OPERATIONAL FINAL WELL REPORT
WELL 30/11 - 5, STEINBIT

DRILLING (AND ABANDONMENT)

MÆRSK JUTLANDER SEMI SUBMERSIBLE

RISAVIKA, TANANGER

A/S Norske Shell

A/S NORSKE SHELL E & P
RISAVIKA, TANANGER

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MANAGEMENT SUMMARY

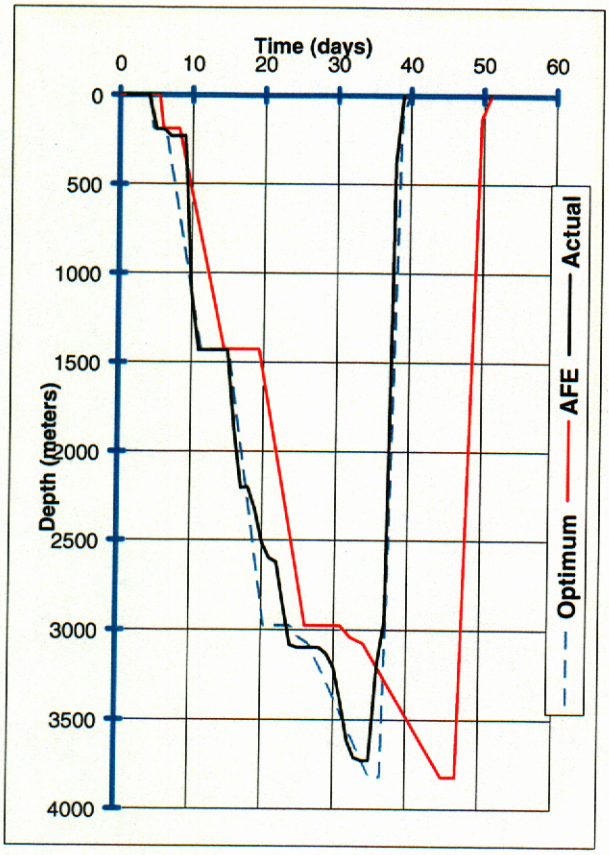
EXPLORATION WELL 30/11-5 STEINBIT

OBJECTIVE

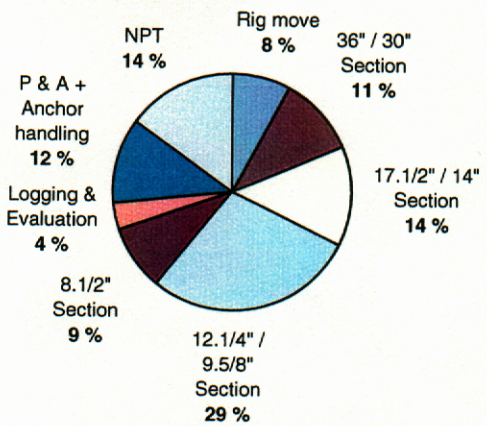
The primary objective of this well was to log and sample the interval between Top Tarbert and Top Drake formation, Expected to comprise two stacked reservoir / seal pairs within the Brent group. In addition a transparent sand was found and logged for future reference.
No significant hydrocarbon bearing zones were encountered, and no production testing was performed.
Plugged and abandoned well.

WELL DATA

Rig	Mærsk Jutlander
Contractor	Mærsk
Spud date	05.12.96
Total time	39.75 Days
Total expenditure	56 Mill. Nok
Well T.D.	3726 m (MD)
Max inclination	8.31 deg. at 3560 m MD
Casing set	30" at 225 m, 20" at 93 m, 14" at 1419 m, 9.5/8" at 3085 m, No Liner ran.
Lost Time Incident	0
Near Misses Reports	29



Steinbit Time Breakdown (Total 39,75 days)



Actual/Planned Costs & Time

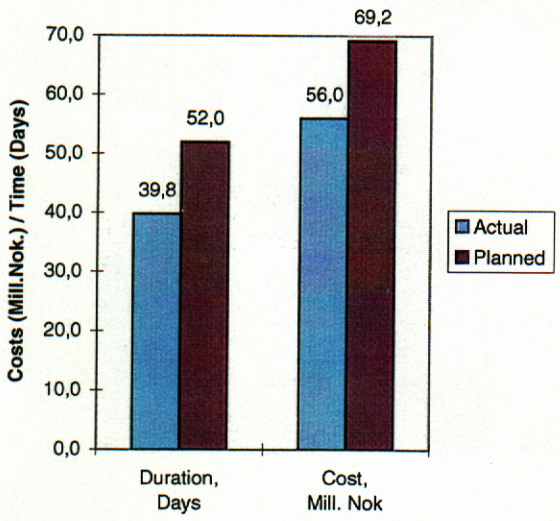


TABLE OF CONTENTS

1 GENERAL DATA

1.1 Well Data

Rig:	Mærsk Jutlander
Rig Heading:	224.0 deg. (True North)
Centre Derrick co-ordinates:	60 deg. 08 min. 50.39 sec. North
(geographical)	02 deg. 33 min. 59.57 sec. East
Centre Derrick co-ordinates :	6 668 054.4 m North
(UTM Zone 31)	475 929.5 m East

Drilling:	
Start of well:	22.30 hrs on 30.11.96 (on tow from Spekkhugger)
Operations commenced:	04.00 hrs on 05.12.96 (Anchors down and pre-tensioned)
Spud date:	11.30 hrs on 05.12.96 (bit on bottom)
Rig off contract:	16.30 hrs on 09.01.97 (handed over to BP)

Total rig days:	39.75 days
Total expenditure:	55.9 million NOK

1.2 Depth References

DFE to Mean Sea Level:	23.16 m
Sea Depth (Mean Sea Level):	104 m

1.3 Deviation Data

Maximum inclination:	8.32° at 3561 m AHBDF
Maximum dogleg:	1.44°/30 m at 3423 m AHBDF

See Enclosures for Borehole Survey Summary Report and Survey Listing for more details.

