13 3/8" shoe. This gave an inclination of 3 degrees. Drilling continued at a high ROP, greater than 75m/hour to 2861m. A second single shot was dropped and recovered at the casing shoe which showed an inclination of 4 1/4 degrees. As no azimuth survey was available, the worst case was assumed that the inclination was all in the same direction. On this assumption the deviation would put the well outwith the target, therefore it was decided to pull the R426 assembly and go back in with a rock bit and pendulum assembly. The well at this point being only approx. 60 m above top Chert. The trip out showed the hole to be in excellent condition with little or no drag.

An HTC ATM 22 was picked up as it was anticipated that it would drill the remaining mudstone section at a good ROP, and still be able to drill the Cherty Ekofisk formations. Drilling commenced in the Sele mudstone formation at 7.5 - 9m/hr ROP with 40 klbs WOB and 150 RPM. the ROP steadily increased up to a maximum of 20 m/hr instantaneous. The MWD surveys indicating a steady drop in the inclination.

On reaching the top of the Ekofisk B, a positive drilling break was observed. Then the ROP levelled out to approx. 10 m/hr average before hitting harder formation and chert bands at 2990m. From there onwards the ROP slowed down to 2 - 3 m/h until 3065m when it further decreased until the bit stopped drilling at 3072m. The pendulum assembly had been successful in continuing to reduce the

hole inclination through the chalk; the survey taken prior to pulling out of hole showed a hole angle of 2.4 degrees (survey depth 3057m). On pulling the bit out of the hole its condition was comensurate with the reduction in ROP towards the end of the run; the bit was graded T8/B4/I with 70% broken teeth. The trip showed the hole to be in good condition.

An HP51X bit was run on the same BHA. The ROP from this bit was disappointing; the average for the 78 metres drilled was only 1.4 m/hr. The chert was prognosed to finish at 3107m. Chert was seen from 2980 to 3077m (rare traces only below 3030m). After drilling to 3150m there was little or no chance of encountering chert deeper in the well so the bit was pulled. Hole angle had decreased to 1.8 degrees by this time.

The trip out of hole was clean except for some minor overpull (20 klbs maximum) between 3115m and 3105m. A Hycalog DS46H was run on a locked up assembly. Heavy reaming was required from 3127m to 3147m on the way back in the hole; the previous bit was 1/16" undergauge when it was pulled.

The DS46H drilled the rest of the section (a distance of 534m) at an average ROP of 9.4 m/hr (the bit was 25% worn when pulled out of the hole). Hole angle had increased to 6.1 degrees by the end of the section. As the lower permeability upper zones of the Ula reservoir were expected to be missing at this location it was imperative to TD the section above the reservoir due to the massive overbalance that would result from drilling into the depleted reservoir with a 1.55 sg mud. It was, however, also important to set the shoe as close to the top of the reservoir as possible to reduce the possibility of hole problems when drilling the next section with a light weight oil based mud. TD was 3684m. This was later found to be 14 m above top Ula.

A single logging run (DIS/LSS/GR/CAL) was made at TD without problems. The sonic log was run back inside the 13 3/8" as an eccentric CBL/VDL, to identify top of cement. The TOC was picked at 505m behind the 13 3/8" casing with indications of some soft cement down to 590m. There was good cement below 590m. The caliper indicated gauge hole throughout so no wiper trips were made.

9 5/8" Casing and Cementing

Programme:Run 9 5/8" and 10 3/4" casing to approx. 3713m BRT. String to consist of 47 lb/ft C95 9 5/8" VAM/NEW VAM casing and 5 joints of 55.5 lb/ft N80 10 3/4" FJL VAM casing. Cement in a single stage to 200m inside the 13 3/8" casing shoe. Use G+8% bentonite at 1.58 sg lead slurry tailed in with 1000m G+35% Silica (for strength retrogression)at 1.90 sg. Both slurries to be retarded by D 801 mid-temp liquid retarder.

A total of 267 joints of 9 5/8" casing and 5 joints of 10 3/4" casing were run and landed at 3680m BRT. The 10 3/4" casing was run to house a down hole safety valve in case the well will be completed at a later stage.

As for the 13 3/8" casing, severe backflow was experienced from the pipe. Therefore heavy slugs were pumped after joint 25 and 61. The Weatherford floats were tripped with the 9 5/8" casing inside the 13 3/8" shoe after 125 joints had been run. The casing was filled every 5 joints thereafter.

Just after lowering the wellhead hanger through the rotary table the string took 100 klbs weight. After working the pipe it came free and no further problems was experienced down to the shoe depth. It was most likely a casing collar that hung up in the subsea wellhead. Washed down the last 10m of casing and landed the casing with the shoe at 3680m. Circulated 1 .5 times the casing volume prior to the cement job to optimize hole and mud properties.

As for the 13 3/8" casing the calculated top of the cement was raised in order to leave as little of the Petrofree mud as possible behind the casing. Theoretical top of the cement was raised to 1471m (this would leave approximately 50 bbl of Petrofree in the casing annulus. This was the minimum volume of Petrofree that had to be left down hole due to logistic problems on the surface. Since ordinary OBM was to be used in the next section as much of the Petrofree mud as possible had to be

backloaded prior to bringing the new mud onboard, simply to avoid contamination of the Petrofree system).

Pumped 150 bbls of XC polymer spacer at 1.58 sg followed by 60 bbls of D3001 spacer at 1.61 sg. A total of 250 bbls of lead slurry at 1.62 sg were mixed at a rate of 5-8 BPM. This was followed by 230 bbls of tail slurry at 1.90 sg mixed at 6 BPM. The slurry density of the lead slurry varied slightly too much. The mixing was stopped prior to mixing the tail slurry and the surface piping was checked. However, no obvious problems/explanations were found and the mixing operations were continued. The cement was displaced with seawater to aid in the logistical arrangements of removing Petrofree from the rig and taking OBM onboard.

The top plug was picked up after pumping 5.8 bbls of seawater and it sheared at 1810 psi. Since the maximum expected pump pressure during the displacement of the cement slurries could get as high as 4000 - 4500 psi it was decided to do the complete displacement with the cement unit. However after displacing 530 bbls one of the main diesel engines broke down and the final displacement had to be done by the mud pumps at controlled rate to avoid tripping the pressure relieve valves.

The cement plug was bumped after 879 bbls with 4000 psi which was according to the calculated displacement volume. The pump pressure was bled off twice, but the floats did not hold. It was therefore decided to WOC for 5 hours. No mud losses were experienced during the displacement.

No problems were experienced when cleaning out the wellhead area or when installing the seal assembly.

The casing was later pressure tested to 5000 psi over a seawater gradient.

The cement was tagged at 3612m (41m too high) and drilled down to 3653m, which took 2.75 hrs. At this depth the hole was displaced to light weight OBM at 0.93 sg. The remaining shoe track took 2.25 hrs to drill.

The leakoff test carried out after drilling out the shoe track and 1m of new formation gave a result of 1.89 sg EMW.

8 1/2" Hole Section

Programme: Drill/Core/Drill 8 1/2"hole from the 9 5/8" shoe to approximately 3766m BRT. The base of the Lower Corbonaceous Member (just below the 9 5/8" shoe) and the top ULA formations (including the entire unit "2A") to be cored. The remaining reservoir section to 3766m (10m into Unit 3A) to be drilled with a GR MWD sensor located as close as possible to the bit.

After performing the leak off test, 4m of new formation was drilled to get as close as possible to the top of the ULA reservoir. A SEEKER gyro survey was then run to confirm the well trajectory, indicating that the bottom hole location was 75.91m in a direction of 36.16 degrees from the surface location.

A 120 ft corebarrel assembly with a RC476 corehead was run and a 4" core was cut from 3689m to 3721.5m. Close attention was paid to any signals indicating higher reservoir pressures than expected.

A positive flowcheck was performed at 3721.5m (following a drilling break) and the well was shut in.

A total of 3 bbls gain was observed at the surface prior to shutting in the well. Bottoms up was circulated through the choke. Maximum gas level during the circulation was 0.49%.

After opening the well the corebarrel was run back to bottom without problems. However, when trying to POOH the corebarrel was stuck and there was no circulation. Max. over pull was 120 klbs. After working the pipe up and down, including rotation it came free and circulation was reestablished.

It was later found that a 10m section below the 9 5/8" shoe had washed out (caved in) to an average diameter of 16". It is therefore likely that some of this had caved in during the well shut in period, and therefore wedged the corebarrel/corebarrel stabilizers when pulling back into the 9 5/8" casing.

As a consequence of the pit gain and the stuck corebarrel after circulating bottoms up, it was decided to stop coring and continue drilling to TD with a 8 1/2" bit and a GR MWD.

The remaining 8 1/2" section, from 3721.5m to 3742m (section TD), was drilled with a Hycalog DS26H PDC bit without incident. The hole condition was tight at 3732m and 3715m requiring an overpull of 60 klbs, so the bit was run back to bottom. The bit was pulled with a slight tight spot at 3727m. The reservoir interval was logged (2 runs) and 5 RFT runs were made before rigging up to run the liner. No wiper trip was required. All drilled cuttings and fines extracted from the mud were drummed and sent ashore for disposal.

7" Liner

Programme: Run 7" 29 lb/ft L80 liner to 3742m with 150m overlap inside the 9 5/8" shoe. Activate liner hanger and cement in place with G+35% silica cement at 1.90 sg while rotating the liner. Use 30% excess on theoretical open hole volume plus 10 barrels. Set liner packer. Clean out and pressure test.

On completion of logging, the liner was run without a wiper trip based on the fact that the logging had been problem free and that the hole was in good condition. Total logging time was approximately 38 hours.

Prior to running the liner, the cementing kelly was made up, dart and ball installed, and laid down ready for use.

The 3 joint shoe track consisted of a Weatherford Auto Fill float shoe, a float collar one joint above that and the Nodeco landing collar one joint above that. The auto filling equipment was tested and found to be working OK.

A total of 17 full joints of 7" liner were run together with 2 pup joints. One pup joint immediately above the reservoir, and the second placed 4 joints of casing higher to assist in depth correlation for the permanent packer. The Nodeco rotating liner hanger assembly was then made up which incorporated an integral packer and 15 ft PBR. The liner was run in on 5" drill pipe, the auto fill float equipment worked well while running the liner, but had to be tripped early due to severe back flowing of mud up the drill pipe. The pipe was then filled every 5 stands.

At the 9 5/8" shoe (3680m BRT), circulation was broken and the up/down weights taken. The run continued and the cementing kelly was picked up. Circulation was broken and the liner run to bottom. The liner held up at 3738.5m. Circulation was maintained without any rise in pressure, but it was not possible to penetrate further.

The liner setting ball was dropped and the liner set with 1700 psi. Top of the PBR at 3513m. The ball seat was sheared out with 2600 psi, and circulation and rotation at 20 RPM commenced.The circulating pressure was initially some 1000 psi greater than before setting the hanger, with the same pump strokes. There was no problem rotating the liner. The pump pressure gradually decreased as circulation progressed, but with fluctuations up to approximately 800 psi. However the overall trend being downward. Rotation continued with only a few torque fluctuations. Eventually, some time after bottoms up, the circulation pressure steadied at the same pressure as before setting the hanger. It was then considered safe to start mixing cement.

60 bbl of Dowell 3001 spacer at 1.40 sg was pumped, followed by 36 bbls of batch mixed G+35% silica cement at 1.90 sg. The wiper dart was released and displaced at 6 bbl/min by the cement unit at about 200 psi. The pressure rose rapidly to 2300 psi indicating the wiper dart had latched into the wiper plug approximately 19 bbl before it was due. Circulation was stopped at this point due to the unexpected rapid increase in pressure, but this shut in pressure was suddenly lost, suggesting the wiper plug had sheared out. Circulation recommenced at 4 bbl/min and about 1100 psi pressure. The pressure continued to increase as cement entered the annulus and the circulation rate was reduced to 2 bbl/min. At 202 bbl displacement volume, still about 20 bbl early, the pressure rose to 2000 psi and circulation was stopped. This pressure bled off so a further 3 bbl was pumped, and a pressure off 2200 psi was held. The plug was assumed to have bumped. Pressure was held for 10 minutes then bled off without any backflow. Rotation had been maintained throughout at 20 RPM. 70 bbls mud were lost to the formation during the job.

The liner running tool was released from the rotating assembly and attempts were made to release from the liner without success. Max 100 klbs overpull was taken. This was slacked off and 3000 psi put inside the liner to assist with release. 100 klbs overpull again failed to release the tool. 4000 psi was put below the running tool and this time at 100 klbs overpull some pressure escaped and the tool pulled free. The running tool was set down with 60 klbs on the PBR to set the packer. No indication was seen of the pins shearing or the packer being set. The string was reverse circulated and 3 bbl of cement followed by 60 bbl of spacer was returned. The 0.9 sg mud was circulated out of the well above the liner with sea water and the string POOH.

The Nodeco PBR top dressing mill was RIH. This tagged the PBR at 3510m, approximately 3m higher than expected. The liner must therefore have been pulled up some 3m while trying to free the running tool. The top of the PBR was milled, then the well circulated to 1.40 sg mud in preparation for the 6" hole section.

An attempt was made to pressure test the liner overlap to 3100 psi, but without success. 6 bbl of mud was pumped at little or no pressure. Pumping was stopped and the 6 bbl returned. The milling assembly was POOH and a 9 5/8" packer RIH. Prior to setting the packer just above the liner overlap, the string was circulated to seawater in anticipation of an injectivity test. The casing above the packer was tested to 2000 psi OK, then the liner below tested OK to 4500 psi. No explanation can be given for the failure of the previous pressure test.

A 6" bit was RIH and the wiper plug tagged at 3708m. The shoe track was drilled out following a 3100 psi casing pressure test. The shoe was confirmed at 3735.5m. 3m of new formation were drilled to 3745m. An FIT was then performed to 3100 psi, 1.98 sg EMW then the bit pulled out.

6" Hole Section

Programme: Drill 6" hole through the remainder of the Ula formation, then 50m into the underlying Triasssic formation to approximately 3845m. Log the open hole and plug back the 6" hole to 50m inside the 7" liner using 50% excess on open hole volume. Dress- off the cement plug to 3m inside the 7" shoe and run a bridge plug.

A 6" J4 bit was used to drill the shoe track. Top of cement was tagged at 3708m and drilled to 3725.5m (3m below the float collar). The casing was pressure tested to 3,100 psi. The shoe track was drilled at 3735.5m. 3m of 6" hole were drilled to 3745m, before conditioning the mud and performing the FIT. 3,100 psi was applied but there was no leak off, EMW = 1.98 sg.

A Hycalog DS26H bit was RIH to drill to well TD. 75m of 6" hole were drilled in 10 hours to 3820m, with drilling breaks at 3750m, 3774m and 3818m. Each drilling break was flow checked and proved to be negative. The hole was cleaned up ready for the first logging run.

All drilled cuttings and fines extracted from the mud were drummed and sent ashore for disposal.

6 logging runs were made including a velocity survey and RFT's. A CBL log showed good cement bond across the reservoir section. The RFT indicated the formation below the Ula zone 4 to be at virgin pressure (1.39 sg). Minimum mud overbalance with 1.40 sg mud was 49 psi. 34 hours were spent logging.

On completion of logging, 24 jts of 2 7/8" EUE tubing were RIH below 3 1/2" and 5" drill pipe to set a balanced cement plug across the 6" open hole section and 50m minimum into the 7" liner. A Halliburton latch down sub was installed at the 3 1/2"-5" cross over, to be positioned some 60m above the top of the liner PBR when RIH.

Bottoms up were circulated while rotating pipe with the 1.40 sg mud in circulation. 15 bbl HEC spacer was pumped ahead of the cement followed by 23 bbl of 1.90 sg G+35% silica slurry and the latch down plug was released. The slurry was chased with mud from the cement unit while rotating pipe, 201 bbl was the calculated volume to bump the dart and shear out the sleave. After 202 bbl no plug bump was seen, therefore pumping was stopped. The cementing kelly was laid down and 3 stands pulled dry. The 4th stand pulled wet indicating the dart had landed. This showed that the plug had landed 6 bbl later than it should have done. The reason for this is unexplained. The sub was sheared out at 1200 psi and the pipe went on suction. A further 4 stands were pulled dry to a height of 30m above the cement plug, and 50 bbl mud pumped to ensure clean pipe. POOH was then completed. Pumping and displacing the slurry took 1 hour total with a further 20 minutes for batch mixing prior to displacement.

After making a dummy run with the subsea test tree and torquing up the flowhead to a joint of tubing, a 6" bit and casing scraper were RIH. The bit tagged hard cement at 3620m which was the calculated top of the balanced plug. Hard cement was drilled to 3733m in 6 1/4 hours. The hole was circulated clean and displaced to 0.9 sg mud for the testing phase.

Sclumberger ran a gauge ring and junk basket followed by a 7" Baker bridge plug which was set at 3732m. The plug, 7" liner and 9 5/8" casing were then tested to 5000 psi over the 0.90 sg mud column. The Baker production packer was run on wireline and set at 3665m.

Following BOP testing the well was ready for the production/injection testing phase.

Testing

Programme: Run 3 1/2" 12.9 lb/ft, L80 tubing test string (NK-EL connections). Pressure test string after making up three joints of tubing, half the string and before picking up the sub sea test tree. Run the 4 1/2" 24 lb/ft, L80 landing string (PH4 connections). Displace string to nitrogen. Run 2.2" gauge cutter. Perforate with through tubing guns 1,000 psi underbalanced. Open well for clean up and main flow period (estimated 12 hours, 8 hours stabilised flow). Close well in down hole for main PBU for 1 1/2 times the main flow period. Perform water injection test. Reverse out and pull test string. Retrieve permanent packer.

Running Test String and Perforating

The minor tool string was run in hole on 372 joints of 3 1/2" , 12.95 lb/ft L80 NK-EL tubing. See fig. 1.4. The string was pressure tested to 6500 psi after running 3 joints of tubing, half way in the hole and after running the complete string. The string was filled with mud every 3 joints when running in the hole. Torque turn was used when making up the string. Only three joints were rejected when running in the hole. One of these was for suspected body damage caused by the slips. The second was laid out due to mechanical damage caused to the box by the elevators. The final joint was laid out due to a suspected undersized pin. The string was run in on 5" drill pipe for space out and the packer tagged at 3661.5m. After pulling the drill pipe the landing string was picked up from the derrick and run in hole. The string was again tested to 6500 psi prior to picking up the flow head.

An attempt was made to open the MCCV by holding 700 psi on the annulus and cycling the tubing pressure from 0 to 1800 psi. The tool had not opened after 11 cycles. The annulus pressure was therefore increased to 900 psi and the tubing pressure cycled to 2500 psi. While pressuring up for the 8 th time with this pressure there was communication between the tubing and annulus. The pressure was bled off from the tubing and communication was lost. It appeared that the valve had missed the reversing position and gone straight to the circulating position. The flow from the annulus to the tubing had been sufficient to close the valve. After a further four cycles the annulus pressure was increased to 1200 psi and the tubing pressure was cycled at 3500 psi. When pressuring up for the eighth time communication between the annulus and tubing was observed again. This time the pressure was bled off from the annulus and the valve remained open.

Due to the highly depleted reservoir pressure (approximately 0.72 sg from the RFT data), it was critical to reduce the hydrostatic pressure in the string as far as practically possible. Five barrels of base oil were displaced to the string to occupy the volume between the bottom of the nitrogen cushion and the MCCV. 83 bbls of the string was displaced to nitrogen with a tubing pressure of 3300 psi, the volume was measured by careful monitoring of returns. String volume was calculated to be 88.5 bbls; the nitrogen displacement was equal therefore to 94% of string volume.

A 2.2" gauge cutter was run to the wireline re-entry guide on Testtech wireline. Several attempts were required to get through the PCT. This was as a result of either the PCT not fully opening or tubing dope being pushed down ahead of the gauge cutter. (Precautions had been taken against too much dope being applied to the pipe; only a small amount was applied to the pin of each joint with a paint brush and none was applied to the box).

Two perforating runs were performed using pressure control equipment. The first run perforated the interval 3719 - 3710m, the second 3710 - 3701m. 2 1/8" Enerjet perforating guns were used. Prior to firing the first set of guns the surface nitrogen pressure was bled down to 1800 psi. This gave 1000 psi underbalance. Surface pressure rose to 1950 psi after the first guns were fired.

Flow , Build Up and Injection Periods

The well was opened up with the adjustable choke increasing to 107/64 ths with 0 psi WHP. There was weak flow from the bubble hose before the base oil began to flow followed by mud and then Ula oil. The well flowed for a total of 13 1/4 hours with a flow rate of approximately 900 bbl/day with a 280 psi WHP. The well was shut in down hole at the PCT for a total of 18 hours.

The string contents were then bullheaded using filtered (Coarse filters only) and treated seawater before continuing with the injection test. A surface pressure of approximately 6500 psi was required to fracture the well before a stabilised injection rate of 9 bbl/min was achieved with a WHP of 4500 psi. Upon completion of the injection test 100 bbls of 0.93 sg mud were bullheaded down the test string. The SHORT was then opened with 3300 psi. Total well contents were then circulated prior to pulling out of the packer. Maximum gas was 1.2%.

Pulling Test String and Retrieving Permanent Packer

While laying the test string down, an inspection was carried out on the rig by a representative of the test string owner's company. No joints were rejected.

A Baker CJ-1 packer milling tool was used to retrieve the Baker FB-1 permanent packer. After milling for 1 3/4 hours the packer appeared to drop 0.7m. However pulling 80 klbs up and setting 15 klbs down failed to move the packer any more. After milling for a further 5 1/2 hours all signs that the mill was cutting metal had ceased (there was only a low steady torque). The tool was disengaged from the packer. Four attempts were required with a maximum overpull of 150 klbs and maximum down weight of 20 klbs before the tool released from the packer. On examining the tool at surface it was discovered that there was little wear on the mill; the mill had apparently only being milling on the short collar at the top of the packer. The dogs showed signs of damage consistant with the difficulty experienced in removing the tool from the packer. The burn shoe and dogs were replaced and the tool re-run.

During the second run more weight was applied (28 klbs compared to 6-10 klbs during the first run). Rotary speed was a constant 60 RPM during the second run compared to 60 - 140 RPM for the first run. After milling on the packer for 4 3/4 hours the packer dropped. It was free up and down. The packer required working through the liner top. Maximum overpull was 40 klbs. On examining the fish on surface heavy score marks were apparent on the collars of the seal bore extension. These were probably caused by junk being caught between the collars and the profiles in the liner hanger.

Suspension

Programme: Run in hole with cement stinger and displace well to seawater. Set a cement plug from the 7" bridge plug to 100m above the 7" liner top. Use a Halliburton latch down indicator sub. Squeeze cement to perforations. Dress off the cement and load test it to 10,000 lbs. Displace the well to treated seawater suspension fluid. Set a bridge plug on top of the cement plug. Set a top cement plug from 330 - 130m. Pull the riser and BOPs. Run a corrosion cap and displace to corrosion inhibiting oil. Cut the guidelines and perform a seabed clearance survey. Pull anchors and move off location.

35 joints of 2 7/8" tubing were run on 5 stands of 3 1/2" drillpipe with 5" drillpipe back to surface. The 3 1/2" pipe was necessary so as there was no 5" drillpipe in the plug when it was fully displaced. The Halliburton latch down indicator sub was run at the bottom of the 5" drillpipe. The bottom of the hole was tagged at 3724m, 8m higher than anticipated. When displacing the well to seawater gas levels started to rise so the upper annular BOP was closed and returns routed through the choke manifold and poor boy degasser. Maximum gas was 12%. As the gas levels decreased the annular was reopened and returns redirected up the riser. 15 bbls of unweighted HEC spacer with D607 was pumped ahead of the cement. 61 bbls of batch mixed G+35% slurry at 1.90 sg was pumped down the hole and displaced with seawater at 10 bbls/min. After displacing 125 bbls the displacement rate was slowed down to 1 1/2 bbls/min. The 61 bbls of slurry included 10 bbls excess. During the displacement the upper annular was kept closed and 200 psi back pressure held on the choke in an effort to prevent u-tubing due to the large volume of heavy (1.90 SG) slurry in seawater. The dart landed in the indicator sub 20 bbls early compared with the calculated displacement. This suggests that the back pressure held on the choke should have been higher. A higher back pressure was not held due to concerns about losing to the open perforations. The indicator sub was sheared with 1800 psi.

After pulling back to 3330m an attempt was made to squeeze to the perforations. 2000 psi pressure was applied but this was insufficient to squeeze any cement away.

An 8 1/2" bit and 9 5/8" casing scraper were run to dress off the cement plug. Top of cement was tagged at 3348m. This ties in closely with the theoretical top given the quantity of slurry pumped (actual theoretical top would be 3364m). Hard cement was dressed off to 3355m. The plug was then load tested to 10 klbs. The well was displaced to seawater treated with 1.5% Ancopac and 30 ppm Hydrokem 211 before pulling out of hole.

A Schlumberger junk basket was run which indicated top of cement at 3357m (wireline depth). A 9 5/8" bridge plug was set on wireline at 3353m. This corresponds to 6m below a casing collar.

A 2 7/8" tubing stinger was run on 5" drillpipe to 430m. A 25 bbl hi vis slug was spotted and the tubing pulled back to 330m. 49 bbls of batch mixed cement slurry was pumped to the hole. The slurry was displaced with 6.5 bbls of seawater. The pumping of cement was performed at approximately 2 bbls/min apart from the first 10 bbls which were pumped at around 6.5 bbls/min. The displacement was also carried out at 2 bbls/min. It had been planned to mix this plug using G+35% silica flour to use up the remaining bulk. However after mixing around 40 bbls the blended cement ran out and the remainder was mixed with G neat cement (a total of 60 bbls were mixed).

The string was pulled to 130m and reversed out. A small quantity of cement was seen at surface.

Four hours were lost when pulling the BOP stack as difficulty was experienced loosening bolts securing the bottom joint of riser to the top of the stack.

A Dril-Quip Universal corrosion cap was supplied to be run with a plug type cap as back - up. Investigation by the ROV prior to running the corrosion cap showed that the 18 3/4" housing used on this well did not have the necessary ring for this type of corrosion cap to latch onto. However it was decided that there was a possibility that the corrosion cap would latch under the connector profile at the top of the wellhead housing. This upset is 0.17 inches less in diameter than the correct ring, and is bevelled. The universal corrosion cap, was therefore run. A 15 klbs overpull was successfully applied to the corrosion cap once it was landed. The wellhead was then displaced to rust inhibiting oil. When attempting to pull the running tool from the corrosion cap, the cap came off the wellhead with zero overpull. This cap was then pulled to surface and laid down; the shear pins inside the cap were unmarked. The only explanation for the cap taking an overpull and then pulling straight off later is that it was slightly cocked on the wellhead when the original overpull was taken but was given a straight pull when attempting to remove the running tool.

The Dril-Quip "plug type" corrosion cap was then run without problem on the J-slot running tool.

The guidelines were cut close to the post tops with the ROV. A seabed survey showed a large quantity of cuttings on the seabed and on the PGB. Otherwise the seabed was clear of debris. Shackles remain on the short lengths of guideline left sticking out of the post tops.

Number one anchor chain was changed out for inspection prior to pulling anchors. The last anchor was on the bolster at 2200 hrs on the 15th May 1990.

The rig was then moved to location 2/7-22.

7/12-9 TEST STRING

FIGURE 1.4

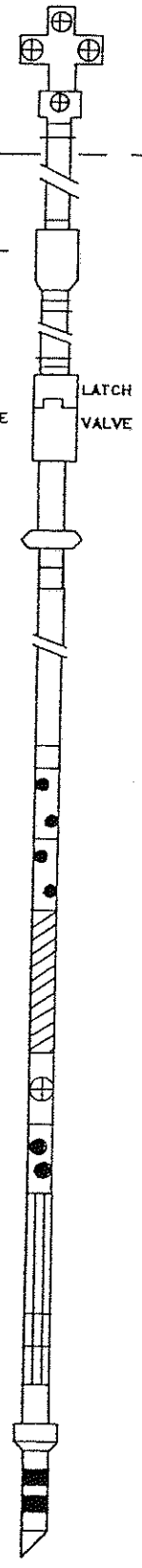
TESTTECH

TUBING TEST STRING – PROVISIONAL

CLIENT : B.P.NORWAY
FIELD : ULA
WELL : 7/12-9

RIG : ROSS ISLE
TEST : DST#1
DATE : MAY 1990

JOINT : NKEL
TUBING WEIGHT : 12.95 LB/FT
TD OF STRING : 3673.6 (MULE SHOE)



	O.D. INCH	I.D. INCH	LENGTH METRES	DEPTH IN HOLE METRES BRT	
SURFACE TEST TREE	N/A	3 1/16	3.97	-9.92	
X-OVER ROTARY TABLE			0.35	-5.95	
TEST TUBING	4.50	3.38	27.80	-5.60 (STICK-UP)	
SUB SEA LUBRICATOR VALVE	8.25	3.00	2.90	22.20	
X-OVER TEST TUBING X-OVER	4.50	3.38	54.80	25.10	
SUBSEA TEST TREE 15K	12.75	3.00	8.20	79.90	
FLUTED HANGER CROSSOVER			1.20	88.10	HANG OFF
TEST TUBING	3.50	2.75		89.30 (BOTTOM OF LANDING STRING)	
CROSSOVER					
S.H.O.R.T.	5.00	2.40	0.90	3612.10	
M.C.C.V.	5.0	2.25	1.90	3613.00	
DRILL COLLAR	4.75	2.25	9.50	3614.90	
P.C.T. TESTER VALVE	5.00	2.25	7.00	3624.40	
P.O.R.T.	5.00	2.25	2.60	3631.40	
	5.50	2.25	8.50	3634.00	
GAUGE CARRIER DRILL COLLAR	4.75	2.25	9.40	3642.50	
DRILL COLLAR	4.75	2.25	9.10	3651.90	
CROSSOVER			1.00	3661.00	
PACKER LOCATOR					
SEAL ASSEMBLY			11.86	3662.00 (3665.0 WHEN LANDED)	
TAILPIPE-MULE SHOE				3673.60	

SECTION 2

PRESSURE AND TEMPERATURE DATA

2.1 PORE PRESSURE (RFT RESULTS. (No. 1)

8 1/2" Hole

No.	Depth m BRT	Mud Hydrostatic before (psig)	Formation pressure psig	Mud Hydrostatic after (psig)	Pre test Permeability (k2 md)	Comments
1	3703.0	4737.5	3781.8	4737.5	10.11	
2	3704.9	4741.7	3783.5	4741.6	10.67	
3	3708.1	4746.2	3786.5	4745.3	8.81	
4	3709.6	4747.1	3787.9	4746.8	14.66	
5	3711.8	4750.8	3789.7	4750.5	4.38	
6	3714.6	4752.2	3792.7	4752.6	4.27	
7	3715.7	4755.8	3793.6	4755.6	2.11	
8	3717.9	4758.8	3797.3	4758.8	2.28	
9	3719.8	4761.5	3798.6	4761.3	1.95	
10	3721.8	4062.0	3820.0	4762.3	0.38	Very tight. Did not stabilise.
11	3725.5	4769.5	3823.4	4769.2	0.46	Very tight. Did not stabilise.
12	3727.6	4772.3	3843.8	4772.3	1.09	
13	3729.4	4774.8	3845.8	4774.8	14.82	
14	3732.5	4779.3	3847.6	4774.2	7.64	
15	3733.7	4780.9	3849.3	4780.4	9.58	

2.1 PORE PRESSURE (RFT RESULTS. (No. 2) 8 1/2" Hole

No.	Depth m BRT	Mud Hydrostatic before (psig)	Formation pressure psig	Mud Hydrostatic after (psig)	Pre test Permeability (k2 md)	Comments
16	3736.2	4784.3	3858.1	4784.	12.43	
17	3738.5	4787,2	3864.2	4786.7	13.45	
18	3733.7	4780.9	3849.3	4780.4	0.67	
	3735.2	4781.0	12.4	-	-	Sampling (Run 3B): To get as deep as possible the 2 3/4 gallon chamber was not run. 36 min to fill (1 gal) Content of 1 gallon chamber: 2.4l oil. 0.8l water/filtrate The formation was very tight
	3719.8	4761.2	3798.4	-	-	Sampling (Run 3C) 38 min to fill (1 gal) Content of 1 gallon chamber: 2.3l oil. 0.05l water/filtrate 86 min to fill (2 3/4 gal) Content of 2 3/4 gallon chamber: 9.8l oil. 0.5l filtrate.
	3729.0	4772.5	3845.3	-	-	Sampling (Run 3D) 4 min to fill (1 gal) 6 min to fill (2 3/4 gal) 100% oil in both chambers. totally 10.6l.
	3734.7	-	-	-	-	Sampling (Run 3E) Did not run the 2 3/4 gal chamber for the same reason as for 3B 5 min to fill (1 gal) Chamber content: 3.5l oil.

Note: Sampled two times at approximately 3735m due todoubtfulwater resistivity from run 3B.
No water was sampled. The water from run 3B could have leaked from the cushion in the RFT tool.