1.4 Casing Data

Size (inch)	Weight (lbs/ft)	Grade	Casing Shoe Depth (m AHBDF)
30"	310	X52	225
20"	(x/o from well-	head to 14")	132
14"	93	NKHC 125 HPC	1419
9.5/8"	47	L80	(x/o at 1887 m)
9.5/8"	53.5	C-95	3085
7"	not run		

1.5 Suspension Data

Wellhead retrieved and well cemented up.

See Figure 1 for Well Status Diagram.

1.6 Primary Cementation

Casing size: 30" Conductor
Type and density: Class G, 1.90 SG
Top of cement: Sea Bed
Casing shoe: 225 m AHBDF

Casing size: 14" Surface Casing
Type and density: Class G, 1.5 SG Lead / 1.9 SG Tail
Top of cement: Sea Bed
Casing shoe: 1419 m BDF

Casing size: 9.5/8" Production Casing
Type and density: Class G, 1.90 SG
Top of cement: 2380 m AHBDF
Bottom of cement: 3042 m AHBDF
Casing shoe: 3085 m AHBDF

1.7 Mud Summary

36" conductor hole	Sea water/Bentonite hi-vis pills as required. 1.30 SG hi-vis mud left in hole for casing run.
17.1/2" surface hole	Sea water/Bentonite hi-vis pills as required. 1.20 SG hi-vis mud left in hole for casing run.
12.1/4" intermediate hole	Barasilc (Sodium Silicate) Mud (1.40 - 1.42 SG).
8.1/2" production hole	Barasilc (Sodium Silicate) Mud, depleted and gradually converted to KCl Polymer mud in this section. The mud weight was reduced by dumping and diluting down to 1.3 SG prior to drilling.

30/11-5 was the second well in which a Barasilc mud system was used by NSEP. This mud system consists of soluble silicates and KCl / polymer based fluid.

The Barasilc system demonstrated excellent shale inhibition. The gauge hole drilled tended to cause some drag and overpulls on the first trip out of hole, with these effects diminishing on subsequent trips. The cuttings integrity meant that low gravity solids build up was much reduced.

Based on the above and the total mud costs for the well, the Barasilc system was deemed to be very cost effective.

1.8 Contractor Data

Drilling contractor:	Mærsk Drilling
Casing running:	Mærsk Held Contract (Odfjell)
Wellhead:	Dril-Quip
Slickline contractor:	Schlumberger
Conductors:	Dril-Quip
Geology:	Cambrian
Palynology:	Geochem
Turbines:	Neyrfor
Plug and Abandonment	Red Baron

Integrated Services

Cement contractor:	Dowell Schlumberger
Deviation & survey contractor:	SDC/Anadrill Schlumberger
MWD/LWD contractor:	Anadrill Schlumberger
Logging contractor:	Schlumberger
Mud chemical contractor:	Baroid
Mud logging contractor:	Sperry Sun

2 OPERATIONS

2.1 Rig Move / Anchoring

Tight tow commenced at 22:30 hrs on the 30th November 1996. The rig was towed over a distance of 230 nautical miles in 30 hrs, giving an average speed of 7.6 knots. The tow was without incident, with the rig arriving on location at 05:15 hrs, 2nd December.

Anchor handling started on arrival at location using two anchor-handling vessels. Anchors #1, #5, #4 and #8 were run, but as the weather deteriorated, anchor handling was interrupted at 11:30 hrs to start ballasting to survival draft. At this draft the running and testing of anchors continued. It was found that the anchors were slipping at 150 MT pre-tension. Two piggybacks were run, but operations were delayed 8 hours while waiting for more piggyback anchors to arrive. Anchor handling continued, but bad weather caused a further delay of 14 hours, before anchor handling, pre-tensioning to 170 MT and position confirmation was completed. Piggy-backs had been run on all eight anchors.

The rig was handed to the OIM at 02:00 hrs, 5th December 1996 and the final rig position was within 1.5 m from the planned location. During the anchor handling, 3000 m of 5" DP, 150 m of HWDP and BHA sections for 36", 17.1/2" and 12.1/4" were picked up.

The total time for rig move and anchoring was 4.5 days vs. an AFE of 4.0 days.

	Main Learning Points
1	When setting anchors in northern North Sea waters, look at offset anchor handling problems. Get feedback from other operators in the area. Include/discuss in pre-move meeting.
2	Future wells in the vicinity: Possible hard formation. Shell, Mærsk, Towmaster to study site survey and possible anchor patterns. Options: 1) have piggy-back anchors available for all anchors; 2) change/modify anchors to get better penetration. Option no.1 will probably be cheaper as there will be a definite time penalty for option no.2.
3	Future wells in the vicinity : Logistics to remote location; loading up before rig move have implications: 1) variable deck load available; 2) time for sea fastening; 3) tow speed.

2.2 Preparations

Pre-spud preparation
A pre-spud rig inspection was carried out as per Shell requirements. Spud BHA and HWDP was picked up from pipe deck, made up and racked back in the derrick in 8.5 hours. During this time the PGB was positioned below the rotary table and guidelines installed. The ROV was also launched during this period. Firm seabed was found at 104 m water depth while doing a 70 m seabed clearance survey. No penetration or targets were observed.

Operations commenced at 04:00 hrs on the 5th December 1996. The five joints of 30" conductor was pre-run, locked into the PGB and hung off on the mini transporter and racked in the forward moonpool area. The 30" conductor was primarily a Vetco rotary shouldered connection with an SL60 (Drill-Quip squnch joint) fitted on the bottom of the 30" casing housing joint. The cementing stand was made up and racked prior to spudding the well.

The 30" housing joint was fitted with the TITUS top up system and anti-rotation keys were installed on the inside of the 30" housing and the outside of the 18.3/4" Wellhead housing. This system was custom built to prevent rotation of the 18.3/4" WHH during the abandonment phase of the well and was built and fitted at the wellsite. For future wells, it is recommended that this is pre-installed by the vendor in a controlled environment with the paperwork/reference drawings available.

	Main Learning Points
1	Important to ensure that all pipe handling equipment is fully functional and operational prior to getting on "critical path".
2	Hanging off 30" conductor in moonpool on CART was successful. Note: max. SWL for Jutlander CART is 120 MT; certain types of guidebases have a SWL of 100 MT (lock-ring) - this will limit the length of casing that can be hung off.
3	Pre install anti-rotation keys on the inside of the 30" housing and the outside of the 18.3/4" wellhead housing. this should be done by the wellhead vendor.
4	Difficulty to establish hole position using ROV/sonar. Low visibility < 0.5m. 2 hrs lost time reported 06.12.96. -> Establish exactly what the problem was, and try to rectify for PL214. Evaluate sonar's for Future wells in the vicinity.

2.3 Surface Hole Section

Steinbit 30/11-5 was spudded at 11:30 hrs, 5th December 1996.

A pre-spud rig floor safety meeting was held, where all operational and safety aspects of the forthcoming job were discussed. The transponder was run to the sea bed and the rig position was zeroed as reference using the rig Honeywell position indicator.

This was followed by picking up and running the spud BHA to the seabed. The seabed was tagged at 127 m BRT. No penetration was seen with 10 Klbs down-weight and low pump rate applied. Pipe verticality was confirmed by observation at the moonpool. The ROV placed two marker beacons (sonar reflectors) adjacent to the drillstring prior to spud.

Drilling
Top hole was drilled from 127 m to 191 m. This section was drilled using a 17.1/2" Smith re-run bit followed by a Red Baron 26" x 36" hole-opener. The hole was drilled with seawater, cleaning the hole with 7.5 m3 sweeps every 15 m and spotting 7.5 m3 hi-vis pill on connections. The survey tool used was a Teledrift inclinometer and the max inclination observed was 1.0° on bottom. This tool is not considered as "Driller friendly" as the Anderdrift type and the surface signal is not as positive as the Anderdrift. The drilling was slow indicating hard /firm conditions, but no indications of erratic conditions normally associated with boulders were seen. The well was displaced to 1.2 SG mud and the BHA was check-tripped to seabed with no problems observed.

Standing up with the Conductor
The hole was considered to be in good casing running condition. Three joints of fibre glass tubing was picked up and installed under the 30" running tool and the 30" conductor and PGB was picked up and run in to Hold-Up-Depth at 167 m. The string was worked over this interval with 8 m progress made which decreased with time to zero progress. Surface indicators indicated that smaller boulders were able to pass the conductor shoe and were worked clear resulting in the 8 m progress, but then it appeared as though the remaining obstructions were to large to pass the 30" - 36 " annulus. The conductor was recovered with severe scoring observed within 10m of the shoe.

2nd attempt
RIH with 36" BHA until resistance occurred at 158 m. The assembly was washed and reamed down to 191 m, before sweeping the hole clean and displacing the seawater with 1.3 SG mud. POOH to run conductor. RIH with 30" conductor until resistance was encountered again at 167 m. The string was worked down to 183 m before deciding to run the hole-opener again. Swept hole clean and placed 15 m3 of hi-vis pill. Analysis of offset mud logs and actual hole conditions suggested that setting a deeper 30" conductor to ensure isolation of the boulder beds was the optimum choice. The standby SL60 30" string was mobilised and a heavy duty hole opener was dispatched as back up.

Deepening hole
The 36" drilling assembly was modified by adding a pony 9.5" DC under the standard hole-opener to provide a 17.5" sump. The assembly was run in to a bit depth of 178 m and hole-opener depth of 167 m where the 30" conductor stood up. Broke circulation and rotated string with normal torque values. Washed and reamed down to 179 m when the string stalled out. The string was stuck, but it was pulled free on heave with 300 Klbs overpull. Reamed from 167 m to 171 m while working stuck pipe approximately every half metre of progress. The weather deteriorated during this period, and the increasing heave resulted in added difficulty to free the pipe. POOH to check string.

RIH with 26"/36" hole-opener until resistance occurred at 165 m. Drilled down to 229 m and swept the hole with a 48 m3 hi-vis pill. Some time was lost due to a wash out of the HWDP saver sub. The survey at TD showed 1.0° inclination. Pulled out after spotting 15 m3 hi-vis pill on bottom, and let the hole rest for one hour before running in again. The hole condition was fine with 3 metres of loose fill, and a new survey confirmed the 1.0° inclination at TD.