2.1 PORE PRESSURE (RFT RESULTS. (No. 3) 6" Hole

No.	m BRT	Hydrostatic before (psig)	pressure psig	Hydrostatic after (psig)	Permeability (k2 md)	
	3746.5	7455.4	-	-	-	Very tight. test abandonded
	3748.7	7453.2	-	-	-	Very tight. test abandonded
	3753.3	7463.0	7181.4	7462.0	0.3	
	3756.6	7468.9	7356.9	7469.2	7.30	
	3757.5	7471.4	7360.0	7490.6	6.50	
	3766.4	7491.3	-	7490.7	-	Very tight. test abandonded
	3768.5	7495.5	7468.4	7495.0	1.50	
	3771.5	7501.9	-	7501.5	-	Supercharged. very tight
	3778.0	7515.1	7463.9	9515.5	4.0	
	3784.5	7528.8	7485.2	7528.6	0.2	Supercharged. tight
	3746.8	7452.6	-	7452.6	-	Very tight. (tried 3746.6. 3746.4. 3746.5. 3746.2m or sample all tight.
	3748.7	-	-	-	-	Very tight
	3756.5	-	7362.6	7473.6	-	Sample. 1 gallon segregated

2.2 FRACTURE PRESSURE - leak off test results

At 20" Casing Shoe:

Date of test:	31.03.90		
Open Hole Depth	1008	m MD	Second attempt
20" Casing Shoe Depth	949	m MD	of the Leak-off
Mud Weight	1.20	SG	
Volume Pumped	6.50	BBLS	
Volume Returned	6.50	BBLS	
Pump Pressure	770	PSI	
Mud Hydrostatic Pressure	1620	PSI	
Formation Breakdown Pressure	2390	PSI	
Equivalent Mud Weight	1.77	SG	

At 13 3/8" Casing Shoe:

Date of test:	07.04.90		
Open Hole Depth	2353	m MD	
13 3/8" Casing Shoe Depth	2342	m MD	
Mud Weight	1.55	SG	
Volume Pumped	9.50	BBLS	
Volume Returned	8.50	BBLS	
Pump Pressure	1930	PSI	
Mud Hydrostatic Pressure	5164	PSI	
Formation Breakdown Pressure	7094	PSI	
Equivalent Mud Weight	2.13	SG	

At 9 5/8" Casing Shoe:

Date of test:	22.04.90		
Open Hole Depth	3684	m MD	
9 5/8" Casing Shoe Depth	3680	m MD	
Mud Weight	0.93	SG	
Volume Pumped	20.00	BBLS	
Volume Returned	20.00	BBLS	
Pump Pressure	5000	PSI	
Mud Hydrostatic Pressure	4868	PSI	
Formation Breakdown Pressure	9868	PSI	No Leak-off
Equivalent Mud Weight	1.89	SG	FIT

At 7" Casing Shoe:			
Date of test:	30.04.90		
			Comments
Open Hole Depth	3745	m MD	
7" Casing Shoe Depth	3745	m MD	
Mud Weight	1.40	SG	
Volume Pumped	11.80	BBLS	
Volume Returned	10.00	BBLS	
Pump Pressure	3100	PSI	
Mud Hydrostatic Pressure	7458	PSI	
Formation Breakdown Pressure	10558	PSI	No Leak-off
Equivalent Mud Weight	1.98	SG	FIT

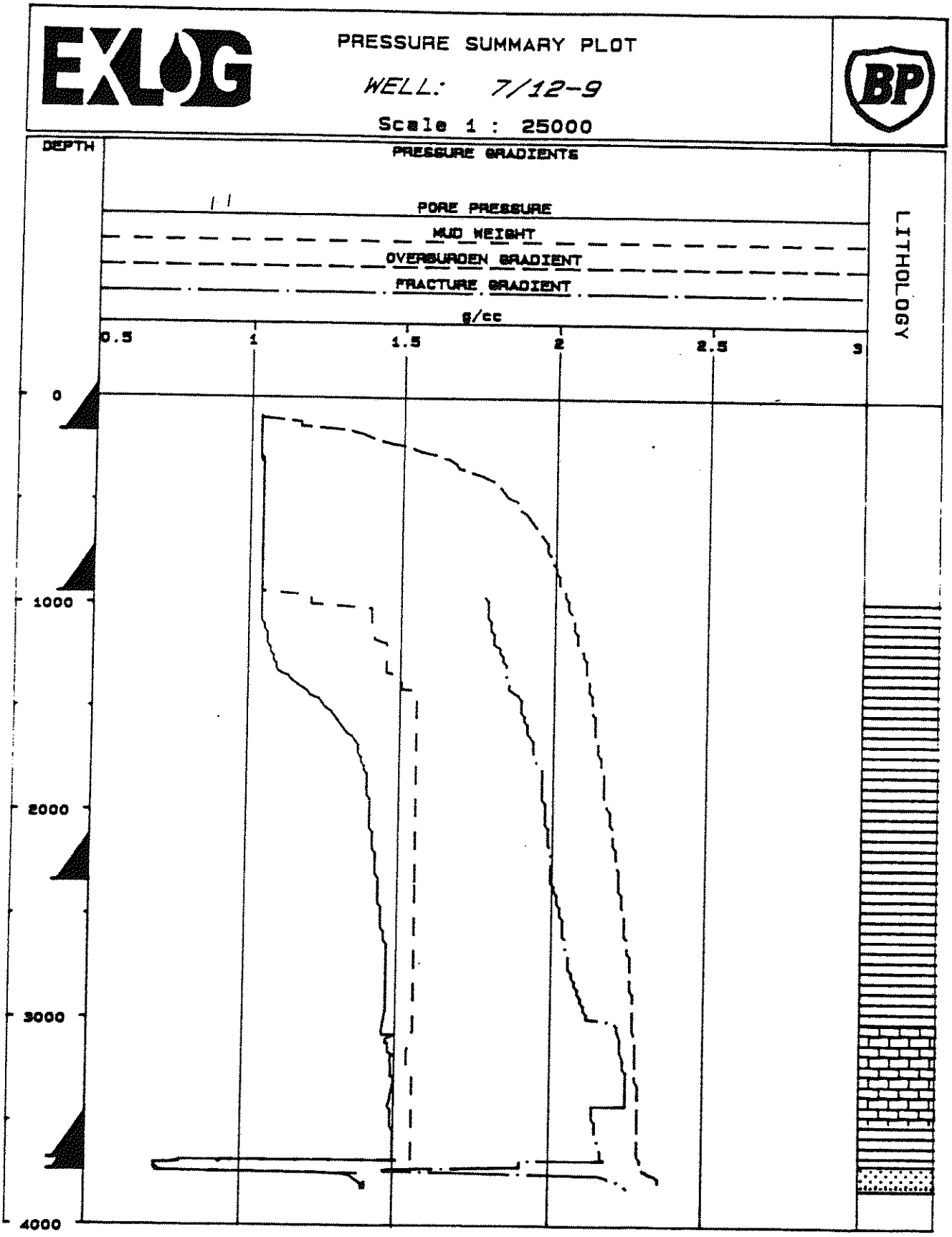
DRILLING COMPLETION REPORT

WELL 7/12-9

Document Number

90.R.72.0177

Fig. 2.3


EXLOG
PRESSURE SUMMARY PLOT
WELL: 7/12-9
Scale 1 : 25000
BP
DEPTH
PRESSURE GRADIENTS
PORE PRESSURE
MUD WEIGHT
OVERBURDEN GRADIENT
FRACTURE GRADIENT
g/cc
0.5
1
1.5
2
2.5
3
LITHOLOGY
0
1000
2000
3000
4000

2.3 DISCUSSION OF THE PRESSURE VS. DEPTH PLOT, WELL 7/12-9

This section of the completion report was written by Exploration Logging Norge A/S and is taken from their end of well report.

The well can be divided into seven separate pressure regimes. These were predominantly lithology based. From the seabed at 93m to 956m, through a sequence of loose sand and mudstone a normal pore pressure gradient of 1.03 sg was assumed. From 956m to 1460m, within a sequence of more consolidated claystones with minor limestone/dolomite stringers, the pressure gradient rose very gradually to 1.20 sg.

Below 1460m, in a further continuation of the overlying claystones with more common limestone/dolomite stringers, the pressure gradient increased more rapidly to 1.46 sg by 2960m.

From 2960m down to 3682m the section was dominated by the Chalk Group with the Cromer Knoll Group claystones at the base. The pressure gradient increased in steps from 1.46 sg to 1.49 sg.

Through the reservoir section, from 3698m, the pore pressure was depleted varying between 0.718 sg and 0.727 sg (from RFT data). Once out of the main reservoir section, from 3799m, the pore pressure increased to 1.38 sg by the end of the well, at 3820m.

Section 1 - 93m to 956m.

A wide scatter of Dxc values was the result of the unconsolidated lithology which caused variances in ROP, WOB, RPM and other drilling parameters. A normal pore pressure trend of 1.03 sg was established for this section based on Dxc values alone. Gas, temperature and cuttings data were unavailable due to the dumping of returns to the seabed in the absence of a marine riser.

Section 2 - 956m to 1460m

This section, consisting of an increasingly compacted claystone with minor stringers of limestone/dolomite, was interpreted using the aforementioned techniques of pore pressure evaluation. It was drilled using one bit in two runs.

Dxc Data

From an initial trend line of 1.03 sg, obtained from Dxc points, a very gradual cutback of Dxc values can be seen. This cutback continued to the end of the section where the pressure gradient was estimated to be 1.20 sg.

Throughout the section the mud weight was increased and this was taken into account when calculating pressure from Dxc values.

Gas Data

The background gas level from 956m to 1009m remained steady at 0.6% but cut back to 0.3% when the mud weight was raised to 1.40 sg. This background level soon increased to 0.6% and remained constant down to 1340m when the mud weight was raised to 1.50 sg. From 1340m to 1416m the background showed a further increase to 0.9% but dropped back to 0.8% when the mud weight was raised to 1.55 sg, this background level remained to the end of the section.

Gas Peaks

Depth (m)	Formation (%)	Trip (%)	Connection (%)
1333	-	0.99	-
1361	1.00	-	-
1407	1.10	-	-

Drilling Parameters

The rate of penetration averaged 24.63 m/hr in this section and little variation from this average was noted except where mud weight was raised or pore pressure showed an increase. From 1046m to 1135m the average ROP increased to 35 m/hr which corresponded with an increase in pore pressure. The ROP then decreased to an average of 23 m/hr to the base of the section at 1460m.

Hole Condition

Throughout this section the condition of the hole was good with no gumbo problems encountered. Large quantities of cavings were noted but no evidence of overpressure was seen.

Shale Density

Shale density readings were performed in this section and were used to establish trends, rather than exact densities, as the cuttings were affected by the drilling mud.

The overall trend in this section is that of increasing compaction with depth with little evidence of under compaction

Flowline Mud Temperature

The flowline temperature data for this section shows a gradually increasing gradient of 10 degrees F/100m with no distinct variations from this gradient.

Summary

Dxc and Gas data were the most useful tools in the interpretation of the pore pressure regime. The evidence provided by this data is that of a gradual increase in pore pressure from 1.03 sg to 1.20 sg. The slow rate of increase is backed up by the temperature data, ROP and, to a lesser extent, Shale Density.

Section 3 - 1460m to 2960m

This section comprised of claystones with limestone stringers becoming more common and was drilled with three bits in three runs.

Dxc Data

The Dxc trends gradually cut back throughout this section indicating further increases in the pore pressure. From 1460m to 1590m the pore pressure increased to 1.31 sg and continued to increase to reach 1.46 sg at 2960m. Dxc values increased where limestone stringers were encountered and also showed a marked increase at the top of the Balder formation at 2766m.

Gas Data

The background gas level remained constant at 0.8-0.85% throughout the section with very few formation gas peaks, the maximum formation gas was 1.72% at 1606m. The mud weight remained at 1.55 sg for the whole section.

Gas Peaks

Depth (m)	Formation (%)	Trip (%)	Connection (%)
1606	1.72	-	-
1606	1.40	-	-
1713	1.05	-	-
1770	-	1.9	-

Drilling Parameters

The rate of penetration averaged 25 m/hr from 1460m to 2342m, 55.82 m/hr in the bit run from 2342m down to 2860m and 11 m/hr from 2860m to 2960m. There was little variation from these averages and did not give a good indication of pore pressure increases.

Hole Condition

No hole problems were encountered in this section

Temperature/resistivity

A relatively stable temperature gradient of 4.0 degrees/100m occurred throughout the section. There was a slight negative variation between 1650m and 1700m, becoming -9.0 degrees F different from the established trend.

Mud resistivity data was of no use throughout the well due to the nature of the PETROFREE mud system.

Summary

Interpretation of the Dxc values gave the best method of assessing the pore pressure regime. These values produced trends that gradually cut back indicating an increasing pore pressure gradient for the section. The constant background gas values gave little indication of the increasing pore pressure. It is more likely that gas levels were suppressed by the high mud weight. Temperature data showed an overall steady gradient, however, there is evidence of a pressure increase between 1600m and 1700m shown by the cut back in the trend at this interval.

Section 4 - 2960m to 3424m

This section was represented by a major limestone sequence. Generally the limestone was very pure with occasional thin claystone and chert beds in the upper part and graded into claystone in the lower.

Dxc Data

The trends given by the Dxc values show a distinct and erratic shift to the right, a response to the poor drilling environment and the limestone lithology. For these reasons employing Dxc data for pore pressure evaluation in this section was impractical.

Gas Data

Background gas gradually decreased from 0.85% at the top of the section to 0.1% at 3180m and increasing again to 0.2% at the base of the section. This reduction followed the trend of decreasing ROP.

Gas Peaks

Depth (m)	Formation (%)	Trip (%)	Connection (%)
3072	-	0.25	-
3110	0.6	-	-
3125	0.12	-	-
3142	0.13	-	-
3147	0.12	-	-
3156	-	0.56	-
3182	0.17	-	-
3214	0.19	-	-
3229	0.18	-	-
3232	0.18	-	-
3279	0.24	-	-
3318	0.19	-	-
3337	0.24	-	-
3342	0.24	-	-
3360	0.25	-	-
3376	0.28	-	-
3379	0.35	-	-
3389	0.33	-	-
3414	0.23	-	-

Drilling Parameters

Drilling was influenced by the lithology which led to a low average ROP of 4 m/hr which decreased with depth. The average ROP improved to 7 m/hr following the change to bit number 12, indicating a response to bit type rather than lithological or pore pressure changes.

Hole Condition

No problems were encountered in this section.

Shale Density

No readings were taken in this section.

Electric Logs

Sonic log data showed a relatively stable trend in the sequence averaging 64 msec/ft. At 3240m there was a marked increase in the values to 76 msec/ft, returning to the normal trend at 3300m.

Resistivity data was variable in the range 0.68 to 8.0 ohm-m, averaging 2 ohm-m throughout the section. At 3240m there was a decrease in resistivity to 0.68 ohm-m, corresponding to the increase in sonic values and returns back to the normal trend at 3300m.

This data shows evidence of zones of increased pore pressure within the Chalk Group.

Flowline Mud Temperature

Delta temperature displayed a reduction from an average of 12.5 degrees F to 8 degrees F at 3173m. This trend continued to 3194m where it increased to 12.4 degrees F, decreasing again to 7.2 degrees at 3213m. Between 3240m and 3326m delta temperature falls rapidly to -5.8 degrees F.

Flowline temperature shows a steady temperature gradient of 8.8 degrees F/100m with little discernible variation.

Summary

Interpretation of flowline delta temperature, sonic and resistivity data were the main method of assessing the pore pressure regime in this section.

Due to the limestone being a chemically deposited rock, with no environment being present for over compaction during deposition, a salt water gradient of 1.466 psi/m was assumed throughout the section. Throughout the limestone however, there were a number of "sealed units". These sealed units can be seen as either claystones or denser less porous limestone horizons. The positioning of each unit was based primarily on formation changes, sonic data and gas peaks.

These units resulted in a number of separate pressure regimes. Although each unit had an effective decrease in pore pressure the general, stepped, trend was an increasing one.

With this being the case the pore pressure initially decreased from 1.45 sg down to 3074m. At this point the Tor formation was penetrated and an increase of pore pressure to 1.465 sg was estimated. Between 3074m and approximately 3300m the pore pressure increased up to an estimated maximum of 1.49 sg. The maximum increase in pore pressure was indicated by the increase in sonic values and decrease in formation resistivity and delta temperature. Gas values gave a poor indication of pressure increases owing to the high mud weight. Below 3300m the pore pressure decreased to 1.47 by the end of the section at 3424m.

Section 5 - 3424m to 3680m

This sequence comprised a series of claystones, calcareous in the upper part, non calcareous in the lower and belonging to the Rodby, Valhall, Mandal and Farsund formations.

Dxc Data

Due to the calcareous nature of the claystones at the top of the sequence, the Dxc values were scattered making the evaluation of pore pressure difficult, As the claystones become less calcareous with depth the Dxc values produced a very good trend of 1.47 sg. This trend cut back at 3628m, where the pore pressure was estimated at 1.49 sg.

Gas Data

Background gas showed a very slight increase from 0.1% at 3424m to 0.2% at 3610m. This background rapidly increased to 1.6% at 3642m and continued at this level to the bottom of the section. At 3631m a distinctive gas peak occurred which marked the top of the Mandal formation.

Gas Peaks

Depth (m)	Formation (%)	Trip (%)	Connection (%)
3439	0.23	-	-
3453	0.29	-	-
3463	0.19	-	-
3492	0.18	-	-
3618	0.36	-	-
3631	3.37	-	-
3634	1.22	-	-
3638	1.92	-	-
3656	2.20	-	-
3662	1.29	-	-
3681	1.39	-	-

Drilling Parameters

The ROP remained steady at an average of 14 m/hr down to 3629m, with positive drilling breaks at 3437m and 3629m. The average ROP increased to 19m/hr below this depth.

Hole Condition

No problems were encountered in this section.

Flowline Mud Temperature

Delta temperature showed a marked decrease from 2.7 degrees F to -2.8 degrees F at 3490m, increasing to 12.8 degrees F at 3544m. Below this depth delta temperature followed a stable trend of 6.0 degrees F to the base of the interval.

The flowline temperature gradient increased at 6.0 degrees F/100m to 3467.7m, cutting back to a gradient of -8.1 degrees F/100m at depth of 3501m. This cutback in temperature corresponded with the top of the Valhall formation. The temperature gradient increased at 10.8 degrees F/100m to a depth of 3530m, falling to a steady gradient of 3 degrees F/100m down to the base of the interval.

Electric Logs

Sonic data showed an increase to 89 microseconds/ft through the Rodby and the top of the Valhall formation. This increasing trend became shallower at 97 msec/ft to 3580m, before rapidly increasing to 106msec/ft in the Mandal formation. A declining trend is exhibited at the base of the section.

Resistivity decreased rapidly in the upper part of the section, declining to 1.10 ohm-m at 3600m. From this depth the values increased to 2.80 ohm-m in the Mandal formation, decreasing to 1.7 ohm-m at 3690m.

Summary

Dxc values, sonic, resistivity and temperature data suggested steadily increasing pore pressure from 1.47 sg to 1.48 sg at 3629m. Good evidence of a further rise to 1.49 sg was given by a cutback in the Dxc trend, increase in background gas, sonic data and resistivity data.

Section 6 - 3680m to 3770m

This section was comprised of sandstones belonging to the Ula formation, the target zone for the well.

Dxc Data

Dxc values became widely scattered due to coring between 3689m and 3721.5m. Below this interval no trend could be established making Dxc impractical in evaluating pore pressures.

Gas Data

The background gas level in the cored interval was 0.3% and decreased to 0.2% to 3680m.

Depth (m)	Formation (%)	Trip (%)	Flow Check (%)
3689	-	0.25	-
3721.5	-	0.25	-
3730	-	-	-
3734	-	-	-
3745	0.19	-	-

Data from other wells drilled in the area showed that the pressure was depleted at 0.74 sg in this section. Pror to drilling out of the 9 5/8" casing shoe the hole was displaced with 0.90 sg oil based mud. The ROP in the cored section ranged from 3 to 20 m/hr with an average of 10 m/hr for the rest of the section.

Hole Condition

At 3712m a gain in the pits was observed and the well shut in, leading to a standpipe pressure of 145 psi. The well was circulated via the choke before drilling could continue. No other gains were observed.

Electric Logs

Sonic data showed a decreasing trend at an average of 72 msec/ft. At 3710m a value of 69 msec/ft occurred, this corresponded with a very sharp peak of 25 ohm-m in resistivity indicating the presence of hydrocarbons.

Formation resistivity values were scattered between 1.4 ohm-m and 25 ohm-m.

RFT readings for this section revealed the pore pressure to vary between 0.72 at 3781.8m and 0.73 sg at 3864.2m (see section 5).

Density logs showed average values of 2.35 g/cc for the sandstone at 3700m, increasing to 2.72 g/cc at the base of the interval.

Temperature Data

Difficulties arose in establishing accurate gradients owing to frequent trips and coring.

Summary

Normal pore pressure detection methods were, in the main, useless in this section. The best data collated was from the RFT electric log data which gave an accurate value of pore pressure. This data showed that the pressure was depleted in the reservoir at around 0.73 sg.

Section 7 - 3770m - 3820m

Very fine sandstones with an increasing argillaceous content were observed in this interval.

Dxc Data

A cutback in the trends produced suggested that the pore pressure was increasing below the Ula formation. However, no true claystone/shale trend could be established for Dxc.

Gas Data

Background gas remained static at 0.25% to the end of the section with no breaks observed.

Drilling Parameters

Before drilling out of the 7" liner shoe the hole was displaced with 1.40 sg oil based mud. Offset well data showed that the pore pressure increased in this section. The average ROP was 9.0 m/hr with little variation.

Hole Condition

No problems were encountered in this section.

Electric Logs

Sonic values increased over the interval to 83 msec/ft and resistivity varied within the range 1.4 to 1.8 ohm-m.

Densities reduced in the sandstone/siltstone horizons and increased to a maximum of 2.67 g/cc in more argillaceous sediments.

RFT data showed that the pore pressure increased from 1.35 sg to 1.395 sg at 3680m, revealing that the hydrostatic pressure exerted by the mud column was only 50 psi greater that the pore pressure.

Summary

This final section revealed that pore pressure rapidly increased to 1.39 sg directly below the reservoir. Resistivity, sonic and RFT data verify the pressure increase. Dxc values suggested an increase but were affected by the nature of the lithology, logged data gave a poor indication of pore pressure regime.

Overburden Gradient

The overburden gradient for the well was calculated using data from previous wells, wireline density data was not available for the whole well.

A final overburden gradient of 2.37 g/cc was calculated at the end of the well.

Fracture Gradient

Fracture pressures were calculated from formation leak off and integrity tests using Daines zero tensile stress method. The tests were:-

Depth (m)	Gauge Pressure (psi)	Mud Weight (sg)	Leak Off (EMWD sg)
958	770	1.20	1.77
2342	1930	1.55	2.13
3680	4970	1.55	1.89
3745	3100	1.40	1.98

Typical fracture gradients, using the leak off and formation integrity tests for the well were:-

Depth (m)	Formation	Fracture Pressure
1000	Claystone	1.78 EMWD
2000	"	1.97 "
3000	Limestone	??? "
3424	"	2.24 "
3450	Claystone	1.98 "
3685	"	2.22 "
3740	Sandstone	1.46 "
3820	Siltstone	2.24 "

2.4 TEMPERATURE DATA

RUN NO.	LOG	THERMOMETER		CIRCULATION				LOGGER ON BOTTOM		LOG t+DELTAt	EST.BHT (DEG F)
		DEPTH (M)	TEMP (DEG F)	START TIME	START DATE	STOP TIME	STOP DATE	TIME	DATE	DELTA t	
						t=4.5					
3C	DIL/BHC/GR	3742	262	3:00	25.Apr	7:30	25.Apr	16:35	25.Apr	0.175	288
3A	LDL/CNL/NGT	3742	268	"	"	"	"	20:15	25.Apr	0.131	"
3A	RFT/GR	3721	280	"	"	"	"	0:20	26.Apr	0.102	"
3B	RFT/GR	3736	273	"	"	"	"	8:09	26.Apr	0.073	"
3C	RFT/GR	3721	271	"	"	"	"	11:53	26.Apr	0.064	"
3D	RFT/GR	3730	272	"	"	"	"	16:36	26.Apr	0.055	"
3E	RFT/GR	3736	282	"	"	"	"	19:34	26.Apr	0.051	"
4B	CBL/VDL/GR/CCL	3731	284	6:50	1.May	2:05	1.May	20:39	2.May	0.0266	289
4D	DIL/BHC/GR	3818	276	"	"	"	"	15:17	1.May	0.134	"
4B	LDL/CNL/GR	3820	280	"	"	"	"	18:35	1.May	0.092	"

SECTION 3

TIME UTILIZATION

WELL	7/12-9	DAILY ACTIVITY SUMMARY

DATE	DAY NO.	MIDNIGHT DEPTH,M	DAILY ACTIVITY SUMMARY
14.03.90	-1		Rig on hire to BP 15:30 hrs. Last anchor racked. Moved from 2/7-19 (Phillips)to 7/12-9 location. WOW
15.03.90	-2		WOW. Ballasted down to survival draught.
16.03.90	-3		WOW. Commenced to deballast to transit draught. Moved rig onto 7/12-9 location.
17.03.90	1	122	Moved onto Location and laid anchors. Changed out anchor no. 4 RIH with spud assembly. Unable to open the drill string compensator. Repaired same. Tagged seabed at 91.8m (Ref.to MSL). Spudded the well at 2115 hrs. Commenced drilling. Pumped 30 bbls of Hi-Vis Pills.
18.03.90	2	168	Drilled 36" hole to 168m with Totco surveys. Pumped 200 bbls Hi-Vis mud around the hole and displaced the hole to 300 bbls of mud at 1.20sg. Waited 1 hr before making a wiper trip to the seabed. Found 0.4m fill on bottom. Displaced the hole to 1.20 sg before POOH. Ran and cemented the 30" conductor. No returns could be observed throughout the cement job. WOC, POOH with the 30" housing running tool.
19.03.90	3	234	Laid down the 30" housing running tool and the cement stinger. Performed a top up cement job on the 36"/30" annulus. Tagged hard cement at 128m. RIH and drilled cement from 156m to 168m. Found shoe at 166m. Drilled formation to 170m. POOH. RIH with a 17 1/2" bit and drilled to 198m. (MWD tool failed to work). Observed that the PGB/30" housing vibrated. Checked with the ROV - Bullseye - OK. Drilled ahead taking Totco surveys.
20.03.90	4	591	Drilled the 17 1/2" pilot hole taking Totco and MSS surveys. Pumped a 50 bbls Hi-Vis pill and chased out with seawater. Spotted 200 bbls mud at 1.20 sg on bottom. Flowchecked, dropped the survey and POOH. Had 40,000 lbs of overpull at 524m. Wiped the same interval. Otherwise the hole was in good condition. Changed the MWD tool and the BHA.
21.03.90	5	942	RIH and continued to drill the 17 1/2" pilot hole. The MWD failed to work, hence Totco surveys were taken. Observed some gas in the water below the moonpool with the bit at 677m. Flowchecked the well - negative.
22.03.90	6	950	Continued to drill the 17 1/2" hole to 950m. Pumped 100 bbls spacer and displaced the hole to 1.20 sg Hi-Vis mud.

WELL	7/12-9	DAILY ACTIVITY SUMMARY

DATE	DAY NO.	MIDNIGHT DEPTH,M	DAILY ACTIVITY SUMMARY
			Dropped the survey and POOH. Tight hole from 920m to 725m. Max. overpull 50,000 lbs. Laid down the 17 1/2" bit and BHA. Made up the 26" bit and new BHA. RIH. Opened up the 17 1/2" pilot hole from 170m to 404m.
23.03.90	7	820	Continued to open the 17 1/2" hole from 404m to 820m. Performed a top up cement job on the 36" X 30" annulus while drilling. Top of cement was tagged at 15m below the seabed. Prepared to POOH due to bad weather. Max. anchor tension 270 tons on anchor 8.
24.03.90	8	820	WOW
25.03.90	9	820	WOW
26.03.90	10	820	RIH to continue to open the 17 1/2" pilot hole. Had to wash and ream from 173m to 750m. Repaired failures on both mud pumps.
27.03.90	11	956	Continue to wash and ream from 750m to 820m. Opened the pilot hole from 820m to 950m and drilled 26" hole from 950m to 956m. Repaired both mud pumps. Made wiper trip to the shoe before POOH. The hole was very tight and backreaming was necessary. Pumped several batches of 1.20 sg mud to stabilize the hole.
28.03.90	12	956	Continue to POOH. Ran the 20" casing, circulated the hole clean before starting to cement the casing.
29.03.90	13	956	Continued to cement the 20" casing. Ran and tested the 18 3/4" BOP stack.
30.03.90	14	956	Continued to test the BOP. Tested the 20" casing before drilling out the cement track. Displaced the hole to Petrofree mud.
31.03.90	15	1147	Continued to shear the Petrofree mud and at the same time drilled 2m of new formation. Performed a leak off test, EMW=1.57 sg. Drilled new 17 1/2" hole from 958m to 1008m and repeated the leak off test. EMW=1.77sg. Continued to drill the 17 1/2" hole from1008m to 1147m while increasing the mudweight in steps to 1.45 sg.
01.04.90	16	1416	Continued to drill the 17 1/2" hole to 1333m. Performed a short wiper trip to the casing shoe. Some tight spots, but hole in remarkable good shape. POOH to change out the MWD tool. Continued to drill to 1416m.

WELL	7/12-9	DAILY ACTIVITY SUMMARY

DATE	DAY NO.	MIDNIGHT DEPTH,M	DAILY ACTIVITY SUMMARY
02.04.90	17	1812	Continued to drill 17 1/2" hole down to 1812m. Made a wiper trip to the shoe. Circulated casing contents clean. Hole condition very good.
03.04.90	18	2202	Drilled 17 1/2" hole 1812 - 2014m. Circ while repairing mud pump no. 2. drilled to 2202m.
04.04.90	19	2350	Drilled 17 1/2" hole 2202 - 2350m. Pumped 30 bbl hi-vis pill and circ hole clean. Dropped survey. POOH to shoe. Tight at 2290m - 50,000 lbs o/pull. Tight at 2192m 60,000lbs o/pull. Retrieved survey. POOH. Made up 13 3/8" casing hanger to running tool. Stood back in derrick. Logged.
05.04.90	20	2350	Continued running log. Wouldn't pass 2326m. Washed WHD area and pulled wear bushing. Ran 13 3/8" casing. Made up hanger assembly. RIH on drillpipe. Took weight at 2339m. Circulated down. Landed csg hgr. Circ prior to cement job.
06.04.90	21	2350	Circ. prior to cement job. Cemented 13 3/8" casing. Displaced with rig pumps. Bumped plug to 1500 psi. POOH csg hgr running tool. RIH mill and flush tool. Conditioned mud (spacer contaminated in riser). Washed/ milled csg hgr. POOH. Set csg hgr seal assy. Tested BOPs. Tested casing to 2250 psi against shear rams. Ran wear bushing. Laid down 17 1/2" BHA. Picked up BHA no 7.
07.04.90	22	2493	RIH to 560m. Tested kelly cocks and rotary hose. Cont RIH. Tagged cmt plugs at at 2318m. Drilled out shoe track and cleaned out rat hole. drilled to 2353m. Performed LOT. POOH. RIH BHA no 8. Drilled 2353 - 2493m. Teleco tool not working.
08.04.90	23	2861	Drilled 2493 - 2662m. Circ prior to survey. Dropped mag single shot. POOH to 13 3/8" shoe (hole clean). Retrieved single shot. RIH to bottom (no fill). Drilled 2662 - 2681m. Circ btms up. Dropped mag single shot. POOH to shoe (hole good). Retrieved survey. Tripped for BHA.
09.04.90	24	3008	Made up hang off assy and stood in derrick. RIH clean. Drilled 2861 - 3008m.
10.04.90	25	3068	Drilled 12 1/4" hole from 3008m to 3106m.
11.04.90	26	3077	Drilled 3068 - 3072m. No progress. Tripped for bit. Washed 3029 - 3072m. Drilled 3072 - 3077m.
12.04.90	27	3106	Drilled 12 1/4" hole from 3077m to 3106m.
13.04.90	28	3150	Drilled 12 1/4" hole to 3150m. Circ bottoms up.