POOH to seabed again. The hole was rested for two hours while waiting for more conductor joints to be unloaded. RIH experiencing no resistance. Swept hole and a new survey showed 0.5° inclination. The hole was then displaced to 37.5 m3 hi-vis pill and 37.5 m3 1.2 SG stabilising mud (mill fluid) before pulling out to run conductor. The 26 x 36 " hole opener was severely worn on the 36" cutters (6" undergauge) due to the cutters being jammed with gravel preventing them to rotate. A new standard hole-opener was made up and RIH with no resistance encountered. The hole was re-displaced to 40 m3 1.2 SG stabilising mud before pulling and racking the BHA.

Running the Conductor, 3rd Attempt
Three extra joints of 30" conductor was made up, and three extra joints of fibre glass cement stinger was made up to the running tool. The cement hoses was attached, and finally the 30" conductor was run to 226 m (3 m off bottom), experiencing no resistance.

The well was circulated to seawater after moving the rig to get the bulleye within 0.5°. The conductor was cemented in place without difficulties by pumping 21 m3 1.9 SG lead-, and 40 m3 1.92 tail slurry. Displaced the cement with 27 m3 at 795 ltr/min. Dropped dart and performed top up cementation via TITUS lines by pumping 4 m3 1.9 SG slurry, displaced same to seabed with 0.5 m3. The ROV released the TITUS connector and the cement lines were thoroughly flushed. Some WOC time was incurred as the conductor was not landed on bottom in view of earlier problems. A further slight delay occured as the running tool did not release easily (the hydraulic lock was released at the seabed and the tool rocked free).

The time spent on the 36" hole / 30" conductor phase of the well was 5.1 days vs. an AFE of 2.3 days. This should be considered in relation with the alternative shallow setting of the 30" conductor, which probably would have resulted in additional time spent setting a 20" intermediate string to isolate the boulder beds which would have prevented the 17.1/2" section from being successfully drilled to 1400 m.

	Main Learning Points
1	Avoid drilling ahead with severe undergauge hole opener - stuck risk. Use heavy-duty hole-opener for northern waters.
2	Teledrift tool provided indications on inclination. Rig crews have indicated a preference for Anderdrift. BP experienced problems with getting a pulse (lack of back pressure) on a shallow test with Anderdrift / 6.5/8" DP. Teledrift comes with a chart recorder, i.e. a physical record of survey. No problems were experienced by NSEP with the Anderdrift and this will be the recommendation in future.
3	Boulders and gravel beds. Re-evaluation of high resolution seismic has been conducted, but cannot pinpoint boulderbeds even with benefit of hindsight. Future wells in the vicinity - may get problems: 1) have to be prepared, heavy-duty hole-openers / back-ups, other tools (11.1/4" DCs); 2) approach Conoco about Heidrun experience; 3) warn seismic interpreters about possible bolder beds.
4	BHA: 8" vs. 9.1/2" DCs; cannot see that 9.1/2" DCs would have made any difference in Steinbit well. Need to size up to 11.1/4" to get marked improvement in stiffness/coupling strength. Source as back-up for Future wells in the vicinity, Evaluate time penalty by using/handling 11.1/4" DCs on Jutlander.
5	Spotted a "mill-fluid" (extended bentonite) to stabilise hole when POOH. Good practise to carry a stock (N-Vis-Hi, ½ pallet) for top-hole sections.
6	Conductor; 1) look at conductor setting depths in adjacent wells. Establish why other operators run fewer/more joints, 2) have back-up string of same connection type to give possibility to go deeper if needed,
7	Top up cementation facility, TITUS, was successfully used. A modification was done for Shell to bring it back to basics. No explanation for the damaged swivel - probably done during surface handling.
8	Cement job: 1) did not land conductor on bottom in Steinbit well due to earlier problems -> WOC; 2) Future wells in the vicinity plan: land conductor on bottom, pump fast setting slurry; 3) map out logistics prior to cement job, need vessel alongside? (BP shallow gas top-hole: 340 MT of cement used in one job.

2.4 17.1/2" Hole Section

Preparations
Prior to BHA handling, the Dowell Subsea Express plug launcher and the 18.3/4" Well Head Housing and running tool were made up and racked back in the derrick. The 36" assembly was laid down and a 26" assembly picked up. This assembly was stabbed using guide ropes and RIH until TOC was tagged at 219 m. Hard cement and the float shoe was drilled from 219-226 m, and the rathole was cleaned out down to 228 m. Prior to pulling out, the hole was swept with a 16 m3 hi-vis pill and a 10 m3 hi-vis pill was spotted on bottom.

Drilling
The 17.1/2" BHA complete with a Max GT03 bit and MWD/CDR, was surface tested, RIH and stabbed into the wellhead using guide ropes. An ROV failure caused a delay in stabbing into the wellhead. New hole was drilled from 230 m to 337 m when a wash-out occurred in the saver sub. After repairs, drilling continued to 1430 m, pumping sweeps every 1/2 stand, wiping and reaming each stand, and spotting a 9 m3 hi-vis pill on bottom prior to connections. No hole drag or other drilling problems were noted.

Surveys
The MWD tool included a gamma ray sensor for picking the sandstone intervals expected in the top of this section. Sand was detected at 405 m with a corresponding increase in penetration rate. At 600 m high shocks were recorded, and this led to the failure of the gamma sensor. Further increase in the shock rate at 725 m eventually resulted in the failure of the direction and inclination sensor package at 920 m. From this point onwards, the Teledrift tool was used to give the inclination.

At section TD the hole was swept clean with a viscous sweep and displaced to 1.2 SG weighted viscous mud. A wiper trip was made without problems, with no resistance or fill being observed. The hole was then re-displaced to 1.25 SG weighted KCL mud from 1430 m to 1100 m and the BHA pulled to 1100 m, the remainder of the well was displaced to 1.2 SG mud. A MSS survey was dropped before coming out to run casing: depth 1410 m, inclination 2°, azimuth 171° TN.

14" Casing
A heavy walled 14", 93 lbs/ft casing was run in this well. This was due to surplus stock rather than casing design needs. After having jetted the guidebase, preparations to run the 14" casing were undertaken. The shoe track was made up and the floats tested. Due to the prevailing weather conditions, however, the operation was forced to halt at this point, as the rig was heaving too much to stab the casing into the 30" conductor housing.

The weather came down to an acceptable level after 9.5 hours, but before the casing was stabbed, another 2.5 hrs was lost while repairing the ROV. Eventually, the casing was run into the conductor using the rig camera. The running of the 14" casing was slow, hampered by an inoperable stabbing board (cherry-picker) and problems with the Eagle Light pipe handling system. The whole job took close to 30 hrs, excluding direct NPT. About 20 hrs were spent on running 93 joints of casing. This gives an average speed of less than 5 joints per hour which is no more than half of an "acceptable" running speed.

The wellhead stand, which was racked back in the derrick before the job, was made up and the whole lot was run in on heavy weight drillpipe. An overpull of 25 tonne was taken after landing out to confirm a good latch. The cement job was a large one, with 135 m3 lead and 35 m3 bbls tail slurry, but the job went ahead without any unplanned events. Good returns was observed with the ROV, and the plugs were bumped with 93% efficiency before testing the casing to 200 bar psi.

The BOP was run and tested without event.

	Main Learning Points
1	Include an alternative method of surveying in BHA (Teledrift/Anderdrift), MWD/CDR Tools are unreliable in large hole sizes where shock loads are severe. Multishot to be available on rig as back-up. Train MWD or Mærsk personnel to run multishot tools. evaluate MSS times vs. pulling BHA to change tools. Planned future surveying philosophy to be confirmed and in place by next campaign.
2	Max GT03 bit; good drilling performance - shakers coping most of the time. PL214 - new shakers installed.
3	Drillpipe: BP use 6.5/8" DP, max. Jutlander capacity: 2400 m. For better hydraulics, may also consider 5.1/2", Full Hole connections (need to change handling equipment on rig) or 5", wedge thread connections. Tell Dril-Quip what pipe is in use for x-overs, test tool, hang-off tool etc. (BOP configuration).
4	Mud: drilled with seawater/hivis sweeps. Spotted KCl mud across deep shales for inhibition - a good idea for improved casing running.
5	Make sure all pipe handling equipment is in good working order before the casing jobs. 14" casing running proved to be slow and cumbersome.
6	Provide back-up single joint elevators and prepare for running the casing conventionally should pipe-handling equipment break down.
7	Have experienced Eagle Light operators at hand.
8	Man-up casing crew allowing for problems and delays - 1.5 to 2 crews needed.
9	The running of a NMDC as a back up to take a survey at casing depth in the event of a MWD failure
10	Cement: Dril-Quip wellhead running tool cemented up. New procedure for post-job inspection in place.

2.5 12.1/4" Hole Section

Gyro in drillstring
The 12.1/4" BHA with motor and a Smith M91X PDC bit was run in hole. In order to comply with the survey requirements, it was planned to run an SDC Keeper gyro in the drillpipe prior to drilling out the shoetrack. As SDC arrived late and needed some time to prepare their toolstring, the plugs and float were drilled in 2 hrs before rigging up for wireline.

To ease rig up, it was decided run the gyro with the string in the slips and use a heave compensated top sheave in the blocks. As it turned out, this set-up created too much noise for the gyro, and the wireline was temporarily rigged down to land the drillstring in the BOP. The survey run was therefore completed with 1.75 hrs NPT. The results showed a maximum inclination of 2°, decreasing to 0.86° on bottom.

Leak-Off Test
The 14" shoe was set at 1419 m in the Hordaland claystone, and the leak off test was done after circulating the hole to Barasilc mud at 1.40 SG. The graph did not follow the classical straight line relationship very closely, but the leak-off was deemed to take place at a pressure of 37 bar giving an EMMG of 1.66 SG.

Drilling ahead with PDC bit
The drilling of this section started off with an average ROP of 30 - 40 m/hr including surveys and connections. At 1876 m, the washpipe and standpipe manifold gooseneck had to be repaired which caused 4.5 hrs NPT. Drilling continued with ROP in the twenties down to around 2170 m where hard limestone stringers were encountered.

Undergauge bit
The penetration rate dropped off dramatically, and soon it became difficult to get weight down to the bit without stalling the string, indicating that the stabilisers were doing most of the work. The situation worsened and at 2204 m it was decided to pull the assembly to check the bit condition. The ROP at this point was less than 1 m/hr.