WELL	7/12-9	DAILY ACTIVITY SUMMARY

DATE	DAY NO.	MIDNIGHT DEPTH,M	DAILY ACTIVITY SUMMARY
14.04.90	29	3150	Continued to circ bottoms up. POOH. Max overpull 20,000lbs 3115 - 3105m. Changed BHA and corrosion rings. Tested BOP. RIH bit no 12 to 13 3/8" shoe. Tested kelly cocks and kelly hose. Broke circ. RIH to 3070m. Washed/reamed to TD. Hole clean to 3127m. High torque/heavy reaming 3127 - 3147m. Clean 3147 - 3150m.
15.04.90	30	3288	Drilled 12 1/4" hole to 3288m.
16.04.90	31	3441	Drilled 12 1/4" hole to 3441m.
17.04.90	32	3677	Drilled 12 1/4" hole 3441 - 3545. Flow checked at 3497m. Drilled 12 1/4" hole 3677m
18.04.90	33	3684	Drilled 12 1/4" hole to 3684m. Circulated bottoms up for samples and continued until shakers were clean.. Flowchecked well prior to POOH. Max. o-pull 40000 Lbs. Flowchecked at casing shoe and BOP.. Ran the DIS/LSS/GR/CAL log. Made up and racked the 9 5/8" csg.hgr. in the derrick. Retrieved the wearbushing.
19.04.90	34	3684	RIH with the 9 5/8" casing according to tally.
20.04.90	35	3684	Landed the 9 5/8" casing. Circulated 12000 strokes and cemented the casing according to programme. The floats did not hold. Held back-pressure for 5 hrs. Cleaned the wellhead with the mill/wash tool. RIH and set the seal assembly.
21.04.90	36	3684	Tested the casing to 5000 psi. Laid down the 12 1/4" BHA before RIH with the 8 1/2" BHA. Tagged the cement at 3612m. Drilled cement to 3653m. Displaced the hole to light weight OBM at 0.93 sg. Cont. to drill to 3677m. Circ. and conditioned the mud to reduce the mudweight to 0.90 sg. Arranged a D5 drill prior to drilling out of the shoe.
22.04.90	37	3689	Cond. and circulated the mud. Drilled out the shoe and 1m of new formation. Circulated the mud to get an even mudweight. Performed a FIT test to 1.89 sg EMW. Drilled 4m of new formation. Circulated bottoms up. POOH. Ran Seeker multishot gyro. Made up and ran the 120ft core-barrel.
23.04.90	38	3721.5	Cont. RIH with the corebarrel. At TD, circulate the open hole clean. Pulled into the casing and circulated and conditioned the mud to lower the mudweight to 0.90 sg MW. Cut core no.1 from 3689m to 3721,5m. Flowchecked the well at 3721.5m due to a drilling break. Flowcheck - pos. Shut the well in at 1934 hrs. No evident SIDPP & SICP pressures on any of the pressure gauges. Circulated bottoms up through the choke manifold. Max. gas 0.49%. Opened up the well at 2247 hrs. Flowcheck - neg. Attempted to POOH. Corebarrel stuck and no circulation. Worked pipe

WELL	7/12-9	DAILY ACTIVITY SUMMARY

DATE	DAY NO.	MIDNIGHT DEPTH,M	DAILY ACTIVITY SUMMARY
			free - Max.o/pull 120,000 Lbs. Regained circulation & backreamed into the 9 5/8" casing. Well stable.
24.04.90	39	3737	Dropped the ball for the circulation sub and circulated bottoms up. Flow-checked the well - neg. POOH and recoverd core no.1 - 100% rec. Made up new 8 1/2" BHA and RIH. Broke circulation at 3680m and reamed down to 3717m for MWD GR readings. Tight hole at 3717m. Reamed down to 3721.5m. Continued to drill down to 3737m. Flowchecked at 3722m, 3729.5m & 3735.5m - neg.
25.04.90	40	3742	Cont. to drill to 3742m. Flowchecked every drilling break. Circulated bottoms up. Took torque readings for the liner 1m off bottom and inside the 9 5/8" casing shoe. POOH. Strapped and drifted the pipe on the way out. Rigged up Schlumberger and ran log no.1: IND/SONIC/GR and log no. 2: LDT/CNT/NGT and log no. 3: RFT/GR.
26.04.90	41	3742	Ran log no 4 - 7: RFT/GR. Picked up the 7" liner shoe joint and tested the self filling function -OK.
27.04.90	42	3742	Continued to RIH with the 7" liner. Tagged bottom 3m high. Circulated volume of DP and liner at the 9 5/8" casing shoe and bottoms up at TD. Mixed, pumped and displaced the cement. Picked up wiper plug and bumped plug to 3000psi 20 bbls too early. Held pressure for 10mins. - OK. Bled off pressure, floats held backpressure - OK. Total mud losses during the displacement - 70 bbls. Difficulties to release the liner hanger R/T. Eventually pulled pack-off bushing out of the PBR. Max. o-pull 100KLBS. Reverse circulated the drillpipe volume. Got 3 bbls of cement and 60 bbls of spacer in return. Attempted to set the packer. No positive indications that the packer set. Applied 60klbs down weight twice.
28.04.90	43	3742	Displaced the hole to seawater. POOH and laid down the liner R/T. tested the BOP. Made up top dressing mill and 9 5/8" casing scraper. RIH. Took weight at 3510m. Attempted to mill cement - no go. Displaced hole to 1,40 sg mud, circ. and conditioned mud to even mudweight. Attempted to pressure test casing/liner lap to 3100 psi - no go. POOH.
29.04.90	44	3742	POOH w/scraper. Laid down same. Made up Dowell Hurricane packer RIH and tagged liner lap at 3510m. Set packer and pressure tested the annulus above the packer to 2000 psi - OK. Released the packer and displaced the drillpipe to seawater. Reset the packer at 3477m. Attempted to establish an injection rate. - no go. Got a good pressure test to 4500 psi instead. POOH, made up the 6" BHA and RIH to 3708m. Drilled the liner wiper plug and cement.
30.04.90	45	3762	Tested the 7" liner lap and the 9 5/8" casing to 3100 psi - OK. Drilled shoe track, cleaned out rathole and 3m of new formation.

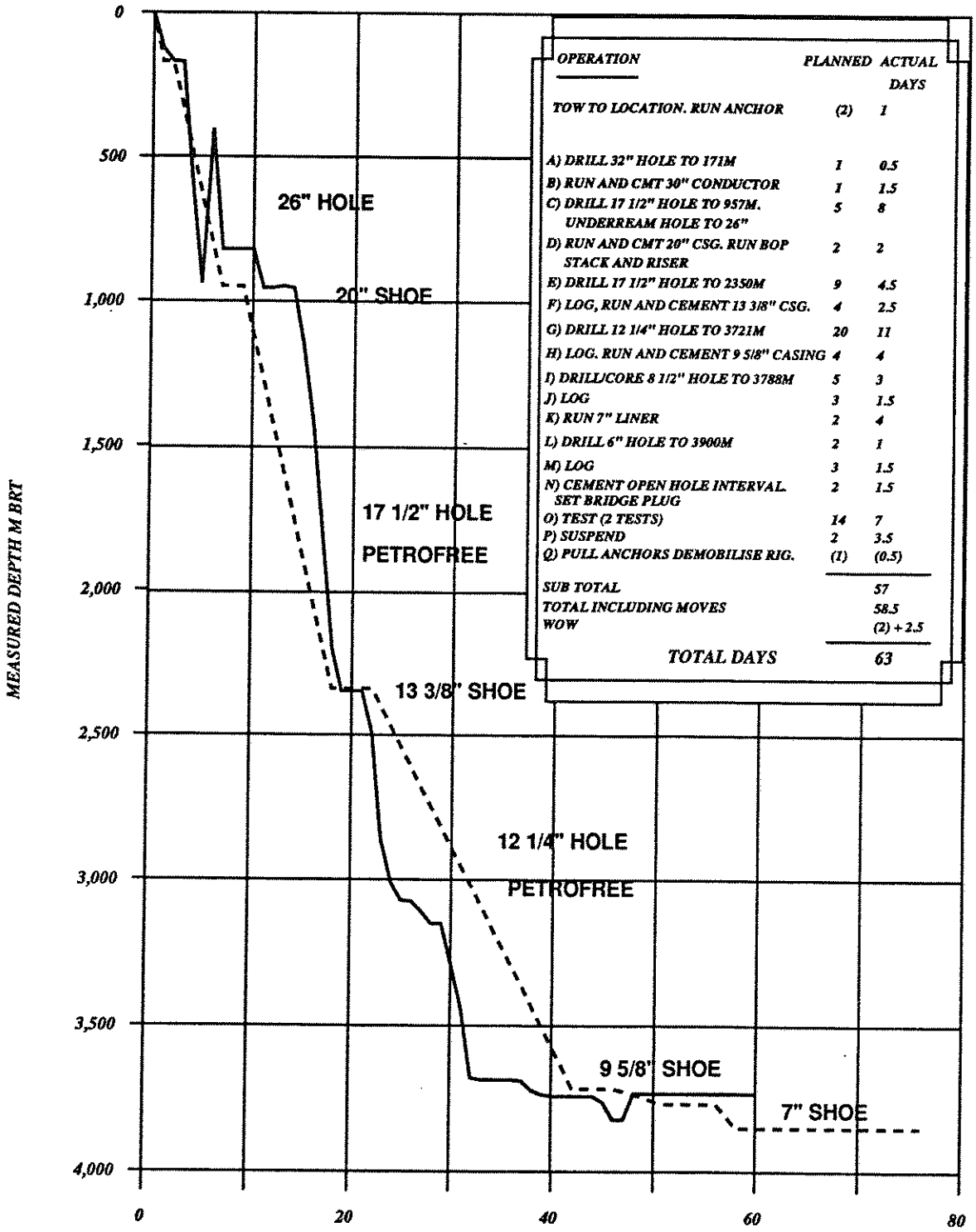
WELL	7/12-9	DAILY ACTIVITY SUMMARY

DATE	DAY NO.	MIDNIGHT DEPTH,M	DAILY ACTIVITY SUMMARY
			Performed a FIT to 3100 psi - EMW=1.98sg. POOH and made up new bit. RIH and drilled 6" hole from 3745m to 3762m. Flowchecked well at 3750m and 3774m - neg.
01.05.90	46	3820	Continued to drill the 6" hole from 3762m to 3820m. Flowchecked at 3774m and 3818m - neg. Circulated the hole clean prior to POOH. Rigged up Schlumberger. RIH with log no.1 DIL/GR/BHC, log no.2 LDT/NGT and log no.3 Seismic.
02.05.90	47	3820	Completed seismic log. Ran RFT - misrun. Re-ran RFT (run 4F). Ran CBL/VDL/GR/CCL (run 4F).
03.05.90	48	3620 PBTD	Rigged down Schlumberger RIH cementing stinger. Circ bottoms up. Pumped 15 bbls HEC spacer. Set cmt plug no. 1. POOH. Made dummy run with SSTT and landing string. Racked back same. Torqued up tubing joint to flow head. RIH 6" bit and casing scraper to 3601m. Washed down. Tagged soft cement at 3604m Washed/reamed to 3620m.
04.05.90	49	3732 PBTD	Drilled cmt 3620 - 3733m. (Hard from 3632m, soft 3690 - 3703m). Circ hole clean. Pumped 35 bbl spacer and displaced hole to 0.95sg mud. Circ and cond. mud to 0.93 sg. POOH. Set bridge plug at 3732m on wireline. Ran production packer on wireline.
05.05.90	50	3732 PBTD	Set Baker FB 1 packer at 3665m. Tested BOP to 300 / 5000 psi. Slipped cut block line. Changed out inside BOP on top drive. Made up and RIH production test tools. Pressure tested after 3 joints and after half of string run.
06.05.90	51	3732 PBTD	Continued running test string. Landed in WHD. Picked up flowhead and made up to string. Opened MCCV. Pumped 5 bbls of base oil to string.
07.05.90	52	3732 PBTD	Displaced test string with 83 bbls nitrogen. Closed MCCV. Opened PCT. Ran slickline gauge cutter (2.2") to 3675m. Perforated well 3701 - 3719m. Opened up well for flow period.
08.05.90	53	3732 PBTD	Continued flowing well. Shut in for pressure build up.
09.05.90	54	3732 PBTD	Continued pressure build up period. Bullheaded string contents to reservoir. Performed injection test. Pumped 100 bbls mud into string. Opened SHORT valve. Circulated hole vol. Laid down flowhead.
10.05.90	55	3732 PBTD	Pulled and laid down test string. RIH packer milling tool. Milled on packer. Packer dropped 0.7m. Attempted to pick up with 80,000 lbs overpull - no go. Continued milling.
11.05.90	56	3732	Milled on FB - 1 packer. Mill stopped cutting. Released from packer - 4

WELL	7/12-9	DAILY ACTIVITY SUMMARY

DATE	DAY NO.	MIDNIGHT DEPTH,M	DAILY ACTIVITY SUMMARY
		PBTD	attempts required. POOH. Redressed packer mill. RIH. Milled packer.
			Milled packer. POOH. Worked packer through liner hanger - max overpull
			40,000 lbs. Cont'd POOH.
12.05.90	57	3348	Laid down FB - 1 packer and CJ -1 packer mill. RIH cementing stinger.
		PBTD	Displaced well to seawater. Gas levels rose. Closed annular and circ
			with returns through choke manifold and degasser. Max gas 12%. Gas
			reduced. Opened annular. Set suspension plug no 2. attempted to squeeze to
			perfo, - No go. POOH. RIH with 8 1/2" bit and 9 5/8" casing scraper.
13.05.90	58	3355	RIH. Tagged cement at 3348m. Dressed off to 3355m. Load tested with
		PBTD	10,000 lbs - O.K. Circulated one circulation with seawater. Displaced well
			to treated seawater. Ran Schlumberger gauge ring. Set 9 5/8" bridge
			plug at 3355m. RIH cement stinger to 430m.
14.05.90	59	130	Set suspension plug no 3. Laid down tubing and DP. Laid down DP in
		PBTD	derrick. Pulled BOPS. Removed siezed bolts from connection between
			bottom joint of riser and top of BOP stack. Ran corrosion cap. Displaced
			wellhead to rust inhibiting oil.
15.05.90	60.	130	Attempted to pull running tool from corrosion cap - corrosion cap lifted off
		PBTD	wellhead. Pulled and laid down Universal corrosion cap. Laid down
			running tool. Set plug type corrosion cap. Recovered guide lines.
			Performed seabed survey. Deballasted rig. Pulled anchors. Rig
			on tow to 2/7-22 at 2200 hrs.

3.2 TIME DEPTH CURVE - WELL 7/12-9



OPERATION	PLANNED DAYS	ACTUAL DAYS
TOW TO LOCATION. RUN ANCHOR	(2)	1
A) DRILL 32" HOLE TO 171M	1	0.5
B) RUN AND CMT 30" CONDUCTOR	1	1.5
C) DRILL 17 1/2" HOLE TO 957M. UNDERREAM HOLE TO 26"	5	8
D) RUN AND CMT 20" CSG. RUN BOP STACK AND RISER	2	2
E) DRILL 17 1/2" HOLE TO 2350M	9	4.5
F) LOG, RUN AND CEMENT 13 3/8" CSG.	4	2.5
G) DRILL 12 1/4" HOLE TO 3721M	20	11
H) LOG. RUN AND CEMENT 9 5/8" CASING	4	4
I) DRILL/CORE 8 1/2" HOLE TO 3788M	5	3
J) LOG	3	1.5
K) RUN 7" LINER	2	4
L) DRILL 6" HOLE TO 3900M	2	1
M) LOG	3	1.5
N) CEMENT OPEN HOLE INTERVAL. SET BRIDGE PLUG	2	1.5
O) TEST (2 TESTS)	14	7
P) SUSPEND	2	3.5
Q) PULL ANCHORS DEMOBILISE RIG.	(1)	(0.5)
SUB TOTAL		57
TOTAL INCLUDING MOVES		58.5
WOW		(2) + 2.5
TOTAL DAYS		63

3.3 TIME UTILISATION TABLES

3.3.1 Time Utilisation by operation (what codes).

Well 7/12-9 Rig Ross Isle

Operation	% of Total Time	Hours
Anchor Work	2.25	34.00
Drill	26.07	394.00
Wash and Ream	1.80	27.25
Coring	0.43	6.50
Circ. and Condition	8.29	125.25
Trip (Inc. precautionary wash)	23.21	350.75
Maintain Rig	0.40	6.00
Repairs	1.57	23.75
Deviation survey	0.88	13.25
Logging (Except perforation)	5.95	90.00
Casing	4.38	66.25
Cementing	2.58	39.00
Run/Pull BOP, Riser,Pkoff.	1.51	22.75
Test BOP (Run/Pull W/B, test plugs)	2.61	39.50
Perform DST	3.31	50.00
Wait on cement	0.31	4.75
Fishing (Inc. Jar/pipe work)	0.71	10.75
Move rig	0.46	7.00
Wait on weather	6.52	98.50
Rig up/down equipment	2.41	36.50
BOP and safety drills	0.15	2.25
Casing/leak off test	0.61	9.25
Well control	0.38	5.75
Pump/pull O.O tight hole	0.03	0.50
Pressure test	0.46	7.00
Cut/mill casing, set patch	0.03	0.50
ROV/ diver work	0.03	0.50
Run/pull corrosion cap/TBG	0.28	4.25
Establish/cut guidelines	0.02	0.25
Other	0.05	0.75
Perforating	1.14	17.25
Write off time	1.16	17.50
Total	100%	1511.50

3.3 TIME UTILISATION TABLES

3.3.2 Time Utilisation by function (why codes).

Well 7/12-9 Rig Ross Isle

Operation	% of Total Time	Hours
Drill to casing point/TD	42.46	641.75
Log	5.36	81.00
Core	2.50	37.75
Logging Problems	0.40	6.00
Casing	7.54	114.00
Cementing	4.07	61.50
BOP, W/head work	4.20	63.50
Casing problems	0.07	1.00
Cementing problems	1.82	27.50
BOP W/head problems	0.03	0.50
DST	11.40	172.25
Move	2.71	41.00
Suspend	5.66	85.50
Suspend problems	0.18	2.75
Rig repairs	1.57	23.75
Delays	7.13	107.75
Write off time	1.16	17.50
Drilling equipment problems	0.36	5.50
Stuck pipe	0.05	0.75
Open hole problems	1.21	18.25
Other	0.13	2.00
Total	100%	1511.50

Note: The time Utilisation by operation and the time Utilisation by funcion are based on the IDDS "what" and "why codes respectively.

SECTION 4

DRILLING DATA

BP NORWAY BIT RECORD			AREA	NOCS			Page 1 of 3	
WELL NO.	7/12-9	RIG RATE $/HR	35000	PUMP MAKE/TYPE			OILWELL 1700	
RIG	ROSS ISLE	TRIP TIME/1000M	1.5 hrs	OPERATOR			BP NORWAY	
BIT DESC	Run Number	1	2	3	4	5	6	7
	Bit Number	1	2RR	3	4RR	5RR	6	7RR
	Size (inches)	26"	26"	17 1/2	17 1/2	26"	17 1/2"	17 1/2"
	Make	SEC	SEC	REED	REED	SEC	SEC	SEC
	Type	SS33SGJ4	SS33SGJ4	MS11G	MS11G	SS33SGJ4	SS44SGJ4	SS44SGJ4
	Ser. no	483323	483323	J99161	J99161	483323	484537	484537
	IADC Code	1-1-4	1-1-4	1-1-5	1-1-5	1-1-4	1-1-4	1-1-4
	(R) Bear (J) (S) Lub. (N)	R/S	R/S	R/S	R/S	R/S	R/S	R/S
	Weight on Bit	0-5	5-10	2-23	8-15	5-20	10-20	5-30
	R.P.M	25-70	60	90-130	130	100-125	150	150
	Depth Out (m)	168	170	591	950	950	1333	2350
PERFORMANCE	Hours	6.75	3.75	21	16.5	38.7	16.6	40
	Meters	76	12	421	359	786	377	1017
	R.O.P	11.3	3.2	20	21.8	20.3	22.7	24.6
	Teeth Cone/Row/Wear	1	1	1	1	1	1	3
	Bearing Seal/Clear./Wear	1	1	1	1	1	1	2
	Cost NOK/m	10671		2350	2389	2213	2075	1567
	Broken Teeth/ Inserts %							
	Gauge	I	I	I	I	I	I	I
HYDRAULICS	KRevs	1	14				147	266
	Nozzles 1 | 2 | 3 | 4	28/28 28/28	28/28 28/28	28/28 28/16	28/28 28/16	20/20 20/16	26/26 26/16	26/26 26/16
	Flow Rate (GPM)	400-1200	1200	1200	1150	1150	900	770-690
	Pump Pressure (Psi)	700-1170	1100	1650-2700	2600	2700	3000	3100
	Overbalance (Psi)						740	450
	Pore Pressure (SG)	1.03	1.03	1.03	1.03	1.03	1.06	1.42
MUD	Mud Type	S/W	S/W	S/W	S/W	S/W	PETROFREE	PETROFREE
	Mud Weight (SG)	1.03	1.03	1.03	1.03	1.03	1.45	1,45-1,55
	PV YP	-/-	-/-	-/-	-/-	-/-		36/39
	Solods % Sand %	-/-	-/-	-/-	-/-	-/-		22/0,5
Lithology		SAND CLAY	CMT + 2M CLAY	SAND/ CLAY	SAND/ CLAY	SAND/ CLAY	CL.STONE	MUDSTONE
Completed by		PSP	PSP	PSP	RBV	RBV	RDM	PSP
Comments		RUN WITH 36" HO	CLEAN OUT CMT. &2M NEW FORM	PILOT HOLE	PILOT HOLE	OPENING OF PILOT HOLE	PULLED TO REPLACE MWD	PULLED @ CSG.POINT

BP NORWAY BIT RECORD			AREA				Page 2 of 3	
WELL NO.	7/12-9	RIG RATE $/HR	35000	PUMP MAKE/TYPE			OilWell 1700	
RIG	ROSS ISLE	TRIP TIME/1000M	1.5 hrs	OPERATOR			BP Norway	
	Run Number	8	9	10	11	12	13	14
BIT DESC	Bit Number	8	9	10	11	12	13	14 CB1
	Size (Inches)	12 1/4	12 1/4	12 1/4	12 1/4	12 1/4	8 1/2	8 1/2
	Make	HTC	CHRIST	HTC	REED	HYCALOG	HTC	CHRIST
	Type	XDG	R426	ATM22	HP51X	DS46H	J4	RC476
	Ser. no	239EK	120408	D35BF	D28187	10575	C37BK	1203845
	IADC Code	1-3-5	PDC	5-1-7	5-1-7	PDC	2-1-6	COREBIT
	(R) Bear (J) (S) Lub. (N)	R/S	PDC	J/S	J/S	PDC	J/S	-
	Weight on Bit	20	0-35	44-60	40-60	15-20	10-25	5-15
	R.P.M	80	130-200	50-150	40-70	125-195	50	66
	Depth Out (m)	2353	2861	3072	3150	3684	3689	3721.5
PERFORMANCE	Hours	2.85	9.1	44.2	52.8	57.1	5.5	5
	Meters	27	508	211	78	534	70	32.5
	R.O.P	9.5	55.8	4.8	1.4	9.36	12.72	6.5
	Teeth Cone/Row/Wear	3	15%	8	2	PDC	1	COREBIT
	Bearing Seal/Clear./Wear	1	PDC	4	2	PDC	2	COREBIT
	Cost NOK/m		1545	9167	29065	7678	26571	23385
	Broken Teeth/ Inserts %	BT		70% BT	6 BT	5BT/25%	6 BT	5%
	Gauge	I	I	I	1/16	I	I	I
HYDRAULICS	KRev	17.4	95	227	185	544	7.7	-
	Nozzles 1 | 2 | 3 | 4	OPEN	6X15	3X18	3X18	4X18	3X22	-
	Flow Rate (GPM)	705	650	530	530-550	450-650	620	600-615
	Pump Pressure (Psi)	2700	3150	3150	3100	1900-3700	2100	2100
	Overbalance (Psi)	450	364	376	268	262	160	900
	Pore Pressure (SG)	1.42	1,42/1,46	1.45	1.47	1.49	0.9	0.73
MUD	Mud Type	PETROFREE	PETROFREE	PETROFREE	PETROFREE	PETROFREE	SAFEMUL	SAFEMUL
	Mud Weight (SG)	1.55	1.55	1.55	1,55-1,53	1.55	0.93	0.9
	PV YP	47/40	44/35	48/36	49/33	50/30	21/10	21.Oct
	Solods % Sand %	22/0,5	22/TR	22/TR	23/TR	23/TR	5/0	5/0
Lithology		CEMENT	CLAYST. W/LST STGRS	SELE, LISTA,LST MDST,EKO	EKO 'B' + TOR LST	TOR,RØD-BY,LST, MDST	CEMENT+ 5M FORM. LCM	ULA RES.
Completed by		PSP	PSP	PSP	PSP	RBV	RBV	RBV
Comments		DRILLED SHOE TRACK + 3M FORM.	PULLED DUE TO INCR. ANGLE	PULLED DUE TO ZERO ROP	PULLED WHEN OUT OF CHERT	TD OF 12 1/4" HOLE SECTION	START OF CORING	PULLED DUE TO A KICK & FULL CORE

BP NORWAY BIT RECORD			AREA					Page 3 of 3	
WELL NO.	7/12-9	RIG RATE $/HR	35000	PUMP MAKE/TYPE			OilWell 1700	
RIG	ROSS ISLE	TRIP TIME/1000M	1.5 hrs	OPERATOR			BP Norway	
	Run Number	15	16	17	18	19	20	21
BIT DESC	Bit Number	15	16	17	18RR	19	20	21RR
	Size (inches)	8 1/2	6"	6"	6"	6"	6"	8 1/2"
	Make	HYCALOG	HTC	HYCALOG	HTC	MILL	MILL	HTC
	Type	DS26H	J4	DS26H	J4	-	-	JD4
	Ser. no	9579	S95ED	9081	S95ED	-	-	C45BA
	IADC Code	PDC	2-1-6	PDC	2-1-6	-	-	2-1-7
	(R) Bear (J) (S) Lub. (N)	PDC	J/S	PDC	J/S	-	-	J/S
	Weight on Bit	0-14	5-10	10-25	5 - 12	6 - 10	60 - 140	0-5
	R.P.M	60	10-20	40-50	40 - 50	10 - 30	60	70
	Depth Out (m)	3742	3745	3820	3733	3665	3665	3355
PERFORMANCE	Hours	3.2	0.8	8.7	5.7	-	-	0.1
	Meters	20.5	3	75	117	-	-	7
	R.O.P	5	3.75	8.62	20	-	-	35
	Teeth Cone/Row/Wear	-	1	10%	4	-	-	5
	Bearing Seal/Clear./Wear	-	2	-	5	-	-	3
	Cost NOK/m	30195	131835	8926	-	-	-	-
	Broken Teeth/ Inserts %	5-10%	10 BT	0	BT	-	-	-
	Gauge	I	I	I	I	-	-	I
HYDRAULICS	KRev	11.5	2.9	31.8	16.1	-	-	-
	Nozzles 1 | 2 | 3 | 4	3X18	3X12	2X12 1X15	OPEN			OPEN
	Flow Rate (GPM)	450	350	350	445	144	180	625
	Pump Pressure (Psi)	1750	3100	3100	3100	300	600	1150
	Overbalance (Psi)	905	1440	270	-	-	-	-
	Pore Pressure (SG)	0.73	1.12	1.35	-	-	-	-
MUD	Mud Type	SAFEMUL	SAFEMUL	SAFEMUL	SAFEMUL	SAFEMUL	SAFEMUL	S/W
	Mud Weight (SG)	0.9	1.4	1.4	1.41	0.93	0.93	1.03
	PV YP	13/9	40/12	41/11	45 / 13	-	-	-
	Solids % Sand %	4 / 0	19 / 0	18 / 0	18 / 0	-	-	-
Lithology		ULA 2B + 3A	ULA 3B	ULA 3B,4, 5 + TRIAS	CEMENT			CEMENT
Completed by		RBV	RBV	RBV	PSP	PSP	PSP	PSP
Comments		TD OF 8 1/2" SECTION	PLUG,CMT FLOATS + ONLY 3M NEW FTN.	TD 0F 6" SECTION	DRESSED CMT PLUG	PACKER PLUCKER	PACKER PLUCKER	DRESSED CMT PLUG

4.2 HYDRAULICS REPORT - WELL 7/12-9

Date	Hole Size	Depth	Circ Pres	Circ Rate	Bit Data								Ann Vels ft/min					Mud Weight	ECD	Estimated Pore.Pres
					No	Type	Nozzles / TFA	DP Bit	Noz Vel	HHP Bit	HHP %	IMPT	DC	DP	LIN	CSG	RIS			
	inch	m	psi	gpm			32nds/ in2	psi	ft/s			ft/lbs						sg	sg	sg
17.03.90	36	122	1100	1200	1	SS33SGJ4	28/28/28/28/00/00/00/ .	198	169	138	18	902	24	23				1.03		
18.03.90	36	168	1200	1170	1	SS33SGJ4	28/28/28/28/00/00/00/ .	188	164	128	16	857	23	22				1.03		1.03
19.03.90	71/2	234	1100	1200	2R	SS33SGJ4	28/28/28/28/00/00/00/ .	198	169	138	18	902	102			102		1.03		1.03
19.03.90	71/2	234	1650	1200	3	MS11G	28/28/28/16/00/00/00/ .	286	203	200	17	1084	136	105		39		1.03		1.03
20.03.90	71/2	591	2700	1180	3	MS11G	28/28/28/16/00/00/00/ .	276	199	190	10	1048	134	103		38		1.03		1.03
21.03.90	71/2	942	2600	1150	4R	MS11G	28/28/28/16/00/00/00/ .	255	194	171	10	967	131	101		37		1.00		1.03
22.03.90	71/2	950	2510	1160	5R	SS33SGJ4	20/20/20/16/00/00/00/ .	857	351	580	34	1815				44		1.03		1.03
23.03.90	26	820	2820	1160	5R	SS33SGJ4	20/20/20/16/00/00/00/ .	857	351	580	30	1815				49		1.03		1.03
26.03.90	26	820	2500	1160	5R	SS33SGJ4	20/20/20/16/00/00/00/ .	857	351	580	34	1815						1.03		1.03
31.03.90	17 1/2	1147	3060	900	6	SS44G	26/26/26/16/00/00/00/ .	287	174	151	9	953	102			67	59	1.41		1.03
01.04.90	17 1/2	1416	3100	825	7R	SS44G	26/26/26/16/00/00/00/ .	248	159	119	8	824	91	70			53	1.45		1.2
02.04.90	17 1/2	1812	3080	770	7R	SS44G	26/26/26/16/00/00/00/ .	231	148	104	7	767	88	67			50	1.55	1.57	1.38
03.04.90	17 1/2	2202	3150	725	7R	SS44G	26/26/26/16/00/00/00/ .	205	140	87	6	680	83	63			48	1.55	1.57	1.41
04.04.90	17 1/2	2350	3100	690	7R	SS44G	26/26/26/16/00/00/00/ .	185	133	75	6	616	79	60			46	1.55	1.57	1.42
07.04.90	12 1/4	2493	2700	705	8	XDG	32/32/32/00/00/00/00/ .	107	101	44	4	478	223			135	46	1.55	1.57	1.42
08.04.90	12 1/4	2861	3100	637	9	R426	15/15/15/15/15/15/00/ .	452	208	168	15	888	181	124		122	41	1.55	1.62	1.46
09.04.90	12 1/4	3008	3150	526	10	ATM22	18/18/18/00/00/00/00/ .	595	238	183	19	841	151	104		101	35	1.55	1.58	1.46
10.04.90	12 1/4	3068	3150	535	10	ATM22	18/18/18/00/00/00/00/ .	615	242	192	20	870	154	106		103	36	1.55	1.58	1.46
11.04.90	12 1/4	3077	3150	535	10	ATM22	18/18/18/00/00/00/00/ .	615	242	192	20	870	154	106		103	36	1.55	1.57	1.45
11.04.90	12 1/4	3077	3150	535	11	HP51X	18/18/18/00/00/00/00/ .	615	242	192	20	870	154	106		103	36	1.55	1.57	1.45
12.04.90	12 1/4	3106	3150	557	11	HP51X	18/18/18/00/00/00/00/ .	658	252	214	21	931	160	110		107	37	1.53	1.55	1.45
13.04.90	12 1/4	3150	3100	534	11	HP51X	18/18/18/00/00/00/00/ .	605	242	189	20	856	153	105		103	35	1.53	1.55	1.47
14.04.90	12 1/4	3150	3700	630	12	DS46H	18/18/18/18/00/00/00/ .	474	214	174	13	893	179	124		120	41	1.53	1.55	1.47
15.04.90	12 1/4	3288	3700	630	12	DS46H	18/18/18/18/00/00/00/ .	480	214	176	13	905	179	124		120	41	1.55	1.57	1.49
16.04.90	12 1/4	3441	3400	605	12	DS46H	18/18/18/18/00/00/00/ .	443	206	156	13	835	172	102		115	40	1.55	1.57	1.48
17.04.90	12 1/4	3677	3500	605	12	DS46H	18/18/18/18/00/00/00/ .	443	206	156	13	835	172	102		115	40	1.55	1.57	1.49
18.04.90	12 1/4	3684	3500	605	12	DS46H	18/18/18/18/00/00/00/ .	443	206	156	13	835	172	102		115	40	1.55	1.57	1.49
21.04.90	8 1/2	3684	1970	614	13	J4	22/22/22/00/00/00/00/ .	218	186	78	11	460						0.93		
22.04.90	8 1/2	3689	2100	614	13	J4	22/22/22/00/00/00/00/ .	218	186	78	10	460		298				0.93		0.93
23.04.90	8 1/2	3721	240	180	14	RC476	/ / / / / / / 1.000	22	61	2	9	43	148	94		94		0.90	0.95	
24.04.90	8 1/2	3737	1210	405	15	DS26H	12/12/12/00/00/00/00/ .	1037	413	245	86	652	329	209				0.90	0.95	
25.04.90	8 1/2	3742	1750	454	15	DS26H	12/12/12/00/00/00/00/ .	1303	463	345	74	819	329	248				0.90	0.95	0.73
29.04.90	8 1/2	3742	3100	354	15	DS26H	12/12/12/00/00/00/00/ .	1258	361	260	41	791						1.43		
30.04.90	6	3762	3100	350	16	J4	12/12/12/00/00/00/00/ .	854	300	174	28	637		361				1.40	1.47	1.35
03.05.90	6	3620	3000	445	17R	DS26H	12/12/12/00/00/00/00/ .	1961	454	509	65	1232	499		163	216	29	1.41		
04.05.90	6	3732	3100	445	17R	DS26H	12/12/12/00/00/00/00/ .	1293	454	336	42	813	364		163	216	29	0.93		
10.05.90	6	3732	300	144	18	MILL	/ / / / / / / 1.000	15	49	1	5	28	364					0.93		
11.05.90	6	3732	600	180	19R	MILL	/ / / / / / / 1.000	23	61	2	4	45						0.94		
13.05.90	8 1/2	3353	1150	625	20R	JD4	28/28/28/00/00/00/00/ .	95	117	35	8	326						1.03		

4.3 DRILLING FLUID REPORT

This section of the completion report is extracted from Baroid A/S well summary. The costs have been obtained from both Baroid A/S and Aker Drilling Fluids for the materials provided by each company.