It had been anticipated that the Barasilc mud would drill a gauge hole, and a motor with a 0.38° bend was used to reduce tripping problems. Even so, the hole was tight on the trip out, as had been encountered on previous occassions, with swabbing and overpulls of up to 75 Klbs. Upon retrieving the BHA to surface, it was found that the bit was 1.1/8" undergauge. In addition, both the sleeve stab on the motor and one string stab had to be changed out due to wear.

Ream down new BHA
It was decided to run a Hughes R535XLG4 PDC bit with the same BHA as before. This bit was said to be able to withstand reaming down the last two stands which was thought to be undergauge, and the assembly was run in hole.

The reaming was found difficult. The idea was to use high RPM and low WOB and inch the string downwards, but due to rig heave the bit would take a solid bite and stall the motor repeatedly. The situation was possibly made worse by the fact that the active heave compensation system was out of action, and the passive compensation is relying on some WOB to work. In hindsight it might have been better to slide the assembly down, thereby having the hole drag to compensate the block.

Progress was slow but steady. It soon became apparent that the bit had to do a lot of hard work and it was doubtful that it would make it to bottom unharmed. On bottom, drilling started off in an encouraging manner, but before long the symptoms of an undergauge bit were apparent once more.

At 2222 m and an ROP of 1 m/hr it was decided to pull out of hole to examine the bit. This time the hole was in a good condition, but the bit was found to be 7/8"undergauge. A rotary insert bit assembly was determined to be the most cost effective solution. A Reed EHP53AD bit was run in hole.

Rotary drilling

The reaming down was easier this time and the bit drilled new formation with an ROP of some 10 m/hr. The intention was to get this bit to drill down past the top of the Shetland formation, which can contain chert, before running another PDC bit.

This objective was reached, but at the price of drilling the last 20 m at no more than 2 m/hr. At 2574 m the traces of chert ceased and the bit was pulled at 2597 m. On the way out the hole, overpulls up to 130Klbs were observed between 2483 m and 2144 m, and from 1734 m to 1676 m. The poor drillability of the formation was confirmed by the slow drilling prior to pulling out, and a bit in relatively good condition at 2-4-BT-H-E-1-NO-PR.

Making up 9.5/8" casing hanger stand
To cut down on the time between pulling the drilling assembly at section TD and running the casing, it was decided to make up the casing hanger, running tool and subsea cement plug launcher at this stage of the operation. On the last well, the winning cost saving idea was to get most of this work done onshore, but transport containers were not completed. If it had been, it would have saved two to three hours of rig time on this occasion, as the running tool did not function properly, and 1.5 hrs NPT was incurred.

Third 12.1/4" PDC bit run, MWD failure
Due to the apparent hardness of the formation, it was decided to run a Smith M37P PDC bit with a straight set motor. Drilling continued from 2597 m with ROP's between 10 to 15 m/hr. At 2708 metres, the MWD stopped pulsing and this caused a significant amount of non-productive time as magnetic single shot surveys had to be run every three stands to comply with internal surveying procedures. Each survey took two to three hours, including the circulating time required to clean the hole. The string was rotated in the slips while running the survey barrel on slickline.

Drilling continued, only interrupted by single shot surveys, total of 4 were taken, down to 3096 m where a sudden increase in mud gas level was noted. The Cromer Knoll, which was the casing seat for this section, was expected to come in at 3023 m. But as no change in cuttings was observed at this point, drilling had carried on (no MWD due to earlier failure). When the mud gas level reached 25%, it was decided to stop drilling and to do a flow check. The well was static.

It was suspected that the gas came from a new type of formation, and circulation resumed to get the cuttings to surface. The gas level peaked at 33% during this operation. The cuttings recovered, indicated that the formation at the bottom of the hole was Draupne, which is underlying the Cromer Knoll. After consultation between the Geology and Drilling departments, it was decided to set casing at this point and the well was circulated cuttings and gas free.

A wiper trip was performed back into the old hole. This trip indicated that the hole was in a good condition, and the subsequent bottoms up showed little gas. The trip out was uneventful.

Wireline logging
A "transparent" sand (not seen on seismic) had been penetrated earlier in the Hordaland formation. To supplement the LWD log, a suite of GR-CNL-LDL-AS was logged across 2250 - 1700 m with Schlumberger wireline was called for outside the scope of the drilling AFE. The whole logging operation took just 5.75 hrs.

Mud
Baroid's Barasilc, a sodium silicate, water based mud system was used in the deeper sections in this well. This was the second well in which Barasilc was used by NSEP and the excellent inhibitive properties seen in the previous well was confirmed. The mud weight in the 12.1/4" section varied from 1.40 to 1.42 SG. The mud properties and weight were maintained by adding a light premix to the system rather than using centrifuges (for which we had no contract in place). Overall it proved cheaper due to useage over 2 wells, intallation, personnel, demob.

9.5/8" Casing

Before rigging up to run casing, the wear bushing was recovered and the wellhead jetted clean with a separate run. As the 14" casing run had been quite troublesome, six Odfjell casing hands were brought out for this job. The 9.5/8" casing run was smooth, with a running speed of up to 20 joints per hour, and the Eagle Light pipe handling equipment working well.