INTERVAL DISCUSSION

36" Hole Interval

The well 7/12-9 was spudded on 17th March 1990, with a 26 " bit and 36 " hole opener drilling assembly. RKB-SEABED was 92m, water depth 70m. The 36 " hole was drilled to a total depth of 168m in 2 days for a mud cost of USD 13,478.50. A total mud volume of 2940 bbls was mixed with 1270 bbls lost to the seabed and 1670 bbls transferred to the 26" hole section.

Before drilling commenced, as per SHALLOW GAS CONTINGENCY PLAN, 900 bbls of kill mud at 1.20 sg were mixed in the reserve pits, as well as 600 bbls high viscosity mud (+150 seconds per quart) and spud mud, containing 30 ppg bentonite. The hole was drilled with seawater at 1200 gpm with returns to the seabed. The hole was flushed with high viscosity pills (35 bbls) twice per stand or else as required. At total depth the hole was flushed with 200 bbls. After waiting one hour a wiper trip was made with no hole or fill problems experienced. The hole was again displaced with 300 bbls mud at 1.20 sg. After POOH, the 30" casing was run and the shoe landed at 166m. No problems were encountered and the hole was cemented as per programme. No cement returns were seen at the seabed. A top up cement job was performed. A 30 bbl LCM pill at 30 ppb LCM mixture was spotted down the annulus before the top-up cementing took place.

26" Hole Interval

A 17 1/2" pilot hole was drilled to a depth of 950m using seawater. Two 30 bbls high viscosity pills were pumped on each stand to sweep the hole clean with all returns to the seabed. The hole was then opened out to 26" using a 26" bit and stabilizer down as far as 820m when it was necessary to pull out of the hole because of bad weather. The hole was displaced with 30 bbls of high viscosity mud followed by 600 bbls of 1.20 sg mud to keep the hole open. The hole was static for more than two days before hole opening could resume and it was necessary to wash and ream from just below the casing shoe back down to 820m. The remainder of the hole was then opened out to 26" and a further 6m of rat hole drilled to 956m. A short wiper trip was performed back to 800m and then back to bottom. The hole was then displaced with 1800 bbls of 1.20 sg mud. However the hole was tight at several stages on the way out to the shoe so the drill string was then run in back to bottom. While pulling back to the shoe, it was necessary to pump and rotate at 321m to get the pipe free. A further 600 bbls of 1.20 sg mud was spotted in the hole on the way out. 20" casing was then run to 949m without any major resistance.

A total of 10,370 bbls of mud were mixed for this section at a cost of USD 42,824.5 (USD 4.13 per barrel). The high cost of spud mud on this well was due mainly to the large volumes of mud required to clean and fill the hole and large volumes of 1.20 sg mud to keep the hole open. The two days bad weather contributed considerably to this as the hole deteriorated whilst being static for such a long time and required a lot of extra reaming and pumping.

All returns went to the seabed. All pits were then cleaned thoroughly in preparation for the new PETROFREE mud system.

17 1/2" Hole Interval

After cementing the 20" casing, prior to bringing on board the PETROFREE mud, the surface pits and solids control pits were thoroughly cleaned and all the mixing lines flushed with water. All valves were checked and the dump valves were closed and sealed. Diesel lines in the mud pits and around the rig floor were sealed. Diesel lines in the mud pits and around the rig floor were blanked off as a precaution against accidental contamination of the PETROFREE system. The rig crews were instructed about the PETROFREE system and emphasis was made on the cost, the environmental aspects of the system and the consequences of it being contaminated with diesel or other hydrocarbons. The PETROFREE mud was brought on to the rig and the loading was carefully monitored with checks performed under the rig for leaking dump valves etc.

Once the mud was brought on to the rig, it was weighted up to 1.20 sg and further mud was mixed to give enough volume to commence drilling.

The cement, float and shoe were drilled out using seawater. The hole was circulated clean and then displaced to 1.20 sg PETROFREE mud. Prior to the displacement, 40 bbls of 1.12 sg PETROFREE mud was viscosified in the slug pit and this was used as a spacer.

The displacement took place using a low pump rate as per BP policy of 5 barrels per minute. This proved to be extremely successful and only a fraction of a barrel was lost. The spacer was incorporated into the active system.

A leak at the shakers was discovered and it was necessary to carry out welding repairs for several hours before circulation was resumed. 90m of formation were drilled before pulling back into the shoe to perform a LOT. At this point the yield point was 13 and showed no signs of rising any further. Gels were only 4/4 and on re-entering the new hole some resistance was encountered which was put down to insufficient mud weight or fill. It was therefore necessary to increase the mud weight from 1.20 sg to 1.40 sg and increase rheology by adding 4 drums of RM63 (1ppb) and 4 sks. GELTONE. This brought the formulation more or less in line with that programmed except for the absence of OMC 42.

The decision to add the RM63 and GELTONE had to be made urgently in light of major concerns about the hole cleaning capacity of the system as it stood. Drilling continued and the yield point rose quickly to 22 and by early morning it had reached 45. However the gels were low and flat, 23/24, and hole cleaning was excellent. The TELECO tools failed at 13:00 hours on 01.04.90 and a wiper trip indicated no tight spots or fill. 2 ppb OMC 42 was added gradually over 8 hours and the yield point stayed at 45 as drilling continued. No pressure surge was encountered on starting the mud pumps after the trip. Drilling continued and by Monday morning 02.04.90 the yield point had reached 49. OMC 42 at 0.5 ppb was added over 4 hours and the plastic viscosity/yield point dropped from 33/45 to 36/32 over 2-4 hours. Drilling ceased for several hours on Monday afternoon due to a blockage in the cuttings ditch. A wiper trip showed no difficulties although some resistance was met on the last couple of stands on the way in. The wiper trip was made with the annulus loaded because it could not be circulated clean due to the cuttings ditch being blocked. Drilling continued through Monday night with one break due to pump failure. At this point the plastic viscosity/yield point was 37/36 with 6 rpm reading 20 and gels 23/24. ES and HPHT remained excellent. Drilling continued to total depth at 2340m on Wednesday morning. The complete section was drilled with one bit which would have been one continuous run had not the TELECO MWD tool failed. The formations were typically soft, wet clays and shales which, if drilled with a water based system, produce lots of "gumbo". However, the PETROFREE system drilled these formations without any hole problems. Three Thule VSM-100s shale shakers were a big advantage because of their high volume processing capabilities combined with their fine mesh sizes meant that there was no real build up of fine drilled solids. The mud cleaners were not used at all. Through out the section the shakers performance were excellent .

This interval was drilled for a mud cost of USD 198,303.46 against a programmed mud cost of USD 502,323.79. The very large difference is due to the level of "mud on cuttings" being considerably lower than expected. The programmed level was 0.30 bbl/feet and the actual value was 0.12 bbl/feet.

12 1/4" Hole Interval

The 12 1/4" section was drilled with the PETROFREE mud salvaged from the previous section . A total of 1,330m of 12 1/4" hole were drilled using 5 bits starting on the 7th April and reaching casing point on the 17th. After the 13 3/8" shoe was drilled out a leak off test was carried out to an equivalent mud weight of 2.13 sg.

Mud density remained almost constant throughout the section at 1.55 sg, as prognosed. There were no associated hole problems. Rheology was again monitored and was relatively stable throughout the interval. The PV varied between 45-49 and the yield point between 30 and 38 lbs/100 sqare feet for

most of the section. Some treatment of OMC 42 was necessary as a buffer against rising trends and this treatment, as in the previous hole secitons, controlled the rheology. The 6 RPM rheometer reading stayed between 16 and 20 for most of the section so no addition of RM63 was necessary as a result. Consequently, hole cleaning and holefill did not prove troublesome.

The whole system did not require any major treatments to drastically alter parameters although maintenance treatments were made to restore and increase product concentrations, particularly EZ MUL and DURATONE as the bottom hole temperature increased towards the casing point. The mud was stress tested daily with drilled solids and barite without any serious detrimental effect on the HTHP fluid loss at 300 degrees Fahrenheit.

Once again the THULE VMS100 shale shakers proved their worth. They were more than capable of processing the 600 gallons per minute circulation rate over 200 mesh screens and could conceivably have done so with 230 mesh. Such efficient solids control is a major advantage in running a mud system such as PETROFREE. The mud cleaners were not used at all.

At casing depth , following a single logging run, the casing was run to bottom without any problems and cemented OK. Some minor water contamination to the mud system was evident from the cement spacer.

A total of 2344 barrels of PETROFREE were backloaded to town.

This interval was drilled for a total mud cost of USD 650,222.98 against a programmed mud cost of USD 833,041.12. The difference is due to the level of "mud on cuttings" being lower than programmed - 0.23 bbl/ft against 0.30 bbl/ft.

8 1/2" Hole Interval

Before the 9 5/8" shoe was drilled, the rig received 1609 barrels of unweighted OBM from the Northern Clipper. Mud weight received on the rig was 0.93 sg and after displaceng it into the hole, this rose to 0.95 sg due to picking up some seawater and dregs of the PETROFREE mud. The system required considerable dilution with base oil and centrifuging to reduce the density to 0.90 sg. Once this was achieved, a core was cut through the Ula horizons. Very great care was taken while coring this section because it was not known for sure if the reservoir in this part of the field was depleted. A small closed active system was employed to closely monitor for gains/losses. Before pulling out with the core barrel, it became diffentially stuck but rotation was soon reestablished and the hole was backreamed back to the shoe. A wiper trip to bottom showed the hole to be tight in a few spots. The core was recovered 100% and the hole was then drilled to 3,742m and logged.

Mud properties in this hole section were stable. The large dilution with base oil meant that product concentrations decreased somewhat. The rheology was low with a yield point at 7-9 (spec. 10-15) but hole cleaning was not a problem and this was eventually raised when treatment was permitted.

The 7" liner was cemented in place. 61 bbls of mud were lost to the formation whilst displacing the cement. When the mud was reverse circulated, a minimum amount of cement/spacer interface was returned and nearly all of the weighted water based spacer returned to the sand trap so as not to contaminate the mud. Difficulties were encountered in releasing the running tool(150,00 lbs overpull) and it was not obvious at surface if the packer was set. It became apparent later that whilst attempting to pull the running tool free, the whole liner was lifted so the shoe depth became 3,735m.

Following the cement job, the hole was displaced to seawater to enable all the light mud to be brought to surface to be backloaded. A total of 2000 bbls were backloaded onto the "Ocean Flower". This left 229 bbls on board in dead volumes. The mud weights of the backloaded mud varied from 0.91 to 0.97 sg.

Coarse calcium carbonate was programmed for slugs on this section so that it could be removed on the shale shaker. However all calcium carbonate received was of fine grade and stayed in the system.

Mud chemicals for this section were supplied by Aker Drilling Fluids A.S. and cost 73,168 NOK.

6" Hole Interval and Testing/Suspension

The 7" liner was tested and the liner lap was found to be leaking. A packer was set and a 2 7/8" tubing stinger was run. Pumping started to establish an injection rate, but the pressure built to 4500 psi, giving a good test. A 6" bit was run, the shoe track and 3m of new formation were drilled and a leak off test was made to 1.98 sg equivalent mud weight. The string was pulled and the bit was changed, drilling then continued to total depth at 3,820m. After pulling out of the hole Schlumberger logs were run. The hole was then cemented back to 3,633m. The cement was then dressed to 3,733m, and the hole was displaced to 0.95 sg mud, this was circulated and the weight reduced to 0.93 sg with additions of base oil. Following this a bridge plug was set above the cement plug and the production packer was set. The BOP stack was tested and the test string was run and pressure tested. Once the string had been run the MCCV was opened and the tubing was displaced to Nitrogen. Two perforating runs were made and the well was opened up and flowed. The well was then shut in and the build up was observed. Injection tests were made. Following this 100 bbls of mud were bullheaded down the tubing, the MCCV opened and the hole was circulated with mud. The test string was then pulled and laid out, the production packer was milled and pulled. A cementing string was run and prior to setting a cement plug the hole was displaced to seawater. The cement plug was set and after running it, in order to tag the cement, the hole was displaced to inhibited seawater.

Mud chemicals for this section were supplied by Aker Drilling Fluids A.S. and cost 39,691 NOK.

Conclusion and Recommendations

The drilling fluids on this well were extremely successful and played an integral part of a very efficient drilling operation. If a similar well were to be drilled again, the same drilling fluids programme is recommended with no significant changes.

The 36" and 26" hole intervals were drilled with sea water and high viscosity pre-hydrated bentonite pills with returns to the seabed. This is standard North Sea practice and no changes are suggested for future wells. The 26" hole costs and volumes were considerably higher than programmed. This was caused by the operation having to wait on weather. The hole conditions deteriorated while waiting on weather and required extensive reaming and sweep pills when the well was eventually reentered.

Baroid's new PETROFREE mud system was used for the first time on this well for the 17 1/2" and 12 1/4" hole intervals. The only hole problems experienced were tight hole at the beginning of the 17 1/2" section . This was attributed to the 1.20 sg mud in use rather than the programmed 1.40 sg. The problem was solved immediately the mud density was increased to the programmed 1.40 sg. No problems were experienced in either section controlling mud properties. A major contribution to this was the excellent performance of the recently installed Thule VSM 100 shale shakers. These shakers have been proved to be extremely efficient in conjunction with oil based mud, which the PETROFREE system is similar to. The presence on the rig of a Thule engineer for both of these sections ensured optimum perfomance from the shakers.

The use of the PETROFREE system produced major time savings (+/- 13 1/2 days) over the initially programmed water based mud and also over conventional low toxicity oil based mud. The latter was due to no requirement for a cuttings cleaning system when using PETROFREE. Therefore drilling rates did not have to be controlled at a rate to suit the cuttings cleaning system.

The PETROFREE costs were markedly lower than programmed due to the much lower mud losses with cuttings than programmed. Further development of the PETROFREE mud system is planned as more experience is gained.

In the 8 1/2" and 6" hole intervals Aker Drilling Fluids' SAFEMUL system was used. This system was chosen for logistical reasons as BP Norway had the mud in stock. The system was run by Baroid

engineers and no problems were experienced. This was largely due to good communication between Aker Drilling Fluids, Baroid A/S and BP Norway. This also illustrated that experienced mud engineers can run virtually any system that they are faced with.

In conclusion this was an extremely successful well both from a drilling fluids point of view and from an operational point of view. A new mud system - PETROFREE - had a successful field trial and a very efficient well was drilled.

INTERVAL SUMMARY

SECTION	
Hole Size	36"
Casing Size	30"
Mud Type	Seawater and Prehydrated Bentonite
Spud Depth	92 metres
Spud Date	17th March 1990
TD Depth	168 metres
TD Date	18th March 1990
Interval Length	76 metres
Maximum Hole Deviation	< 1
Maximum Hole Temperature	N/A
Drilling Days	2
Total Days On Interval	2
Volume Built	2940 bbls
Volume Transferred To Interval	0
Volume Salvaged	1670 bbls
Volume Left Behind Casing	0
Volume Lost To Formation	0
Volume Dumped	0
Volume Lost Over Solids Control Equipment	0
Total Volume To Sea	1270 bbls
Volume Cuttings Drilled	314 bbls
Interval Mud Cost	13,478.50 USD
Cost Per Barrel	4.58 USD
Cost Per Metre	177.35 USD
Cost Per Day	6,739.25 USD

INTERVAL SUMMARY

SECTION	
Hole Size	26"
Casing Size	20"
Mud Type	Seawater and Prehydrated Bentonite
Spud Depth	168 metres
Spud Date	19th March 1990
TD Depth	956 metres
TD Date	27th March 1990
Interval Length	788 metres
Maximum Hole Deviation	1
Maximum Hole Temperature	N/A
Drilling Days	7
Total Days On Interval	11
Volume Built	10,370 bbls
Volume Transferred To Interval	1,670 bbls
Volume Salvaged	0
Volume Left Behind Casing	0
Volume Lost To Formation	0
Volume Dumped	0
Volume Lost Over Solids Control Equipment	0
Total Volume To Sea	12,040 bbls
Volume Cuttings Drilled	1,698 bbls
Interval Mud Cost	42,824.50 USD
Cost Per Barrel	4.13 USD
Cost Per Metre	54.35 USD
Cost Per Day	3,893.14 USD

INTERVAL SUMMARY

SECTION	
Hole Size	17 1/2"
Casing Size	13 3/8"
Mud Type	PETROFREE
Spud Depth	956 metres
Spud Date	31st March 1990
TD Depth	2350 metres
TD Date	4th April 1990
Interval Length	1394 metres
Maximum Hole Deviation	0.5
Maximum Hole Temperature	186°F
Drilling Days	5
Total Days On Interval	9
Volume Built	3,362 bbls
Volume Transferred To Interval	0
Volume Salvaged	2,821 bbls
Volume Left Behind Casing	20 bbls
Volume Lost To Formation	0
Volume Dumped	0
Volume Lost Over Solids Control Equipment	521 bbls
Total Volume To Sea	521 bbls
Volume Cuttings Drilled	1,368 bbls
Interval Mud Cost	198,303.46 USD
Cost Per Barrel	366.54 USD
Cost Per Metre	142.25 USD
Cost Per Day	22,033.72 USD
Mud Consumption	0.37 bbls/metre

INTERVAL SUMMARY

SECTION	
Hole Size	12 1/4"
Casing Size	9 5/8"
Mud Type	PETROFREE
Spud Depth	2350 metres
Spud Date	7th April 1990
TD Depth	3684 metres
TD Date	18th April 1990
Interval Length	1334 metres
Maximum Hole Deviation	1
Maximum Hole Temperature	266°F
Drilling Days	10
Total Days On Interval	14
Volume Built	514 bbls
Volume Transferred To Interval	2,821 bbls
Volume Salvaged	2,344 bbls
Volume Left Behind Casing	20 bbls
Volume Lost To Formation	38 bbls
Volume Dumped	15 bbls
Volume Lost Over Solids Control Equipment	918 bbls
Total Volume To Sea	918 bbls
Volume Cuttings Drilled	636 bbls
Interval Mud Cost	650,222.98 USD
Cost Per Barrel	358.38 USD
Cost Per Metre	487.42 USD
Cost Per Day	46,444.50 USD

INTERVAL SUMMARY

SECTION	
Hole Size	8 1/2"
Casing Size	7"
Mud Type	Safemul
Spud Depth	3684 metres
Spud Date	22th April 1990
TD Depth	3742 metres
TD Date	25th April 1990
Interval Length	58 metres
Maximum Hole Deviation	N/A
Maximum Hole Temperature	288°F
Drilling Days	4
Total Days On Interval	7
Volume Built	2,309 bbls
Volume Transferred To Interval	15 bbls
Volume Salvaged	2,229 bbls
Volume Left Behind Casing	0
Volume Lost To Formation	61 bbls
Volume Dumped	0
Volume Lost Over Solids Control Equipment	34 bbls
Total Volume To Sea	0
Volume Cuttings Drilled	13 bbls
Interval Mud Cost	12,610.31 USD
Cost Per Barrel	122.00 USD
Cost Per Metre	217.42 USD
Cost Per Day	1,801.47 USD

INTERVAL SUMMARY

SECTION	
Hole Size	6"
Casing Size	N/A
Mud Type	Safemul
Spud Depth	3742 metres
Spud Date	30th April 1990
TD Depth	3820 metres
TD Date	1st May 1990
Interval Length	78 metres
Maximum Hole Deviation	0
Maximum Hole Temperature	289°F
Drilling Days	2
Total Days On Interval	6
Volume Built	1,379 bbls
Volume Transferred To Interval	229 bbls
Volume Salvaged	1,608 bbls
Volume Left Behind Casing	0
Volume Lost To Formation	0
Volume Dumped	0
Volume Lost Over Solids Control Equipment	0
Total Volume To Sea	0
Volume Cuttings Drilled	9 bbls
Interval Mud Cost	8,872.87 USD
Cost Per Barrel	-
Cost Per Metre	113.75USD
Cost Per Day	4,436.44 USD

INTERVAL SUMMARY

SECTION	
Hole Size	Test and Suspend
Casing Size	7"
Mud Type	Safemul/Treated Seawater
Spud Depth	3820 metres
Spud Date	1st May 1990
TD Depth	3732 metres
TD Date	15th May 1990
Interval Length	N/A
Maximum Hole Deviation	N/A
Maximum Hole Temperature	N/A
Drilling Days	0
Total Days On Interval	14
Volume Built	1,949 bbls
Volume Transferred To Interval	101 bbls
Volume Salvaged	1,826 bbls
Volume Left Behind Casing	0
Volume Lost To Formation	35 bbls
Volume Dumped	0
Volume Lost Over Solids Control Equipment	88 bbls *
Total Volume To Sea	0
Volume Cuttings Drilled	0
Interval Mud Cost	8,989.50 USD
Cost Per Barrel	N/A
Cost Per Metre	N/A
Cost Per Day	642.11 USD

* 88 bbls dead volume left on rig.

COST SUMMARY

Operator	BP Norway
Block No./Location	Ula Field
Well Name/No.	7/12-9
Total Depth	3820 metres
Deviation	N/A
Spud Date	17th March 1990
Date TD Reached	1st May 1990
Total Drilling Days	27
Cost of Mud Materials used on Well	USD 935,302.43
Cost of Mud Materials used for Drilling	USD 927,625.43
Mud Cost per Metre	USD 242.83
Mud Cost per Day (60 Days)	USD 15,588.37
Cost of Engineering Service	USD 53,370.00

COST SUMMARY

Operator	BP Norway
Well name/No.	7/12-9
Contractor	Ross Drilling
Rig	Ross Isle
Baroid Engineers	D. Garden S. Roden T. O'Hara B. Hendry
TD	3820 meters

Hole Size, in	Casing Size	Casing set at	Mud Type	Mud Cost USD	Drilling Days
36	30	166	Seawater/Spud Mud	13,478.50	2
26	20	949	Seawater/Spud Mud	42,824.50	7
17 1/2	13 3/8	2342	PETROFREE	198,303.46	5
12 1/4	9 5/8	3680	PETROFREE	650,222.98	10
8 1/2	7	3510	SAFEMUL	12,610.31	2
6		3735	SAFEMUL	8,872.87	1
Test & Suspend			SAFEMUL/ INHIBITED SEAWATER	8,989.50	N/A
Total Mud Cost USD				935,302.12	

MATERIALS USED PER CASING INTERVAL

30" CASING

Material	Unit	Quantity	Unit cost In USD	Cost
Barite	MT	51	87.00	4,437.00
Bentonite	MT	35	240.00	8,400.00
Caustic Soda	25 KG	19	14.50	275.50
Soda Ash	25 KG	10	11.40	114.00
Mica Coarse	25 KG	6	14.00	84.00
Wallnut Coarse	25 KG	6	14.00	84.00
Wallnut Fine	25 KG	6	14.00	84.00
			TOTAL USD	13,478.50

20" CASING

Barite	MT	151	87.00	13,137.00
Bentonite	MT	116	240.00	27,840.00
Caustic Soda	25 KG	65	14.50	942.00
Soda Ash	25 KG	45	11.40	513.00
Mica Coarse	25 KG	6	14.00	84.00
Wallnut Coarse	25 KG	6	14.00	84.00
Wallnut Fine	25 KG	6	14.00	84.00
			TOTAL USD	42,824.50

13 3/8" CASING

Petrofree Premix	BBL	1666	430.31	716,896.46
Petrofree Ester	BBL	857	500.00	428,500.00
Barite	MT	401	87.00	34,887.00
Calcium Chloride	25 KG	293	9.10	2,666.30
RM-63	55 GAL	4	816.00	3,264.00
EZ-Mul-NTF	55 GAL	35	403. 85	14,134.75
Duratone HT	50 LB	205	44.19	9,058.95
Geltone II	50 LB	99	36.26	3,589.74
Lime	20 KG	44	5.60	246.40
OMC 2	50 KG	9	616.30	5,546.70
OMC 42	55 GAL	8	1,395.00	11,160.00
XCD Polymer	25 KG	9	262.50	2,362.50
			TOTAL USD	1,232,312.80

Mud carried forward to 12 1/4" interval:

Petrofree	BBL	2821	366.54	(1,034,009.34)
			Interval mud cost USD	198,303.46

MATERIALS USED PER CASING INTERVAL

9 5/8" CASING

Petrofree Premix	BBL	2821	366.54	1,034,009.34
Petrofree Ester	BBL	223	500.00	111,500.00
Barite	MT	116	87.00	10,092.00
Calcium Chloride	25 KG	50	9.10	455.00
Duratone	50 LB	176	44.19	7,777.44
EZ-Mul NTF	55 GAL	30	403.85	12,115.20
Lime	25 GAL	27	5.60	151,20
OMC 42	55 GAL	12	1,395.00	16,740.00
XCD Polymer	25 KG	9	262.50	2,362.50
			TOTAL USD	1,195.202.98
Buy-back on mud salvaged:				
Petrofree	BBL	2344	232.50	(544,980.00)
			Interval mud cost USD	650,222.98

NOTE: Petrofree buy-back = 2344 BBL x 0.62 x USD 500.00 x 75%
= VOL BKL'D x Ester % x Ester cost x 75%

MATERIALS USED PER CASING INTERVAL

7" LINER

Materials	Unit	Quantity	Unit Cost USD	Cost
BAROID				
Geltone	50 lb	10	36.26	362.60
Barite	MT	4	87.00	348.00
			BAROID'S SUB TOTAL USD	710.60

AKER

			Unit Cost NOK	Cost NOK
Lightweight OBM	BBLS	1609	505.00	812,545.00
Base Oil	BBLS	662	313.60	207,603.20
Safemul Vis	25 kg sx.	100	320.00	32,000.00
Safemul Polyvis	200 ltr. drum	2	3,400.00	6,800.00
Safetone LFL	200 ltr. drum	7	2,550.00	17,850.00
Lime	20 kg sx.	61	30.00	1,830.00
Calcium Carbonate	25 kg sx.	132	30.00	3,960.00
Barite	MT	4	595.00	2,380.00
			AKER'S SUB TOTAL NOK	1,084,968.20

Credit for mud backloaded at end of section

Lightweight OBM	BBLS	2,000	505.00	1,010,000.00 NOK
			AKER'S SUB TOTAL	74,968.20 NOK
			AKER'S SUB TOTAL (1 USD = 6.3 NOK)	11,899.71 USD
			GRAND TOTAL =	12,610.31 USD

MATERIALS USED PER CASING INTERVAL

6" HOLE

Materials	Unit	Quantity	Unit Cost USD	Cost
BAROID				
Barite	MT	29	87.00	2,523.00
			BAROID'S SUB TOTAL USD	2, 523.00

AKER			Unit Cost NOK	Cost NOK
OBM - 1.40 sg	BBLS	1331	313.00	416,603.00
Lightweight OBM	BBLS	156	505.00	78,780.00
Base Oil	BBLS	47	313.60	14,739.20
Lime	SX	60	30.00	1,800.00
Barite	MT	78	595.00	46,410.00
			AKER'S SUB TOTAL NOK	558,332.20

Credit for mud backloaded at end of section

Lightweight OBM	BBLS	2,000	505.00	1,010,000.00 NOK

AKER'S SUB TOTAL	40,004.20 NOK
AKER'S SUB TOTAL (1 USD = 6.3 NOK)	6,349.87 USD
GRAND TOTAL =	8,872.87USD

MATERIALS USED PER CASING INTERVAL

TEST & SUSPENSION

Materials	Unit	Quantity	Unit Cost USD	Cost
BAROID				
XCD Polymer	25 kg sx.	5	262.50	1,312.50
AKER				
Lightweight OBM	BBLS	1474	505.00	744,370.00
Base Oil	BBLS	445	313.60	139,552.00
Safemul Vis	25 kg sx.	8	320.00	2,560.00
XCD Polymer	25 kg sx	5	2,043.00	10,215.00
Ancopac	200 ltr. drum	12	6,150.00	73,800.00
Hydrokem	Ltr	10	-	-
		AKER'S SUB TOTAL		970,497.00 NOK

Credit for mud backloaded at end of section

Lightweight OBM	BBLS	1826	505.00	922,130.00 NOK
			SUB TOTAL	48,367.00 NOK

AKER'S SUB TOTAL (1 USD = 6.3 NOK) 7,677.00 USD

GRAND TOTAL = 8,989.50 USD

MATERIAL CONSUMPTION

BAROID MUD COST

Material	Unit	Quantity	Unit cost in USD	Cost
Barite	MT	752	87.00	65,424.00
Bentonite	MT	151	240.00	36,240.00
Caustic Soda	25 KG	84	14.50	1,218.00
Soda Ash	25 KG	55	11.40	627.00
Mica Coarse	24 KG	12	14.00	168.00
Mica Fine	24 KG	10	14.00	140.00
Wallnut Coarse	25 KG	12	14.00	168.00
Wallnut Fine	25 KG	12	14.00	168.00
Petrofree Premix	BBL	1666	430.00	716,896.46
Petrofree Ester	BBL	1080	500.00	540,000.00
Calcium Chloride	25 KG	343	9.10	3,121.30
RM 63	55 GAL	4	816.00	3,264.00
EZ Mul NTF	55 GAL	65	403.85	26,250.25
Duratone HT	50 LB	381	44.19	16,836.39
Geltone II	50 LB	109	36.26	3,952.34
Lime	20 KG	71	5.60	397.60
OMC 2	50 KG	9	616.30	5,546.70
OMC 42	55 GAL	20	1,395.00	27,900.00
XCD Polymer	25 KG	23	262.50	6,037.50
			TOTAL	1,454,355.54
Mud Backloaded				
PETROFREE	BBL	2344	232.50	(544,980.00)
BAROIDS TOTAL MUD COST				USD 909,375.54

AKER MUD COSTS

Lightweight OBM	BBL	3239	505.00	1,635,695.00
OBM - 1.40 sg	BBL	1331	313.00	416,603.00
Base Oil	BBL	1154	313.00	361,894.40
Barite	MT	82	595.00	48,790.00
Safemul Vis	SX	108	320.00	34,560.00
Safemul Polyvis	DMS	2	3400.00	6,800.00
Safetone LFL	DMS	7	2550.00	17,850.00
Lime	SX	121	30.00	3,630.00
Calcium Carbonate	SX	132	30.00	3,960.00
XCD Polymer	SX	5	2043.00	10,215.00
Ancopac	DMS	12	6150.00	73,800.00
Total materials cost for the well			NOK	2,613,797.40
Credit for mud Backloaded:-				
Lightweight OBM	BBL	3826	505.00	(NOK 1,932,130.00)
OBM - 1.41 sg	BBL	1656	313.00	(NOK 518,328.00)
Total Credit for mud backloaded				(NOK 2,450,458.00)
AKER'S TOTAL MUD COSTS				NOK 163,339.40
AKER'S TOTAL MUD COSTS (1 USD = 6.3 NOK)				USD 25,926.89
GRAND TOTAL MUD COST				USD 935,302.43

MUD PROPERTY RECAP — Water Based

OPERATOR: BP NORWAY LIMITED U.A. ROSS ISLE WELL: 7/12-9

Date	Depth m	Mud Wt. ppg	Mud Vis. sec	Filtrate API ml	Filtrate HPHT ml	Ck 1/32"	pH	Rheology PV cp	Rheology YP lb/100 sq ft	Gels 10 Sec	Gels 10 Min	Cl g/l	Ca mg/l	Pf	Mf	Pm	Oil %	Water %	Solids %	MBT ppb	
17-Mar-90	122	1.08	+100	N/C			10.5	20	95	55	70									30	SPUD MUD
18-Mar-90	168	1.08	+100	N/C			10.5	20	95	55	70									30	SPUD MUD
19-Mar-90	234	1.08	+150	N/C			11.0	15	140	80	100									30	SPUD MUD
20-Mar-90	591	1.08	+150	N/C			11.0	15	140	80	100							96	4	30	SPUD MUD
21-Mar-90	950	1.08	+150	N/C			11.0	20	130	75	100							96	4	30	SPUD MUD
22-Mar-90	950	1.08	+150	N/C			11.0	20	130	75	100							96	4	30	SPUD MUD
23-Mar-90	950	1.06	+150	N/C			11.3	15	100	70	80							96	4	30	SPUD MUD
24-Mar-90	950	1.06	+150	N/C			11.3	15	100	70	80							97	3	30	SPUD MUD
25-Mar-90	950	1.06	+150	N/C			11.3	15	100	70	80							97	3	30	SPUD MUD
26-Mar-90	950	1.06	+150	N/C			11.0	15	95	75	85							97	3	30	SPUD MUD
27-Mar-90	956	1.06	+150	N/C			11.0	15	95	75	85							97	3	30	SPUD MUD

MUD PROPERTY RECAP — PETROFREE

OPERATOR: BP NORWAY LIMITED U.A **ROSS ISLE** **WELL:** 7/12-9

Date	Depth M	Mud Dens. SG	Mud Vis. secs	Temp. F	Elec. Stab. V.	HP/HT 500 psi ccs	CK 1/32"	Excess lime	pV cp	YP	GELS 10' lbs/100	GELS 10" ft2	CaCl2 & NaCl ppb	WPS g/ltr	Alka-linity	Ester	Water	Solids	Ester/ Water Ratio	Sand	ASG
29-Mar-90	956	1.20	84	56	344	6.0	2	0.40	15	8	4	4	14.09	192	0.3	73	14	13	84/16	0	
30-Mar-90	956	1.20	86	58	400	6.0	2	0.40	15	8	4	4	14.09	179	0.3	73	14	13	84/16	0	
31-Mar-90	1147	1.41	78	104	854	6.0	2	0.40	30	29	10	12	13.90	132	0.3	64	19	17	77/23	0.5	3.93
01-Apr-90	1416	1.50	81	105	866	4.2	2	0.45	36	45	23	24	12.47	125	0.35	63	19	19	78/22	0.5	4.13
02-Apr-90	1812	1.55	74	110	880	3.0	2	0.30	36	32	20	22	13.90	132	0.2	63	16	21	80720	0.5	4.06
03-Apr-90	2204	1.55	72	112	1043	3.0	2	0.26	34	39	20	22	13.98	141	0.2	62	16	22	79/21	0.5	3.91
04-Apr-90	2350	1.55	84	114	1260	3.2	2	0.26	36	39	20	22	12.44	144	0.2	62	16	22	79/21	0.5	3.90
05-Apr-90	2350	1.55	89		1230	3.0	2	0.26	38	37	20	22	12.44	141	0.2	62	16	22	79/21	0.5	3.90
06-Apr-90	2350	1.55	84		1260	2.8	2	0.26	36	39	20	22	12.44	141	0.2	62	16	22	79/21	0.5	3.90
07-Apr-90	2493	1.55	86		992	2.6	2	0.39	45	40	23	25	13.90	141	0.3	60	18	22	77/23	0.5	3.89
08-Apr-90	2862	1.55	90		1093	2.0	1	0.26	44	35	20	22	12.50	141	0.2	62	16	22	79/21	0.5	3.90
09-Apr-90	3008	1.55	69		1084	2.0	1	0.26	46	38	20	22	13.89	147	0.2	61	17	22	79/21	TR	3.90
10-Apr-90	3068	1.55	68		1040	2.0	1	0.26	48	36	20	23	12.50	141	0.2	62	16	22	79/21	TR	3.90
11-Apr-90	3079	1.55	68	155	1170	2.1	1	0.39	49	38	20	23	12.55	156	0.3	65	12	23	84/16	TR	3.79
12-Apr-90	3106	1.53	61	158	1296	2.2		0.26	45	37	20	23	11.10	143	0.2	64	14	22	82/18	TR	3.84
13-Apr-90	3150	1.53	60	158	1210	2.0	1	0.26	49	33	20	24	12.55	188	0.2	65	12	23	84/16	TR	3.72
14-Apr-90	3150	1.53	102	105	1443	2.0	1	0.26	42	29	18	22	12.55	188	0.2	65	12	23	84/16	TR	3.70
15-Apr-90	3288	1.55	64	155	1290	2.0	1	0.26	48	30	18	27	12.54	188	0.2	65	12	23	84/16	TR	3.85
16-Apr-90	3441	1.55	73	146	1213	2.0	1	0.26	49	29	19	27	11.10	167	0.2	63	12	25	82/18	TR	3.56
17-Apr-90	3677	1.55	70	152	1020	2.0	1	0.91	54	29	15	27	15.46	196	0.7	65	14	21	82/18	TR	4.09
18-Apr-90	3684	1.55	70	163	990	2.5	1	0.65	54	27	19	28	12.48	173	0.5	65	13	22	83/17	TR	3.94
19-Apr-90	3684	1.55	120	72	910	2.4	1	0.65	58	24	18	26	12.48	173	0.5	65	13	22	83/17	TR	3.94
20-Apr-90	3684	1.55	120	65	900	2.8	1	0.65	59	25	20	27	12.53	161	0.5	65	20	27	82/18	TR	4.03

MUD PROPERTY RECAP — SAFEMUL

OPERATOR: BP NORWAY LIMITED U.A.

WELL: 7/12-9

Date	Depth m	Mud Density sg	Mud Vis. sec	Temp. in F	Elec. Stab. V.	HT/HP 500 psi ccs	CK 1/32"	Excess Lime	PV cp	GELS YP lbs/100 ft2	10'	10"	WPS 9/ltr	Total Soluble Salts ppb	Alkalin.	Oil %	Water %	Corr. Solids %	Oil Water Ratio	Sand	ASG
8 1/2" SECTION																					
21-Apr-90	3677	0.93	63	112	1050	5.0	1	1.40	23	7	12	20	143	11.27	1.1	82	14	4	85/15	0	3.0
22-Apr-90	3690	0.93	55	130	860	5.2	1	1.30	21	10	11	17	141	12.76	1.0	79	16	5	83/17	0	2.4
23-Apr-90	3721	0.90	47	44	1000	6.8	1	1.04	11	6	5	7	125	12.50	0.8	87	10	3	90/10	0	3.1
24-Apr-90	3737	0.90	50	110	1440	6.4	1	1.70	12	10	6	8	125	7.00	1.3	86	10	4	90/10	0	2.6
25-Apr-90	3742	0.90	50	80	1400	5.8	1	1.70	13	9	6	8	125	12.60	1.3	86	10	4	90/10	0	2.6
26-Apr-90	3742	0.90	50	60	1400	5.8	1	1.70	13	9	6	8	125	12.60	1.3	86	10	4	90/10	0	2.6
27-Apr-90	3742	0.92	54		1400	5.8	1	1.70	13	11	6	8	125	12.60	1.3	86	10	4	90/10	0	2.6
6" SECTION																					
28-Apr-90	3742	1.40	85		800	5.0	1	2.60	49	15	12	20	132	13.05	2.0	64	17	19	79/21	0	3.7
29-Apr-90	3742	1.43	80		880	5.0	2	2.34	40	12	8	15	141	13.05	1.8	65	16	19	80/20	0	3.9
30-Apr-90	3762	1.40	76	80	890	5.0	2	3.25	41	11	8	11	118	11.60	2.5	65	17	18	79/21	0	3.9
01-May-90	3820	1.40	78		920	4.8	2	3.90	45	13	7	11	132	12.94	3.0	65	17	18	79/21	0	3.9
02-May-90	3820	1.40	82		900	4.8	2	3.90	44	13	7	11	132	12.94	3.0	65	17	18	79/21	0	3.9
03-May-90	3820	1.41	79		920	5.0	2	3.90	45	13	8	11	132	12.94	3.0	65	17	18	79/21	0	3.9
TESTING																					
04-May-90	3820	0.93	38		1320	4.8	2	1.30	12	7	3	5	150	8.47	1.0	88	10	2	90/10	0	2.6
05-May-90	3820	0.93	38		1320	4.8	2	1.30	12	7	3	5	150	8.47	1.0	88	10	2	90/10	0	2.6
06-May-90	3820	0.93	38		1320	4.8	2	1.30	12	7	3	5	150	8.47	1.0	88	10	2	90/10	0	2.6
07-May-90	3820	0.93	38		1320	4.8	2	1.30	12	7	3	5	150	8.47	1.0	88	10	2	90/10	0	2.6
08-May-90	3820	0.93	38		1320	4.8	2	1.30	12	7	3	5	150	8.47	1.0	88	10	2	90/10	0	2.6
09-May-90	3820	0.93	42		1250	5.2	2	1.17	11	8	3	7	150	8.46	0.9	88	10	2	90/10	0	2.6
10-May-90	3820	0.93	42		1380	5.6	2	1.37	10	6	3	5	150	8.47	1.0	88	10	2	90/10	0	2.6
11-May-90	3820	0.94	41		1360	5.8	2	1.30	11	8	3	6	150	8.47	1.0	88	10	2	90/10	0	2.6
12-May-90 SEAWATER																					
13-May-90 INHIBITED SEAWATER																					

MUD VOLUME DISTRIBUTION SUMMARY

RIG: ROSS ISLE HOLE SIZE WELL: 7/12-9 OPERATOR: BP NORWAY LIMITED U.A.

HOLE SIZE	SPUD DEPTH METRES	TD DEPTH METRES	LENGTH METRES	BUILT (BBL)	DUMPED (BBL)	LOST TO HOLE	LOST OVER SOLIDS CONTROL EQUIP.	LEFT BEHIND CASING	TRANSFER TO NEXT SECTION	CUTTINGS VOLUME DRILLED M3	INTERVAL MUD TYPE
36"	92	168	76	2940	0	1270	0	0	1670	49.9	HI-VIS SPUD MUD + WEIGHTED 1.20 SG
26"	168	955	787	10370	0	12040	0	0	0	269.7	HI-VIS SPUD MUD + WEIGHTED 1.20 SG
17 1/2"	955	2350	1395	3362	0	0	521	20	2821	216.6	PETROFREE
12 1/4"	2350	3684	1334	514	0	38	918	20	2344	101.4	PETROFREE
8 1/2"	3684	3742	58	2349	0	61	34	0	229	2.12	SAFEMUL
6"	3742	3820	78	1727	0	0	0	0	1727	1	SAFEMUL
TESTING		3820		1949	0	35	0	0	1826*		SAFEMUL

* 88 BBLS DEAD VOL LEFT ON RIG

4.4 CASING AND CEMENTING

Note: All Depths are Measured Depths

CASING SIZE INCH	30"	20"	13 3/8"	9 5/8"	7"
WEIGHT LB/FT	303	133	68/72	47/55,5	29
GRADE	X-52	X-56	K-55/N-80	C-95/N-80	L-80
CONNECTION	LYNX SA/ MERLIN	VETCO RL-4S	BTC	VAM/FJL VAM	VAM
NUMBER OF JOINTS	6	171	55/125	267/5	15
SHOE DEPTH mBRT	166	949	2342	3680	3735
STAGE COLLAR DEPTH mBRT	N/A	N/A	N/A	N/A	N/A
HANGER DEPTH mBRT	N/A	N/A	N/A	N/A	3510
MUDLINE HANGER DEPTH mBRT	88.7	87.8	89.2	88.9	N/A

FIRST STAGE LEAD SLURRY

					TAIL
ANNULAR TOC mBRT	128	WELLHEAD	505	1180	3606
DETERMINED FROM	TAGGED	N/A	CBL	CBL	CBL
VOLUME OF SPACER	60	1430	140/60	150/60	60
SPACER TYPE	SEAWTR	SEAWTR	XCD/D3001	XCD/D3001	D3001
SPACER S.G.	1.03	1.03	1,59/1,60	1,59/1,61	1.61
CEMENT SLURRY VOLUME (BBLS)	300	1300	751	240	36
OPEN HOLE EXCESS USED %	300	100	CALIPER	CALIPER	CALIPER
CEMENT TYPE	"G" NEAT CEMENT	"G" NEAT + 8% GEL D20	"G" NEAT + 8% GEL D20	G+8% D20 G+35%D66	G+35%D66
SLURRY S.G.	1.9	1.57	1.62	1,62/1,90	1.9
MIX WATER TYPE	SEAWTR	FW	FW	FW	FW=5.35
DESIGNED THICKENING TIME HRS:MINS	4:57	70 BC 8:26	70 BC 5:39	70 BC 5:25	70BC 3:23
DISPLACEMENT RATE (BPM)	9-5	8	7-12	10-3	6
PLUG BUMPED PSI	-	500		4000	
LIQUID ADDITIVES AND CONCENTRATIONS (INCLUDING MIX WATER) G/SK	D77: 0,40 D47: 0,02 SW: 4,87	D47: 0,02 D81: 0,03 FW: 10,73	D47: 0,02 D81: 0,1 FW: 9,27	D47: 0,02 D801: 0,14 FW: 9,23	D47: 0.02 D603: 0.80 D604: 0.20
POWDER ADDITIVES BWOC	NONE	8% BWOC D20	8% BWOC D20	8%D20 35%D66	35%BWOC D66

FIRST STAGE TAIL SLURRY

CEMENT SLURRY VOLUME (BBLS)	92	200	144	227	N/A
OPEN HOLE EXCESS USED %	300	100	CALIPER	CALIPER	-
CEMENT TYPE	"G" NEAT CEMENT	"G" NEAT CEMENT	"G" NEAT CEMENT	G+35%D66 CEMENT	- -
SLURRY S.G.	1.98	1.9	1.9	1.9	-
MIX WATER TYPE	SEAWTR	SEAWTR	FW	FW	-
DESIGNED THICKENING TIME HRS:MINS	2:33	5:01	70 BC 3:58	70 BC 4:45	- -
DISPLACEMENT RATE (BPM)	5	8	8-12	3-10	-
PLUG BUMPED PSI		500	1500	3500	-
LIQUID ADDITIVES AND CONCENTRATIONS (INCLUDING MIX WATER) G/SK	D77: 0,40 D47: 0,02 SW: 4,09	D47: 0,02	D81: 0,08 D47: 0,02 FW:4,9	D47: 0,02 D604: 0,10 D801:0,17	- - -
POWDER ADDITIVES BWOC	NONE		NONE		- -

SECONDARY CEMENT SLURRIES

TYPE OF CEMENT SLURRY	1ST TOP UP 30"	2ND TOP UP 30"			
ANNULAR TOC mBRT	107	SEABED			
DETERMINED FROM	TAG	N/A			
VOLUME OF SPACER VOLUME	-	-			
SPACER TYPE	-	-			
SPACER S.G.	-	-			
CEMENT SLURRY VOLUME (BBLS)	2X100	109			
OPEN HOLE EXCESS USED %	-				
CEMENT TYPE	"G" NEAT CEMENT	"G" NEAT CEMENT			
SLURRY S.G.	1.9	1.9			
MIX WATER TYPE	SEAWTR	SEAWTR			
DESIGNED THICKENING TIME HRS:MINS	4:47	4:47			
DISPLACEMENT RATE (BPM)	5	-			
PLUG BUMPED PSI	-	-			
LIQUID ADDITIVES AND CONCENTRATIONS (INCLUDING MIX WATER) G/SK	D77: 0,40 D47: 0,02 SW: 4,87	D77: 0,40 D47: 0,02 SW:4,87			
POWDER ADDITIVES BWOC	NONE	NONE			

SUSPENSION CEMENT PLUGS

PLUG NUMBER		1	3	5
DEPTH MD m BRT	TOP (TVD m BRT)	3733	3355	130
	BTM (TVD m BRT)	3820	3724	330
SLURRY VOLUME (BBLS)		23	61	49
SLURRY DENSITY (sg)		1.90	1.90	1.90
MIX WATER TYPE		FW	FW	SW
CEMENT TYPE (including preblended additives)		G+35% SILICA FLOUR	G+35% SILICA FLOUR	G+35% SILICA FLOUR AND G NEAT
LIQUID ADDITIVES & CONCENTRATIONS (including mix water type)		D603 AT 0.8 GAL/SK D604 AT 0.2 GAL/SK D47 AT 0.02 GAL/SK	D603 AT 0.3 GAL/SK D604 AT 0.2 GAL/SK D801 AT 0.07 GAL/SK D47 AT 0.02 GAL/SK	NONE
POWDER ADDITIVES BWOC		NONE	NONE	NONE
SPACER VOLUME BBLS INFRONT/BEHIND		15/0	15/0	
SPACER TYPE		HEC	HEC	
SPACER DENSITY (sg)		1.40	1.05	

4.5 BOTTOM HOLE ASSEMBLY RECORD

BHA NO	INTERVAL	BIT RUN	HOLE SIZE	DESCRIPTION	REMARKS
1	92-168	1	36	26"B-36"HO-BS-3X9 1/2"DC-X/O-3X8"DC-X/O-HWDP	Drill 36" hole in one pass
2	156-170	2RR	26	26"B-BS-3X9 1/2"DC-X/O-3X8"DC-X/O-HWDP	Cleaned out cmt from 30" cond. Drill 2m of new formation.
3	170-591	3	17 1/2	17 1/2"B-BS-9 1/2"NMDC-MWD-9 1/2"NMDC-3X9 1/2"DC-X/O-3X8"DC-J-2X8"DC-X/O-15HWDP	Pilot hole
4	591-950	4RR	17 1/2	17 1/2"B-BS-9 1/2"NMDC-MWD-9 1/2"NMDC-17 1/2"SS-3X9 1/2"DC-X/O-3X8"DC-J-2X8"DC-X/O-15XHWDP	Pilot hole
5	170-955	5	26	26"B-BS-9 1/2"NMDC-MWD-9 1/2"NMDC-26"SS-3X9 1/2"DC-X/O-3X8"DC-J-2X8"DC-X/O-15XHWDP	Opening up the pilot hole
6	955-2350	6 7RR	17 1/2	17 1/2"B-BS-9 1/2"NMDC-9 1/2"MWD-17 1/2"NM SS-9 1/2"NMDC-17 1/2"SS-3X9 1/2"DC-X/O-CS-6X8"DC-J-2X8"DC-X/O-15XHWDP-DS	MWD tool changed out @ 1333M
7	2318-2353	8	12 1/4	12 1/4"B-BS-6X8"DC-X/O-15XHWDP-DS	Drilled Shoe track
8	2353-2861	9	12 1/4	12 1/4"B-12 1/4"NBS-8"NMDC-12 1/4"NMSS-MWD-SAVER SUB-8"NMDC-8X8"DC-J-2X8"DC-15XHWDP-DS	Pull due to inc. hole angle (4.25 Deg)
9	2861-3150	10.11	12 1/4	12 1/4"B-BS-8"NMDC-MWD-SAVER SUB-12 1/4NMSS-8"NMDC-12 1/4"SS-14X8"DC-J-2X8"DC-X/O-15XHWDP-DS	Hole angle dec. (1.8 deg)
10	3150-3684	12	12 1/4	12 1/4"B-12 1/4"NBS-GS-MWD-SAVER SUB-12 1/4"NMSS-8"NMDC-12 1/4"SS-12X8"DC-J-2X8"DC-X/O-15XHWDP-DS	TD of 12 1/4" sec.
11	3684-3689	13	8 1/2	8 1/2"B-JS-BS-15X6 1/2"DC-J-2X6 1/2"DC-6XHWDP-DS	Cleaning out the shoe track w/cmt 3612 - 3680 & 3m new F
12	3689-3721.5	14	8 1/2	8 1/2"CH-CB-CS-9X6 1/2"DC-J-2X6 1/2"DC-6XHWDP-DS	120 ft core barrel 100% Recovery
13	3721.5-3742	15	8 1/2	8 1/2"B-BS-GS-MW-SS-6 1/2"-SS-CS-2X6 1/2"DC-6XHWDP-DS	TD of the 8 1/2" section
14	-	MILL	-	MILL-SCRAP-BS-6X6 1/2"DC-15X5"HWDP	Milling on the 7" liner lap
15	-	-	-	3X2 7/8"TBNG-PKR-6X6 1/2"DC-15X5"HWDP	Press. testing 7" liner & 9 5/8" csg
16	3742-3745	16	6	B-NBS-PODC-SS-4 3/4"DC-SS-2X4 3/4"DC-SS-17X4 3/4" -J-2X6"DC-DS-24X3 1/2"DP-XO	Drilled wiper plug, land ing collar, cmt. float + 3m
17	3745 - 3820	17	6	B-NBS-PODC-SS-4 3/4"DC-SS-2X4 3/4"DC-SS-17X4 3/4" -J-2X6"DC-DS-24X3 1/2"DP-XO	Drilled 6" hole to TD
18	3604 - 3733	18	6	B - 7" CSG SCRAPER - BS - 15 X 4 3/4" DC	Dressed cmt. plug
19	-	19, 20	6	CJ-I PACKER MILL - JS - XO - 12 X 4 3/4" DC - 12 X 3 1/2" DP - XO - BPS - FJ - 3 X 6 1/2" DC.	2 Runs. fished FB - 1 packer
20	3348 - 3355	21		B - 9 5/8" CSG SCRAPER - 3 X 6 1/2" DC - FJ - 3 X 6 1/2" DC.	Dressed cmt. plug no.2

EASTMAN CHRISTENSEN

REPORT OF

SUB-SURFACE DIRECTIONAL SURVEY

BP PETROLEUM DEVELOPMENT
COMPANY

7/12 - 9
WELL NAME

ULA FIELD
LOCATION

	SEEKER MULTISHOT	23.04.90
JOB NUMBER	TYPE OF SURVEY	DATE

E. FEET/R.SELE		TANANGER
SURVEY BY		OFFICE

EASTMAN CHRISTENSEN SURVEY CERTIFICATION SHEET

Company BP PETROLEUM DEV. Job No Date 23.04.90

Lease 7/12 Well No 7/12 - 9 Country NORWAY

Surveyed from a depth of 120 M ~~feet~~ to a depth of 3660 M ~~feet~~

Type of Survey SEEKER MULTISHOT

Directional Supervisor/Surveyor EINAR FEET/RUNE SELE

The data for this survey and the calculations for this survey were obtained and performed by me according to the standards and procedures as set forth by EASTMAN CHRISTENSEN and are true and correct to the best of my knowledge.

Einar Feet.

Directional Supervisor/Surveyor

The data and calculations for this survey have been checked by me and comform to the standards and procedures as set forth by EASTMAN CHRISTENSEN. This report represents a true and correct Directional Survey of this well based on the original data obtained at the well site.

Checked by:

Ivr Jan Fr

Distribution: Customer - White, Division - Yellow, District - Red

Rostrup Grafiske a/s

EASTMAN CHRISTENSEN

INRUN-OUTRUN COMPARISON

CUSTOMER:	BP PETROLEUM DEV.	CO. REP:	JEAN NORMAND
FIELD:	ULA	LOCATION:	NORTH SEA
WELL:	7/12 - 9	RIG:	ROSS ISLE
SURVEY TYPE:	SEEKER MULTISHOT	DATE:	22-APR-90

NO. OF INRUN - OUTRUN - STATIONS: 11

	INRUN			OUTRUN		DIFFERENCES	
NO	DEPTH	INCL.	AZIM	INCL.	AZIM	INCL.	AZIM
1	300	0.53	297.42	0.54	282.15	- 0.01	15.27
2	600	0.33	303.08	0.25	274.78	0.08	28.30
3	900	0.47	206.51	0.56	200.02	- 0.10	6.49
4	1500	0.25	53.51	0.17	74.74	0.08	- 21.22
5	1800	0.96	349.59	0.93	350.61	0.04	- 1.02
6	2100	0.80	23.58	0.74	35.40	0.06	- 11.82
7	2400	1.54	34.99	1.43	37.94	0.12	- 2.95
8	2700	3.50	52.48	3.47	52.30	0.03	0.18
9	3000	2.76	58.06	2.62	59.57	0.14	- 1.50
10	3300	2.31	29.19	2.25	31.73	0.06	- 2.53
11	3660	6.93	19.43	6.94	19.62	- 0.01	- 0.19

TOOL AXIS CORRECTION APPLIED: ~~YES~~/NO

SURVEYORS NAME: EINAR FEET/RUNE SELE

compre001.rep

EASTMAN CHRISTENSEN

NORWAY BRANCH

WELL DEFLECTION SURVEY

For

BP PETROLEUM DEVELOPMENT
7/12-9

Slot : 1
Well : 7/12-9

Survey Reference : S08784.79F

Measured Depth	Drift Angle	Drift Direction	Course Length	Vertical Depth	Vertical Section	RECTANGULAR COORDINATES		Dogleg Severity
92.00	0.00	0.00	0.00	92.00	0.00	0.00 N	0.00 E	0.00
120.00	0.21	304.30	28.00	120.00	-0.00	0.03 N	0.04 W	0.22
150.00	0.22	312.34	30.00	150.00	0.00	0.10 N	0.13 W	0.03
180.00	0.31	325.55	30.00	180.00	0.04	0.20 N	0.22 W	0.11
210.00	0.32	318.38	30.00	210.00	0.08	0.33 N	0.32 W	0.04
240.00	0.57	292.55	30.00	240.00	0.06	0.45 N	0.51 W	0.31
270.00	0.56	289.82	30.00	270.00	-0.01	0.56 N	0.79 W	0.03
300.00	0.54	282.15	30.00	300.00	-0.11	0.64 N	1.07 W	0.08
330.00	0.32	283.05	30.00	329.99	-0.20	0.69 N	1.29 W	0.22
360.00	0.29	297.56	30.00	359.99	-0.25	0.74 N	1.43 W	0.08
390.00	0.24	280.22	30.00	389.99	-0.29	0.79 N	1.56 W	0.09
420.00	0.26	283.52	30.00	419.99	-0.34	0.82 N	1.69 W	0.02
450.00	0.34	292.16	30.00	449.99	-0.39	0.87 N	1.84 W	0.09
480.00	0.31	288.26	30.00	479.99	-0.43	0.92 N	2.00 W	0.04
510.00	0.30	298.81	30.00	509.99	-0.48	0.98 N	2.15 W	0.01
540.00	0.31	290.19	30.00	539.99	-0.53	1.03 N	2.30 W	0.01
570.00	0.30	286.95	30.00	569.99	-0.58	1.08 N	2.45 W	0.02
600.00	0.25	274.78	30.00	599.99	-0.64	1.11 N	2.59 W	0.08
630.00	0.16	274.71	30.00	629.99	-0.69	1.12 N	2.70 W	0.09
660.00	0.17	246.90	30.00	659.99	-0.75	1.10 N	2.78 W	0.08
690.00	0.23	242.94	30.00	689.99	-0.85	1.06 N	2.88 W	0.06
720.00	0.40	229.31	30.00	719.99	-1.00	0.96 N	3.01 W	0.18
750.00	0.46	230.47	30.00	749.99	-1.22	0.82 N	3.18 W	0.06
780.00	0.53	226.82	30.00	779.99	-1.47	0.65 N	3.38 W	0.08
910.00	0.55	213.25	30.00	809.99	-1.75	0.43 N	3.56 W	0.13
840.00	0.56	197.44	30.00	839.99	-2.04	0.17 N	3.68 W	0.15
870.00	0.56	209.41	30.00	869.98	-2.32	0.10 S	3.80 W	0.12
900.00	0.56	200.02	30.00	899.98	-2.61	0.36 S	3.92 W	0.09
930.00	0.47	189.57	30.00	929.98	-2.86	0.62 S	3.99 W	0.13
960.00	0.41	187.29	30.00	959.98	-3.06	0.85 S	4.02 W	0.06

Measured Depth	Drift Angle	Drift Direction	Course Length	Vertical Depth	Vertical Section	RECTANGULAR COORDINATES		Dogleg Severity
990.00	0.32	189.85	30.00	989.98	-3.23	1.04 S	4.05 W	0.09
1020.00	0.17	174.87	30.00	1019.98	-3.34	1.17 S	4.06 W	0.16
1050.00	0.05	17.40	30.00	1049.98	-3.36	1.20 S	4.05 W	0.22
1080.00	0.08	297.52	30.00	1079.98	-3.35	1.18 S	4.07 W	0.09
1110.00	0.22	312.09	30.00	1109.98	-3.35	1.13 S	4.13 W	0.14
1140.00	0.09	317.36	30.00	1139.98	-3.34	1.07 S	4.19 W	0.13
1170.00	0.09	287.99	30.00	1169.98	-3.34	1.05 S	4.23 W	0.05
1200.00	0.16	46.72	30.00	1199.98	-3.31	1.01 S	4.22 W	0.22
1230.00	0.09	344.94	30.00	1229.98	-3.25	0.96 S	4.19 W	0.14
1260.00	0.23	347.94	30.00	1259.98	-3.20	0.88 S	4.21 W	0.14
1290.00	0.39	328.69	30.00	1289.98	-3.12	0.73 S	4.28 W	0.19
1320.00	0.31	334.38	30.00	1319.98	-3.04	0.57 S	4.37 W	0.09
1350.00	0.34	315.29	30.00	1349.98	-2.99	0.43 S	4.46 W	0.11
1380.00	0.34	337.27	30.00	1379.98	-2.93	0.29 S	4.56 W	0.13
1410.00	0.44	13.93	30.00	1409.98	-2.77	0.10 S	4.57 W	0.26
1440.00	0.32	19.63	30.00	1439.98	-2.59	0.10 N	4.51 W	0.13
1470.00	0.27	29.29	30.00	1469.97	-2.44	0.24 N	4.45 W	0.07
1500.00	0.17	74.74	30.00	1499.97	-2.33	0.31 N	4.37 W	0.19
1530.00	0.25	93.47	30.00	1529.97	-2.26	0.32 N	4.26 W	0.10
1560.00	0.20	92.73	30.00	1559.97	-2.20	0.31 N	4.15 W	0.05
1590.00	0.55	72.00	30.00	1589.97	-2.05	0.35 N	3.96 W	0.37
1620.00	0.68	64.94	30.00	1619.97	-1.78	0.47 N	3.66 W	0.15
1650.00	0.78	59.81	30.00	1649.97	-1.44	0.65 N	3.32 W	0.12
1680.00	0.84	35.95	30.00	1679.97	-1.03	0.93 N	3.01 W	0.34
1710.00	0.76	29.39	30.00	1709.96	-0.61	1.28 N	2.79 W	0.12
1740.00	0.82	17.79	30.00	1739.96	-0.21	1.66 N	2.62 W	0.17
1770.00	0.79	359.89	30.00	1769.96	0.16	2.07 N	2.56 W	0.25
1800.00	0.93	350.61	30.00	1799.95	0.50	2.52 N	2.60 W	0.20
1830.00	0.83	345.56	30.00	1829.95	0.81	2.97 N	2.69 W	0.13
1860.00	0.96	343.36	30.00	1859.95	1.10	3.42 N	2.82 W	0.13

Measured Depth	Drift Angle	Drift Direction	Course Length	Vertical Depth	Vertical Section	RECTANGULAR COORDINATES		Dogleg Severity
1890.00	0.89	342.86	30.00	1889.94	1.39	3.88 N	2.96 W	0.07
1920.00	0.94	342.81	30.00	1919.94	1.67	4.34 N	3.10 W	0.05
1950.00	0.78	350.06	30.00	1949.94	1.96	4.78 N	3.21 W	0.19
1980.00	0.81	343.18	30.00	1979.93	2.23	5.18 N	3.31 W	0.10
2010.00	0.79	2.92	30.00	2009.93	2.53	5.59 N	3.36 W	0.27
2040.00	0.84	7.92	30.00	2039.93	2.90	6.02 N	3.32 W	0.09
2070.00	0.72	3.96	30.00	2069.92	3.25	6.42 N	3.27 W	0.13
2100.00	0.74	35.40	30.00	2099.92	3.60	6.77 N	3.15 W	0.40
2130.00	0.80	31.25	30.00	2129.92	4.00	7.10 N	2.93 W	0.09
2160.00	1.14	47.17	30.00	2159.92	4.51	7.49 N	2.60 W	0.43
2190.00	1.17	51.12	30.00	2189.91	5.10	7.88 N	2.14 W	0.09
2220.00	1.16	46.92	30.00	2219.90	5.69	8.28 N	1.68 W	0.09
2250.00	1.15	45.86	30.00	2249.90	6.28	8.70 N	1.24 W	0.02
2280.00	1.05	42.26	30.00	2279.89	6.85	9.11 N	0.84 W	0.12
2310.00	0.94	45.32	30.00	2309.89	7.37	9.49 N	0.48 W	0.13
2340.00	1.16	36.50	30.00	2339.88	7.92	9.91 N	0.13 W	0.27
2370.00	1.29	33.98	30.00	2369.87	8.56	10.43 N	0.24 E	0.14
2400.00	1.43	37.94	30.00	2399.87	9.27	11.00 N	0.66 E	0.17
2430.00	1.49	36.89	30.00	2429.86	10.03	11.61 N	1.12 E	0.07
2460.00	1.73	41.95	30.00	2459.84	10.88	12.26 N	1.66 E	0.28
2490.00	1.95	43.43	30.00	2489.83	11.83	12.97 N	2.32 E	0.23
2520.00	2.08	44.96	30.00	2519.81	12.88	13.72 N	3.05 E	0.14
2550.00	2.32	48.73	30.00	2549.79	14.01	14.51 N	3.99 E	0.28
2580.00	2.55	48.87	30.00	2579.76	15.25	15.35 N	4.85 E	0.23
2610.00	2.77	50.67	30.00	2609.73	16.60	16.25 N	5.91 E	0.24
2640.00	3.05	49.56	30.00	2639.69	18.08	17.22 N	7.08 E	0.29
2670.00	3.26	51.25	30.00	2669.64	19.68	18.28 N	8.36 E	0.23
2700.00	3.47	52.30	30.00	2699.59	21.38	19.37 N	9.74 E	0.22
2730.00	3.71	52.25	30.00	2729.53	23.18	20.51 N	11.22 E	0.24
2760.00	3.97	54.81	30.00	2759.47	25.10	21.71 N	12.84 E	0.31