The cementing of the 9.5/8" casing did, however, not go as planned. The job consisted of 13 m3 of spacer, followed by 22 bbls of cement slurry at 1.9 SG. Through miscommunication between Dowell Rep on Drillfloor and Rep on the cement unit the second dart was released "on the fly" i.e. at 5 bpm pumping rate (within the design capabilities) and surface indication of 200 bar pressure increase indicated that the top plug was engaged and had sheared. However this was not the case as the dart held up in the surface cementing head. The cement was displaced using the rig pumps and was overdisplaced by 4 m3 with no bump The height of the cement column in the annulus was calculated to approximately 800 m from differential pressures. But the bottom of the cement column is thought to be some 40 m above the 9.5/8" casing shoe.

9.5/8" Casing Test / Formation Limit Test
The initial plan was to test the 9.5/8" casing after the cement job, and then drill out the shoe track and do a formation limit test.

The 8.1/2" drilling assembly including Smith rebuilt M73P and Annadrill geosteering tool (provides resistivity at the bit via motor) was RIH to 2350 .An attempt to pressure test the casing failed at 200 bar. This was concluded to be the formation leak off pressure due to the overdisplacement during the 9.5/8" casing job The drilling assembly was tripped out and a packer assembly picked up. this was initially ran in to 1500 m and successfully tested to 344 bar. The assy was then further ran in to TTOC and reset. The casing string was successfully pressure tested to 344 bar.
The pressure at which leak off occurred during the initial casing test was very close to the anticipated leak off pressure at the shoe. It was decided that a formation limit test after the shoe was drilled out would not be needed. The formation limit test pressure was set to the 200 bar given from the first casing test. This equated to an EMMW of 2.08 SG .

	Main Learning Points
1	Land off drillstring in BOP for gyro surveys run inside drillpipe. Conventional rig-up with compensated top shieve is too noisy for gyros. (cased hole only)
2	It is possible to clean out shoetrack with PDC bits. Use PDC drillable float equipment.
3	Barasilc mud drills gauge holes. Beware on first trip out.
4	Be able to run centrifuges if needed. Premix for weight/properties control. Evaluate cost vs. staying within programme parameters.
5	Do not ream long sections with PDC bits on a heaving rig. The bit will bite and stall the motor/string. Use active heave compensation, or consider sliding to get better passive heave compensation.
6	PDC bit quit due to abrasive sands. 2nd PDC bit drilled less than 20 metres. Study offset data to determine extent of abrasive sands. Future wells, remote locations, have a wide range of bits for good flexibility (little offset data available).
7	Geology: discovered transparent sand while drilling; abrasive formation; no Cromer Knoll seen. Logged and evaluated sands.
8	MWD: 2 failures, seal problems in silicate (high pH mud). Dedicated team working on problems.
9	Future wells : look at BHA design for long sand sections.
10	Casing planning: ITM provided good stick diagrams for the complicated casing string / cross-over scheme (surplus stock). Onshore measurement / pipe preparation worthwhile - be careful with amount of pipe dope applied - consult Odfjell.
11	Pipe handling equipment worked well for 9.5/8" tubulars.
12	The hanger/running tool was made up and set back in the derrick - the pin end of the hanger pup was damaged due to movement while stood back. Odfjell recommend to cut protector in half (to avoid jamming) and use bottoms end to protect the pin - alternatively use plastic protector.
13	Clear communication with cementer is paramount to release darts/plugs at the right time. Procedure changed to include radios. Steinbit: displaced cement slurry with bottom plug - bumped but sheared out -> over-displacement. Had to test casing with DTL packer (lost time).
14	Only "pump to bump" when it is certain that the wiper plugs have been released correctly. Positive indicators should be seen when the 1st dart picks up the bottom wiper plug, when the rupture disk in bottom wiper plug shears, when the 2nd dart picks up the top plug, and when the top plug bumps.
15	Jet wellhead thoroughly prior to running wear bushing. Note: TransOcean has cut hole in casing with 90° jet sub.

2.6 8.1/2" Hole Section

Drilling

The original 8.1/2" drilling assembly was RIH to the float collar at 3058 m and the shoetrack was drilled with no indications of cement while drilling. Drilling continued to 3122 m with no response from the GST (geosteering motor with resistivity at the bit). Real time resistivity was predetermined to be critical for core point selection so the GST tool was recovered for evaluation, with no problem identified at surface.

The back up GST tool was picked up and attempts to shallow test were "inconclusive" (***inconclusive*** is a term associated with the GST shallow testing because of difficulties in transmitting the signal via mud rather than formation). GST #2 was RIH and drilled from 3122 m to 3130 m with no response from the tool. The BHA was recovered to install a MWD/CDR configured in rotary mode to bring the resistivity sensor as close to the bit as possible.

Assembly no. 3 was RIH and drilled from 3130 m to 3206 m with a pressure loss being observed. POOH wet and established a washout 0.6 m from the pin end of a drillpipe at 1536 m. Drilling continued from 3206 m to 3726 m with no coring point selected (criteria: good oil-shows in reservoir sands). The bit drilled 605 m in 69 hrs at an average ROP of 9 m/hr. Check tripped with zero drag and a hole in excellent condition. A magnetic single shot was dropped due to MWD failure but the survey was a misrun.

Logging

The initial wireline programme for dry hole scenario consisted of 4 runs :
1) *Supercombo* : NGT/Resitivity/Micro-Resitivity/Array Sonic/Density/Neutron
2) *Repeat formation tester* (RFT) for pressure measurements and fluid samples
3) *Vertical Seismic profile* (VSP)
4) *Sidewall Samples* (CST)

When logging the 8.1/2" open hole section, only the three first runs were done. When performing surface checks on the supercombo toolstring there were no response from the toolstring. Two hours of NPT was incurred while sorting this fault out. The rest of the logging sequence was performed according to plan, and all logs were completed without experiencing any hole problems. The caliper indicated perfect hole condition.