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Measured Depth	Drift Angle	Drift Direction	Course Length	Vertical Depth	Vertical Section	RECTANGULAR COORDINATES		Dogleg Severity
2790.00	4.12	55.90	30.00	2789.39	27.10	22.91 N	14.58 E	0.17
2820.00	4.32	57.32	30.00	2819.31	29.17	24.12 N	16.43 E	0.23
2850.00	4.28	59.02	30.00	2849.23	31.25	25.31 N	18.34 E	0.13
2880.00	4.14	63.24	30.00	2879.14	33.25	26.37 N	20.26 E	0.34
2910.00	3.78	62.92	30.00	2909.07	35.10	27.31 N	22.11 E	0.36
2940.00	3.63	52.51	30.00	2939.01	36.89	28.34 N	23.74 E	0.69
2970.00	3.07	56.90	30.00	2968.96	38.56	29.36 N	25.17 E	0.62
3000.00	2.62	59.57	30.00	2998.92	39.94	30.14 N	26.43 E	0.47
3030.00	2.38	54.68	30.00	3028.89	41.16	30.95 N	27.53 E	0.32
3060.00	2.12	52.50	30.00	3058.87	42.28	31.55 N	28.48 E	0.27
3090.00	1.76	46.50	30.00	3088.85	43.27	32.20 N	29.26 E	0.41
3120.00	1.73	41.22	30.00	3118.84	44.17	32.86 N	29.89 E	0.16
3150.00	1.65	37.55	30.00	3148.83	45.05	33.54 N	30.45 E	0.13
3180.00	1.60	35.66	30.00	3178.81	45.90	34.23 N	30.96 E	0.07
3210.00	1.76	32.89	30.00	3208.80	46.78	34.95 N	31.45 E	0.19
3240.00	1.87	34.62	30.00	3238.79	47.73	35.74 N	31.98 E	0.12
3270.00	2.05	31.30	30.00	3268.77	48.76	36.61 N	32.54 E	0.21
3300.00	2.25	31.73	30.00	3298.75	49.88	37.56 N	33.13 E	0.20
3330.00	2.47	31.42	30.00	3328.72	51.11	38.62 N	33.77 E	0.22
3360.00	2.62	31.76	30.00	3358.69	52.44	39.75 N	34.47 E	0.15
3390.00	3.06	31.06	30.00	3388.66	53.92	41.02 N	35.25 E	0.44
3420.00	3.20	30.79	30.00	3418.61	55.55	42.43 N	36.09 E	0.14
3450.00	3.63	31.14	30.00	3448.56	57.33	43.96 N	37.01 E	0.43
3480.00	4.10	29.02	30.00	3478.49	59.34	45.71 N	38.02 E	0.49
3510.00	4.52	26.91	30.00	3508.40	61.57	47.70 N	39.07 E	0.45
3540.00	4.89	25.94	30.00	3538.30	63.99	49.90 N	40.17 E	0.38
3570.00	5.34	23.28	30.00	3568.18	66.61	52.34 N	41.28 E	0.51
3600.00	5.81	22.06	30.00	3598.04	69.45	55.03 N	42.40 E	0.48
3630.00	6.45	20.97	30.00	3627.87	72.54	58.01 N	43.57 E	0.65
3660.00	6.94	19.62	30.00	3657.67	75.91	61.29 N	44.79 E	0.51

Measured Depth	Drift Angle	Drift Direction	Course Length	Vertical Depth	Vertical Section	RECTANGULAR COORDINATES		Dogleg Severity
3677.00	6.90	18.70	17.00	3674.54	77.87	63.22 N	45.46 E	0.21
3737.00	6.20	20.10	60.00	3734.15	84.42	69.68 N	47.73 E	0.36
3823.00	6.20	20.10	86.00	3819.65	93.34	78.40 N	50.92 E	0.00

CALCULATION METHOD : Minimum curvature
SLOT COORDINATES : 0.00 N 0.00 E
BOTTOM HOLE LOCATION : Referenced to SLOT
DISTANCE : 93.49
DIRECTION : 33.00

Report Units : Meters

SURVEY RUN INFORMATION

22-APR-90 SEEKER GMS 120 - 3660 MT. MD,
EASTMAN CHRISTENSEN. SURVEYORS: SELE/FEET
TOOL # EW0227
ASSUMED VERTICAL TO 92.00 MT. MD,
TELECO MWD 3677 - 3737 MT. MD,
EXTRAPOLATED TO TD: 3823.00 MT. MD,
ROSS ISLE: RKB-MSL = 22M. MSL-SEABED = 70M,
SURFACE COORINATES: N57DEG. 04MIN. 20.50SEC'S,
E03DEG. 52MIN. 56.40SEC'S.

4.7 WIRELINE LOGS RUN

RUN NO.	DATE	LOGS	DPTH INT (M)	HOLE SIZE INCH	BH TEMP DEG F	TIME TAKEN HRS	LOST TIME H:M	REMARKS
1A	5.1.90	DIL/LSS/PCD/GR	2326-946	17 1/2	186	4:15	-	HELD UP AT 2326M
2A	18.4.90	CBL/VDL	615-453	13 3/8	-	-	-	INSIDE 13 3/8" CSG
2B	18.4.90	DIL/LSS/PCD/GR	3676-2343	12 1/4	266	7:15	-	
3C	25.4.90	DIL/GR/BHC	3739.5-3680.7	8 1/2	262	3:20		
3A	25.4.90	LDL/CNL/NGT	3742-3680.7	8 1/2	268	3:55		
3A	26.4.90	RFT/GR	3703-3738.5	8 1/2	282	8:30		PRESS.MEASUREM
3B	26.4.90	RFT/GR	3735.2	8 1/2	273	3:45	-	SAMPLING
3C	26.4.90	RFT/GR	3719.8	8 1/2	271	5:00	-	SAMPLING
3D	26.4.90	RFT/GR	3729.0	8 1/2	272	2:50	-	SAMPLING
3E	26.4.90	RFT/GR	3734.7	8 1/2	282	4:10	-	SAMPLING
4D	1.5.90	DIL/GR/BHC	3818.0-3736.2	6	276	3:40	-	
4B	1.5.90	LDL/CNL/GR	3819.7-3736.2	6	282	3:50	-	
4A	1.5.90	VELOCITY SURV.		6		8:40	-	
4F	2.5.90	RFT/GR	3784.5-3746.5	6	291	13:50	6:30	
4B	2.5.90	CBL/VDL/GR/CCL	3731.0-1092.0	CSG	284	5:30	-	IN 7" AND 9 5/8"
5A	4.5.90	JUNK BASKET	3732.0-3665.0	CSG	-	2:00	-	INSIDE 7" LINER
5A	4.5.90	BRIDGE PLUG	3732.0	CSG	-	2:30	-	INSIDE 7" LINER
5A	4.5.90	BAKER FB-1 PKR	3665	CSG	-	3:15	-	INSIDE 7" LINER
6A	7.5.90	PERFORATING	3719 - 3710	CSG	-	7:45	-	INSIDE 7" LINER
6B	7.5.90	PERFORATING	3710 - 3701	CSG	-	5:00	-	INSIDE 7" LINER
	13.5.90	BAKER FB-1 PKR	3353	CSG	-	2:30	-	INSIDE 9 5/8" CSG.

4.8 OIL AND CUTTING DISCHARGE

Explanation

The 36" and 26" hole intervals were drilled riserless so all cuttings and mud were discharged to the sea-bed. The PETROFREE sections (17 1/2" and 12 1/4" intervals) were drilled with cuttings discharged overboard. There were no whole mud losses overboard. The SAFEMUL sections (8 1/2" and 6" intervals) were drilled with the cuttings being sent back to town. No low toxicity oil based mud was discharged to the sea either as a whole mud or on cuttings.

Cuttings discharged to sea

Hole Interval	Cuttings Discharged (m3)
36"	49.9
26"	269.8
17 1/2"	217.4
12 1/4"	101.1
8 1/2"	0
6"	0
Total	638.2

Spud Mud Losses to Sea

A total of 2115 m3 of Spud Mud were lost to the sea-bed. Products discharged were:

Product	Quantity Discharged	Concentration (kg/m3)
Barite	202 M.T	95.5
Bentonite	101 M.T	71.4
Caustic Soda	2.1 M.T	1.0
Soda Ash	1.4 M.T	0.7
Mica Fine	0.25M.T	0.1
Mica Coarse	0.3 M.T	0.1
Wallnut Fine	0.3 M.T	0.1
Wallnut Coarse	0.3 M.T	0.1

PETROFREE Losses to Sea

All PETROFREE losses to the sea were with cuttings.

Mud losses with cuttings:

	17 1/2" hole	12 1/4" hole	Total
1. Hours Operating Time	88.75	195.75	284.50
2. Volume Cuttings Generated (m3)	225.75	118.94	344.69
3. Average Ester Content (Gram Ester/kg dry cuttings)	119.67	144.22	128.99
4. Dry Cuttings Generated	464.59	284.20	748.79
5. Total Ester Discharged on Cutting (MT)	55.60	40.99	96.59
6. Total Petrofree Mud Discharged on Cuttings (m3)	103.13	75.48	178.61

PETFROFREE Discharge Breakdown

Product	Concentration (kg/m3)	Discharge (MT)
PETROFREE Ester	533.2	96.59
Barite	788.6	140.85
Calcium Chloride	38.5	6.87
RM 63	1.5	0.27
EZ Mul NTF	26.5	4.73
Duratone HT	25.9	4.63
Geltone II	7.4	1.32
Lime	4.3	0.76
OMC 2	0.8	0.14
OMC 42	3.0	0.53

4.9 CORING

Hole Section:	8 1/2"
Core Barrel Size:	6 3/4" x 4"
Hole Angle:	Approx. 6 deg
Date:	23.04.90

CORE NO.	DEPTH OUT (M)	SECTION M	HOURS ROP M/HR	RECOVERY M	RECOVERY %	BARREL LENGTH	COMMENTS
1	3721.5	32.5		32.5	100	120	Decided to quit coring after taking a 3bbls kick at 3721.5m

Coring Contractor	Eastman Christensen
Inner Barrel	Aluminium
Coreheads	Christensen (RS476) (8 1/2" x 4")
Formation Cored	ULA Sandstone
Mud Type	SafeMul PE/FL OBM @ 0.90 SG

SECTION 5

WELL COST ANALYSIS

DETAILED EXPENDITURE SUMMARY

	Describtion	A.F.E	Expend. to Date
8661	Rig Hire	25,817,000	18,404,628
8662	Rigsite Survey	1,000,000	808,812
8664	Towing/Anchor Handling	100,000	7,700
8665	Marker Bouys	0	54,700
8666	Rig Positioning	350,000	194,455
8442	Wellheads and Christmas Trees	2,488,000	2,606,185
8444	Conductors	487,000	793,051
8451	Casing 20"	1,570,000	1,571,829
8452	Casing 13 3/8"	1,899,000	1,955,562
8453	Casing 9 5/8"	3,451,000	2,740,177
8454	Casing 7"	144,000	161,059
8456	Casing/Accessories	75,000	151,690
8457	Liner Hangers	600,000	259,480
8458	Rock Bits	765,000	507,780
8459	Diamond Bits	697,000	619,878
8460	Core Heads	98,000	0
8462	Drilling Consumables	1,400,000	165,777
8463	Mud Chemicals	3,631,000	11,348,227
8464	Cement and Additives	1,921,000	3,818,437
8465	Drilling Tools	0	4,068
8477	Fuel	2,050,000	516,475
8692	Supply Vessels	6,150,000	3,618,950
8693	Standby Vessel	1,640,000	1,381,358
8694	Helicopters	2,952,000	3,785,086
8702	Mud Engineering	622,000	562,495
8704	Casing Running	824,000	691,144
8705	Cementing Services	1,214,000	891,219
8706	Mud Logging	1,577,000	1,002,852
8707	Measure While Drilling	1,270,000	1,369,047
8709	Directional Services	725,000	151,499
8712	Underwater TV (ROV)	780,000	699,441
8715	Coring	121,000	241,203
8717	Core Analysis	400,000	139,149
8718	Sampl. & Fluid Analysis	0	30,391
8724	Tool Rental	442,000	762,120
8725	Drill String Testing	5,500,000	3,178,388
8732	Suspension	51,000	0
8733	Wireline Logging	4,332,000	3,210,409
8739	General Drilling Services	0	1,050,759
	Total Direct Cost	77,125,000	69,455,480
	Overheads	12,721,000	9,006,424
	Sub Total	89,846,000	78,461,904
	Budget Contingency	8,985,000	0
	Total	98,861,000	78,461,904

SECTION 6

LOGISTICS SUMMARY

WEATHER DATA

6.1 LOGISTIC SUMMARY Well 7/12-9

6.1.1 Supply Vessels

Usage

NORTHERN CLIPPER	8	Cargo Runs. Combined w/Ula/ Gyda and Ross Isle
FAR SPIRIT	6	" " " " "
FAR SAILOR	8	" " " " "
OCEAN FLOWER	2	" " " " "
		Ula Standby Vessel utilising cargo capacity when vessel is in port for crew-change.
TOTAL	24 CARGO RUNS	WEEKLY AVERAGE 3 CARGO RUNS

Primary Supply Vessel Data

	Northern Clipper	Far Spirit	Far Sailor
Owner	: Active Marine	Sverre Farstad Co.	Sverre Farstad Co.
BHP	: 4,200	6,120	10,560
Deck Cargo	: 2,000 MT	2,500 MT	700 MT
Bulk Capacity	: 9,000 cuft	13,500 cuft	9,500 cuft
Dead Wt.	: 2,200 MT	2,500 MT	1,300 MT
Max Speed	: 13 kts	14 kts	16,5 kts
Econ Cruise Speed	: 9-10 kts	10 kts	9-10 kts
Average Trip time (One way)	: 14-15 hrs	13-14 hrs	14-15 hrs

6.1.2 Helicopters

Total number of flights	: 47
Flights shared with Ula/Gyda	: 35
Flights shared with other operators	: 2
Total Flight Time	: 164 hrs 20 mins
Round Trip Time (Average)	: 3 hrs 30 mins

6.2 WEATHER DATA

DATE	DAYS FROM SPUD	WIND SPEED KNOTS	WIND DIR	AIR TEMP DEG C	WAVE HEIGHT M	WEATHER STATE	RIG HEAVE M
14.03.90	-1	42/42	205	8.4	2,5/5,5	FINE	2.2
15.03.90	-2	40/45	210	8	6/8	GALES	2.8
16.03.90	-3	40/40	228	8	2,5/5	GALES	1.6
17.03.90	1	16/16	195	8	1,5/4	FAIR	0.9
18.03.90	2	40/40	207	8.6	2/5	WINDY	0.8
19.03.90	3	34/41	241	7.1	4/7	FAIR	0.9
20.03.90	4	40/40	210	6.7	4/6	WINDY	0.7
21.03.90	5	46/46	220	8	7/7	FINE	1.3
22.03.90	6	31/31	260	7.4	5/5	FINE	0.8
23.03.90	7	64/80	225	9.3	7/7	HURRICANE	1.8
24.03.90	8	30/44	58	4.4	10/11	GALES	1.8
25.03.90	9	35/35	340	5.9	10/4,5	WINDY	2.8
26.03.90	10	4/4	240	6.1	11/7	FINE	3.3
27.03.90	11	30	200	6.2	11.5	PART CLDY	0.7
28.03.90	12	10	265	5.9	4.5	CLOUDY	0.5
29.03.90	13	21	225	7	2.5	FAIR	0.5
30.03.90	14	28	265	8	2	CLOUDY	0.4
31.03.90	15	18	215	7.3	1/3	FOG	0.4
01.04.90	16	15	220	6.1	0.8	FOG	0.4
02.04.90	17	18	240	7.2	1	DRIZZLE	0.4
03.04.90	18	31	305	2.6	2	SLEET	3
04.04.90	19	17	280	3.8	8	FAIR	1
05.04.90	20	19	235	6.8	5	CLOUDY	0.6
06.04.90	21	15	45	4,2/6	6	PART CLDY	0.4
07.04.90	22	14	40	4,3/5,7	2/3,5	FINE	0.2
08.04.90	23	22	220	5,5/6,1	0,5/2	FAIR	0.2
09.04.90	24	21	250	6.6	1/2,5	PART CLDY	0,3/0,5
10.04.90	25	42	270	7.3	4.5	PART CLDY	0.6
11.04.90	26	18	220	7.7	6	FAIR	0.5
12.04.90	27	14/28	180	7/8,4	4	FAIR	0.4
13.04.90	28	13/42	230	6,4/7,7	2,5/4	DRIZZLE	0.4
14.04.90	29	20/34	215	5,8/7	1/3	RAIN	0.7
15.04.90	30	18	280	5.8	3	FAIR	0.5
16.04.90	31	24	235	5.9	3.5	GOOD	0.4
17.04.90	32	17.5	205	6.4	3	GOOD	0.4
18.04.90	33	24	190	6.5	3	GOOD	0.3
19.04.90	34	26	90	7.6	4	GOOD	0.4
20.04.90	35	28	60	8.8	4	GOOD	0.5
21.04.90	36	20	70	7.9	3.5	FAIR	0.2
22.04.90	37	13	45	6.7	2.5	FAIR	0.1
23.04.90	38	10	81	8.9	1	CLOUDY	0.2
24.04.90	39	6	162	10.6	0.5	NICE	0.5
25.04.90	40	18	204	9.9	3	CLOUDY	0.4
26.04.90	41	15	289	5.7	3	CLOUDY	0.6
27.04.90	42	10	312	5.5	4	CLOUDY	1
28.04.90	43	13	238	8.7	3.5	CLOUDY	0.7
29.04.90	44	7/17	254	8,4	2/2.5	FINE	0,4

6.2 WEATHER DATA

DATE	DAYS FROM SPUD	WIND SPEED KNOTS	WIND DIR	AIR TEMP DEG C	WAVE HEIGHT M	WEATHER STATE	RIG HEAVE M
30.04.90	45	7.4	254	8.4	2.5	CLEAR	0.4
01.05.90	46	6.5	100	9.8	0.8	FINE	0.4
02.05.90	47	3.6	153	11.1/15.8	0.4/0.5	FINE	0.1
03.05.90	48	10.3 / 15.3	149 / 186	11.8 / 16.3	0.5	FAIR	0.1
04.05.90	49	23.3	197	12.3/15.1	0.3 / 0.5	FINE	0.1
05.05.90	50	8 / 20	199	9.7 / 16.2	0.5 / 0.8	FOG	0.1 / O.2
06.05.90	51	0	0	9.5	0.6	3/8 CLOUD	0.1
07.05.90	52	6/12	58	9.3/11.5	1.5	LT. CLOUD	0.1
08.05.90	53	7.8 / 12	151	10.2 / 14.8	0.6 / 0.8	5/8 CLOUD	0.1
09.05.90	54	14 / 18	95	10.8 / 11.1	0.8 / 1.2	RAIN	0.2
10.05.90	55	10 / 21	360	9.3 / 10.6	0.3 / 1.0	CLOUD	0.2
11.05.90	56	10.5	55	10	1.5	RAIN	0.3
12.05.90	57	21	80	9.9	3	CLOUD	0.4
13.05.90	58	12/23	69	9.0/10.3	1.5/3.0	DRIZZLE	0.4
14.05.90	59	15/28	350	8.4/12	0.3/1.0	CLOUD	0.2
15.05.90	60	8	90	8.7/10.3	0.3/1.5	CLOUD	0.1/0.3

SECTION 7

LESSONS LEARNT AND EQUIPMENT

FAILURE REPORTS

LESSONS LEARNT

Event Keyword	Depth (m)	Days Lost - Gained +	Describtion of Event	Action taken	Recommended Future Action	Respons-ibliity
Pilot hole	950					
Mud Pump Failures	950					
Mud Weight	1000	-1/4	Petrofree mud weight = 1.20 sg when displaced to hole.	Increase mud weight	Have higher mud weight when beginning 17 1/2" section at 1.40 sg	BP
Wiper trips with PETROFREE	1248 1313 1771	-1/2	Wiper trips to evaluate hole condition, and confirm there was no problem.	Wiper trips	When using Petrofree there is no requirements to wiper trip the hole due to clay hydration problems	BP
One bit Section 17 1/2" hole	2340	-	Drilled 1395m of Nordland Hordaland mudstone	-	Continue to use rock bits for the 17 1/2" section	BP
MWD tool failure: 12 1/4" hole	2861	-1	The MWD tool failed while drilling the 12 1/4" hole. 7 hours were lost performing single shot surveys, and the PDC bit R426 bit had to be pulled early, resulting in slow ROP in same section with a rock bit.	Changed MWD tool	Ensure reliable MWD tool ratings are selected for actual flow rates.	Teleco/ BP
12 1/4" PDC bit R426	950 to 3684	2	High bit ROP obtained by having no limits on "oil on cuttings". Good bit design for formation.	Use robust bladed PDC bit	Re-use similar bit profile for same formations with OBM	BP/Eastman

LESSONS LEARNT

Event Keyword	Depth (m)	Days Lost - Gained +	Describtion of Event	Action taken	Recommended Future Action	Respons-ibliity
12 1/4" PDC bit DS46H	3150 to 3684	1	High ROP through Limestone + Mudstone to top Ula reservoir	-	Re-use similar bit profile for same formation with OBM	BP/Hycalog
PETROFREE	950 - 3684	7	Petrofree mud produced the properties of a conventional oil based mud. The viscosity increased with shearing. The mud weight had to be adjusted to counteract pore pressure.	- Increase mud weight	If the environmental benefits of Petrofree are substantiated by the trial, continue its usage. If free discharge allowances, maximize ROP, by optimizing flow rate. 6 5/8" pipe, 4 shaker, 3 pumps etc.	BP BP
CBL run combined with Sonic log	3684	1/8	To obtain the TOC behind the 13 3/8" casing the DIL/LSS logging tools were run inside 13 3/8" casing. TOC could be identified	Identify TOC	Continue to attempt to identify TOC using open hole logging tools, but accept a dedicated CBL run may be required.	BP

SECTION 8

SERVICE COMPANY CRITIQUE

8.1 LIST OF SERVICE COMPANIES

8.1.1 Drilling

Contractor	Function	Nationality	Adress
Ross Drilling Co. A/S	Drilling Rig Contractor	Norwegian	P.O Box 5057, Dusavik 4004 Stavanger
Drill-Quip	Wellhead Equipment	British/ Norwegian	P.O Box 138, Dusavik 4004 Stavanger
Baroid Norway A/S	Mud and Mud Engineering	Norwegian	P.O Box 143 4056 Tananger
(Services) Dowell Schlumberger	Cementing	Norwegian/ British/USA	P.O Box 5035, Dusavik 4004 Stavanger
Exploration Logging	Mud Logging	Norwegian	P.O Box 72 5062 Kokstad
Teleco Oilfield Company Ltd. U.A	Measurement While Drilling	British/USA	c/o P.O Box Dusavik 4004 Stavanger
Nodeco Lura	Liner Hangers	Norwegian	P.O Box 1067 4301 Sandnes
Schlumberger Norge A/S	Electric Logging & Perforating	Norwegian French British/USA	P.O Box 129 4051 Sola
Weatherford Norge A/S	Casing Running	Norwegian	P.O Box 5053 Dusavik 4004 Stavanger
Eastman Christensen Ltd.	Coring and Gyro Surveying	British/USA	P.O Box 248 4056 Tananger
Sub Sea Dolphin	Remote Operated Vehicle	Norwegian	P.O Box 172 4056 Tananger
Hunting Oilfield Services	Conductor Connectors	British/USA	Blackness Road Altens Industrial Estate Aberdeen AB 9 8SY
Helikopter Service A/S	Helicopter Service	Norwegian	4033 Forus
Eastman Christensen Ltd.	Stratapax Bits	British/USA	P.O Box 248 4056 Tananger
Test Tech	Surface Test Equipment	Norwegian	P.O Box 172 4033 Forus

8.1.2 TESTING

Perforating	: Schlumberger Norge A/S Limited
Surface Testing Equipment (Separators, burners etc.)	: Testtech A/S
Down Hole Testing Tools	: Schlumberger Norge A/S (Flopetrol)
Down Hole Electronic Gauges	: Wood Group Production Technology Limited
Nitrogen (and coiled tubing - but not used)	: Dowell Schlumberger
Permanent Packer	: Baker Oil Tools Norway
Down Hole mechanical Gauges	: Computatest Well Services
Testing Chemicals (Corrosion and Scale inhibitors and Methanol)	: Hydrokem I/S, Dyno Chmicals A/S

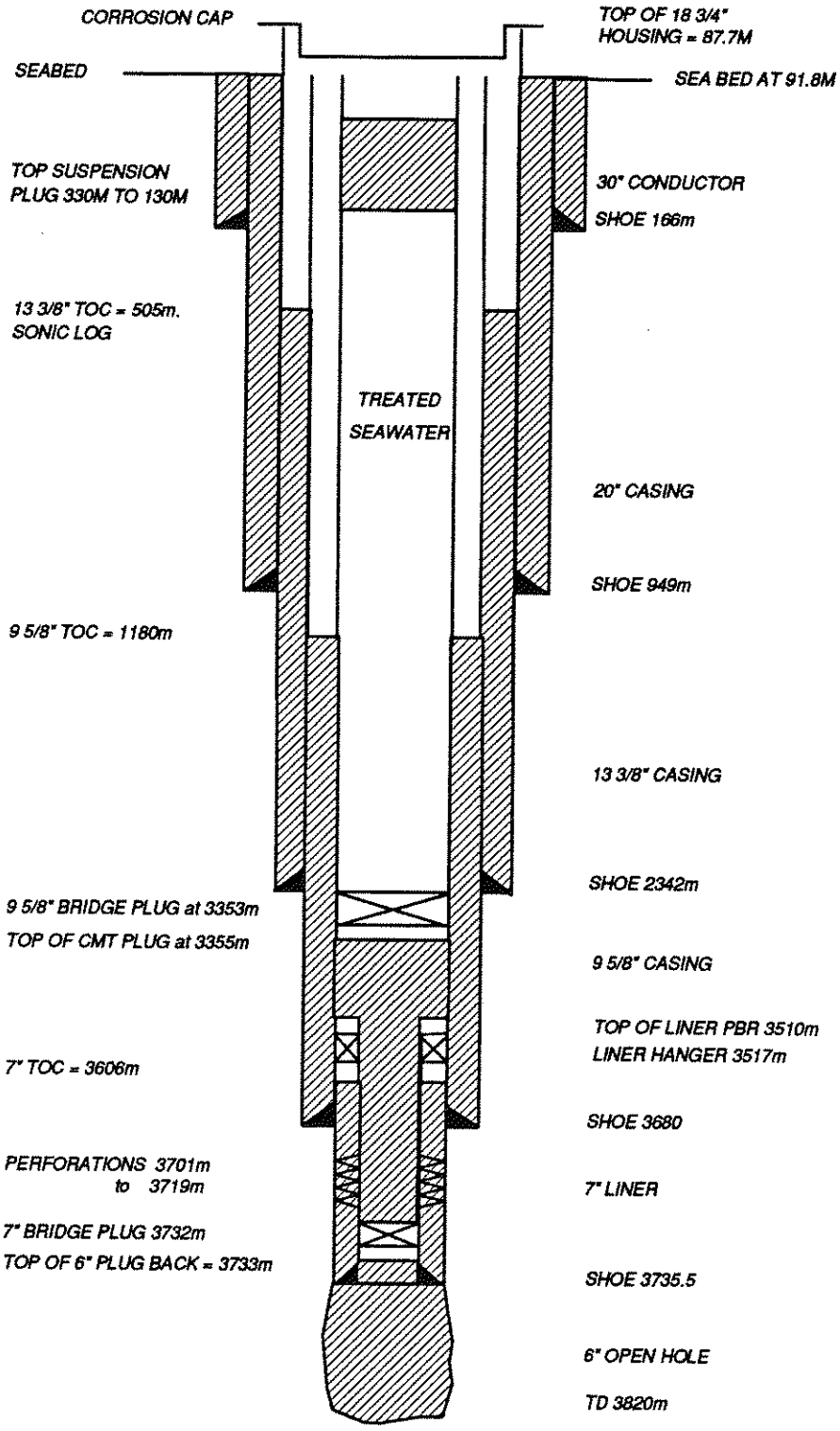
8.2 CRITIQUE OF SERVICE COMPANIES

Completed Contractor Evaluation forms are filed in the 7/12-9 Well file.

SECTION 9

SUSPENSION

SUSPENSION SCHEMATIC
WELL 7/12-9



9.2 SUSPENSION REPORT

9.2.1 Suspension Report

Plug no.	Top of Plug (m BRT)	Bottom of Plug (m BRT)	Remarks
1	3733	3820	Hard Cement dressed off from 320m
2	3732	-	7" Baker Bridge Plug Model-N1
3	3355	3724	Hard cement dressed off from 3348m Weight tested with 10,000 lbs.
4	3353	-	9 5/8" Baker bridge plug
5	130	330	Top plug.

9.2.2 Suspension Fluid

Prior to setting plug no.4 above the 9 5/8" bridge plug the well was displaced to seawater treated with 1.5% Ancopac and 30 ppm Hydrokem 211.

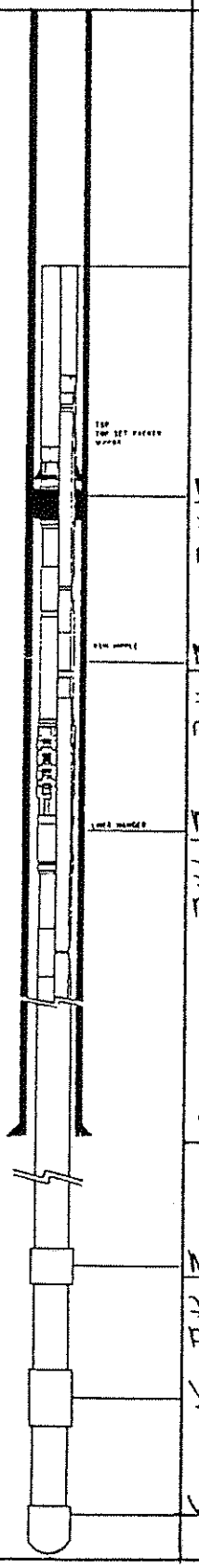
9.2.3 Corrosion Cap

A Dril-Quip Plug type corrosion cap. The wellhead was displaced to a Noral rust inhibiting oil prior to running the cap.

9.3 LINER HANGER SCHEMATIC

Page 1 of 1
Company: BP
Well: 7/12-9
Date: 30/4-90

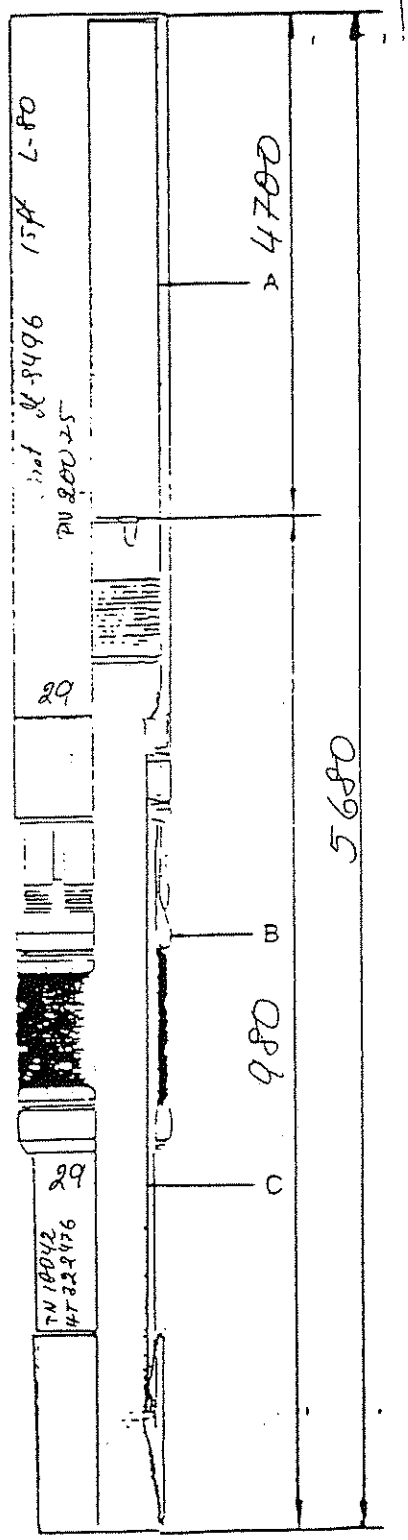
NODECO A/S
Norwegian Drilling Equipment Co.
Tlf. (04) 67 77 33 - Telex 33384 iscon n
Postboks 1067, Lura
4301 SANDNES, NORWAY

Depth	OD	ID	Schematic	Description
3510,5m	8,3"	7,5"		Linertop
	8,3"	6,28"		Nodeco 'TSP' packer 7"- 29 #- L 80 PN 20035/ PN 10042 / cat M 8496
	7,76"	6,56"		Nodeco 'RSM' NIPPLE 7"- 29 #- L 80 PN 10067 / HT 216375
	8,3"	6,15"		Nodeco 'MHR' Liner Hanger 7"- 29#- L 80 PN 00092 / HT 322170
3680m	9,63"	8,68"		9 5/8 Csg. shoe
	7,66"	6,17"		Nodeco 'WLC' Land. collar 7"- 29#- L 80 PN 20021 / C 60 SS
	7,67"	—		Weatherford Float collar
3735,5m	7,67"	—		Weatherford Float shoe

Primary

NODECO A/S

LINER TOP PACKER, TYPE TSP



SER. NR: 29

Inspection tag no: PN 20075 PN10042 / Cast # 8496

CUSTOMER: B. P.

CUSTOMER REF: _____

NODECO REF: _____

DIAMETER/WEIGHT: 7" 29#

MATERIAL: L-80

THREADS: VAM Box

NO./SIZE MAIN SHEARPINS 8 x 1/2 x 12"

WEIGHT TO SET PACKER: _____

PRESSURE TEST:
DATE: 20.4.90
PRESSURE: 3000 PSI

Drift et : 159.1 mm ϕ

Nitrile Packerelement

Dimensions

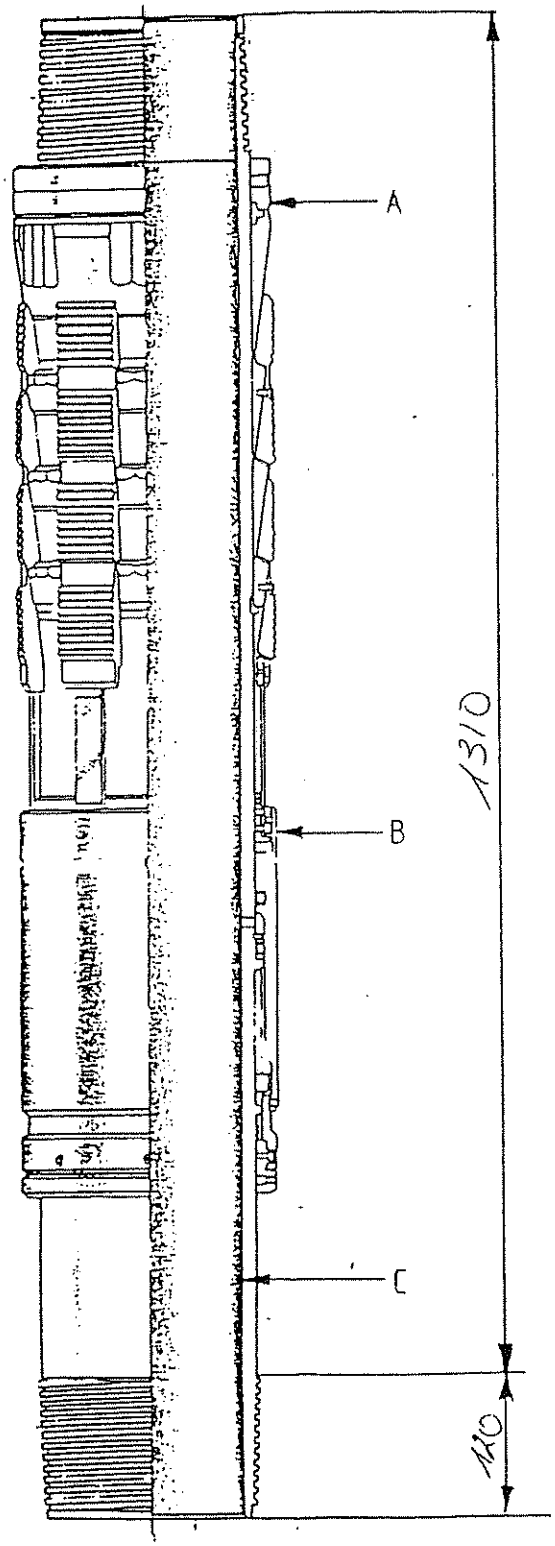
A	B	C	
7.499	8.267	6.279	inches
190.5	210	159.5	mm.

CHECKED DATE: 9/4 90

NODECO A/S

7" LINER HANGER Type 'MHR' · Mk 2

Ser. No. 78



INSPECTION TAG NO: PN00092/PT322476

CLIENT: B.P

CLIENTS REF:

NODECOS REF:

DIAMETER/WEIGHT: 7" 26# - 32#

MATERIAL: L-80

THREADS: VAM Pin + Pin

NO/SIZE SHEARPINS: 4 stk x 6 mm

PRESSURE TO SHEAR: 1400 PSI

PRESSURE TEST

DATE: 21.4.90

PRESSURE: 3000 PSI

REMARKS:

Viton O-rings

Dimensions

A	B	C	
8.307	8.287	6.153	inches
211	210.5	156.3	mm.

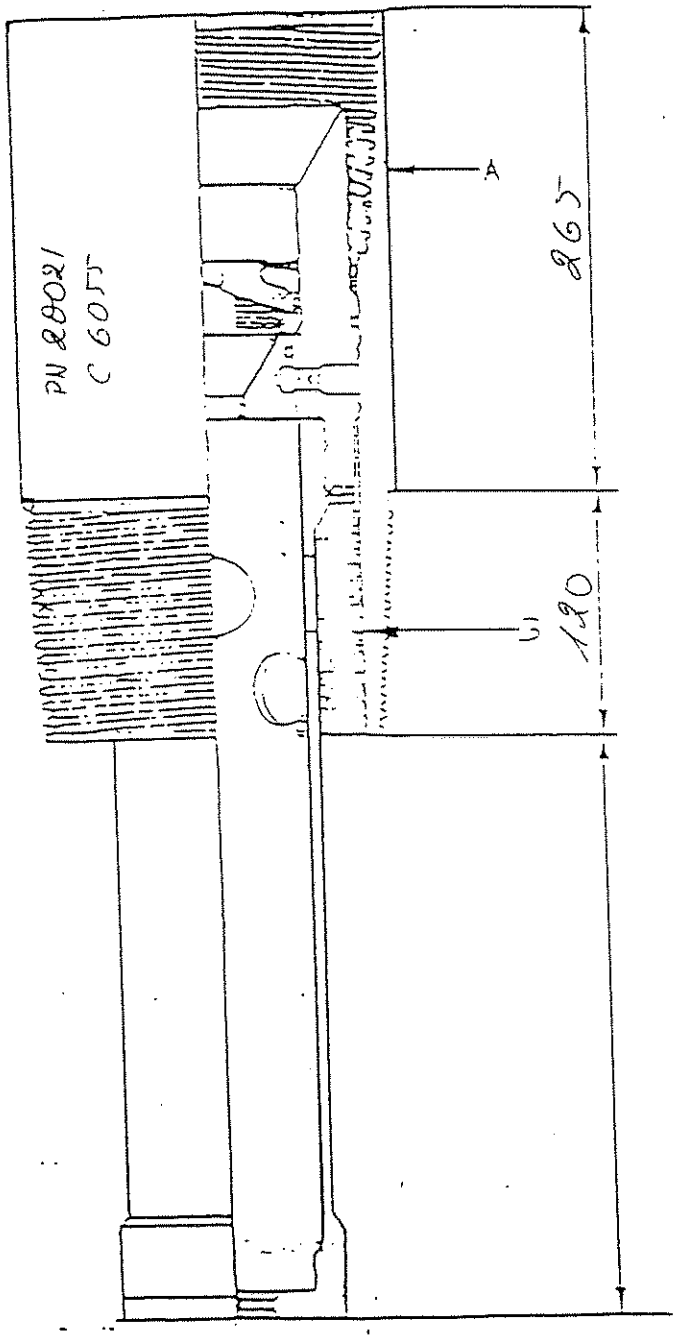
INSPECTED DATE: 21.4.90

INSPECTORS SIGNATURE: S. Hark

NODECO A/S

Primary

LANDING COLLAR W/ CATCHER



INSPECTION TAG NO: PN 28021/C6055

CLIENT: B. P.

CLIENTS REF:

NODECOS REF:

DIAMETER/WEIGHT: 7" 29 #

MATERIAL: L-80

THREADS: VAM Box + Pin

NO/SIZE SHEARPINS: 5 stk x 12mm ø

PRESSURE TO SHEAR: 2500 PSI

REMARKS:

all O-Rings i Viton

Dimensions

A	B		
7.657	6.173		inches
194.5	156.8	-	mm.

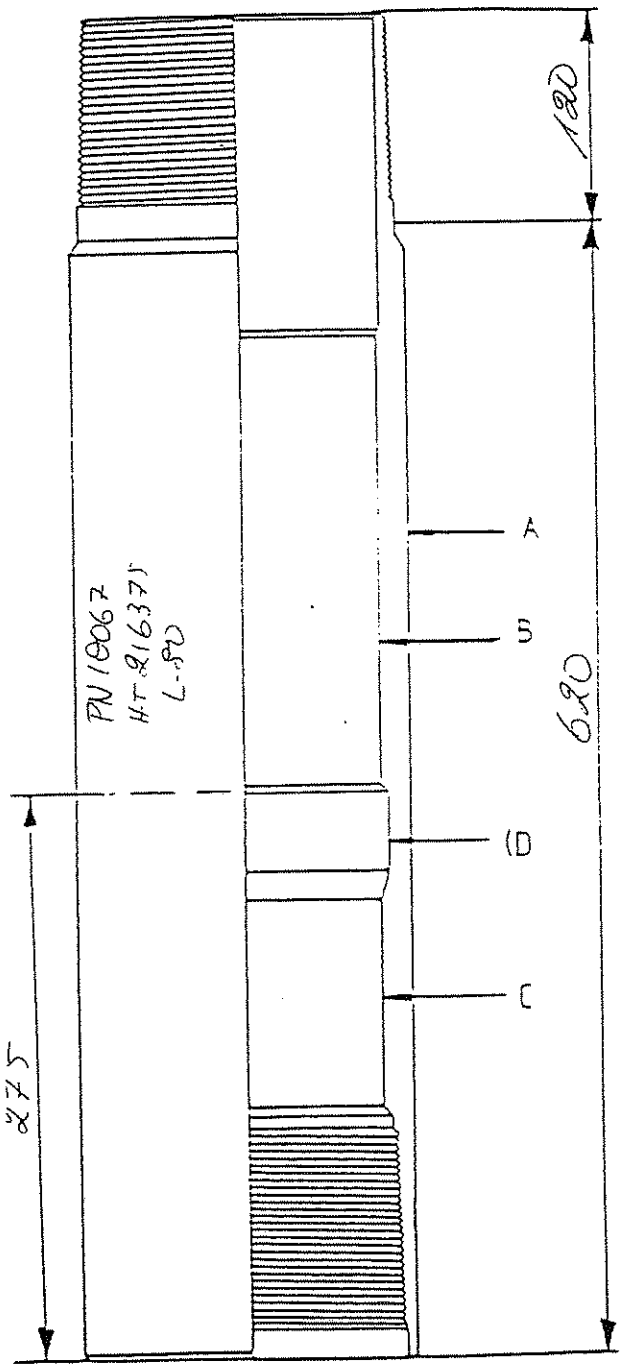
INSPECTED DATE: 20.4.90

INSPECTORS SIGNATURE K. Fjelk.

Primary

NODECO A/S

"RSM NIPPLE"



INSPECTION TAG NO: PN10067/HT216371

CLIENT: B. P.

CLIENTS REF:

NODECOS REF:

DIAMETER/WEIGHT: 7" 26# – 32#

MATERIAL: L-80

THREADS: VAM Box + Pin

REMARKS:

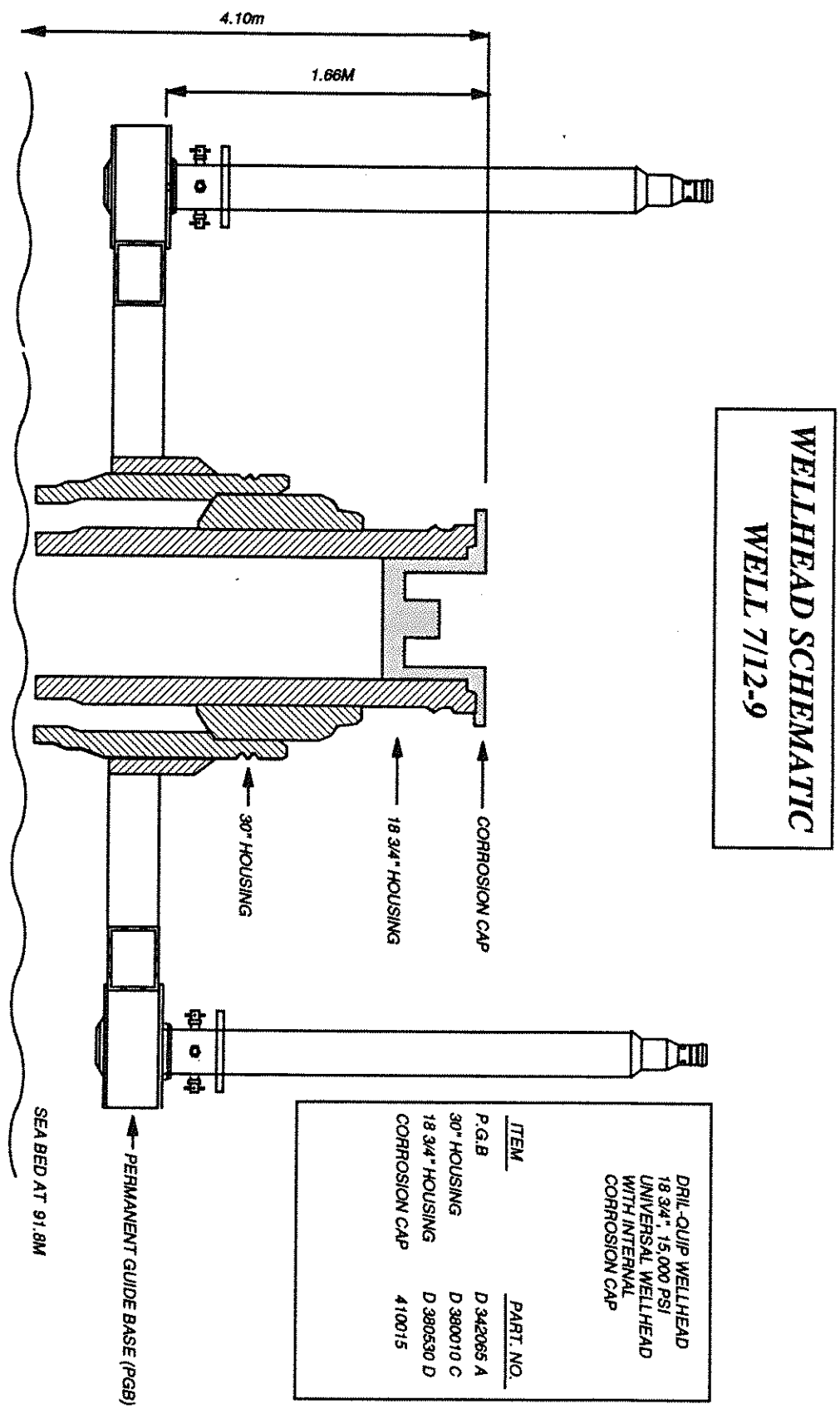
Dimensions

	A (inches)	B (inches)	C (inches)	D (INCE
	7.763	6.188	6.188	655
mm	197.2	157.2	157.2	16.6.

INSPECTED DATE: 20.4.90

INSPECTORS SIGNATURE: B. Gleko

Fig. 9.4



S:\S CVL\GRAHAM\WHDSCHEM.DRW

9.5 SUSPENSION NOTES FOR FUTURE SUB SEA DEVELOPMENT

This well was suspended in a condition suitable for Sub Sea Development or abandonment by a boat at a later date.

Suspension

The 7" perforated liner had cement squeezed to the perforations. This plug was dressed off and load tested. A 9 5/8" Baker mechanical bridge plug was set immediately above the cement. Treated sea water was used as the suspension fluid.

Top of cement outside the 13 3/8" and 9 5/8" casing strings were located by running a CBL/VDL and found to be at 505m and 1180m respectively. This was well inside the previous casing shoes, which was to be expected since excess cement was pumped to fully displace the mud (Petrofree) from behind the casing.

Future Abandonment

There is a distinct possibility that 7/12-9 could be used in the future as a subsea injector into the South East flank of the Ula reservoir.
Therefore the well has been left in a suspended state with a Wellhead Protective cover installed to prevent any accidental damage to the wellhead or guidebase.
The attached report and drawings describe the installation of the wellhead cover and should be referred to prior to reentry.

INSTALLATION OF WELLHEAD COVERS ON ULA SATELLITE WELLS 7/12-8 AND 7/12-9

Introduction

Wells 7/12-8 and 7/12-9 were drilled in 4th Q 1988 and 2nd Q 1990 respectively. The former has a Vetco-Gray wellhead system and the latter a Dril-Quip system and both were left suspended with corrosion caps in place and PGB and guideposts in position.

Future legislation will demand that all such wellheads will be left with Wellhead Protection Covers (WPC) in place so that trawlers have a significantly reduced chance of losing their fishing nets on exposed structures.

The WPC's, based upon a Statoil design, were constructed by Maritime GMC, Dusavik, and installed by the multi service diving vessel Amethyst contracted to BP for the period. Installation, planned for 5 days, was completed in 3 days. The wellhead covers were installed on 5 and 6 December 1990.

Means of Installation

The Amethyst was equipped with 2 x 120 tonne heave compensated cranes, a compensated guidewire facility over the aft of the vessel and a dynamic positioning system. ROV equipment consisted of a Triton with a manipulator arm and sonar facility and a Sprint used for observation purposes only.

Having reached the Ula Field, the vessel was located over the proposed wellhead position and the Triton deployed to locate the wellhead with its sonar equipment. Once located, a thorough inspection of the structure and survey of the local seabed conditions and elevation (wrt the PGB) was carried out and recorded on video.

Each WPC was run over the aft of the vessel on a specially devised removable lifting frame to about 10m above the wellhead structure. As it was not possible before the operation to obtain guidepost top latches for either of the two wellhead systems, two guidelines were run through specially positioned holes in the top of the WPC and shackled onto pad-eyes on the respective PGB and tensioned up. The running of these guidelines through the WPC and their attachment onto the PGB was achieved with the Triton ROV. Divers were not used.

The WPC's were designed as a pyramid shape (see Drawings and specifications in Wellhead protection Cover File - Ula Field) with location tubes that slid down over the guideposts. Each tube had at its lower end a guide funnel to aid location - see Recommendations Section later. One of these tubes was longer that the other four to help establish initial guidance. The WPC's had a hinged grating on one of their sides to allow entry of the Sprint ROV such that the final landing of the WPC on the guideposts could be observed from within. Once achieved, the Sprint was moved out and the hinged grating closed by a simple release mechanism.

After landing, a final video periferal inspection of the WPC was performed to ensure that the WPC had grounded satisfactorily on each of its corners. The removable lifting frame was then detached from the WPC by the Triton and pulled to surface. Guidewires were cut by the Triton immediately above the WPC, and retrieved to the vessel.

Location 7/12-8

The site survey is recorded on video, but a brief description is as follows:

The top of the I beam of the PGB was approx 2m above the seabed. The seabed was flat, horizontal, and consisted of concrete over a circular area of radius 6-7m from the wellhead centre. The wellhead, PGB and guideposts were in good condition with no debris presents.

After WPC Landing (also on video):

All four corners of the WPC were in contact with the seabed/concrete. Three of the corners legs did not penetrate the concrete, although the fourth did with the load being taken by the 10" diameter horizontal pipe at the base of the WPC in the vicinity of this leg. Inside the WPC, the bottom of the long tube stopped approx 1m above the PGB. All four tubes were located over their respective guideposts.

Location 7/12-9

The site survey is recorded on video, but a brief description is as follows:

The seabed in the area of the wellhead consisted of very soft and penetrable cuttings/spoil at an average depth of approx 0.3m below the PGB. This seabed was flat, but sloping with an elevation difference of approx 0.6m across the length that the WPC would bridge. The wellhead, PGB, and guideposts were in good condition with no debris present.

After Landing of the WPC (also on video):

All four corners landed well and sank approx 0.25-0.5m into the soft seabed, providing an excellent smooth transition from the cuttings on the seabed into the sides of the WPC. Inside the WPC, due to the slope of the surrounding seabed, only 2 of the location tubes slid over guideposts. This is a perfectly satisfactory situation. Each WPC weights approx 24 tonne and this weight itself will provide more than sufficient anchoring capability for the structure.

Recommendations for the future

For future drilling, it is planned to employ removable PGB/guideposts. These will be brought to the surface after suspension and a significantly smaller WPC combined with a corrosion cap will be run onto the wellhead. The latter will be of a size that is capable of being run through the moonpool of the drilling vessel concerned. The WPC's run on 7/12-8 and -9 were too large to be run through a moonpool.

If, for whatever reason, we do again run WPC's of this present design, we must ensure that all four funnels on the end of the locating tubes are at least 1m across at their lowermost point. This will considerable aid the final locating. (On these two WPC's, only two of the four funnels were this size and this was a last minute modification of the original design). A possible further option that might be considered is to dispense with the locating tubes and have one large horizontal ring inside the WPC that would locate within the four guideposts. This would then allow the WPC to settle on any significantly sloping seabed without its final attitude being dictated by the essentially vertical location of the four locating tubes over their respective guideposts. The reason for this is more from the concern of leaving a corner of a WPC hanging above the seabed on which a fishing net could entangle rather than concern over the possible enforced lateral loading on the PGB that might ensue, but which in any case would be small.

Conclusion

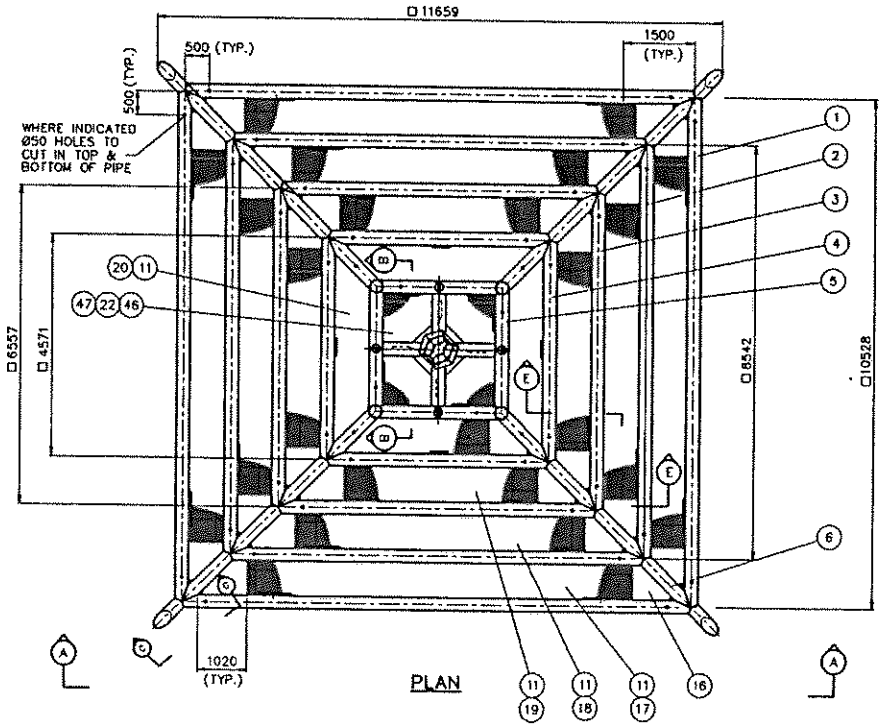
1. The installation of these two WPC's went smoothly and without problem.

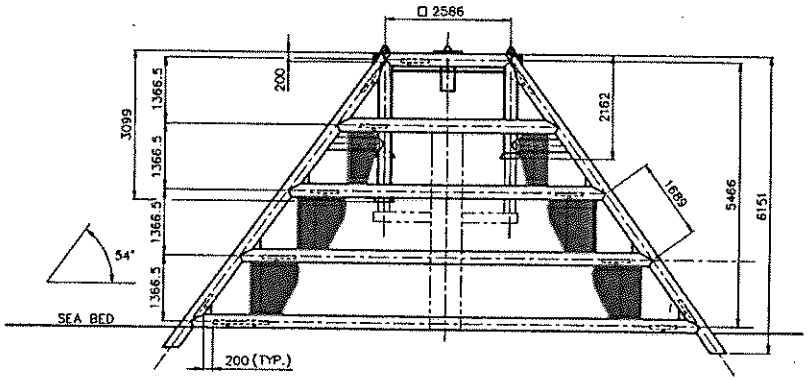
2. The M.S.V. Amethyst is a vessel of considerable capability which is worthy of serious consideration for similar future work.

3. Do not consider running these WPC's without guidewires. Irrespective of the surface weather, the seabed currents are strong.

4. Guidepost top latches are difficult to obtain and significant lead time should be allocated for obtaining these in future. Although in this case the work was done without these, their availability would have been a significant help.

NB: This report will be copied to both 7/12-8 and 7/12-9 Well Files. In addition, all information on Ula Wellhead Protection Covers along with survey videos will be kept in the central filing section within Drilling Division.





VIEW A-A

GENERAL NOTES

1. ALL FABRICATION & INSPECTION TO BE PERFORMED IN ACCORDANCE WITH SPEC. ULA 3-000-00-ME-4004-00
2. ALL STEEL TO BE CLASSIFIED AS SECONDARY STEEL
3. THE PROTECTION STRUCTURE TO BE WEIGHED PRIOR TO LIFTING TEST
4. THE LIFTING TEST TO BE 1.25 x ACTUAL WEIGHT
5. BASE MATERIAL AT LIFTING LUG LOCATION TO BE ULTRASONIC TESTED FOR LAMINATION,
   THE LIFTING LUGS TO BE 100% ULTRASONIC/MPI TESTED AFTER WELDING
6. ALL INSIDE ANODES TO BE WELDED INSIDE BRACING PRIOR SET-UP OF BRACING
7. PRIOR TO PAINTING, ALL ANODES TO BE PROTECTED AGAINST PAINT
8. NDT
   LIFTING LUGS AS STATED IN NOTE 5.
   100% VISUAL INSPECTION
   MPI SPOT CHECK. REF. SPEC. AS STATED IN NOTE 1
9. SURFACE TREATMENT
   SANDBLASTING SA 2.5
   TWO PACK EPOXY PRIMER 30-50 my
   TWO PACK EPOXY COAT 100-125 my FINAL COLOUR: WHITE
   GRATING TO BE HOT DIP GALVANIZED AND PAINTED NON-REFLECTING BLACK
10. ONE HANDLING TOOL TO BE USED IN BOTH SUSPENSION COVERS

BILL OF MATERIAL

POS NO.	QTY	DESCRIPTION	WT (kg)	MATERIAL	REMARKS
47	2	GRATING H9 35/5 280x675	19	ST 52-3U	GALV.
46	2	GRATING H9 35/5 1000x2290	54	ST 52-3U	GALV.
42	4	PL 15x400x400	38	ST 52-3N	
41	4	PL 10x244x460	36	ST 52-3N	
35	1	SUB MATERIAL Ø6 1/2"xØ2 1/4"		AISI 4130	
34	4	ROUND BAR Ø180x180	64	ST 52-3N	
33	2	PL Ø130x20	6	ST 37-2	
32	1	ROUND BAR Ø75x365	13	8.8	
31	8	PL Ø70x10	2	ST 37-2	
30	4	PL 15x150x222	9	ST 52-3N	
29	2	PL 10x207x470	13	ST 37-2	
28	2	PL 10x207x280	8	ST 37-2	
27	2	PL 10x228x372	12	ST 37-2	
26	2	PL 10x265x302	10	ST 37-2	
25	8	PL 15x93x134	12	ST 37-2	
24	1	PIPE Ø273.1 WT 25.4 L=680	106	API 5L GRADE B	
23	4	HE 280B L=1060	437	ST. 52-3N	
22	8	FLAT BAR 10x70x1000	44	ST. 37-2	
20	8	FLAT BAR 10x70x2000	88	ST. 37-2	
19	8	FLAT BAR 10x70x4000	176	ST. 37-2	
18	8	FLAT BAR 10x70x6000	264	ST. 37-2	
17	8	FLAT BAR 10x70x8000	352	ST. 37-2	
16	32	PL. 10x920x1416	2147	ST. 37-2	
11	80	GRATING H9 35/5 1000x1396	5473	ST. 52-3U	WELAND OR SIMILAR GALV.
10	4	GUIDE FUNNEL BRACING Ø273.1 WT 9.3 L=1800	436	API 5L GRADE B	
9	3	GUIDE FUNNELS PIPE Ø273.1 WT 9.3 L=2047	372	API 5L GRADE B	
8	1	GUIDE FUNNEL PIPE Ø273.1 WT 9.3 L=2984	181	API 5L GRADE B	
7	4	PL 10x140x1351	60	ST 37-2	
6	4	PIPE Ø273.1 WT 12.7 L=8819	2877	API 5L GRADE B	
5	4	PIPE Ø273.1 WT 12.7 L=2586	844	API 5L GRADE B	
4	4	PIPE Ø273.1 WT 12.7 L=4571	1491	API 5L GRADE B	
3	4	PIPE Ø273.1 WT 12.7 L=6557	2139	API 5L GRADE B	
2	4	PIPE Ø273.1 WT 12.7 L=8542	2787	API 5L GRADE B	
1	4	PIPE Ø273.1 WT 12.7 L=10528	3435	API 5L GRADE B	

TOTAL WEIGHT: 24 003 KG

NO	SIGN	REVISION	BY (INIT)	DATE (APP'D)	SIGN NO	SIGN NO
1		FOR COMMENTS		01/9/96		
0		FOR APPROVAL		3/10/96		
A		FOR CONSTRUCTION		2/12/96		

JM Consult as
RADGIVENDE INGENIØRER AVD

019-1004

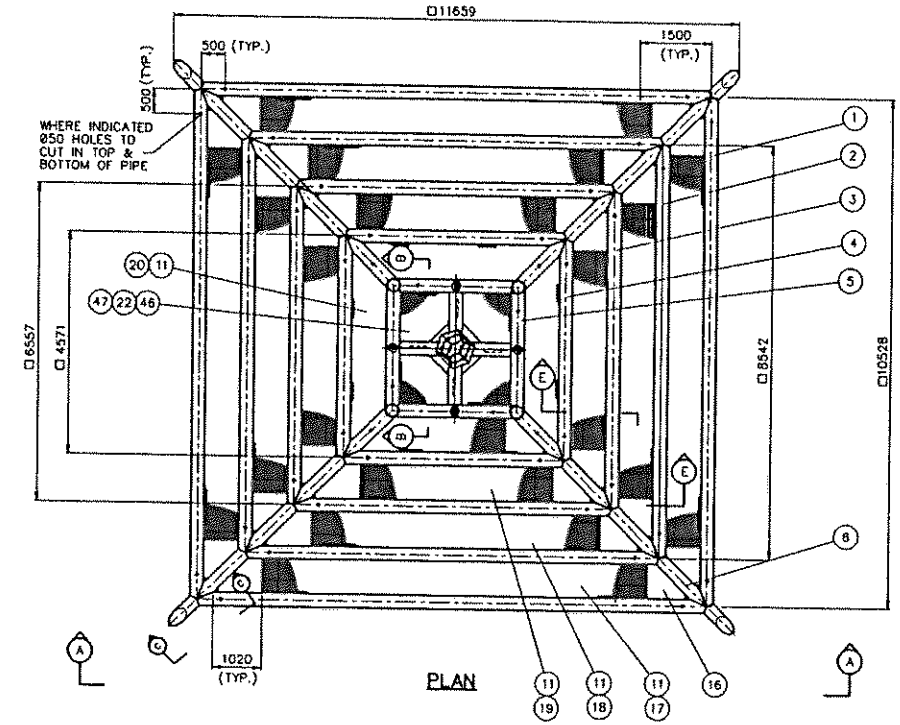
SIGN NO	DESCRIPTION REF SIGN	SIGN NO	DESCRIPTION
01-499-90	SECTIONS & DETAILS		
01-500-90	J-SLOT LIFTING ARR./DETAILS		
01-514-90	DETAILS		
01-520-90	ANODE DETAILS		
01-532-90	GENERAL ARR. LIFTING FRAME		

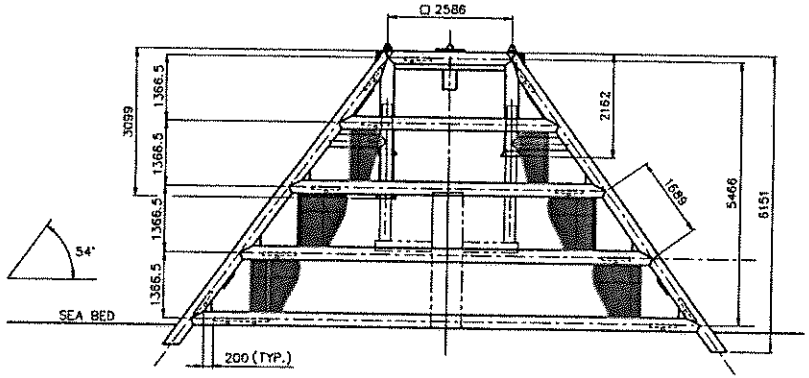
FOR SIGN
FOR APPR
FOR COMM
DRAWN
CHECKED
APP'D

maritime gmc a.s
STAVANGER - NORWAY

SUSPENSION COVERS
GENERAL ARRANGEMENT
WELL 7/12-9

REV. A
SCALE (UNLESS NOTED) 1:50
SIGN NO 01-497-90
SH NO 1 OF 1





VIEW A-A

GENERAL NOTES

1. ALL FABRICATION & INSPECTION TO BE PERFORMED IN ACCORDANCE WITH SPEC. ULA 3-C00-00-ME-4004-00
2. ALL STEEL TO BE CLASSIFIED AS SECONDARY STEEL
3. THE PROTECTION STRUCTURE TO BE WEIGHED PRIOR TO LIFTING TEST
4. THE LIFTING TEST TO BE 1.25 x ACTUAL WEIGHT
5. BASE MATERIAL AT LIFTING LUG LOCATION TO BE ULTRASONIC TESTED FOR LAMINATION.
   THE LIFTING LUGS TO BE 100% ULTRASONIC/MPI TESTED AFTER WELDING
6. ALL INSIDE ANODES TO BE WELDED INSIDE BRACING PRIOR SET-UP OF BRACING
7. PRIOR TO PAINTING, ALL ANODES TO BE PROTECTED AGAINST PAINT
8. NDT
   LIFTING LUGS AS STATED IN NOTE 5.
   100% VISUAL INSPECTION
   MPI SPOT CHECK. REF. SPEC. AS STATED IN NOTE 1
9. SURFACE TREATMENT
   SANDBLASTING SA 2.5
   TWO PACK EPOXY PRIMER 30-50 my
   TWO PACK EPOXY COAT 100-125 my FINAL COLOUR: WHITE
   GRATING TO BE HOT DIP GALVANIZED AND PAINTED NON-REFLECTING BLACK

BILL OF MATERIAL

POS NO.	QTY	DESCRIPTION	WT (kg)	MATERIAL	REMARKS
47	2	GRATING H9 35/5 280x675	19	ST 52-3U	GALV.
46	2	GRATING H9 35/5 1000x2290	54	ST 52-3U	GALV.
42	4	PL 15x400x400	38	ST 52-3N	
41	4	PL 10x244x460	36	ST 52-3N	
34	4	ROUND BAR Ø180x180	64	ST 52-3N	
31	8	PL Ø70x10	2	ST 37-2	
30	4	PL 15x150x222	9	ST 52-3N	
29	2	PL 10x207x470	13	ST 37-2	
28	2	PL 10x207x280	6	ST 37-2	
27	2	PL 10x228x372	12	ST 37-2	
26	2	PL 10x265x302	10	ST 37-2	
25	8	PL 15x93x134	12	ST 37-2	
24	1	PIPE Ø273.1 WT 25.4 L=680	106	API 5L GRADE B	
23	4	HE 280B L=1060	437	ST. 52-3N	
22	8	FLAT BAR 10x70x1000	44	ST. 37-2	
20	8	FLAT BAR 10x70x2000	88	ST. 37-2	
19	8	FLAT BAR 10x70x4000	176	ST. 37-2	
18	8	FLAT BAR 10x70x6000	264	ST. 37-2	
17	8	FLAT BAR 10x70x8000	352	ST. 37-2	
16	32	PL. 10x920x1416	2147	ST. 37-2	
11	80	GRATING H9 35/5 1000x1396	5473	ST. 52-3U	WELAND OR SIMILAR GALV.
10	4	GUIDE FUNNEL BRACING Ø273.1 WT 9.3 L=1800	436	API 5L GRADE B	
9	3	GUIDE FUNNELS PIPE Ø273.1 WT 9.3 L=2047	372	API 5L GRADE B	
8	1	GUIDE FUNNEL PIPE Ø273.1 WT 9.3 L=2984	181	API 5L GRADE B	
7	4	PL 10x140x1351	60	ST 37-2	
6	4	PIPE Ø273.1 WT 12.7 L=8819	2877	API 5L GRADE B	
5	4	PIPE Ø273.1 WT 12.7 L=2586	844	API 5L GRADE B	
4	4	PIPE Ø273.1 WT 12.7 L=4571	1491	API 5L GRADE B	
3	4	PIPE Ø273.1 WT 12.7 L=6557	2139	API 5L GRADE B	
2	4	PIPE Ø273.1 WT 12.7 L=8542	2787	API 5L GRADE B	
1	4	PIPE Ø273.1 WT 12.7 L=10528	3435	API 5L GRADE B	

TOTAL WEIGHT: 24 003 KG

NO	ZONE	REVISION	BY / CHKD	DATE / APP'D	DWG NO	DWG NO
1		FOR COMMENTS	MS / 4	27/5/90		
0		FOR APPROVAL	MS / A	5/10/90		
A		FOR CONSTRUCTION	MS	5/10/90		

JM Consult as

019-1003

DWG NO	DESCRIPTION REF DWG	DWG NO	DESCRIPTION
01-489-90	SECTIONS & DETAILS		
01-500-90	J-SLOT LIFTING ARR./DETAILS		
01-514-90	DETAILS		
01-520-90	ANODE DETAILS		
01-522-90	GENAERAL ARR. LIFTING FRAME		

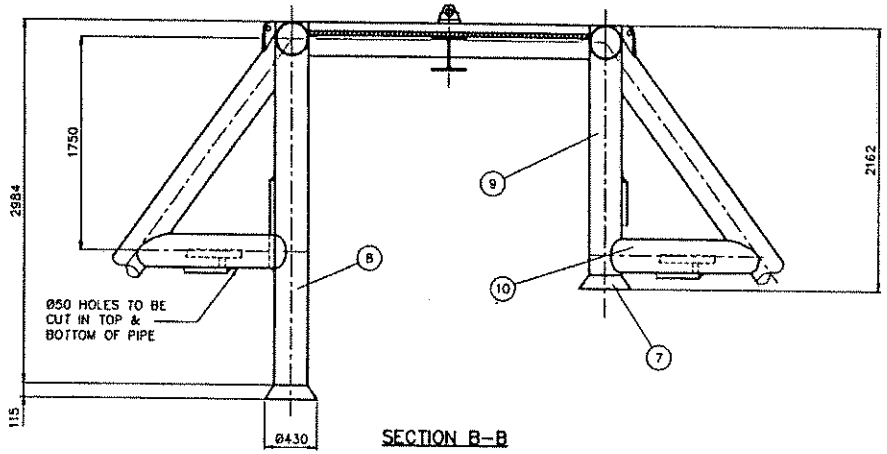
FOR BIDS
FOR APPR.
FOR CONST.
DRAWN
CHECKED
APP'D

maritime gmc a.s
STAVANGER - NORWAY

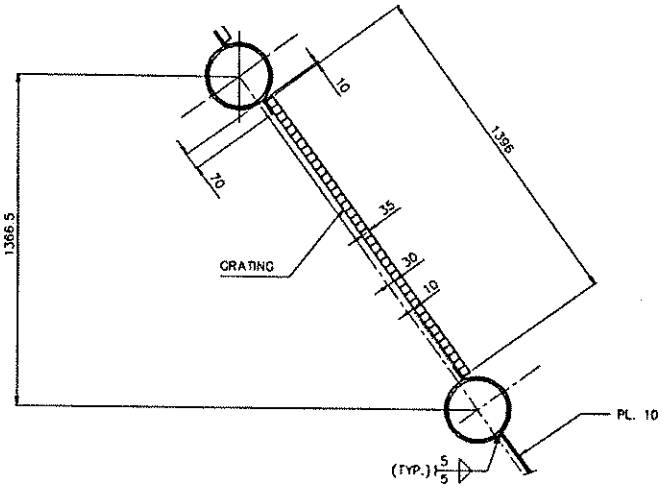
SUSPENSION COVERS
GENERAL ARRANGEMENT
WELL 7/12-8

REV. A
SCALE 1:50
DWG NO 01-498-90
SHT NO 1 OF 1

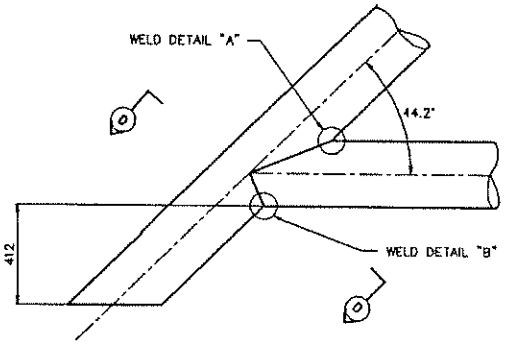
12894B



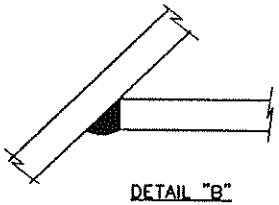
SECTION B–B
SCALE 1:20



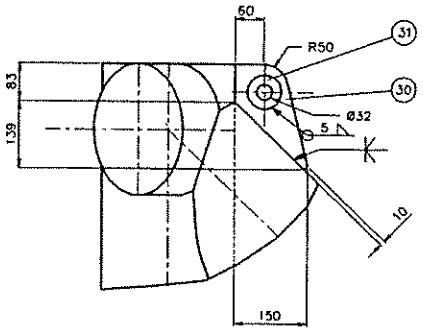
SECTION E–E (TYPICAL)
SCALE 1:10



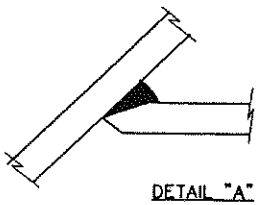
SECTION C–C
SCALE 1:10



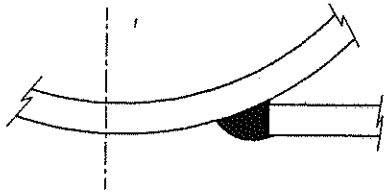
DETAIL "B"



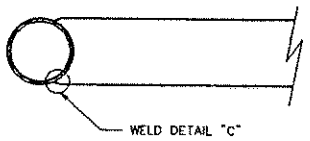
DETAIL 5
SCALE 1:5



DETAIL "A"



DETAIL "C"



SECTION D–D

NOTES

1. FOR GENERAL NOTES SEE DWG. NO. 01-497-90

NO	ZONE	REVISION	BY	DATE
			DWG	APP'D
1		FOR COMMENTS		31/8/90
0		FOR APPROVAL		2/10/90
A		FOR CONSTRUCTION		2/10/90

JM Consult as
RÅDGIVENDE INGENIØRER SIBIF

DWG NO	DESCRIPTION REF DWG
01-497-90	GENERAL ARR. WELL 7/12-9
01-498-90	GENERAL ARR. WELL 7/12-8

FOR BIDS
FOR APPR
FOR CONST
DRAWN
CHECKED
APP'D

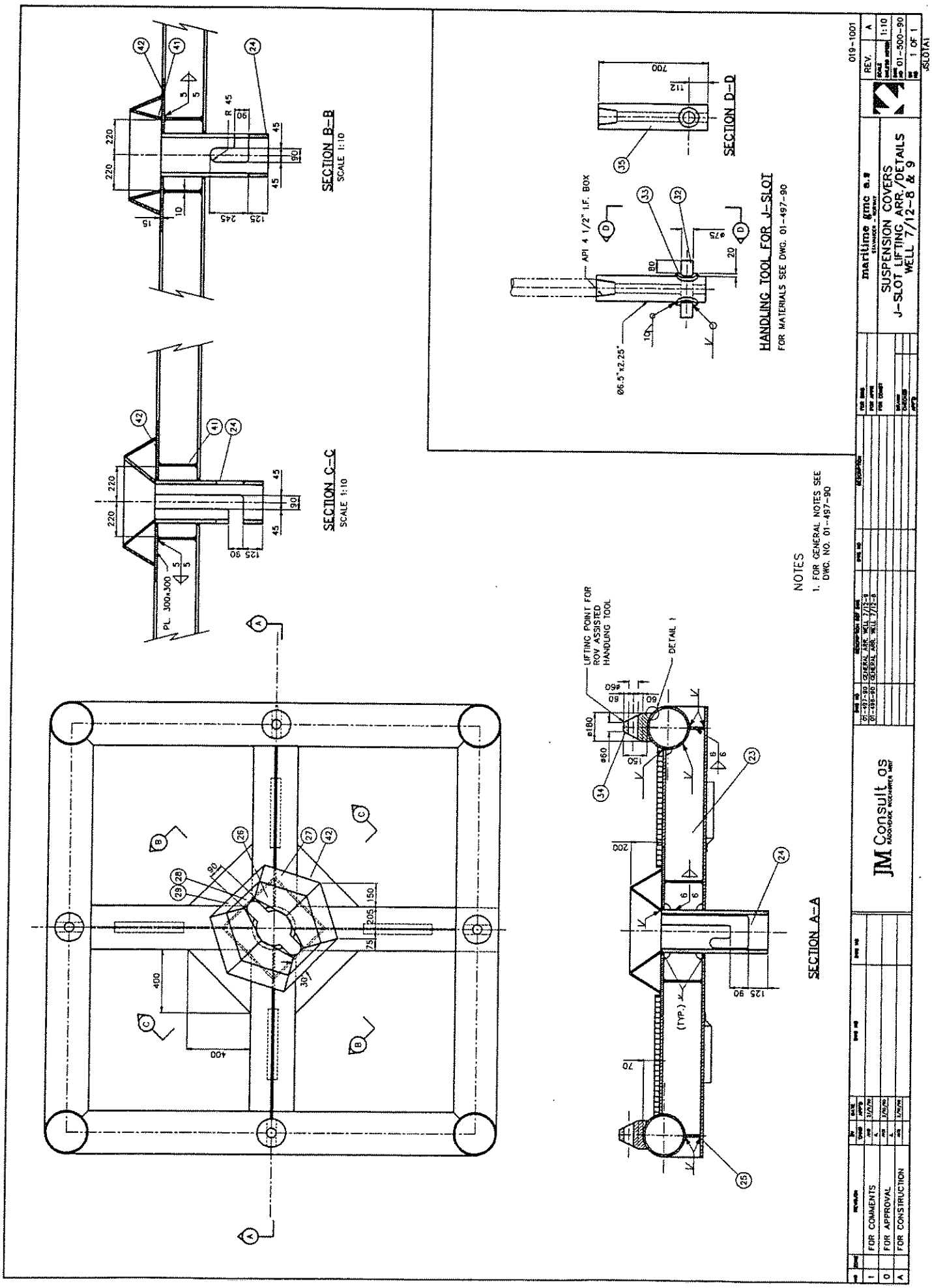
maritime gmc a.s
STAVANGER - NORWAY

SUSPENSION COVERS
SECTIONS AND DETAILS
WELL 7/12-8 & 9

019-1002

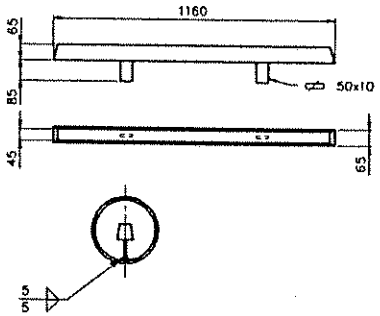
REV. A
SCALE UNLESS NOTED AS NOTED
DWG NO 01-499-90
SH NO 1 OF 1

DETAILS3


SECTION B–B
SCALE 1:10
SECTION C–C
SCALE 1:10
SECTION D–D
HANDLING TOOL FOR J-SLOT
FOR MATERIALS SEE DWG. 01-497-90
API 4 1/2" I.F. BOX
Ø6.5"x2.25"
SECTION A–A
LIFTING POINT FOR ROV ASSISTED HANDLING TOOL
DETAIL 1
NOTES
1. FOR GENERAL NOTES SEE DWG. NO. 01-497-90
maritime gmc a.s
SUSPENSION COVERS
J-SLOT LIFTING ARR./DETAILS
WELL 7/12-8 & 9
JM Consult as
019-1001
FOR COMMENTS
FOR APPROVAL
FOR CONSTRUCTION

NOTES

1. FOR GENERAL NOTES SEE DWG. NO. 01-497-90
2. POS. NO. REFER TO BILL OF MATERIAL ON DWG. NO. 01-497-90

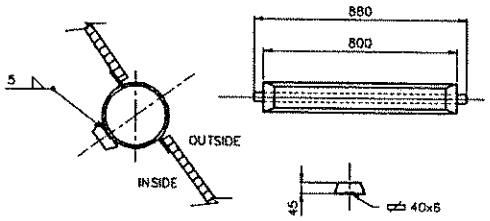


ANODE GROSS WEIGHT: 13 KG
NET WEIGHT: 11.2 KG

INTERNAL ANODES (SEE NOTE 2)

POS.NO.	QTY.	LENGHT (mm)	ANODEWEIGHT (kg)
10	4	460	17.8
6	8	580	44.8
5	4	580	22.4
4	4	580	22.4
3	8	580	44.8
2	4	700	27
2	4	580	22.4
1	4	580	22.4
1	4	1160	44.8

INSTALLATION DETAIL FOR INTERNAL ANODES
SCALE 1:10



ANODE GROSS WEIGHT: 11.6 KG
NET WEIGHT: 10 KG

EXTERNAL ANODES (SEE NOTE 2)

POS.NO.	QTY.	LENGHT (mm)	ANODEWEIGHT (kg)
23	4	440	10
10	4	440	10
9	3	440	15
8	1	880	10
6	4	440	20
6	4	880	40
5	4	440	20
4	8	440	40
3	8	440	40
2	4	440	20
2	4	880	40
1	5	880	60

INSTALLATION DETAIL FOR EXTERNAL ANODES
SCALE 1:10

NO	ZONE	REVISION	BY DRAWN	DATE APP'D	DWG NO	DWG NO
1		FOR COMMENTS	AKB			
0		FOR APPROVAL	AKB			
A		FOR CONSTRUCTION	AKB			

JM Consult as

DWG NO	DESCRIPTION REF DWG
01-497-90	GENERAL ARR. WELL 7/12-9
01-498-90	GENERAL ARR. WELL 7/12-8

DWG NO	DESCRIPTION

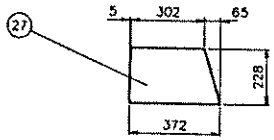
FOR BIDS
FOR APPR
FOR CONST
DRAWN
CHECKED
APP'D

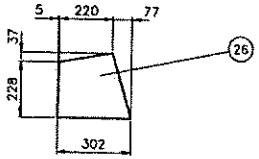
maritime gmc a.s
STAVANGER - NORWAY

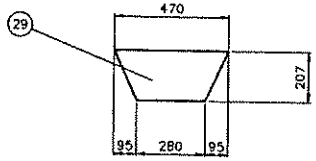
SUSPENSION COVERS
ANODE DETAILS

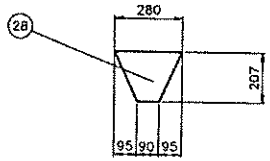
REV. A
SCALE UNLESS NOTED 1:10
DWG NO 01-520-90
SH NO 1 OF 1

ANODE



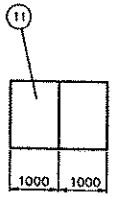


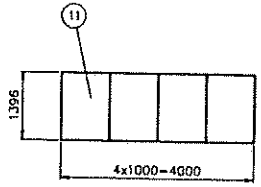


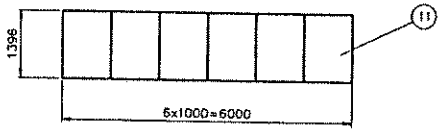


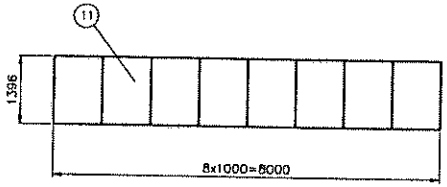
DETAILS OF GUIDE PLATES FOR J-SLOT

SCALE 1:10



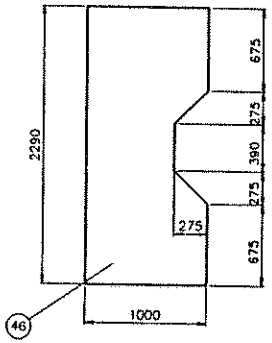


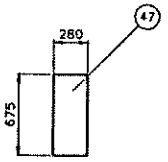




DETAILS OF GRATING PANELS

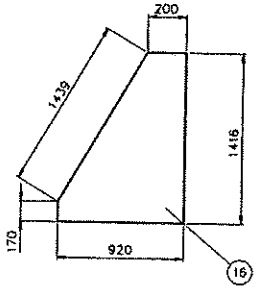
SCALE 1:50





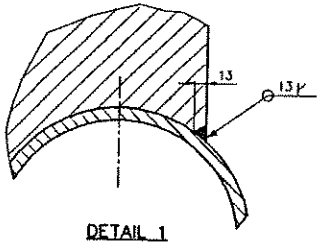
DETAILS OF GRATING PANELS

SCALE 1:20



DETAIL 2

SCALE 1:20



DETAIL 1

SCALE 1:2.5

NO	ZONE	REVISION	BY DATE	APP'D	DWG NO	DWG NO
1		FOR COMMENTS				
0		FOR APPROVAL				
A		FOR CONSTRUCTION				

JM Consult as
RÅDGIVENDE INGENIØRER MNF

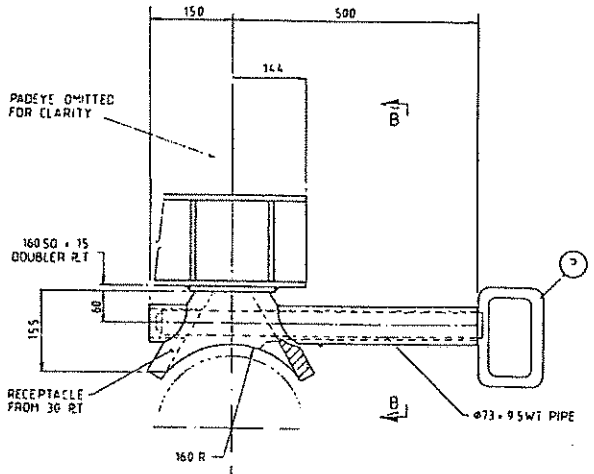
DWG NO	DESCRIPTION REF DWG	DWG NO	DESCRIPTION
01-497-90	GENERAL ARR. WELL 7/12-S		
01-498-90	GENERAL ARR. WELL 7/12-S		

FOR BIDS
FOR APPR.
FOR CONST.
DRAWN
CHECKED
APP'D

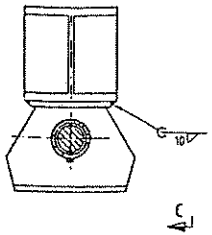
maritime gmc a.s
STAVANGER - NORWAY

SUSPENSION COVERS
DETAILS

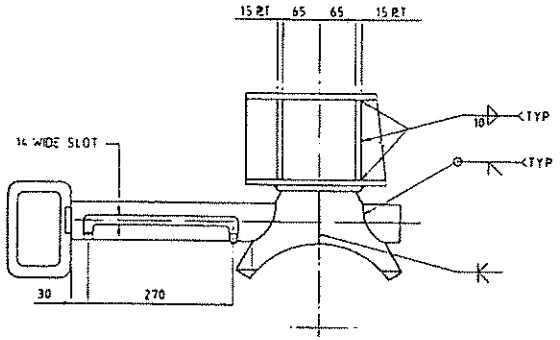
REV. A
SCALE UNLESS NOTED AS NOTED
DWG NO 01-514-90
SHT NO 1 OF 1



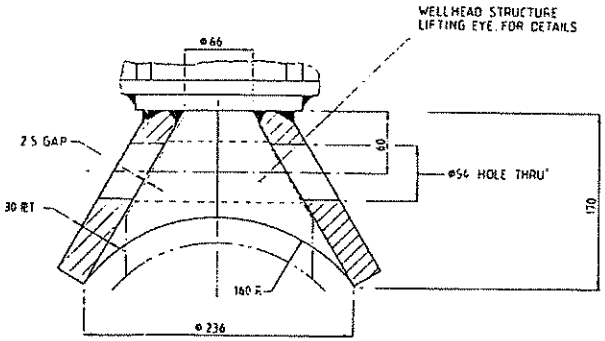
(2) DETAIL 1
(SCALE 1:5)



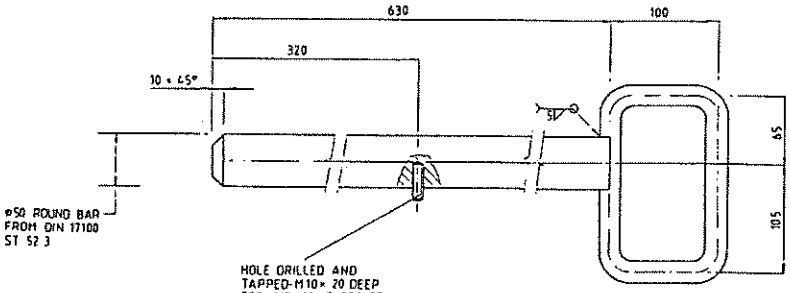
SECTION B-B



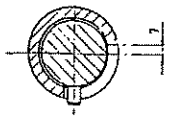
VIEW C-C



SECTION THROUGH RECEPTACLE



(3) DETAIL OF LIFTING PIN



SECTION THROUGH SLOT

NOTES

1. ALL PLATE MATERIAL FROM DIN 17100 ST 37.2 OR EQUIVALENT U.N.O.
2. ALL PIPE MATERIAL FROM ASTM A106 GRADE B OR EQUIVALENT.

REFERENCE DRAWINGS

01-522-90 GENERAL ARRANGEMENT

01-523-90 SECTION AND DETAILS

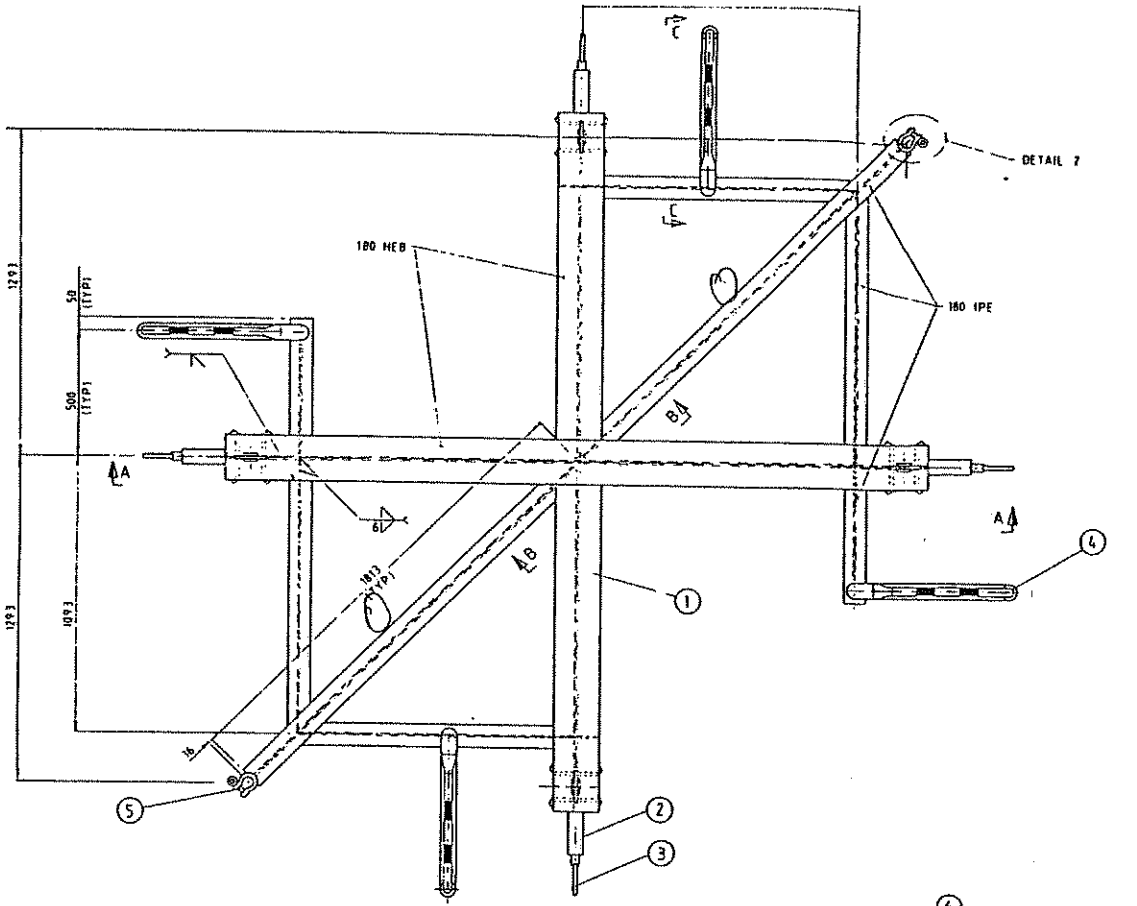
Rev	Date	Reason for Revision	Ckd by	Dsg by	Chkd	Appd

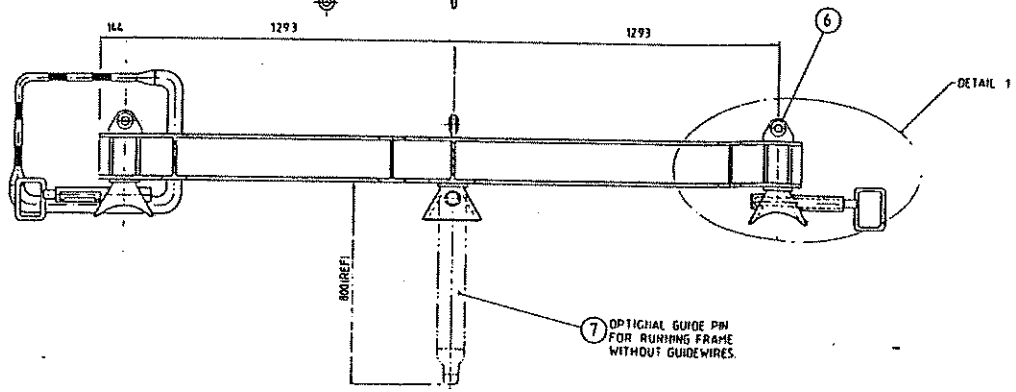
Scale	Dsg Size	Project No
NOTED	A1	

DETAILS OF LOCKING SYSTEM OF LIFTING FRAME FOR WELLHEAD PROTECTION STRUCTURE

maritime 2 gmbh

Dsg No	Rev	Sheet
01-524-90		





VIEW A-A

ITEM	No	DESCRIPTION
1	1	FRAME
2	4	LOCKING MECHANISM
3	4	LIFTING PIN
4	4	GRABBER BAR
5	2	GUIDE
6	4	PADEYE
7	1	GUIDE PIN
8	4	GUIDE PIN BOLTS

NOTES

1 ALL PLATE MATERIAL FROM DIN 17100 ST 37 2 OR EQUIVALENT. UNO.

2 ALL PIPE MATERIAL FROM ASTM A106 GRADE 'B' OR EQUIVALENT.

3 WEIGHT IN AIR = 950 Kg

REFERENCE DRAWINGS

01-523-90 SECTIONS AND DETAILS

01-524-90 DETAILS OF LOCKING SYSTEM

Rev	Date	Reason for Revision	Drn	Chkd	Appd

Scale 1:10 | Dwg Size A1 | Project No

GENERAL ARRANGEMENT OF LIFTING FRAME FOR WELLHEAD PROTECTION STRUCTURES

Dwg No 01-522-90 | Rev | Sheet