Further information provided in the Schlumberger Wireline Logging Report for this well.

	Main Learning Points
1	Contingency criteria for continuing drilling in case of a GST tool failure.
2	GST failures: got good shallow hole test on first run, then lost comms between GST and MWD (wireless telemetry through mud or formation) on subsequent tests/runs. These failures were due to insulation problems on some wires that are not regularly checked prior to tool dispatch. Changes to procedure needed. GST has an application when looking for coring points - business opportunity? - consider making comms sub / GST tool without bend.
3	Evaluation: could not complete RFT and CST programme due to problems getting tools down. Look at Barasilc mud conditioning for logging. May be an option to spot KCl mud downhole for logging, if shale present.

2.7 Plug and Abandon

A 10 m3 hi-vis pill was spotted on bottom of the well before pulling the 3.1/2" cement stinger to 3450 m. Cement plug no.1 was set from 3450 m to 3200 m and plug no.2 was set from 3200 m to 3000 m. A short trip was made to 2950 m where the hole was circulated clean at maximum flow rate, working and rotating the pipe. Slight contaminated returns were observed on bottoms up. POOH cement stinger.

Ran in and set a 9.5/8" bridge plug at 2948 m using wireline and pressure tested the plug to 260 bar. Recovered the wearbushing with 80 Klbs over-pull. Ran in with casing cutter, and cut and retrieved the 9.5/8" casing at 394 m.

Ran in with Elder Hydromechanical 13.3/8" bridge plug on 5" drill pipe, but was unable to set the plug which led to 3 hours NPT (see Dowell failure report). Ran in and set the 13.3/8" bridge plug on wireline at 379 m. Pressure tested plug to 90 bar.

Jetted BOPs and wellhead before pulling the stack and the marine riser. RIH with 3.1/2" cement stinger down to 378 m and pumped a 16 m3 balanced cement plug. A short trip was made to 170 m to circulate the top of well clean.

Ran in and cut the 20" and 30" casings at 132 m. Retrieved the wellhead and housing with 600 Klbs pull. Laid out drillpipe and tools. Deballasted the rig and retrieved anchors.

Operations completed 16:30 hrs, 09.01.97, and transferred the rig to BP Norway Ltd.

	Main Learning Points
1	Bridge plug failure: Elder Hydromac, good concept Pins sheared but tool failed to work, Awaiting report from Dowell (manufacturer Elder oil tools USA)
2	Fit for purpose abandonment programme was good. Do not over design. Set top cement plug prior to cutting and retrieving wellhead and housing.

3 RECOMMENDATIONS

A Steinbit Review Meeting was held at NSEP offices at Risavika 31.01.97 with all principal service contractors participating. The objective of the meeting was to discuss any lessons that could be learned from the operations on Steinbit. ***The main learning points are summarised below:***

3.1 Rig Move / Anchoring

1	When setting anchors in northern North Sea waters, look at offset anchor handling problems. Get feedback from other operators in the area. Include/discuss in pre-move meeting.
2	Future wells: Possible hard formation. Shell, Mærsk, Towmaster to study site survey and possible anchor patterns. Options: 1) have piggy-back anchors available for all anchors; 2) change/modify anchors to get better penetration. Option no.1 will probably be cheaper as there will be a definite time penalty for option no.2.
3	Future wells : Logistics to remote location; loading up before rig move have implications: 1) variable deck load available; 2) time for sea fastening; 3) tow speed. Possible option to gradually move equipment to Brønnøysund/Sandnessjøen in good time, to be picked up by vessels/rig just prior to spud.

3.2 Preparations

1	Important to ensure that all pipe handling equipment is fully functional and operational prior to getting on "critical path".
2	Hanging off 30" conductor in moonpool on CART was successful. Note: max. SWL for Jutlander CART is 150 MT; certain types of guidebases have a SWL of 100 MT (lock-ring) - this will limit the length of casing that can be hung off.
3	Difficulty to establish hole position using ROV/sonar. Low visibility < 0.5m. 2 hrs lost time reported 06.12.96. -> Establish exactly what the problem was, and try to rectify for PL214. Evaluate sonars for Future wells .

3.3 Surface Hole Section

1	Avoid drilling ahead with severe undergauge hole opener - stuck risk. Use heavy-duty hole-opener for northern waters.
2	Teledrift tool provided indications on inclination. Rig crews have indicated a preference for Anderdrift. BP experienced problems with getting a pulse (lack of back pressure) on a shallow test with Anderdrift / 6.5/8" DP. Teledrift comes with a chart recorder, i.e. a physical record of survey.
3	Boulders and gravel beds. Re-evaluation of high resolution seismic has been conducted, but cannot pinpoint boulderbeds even with benefit of hindsight. PL214 - may get problems: 1) have to be prepared, heavy-duty hole-openers / back-ups, other tools (11.1/4" DCs); 2) approach Conoco about Heidrun experience; 3) warn seismic interpreters about possible bolder beds.
4	BHA: 8" vs. 9.1/2" DCs; cannot see that 9.1/2" DCs would have made any difference in Steinbit well. Need to size up to 11.1/4" to get marked improvement in stiffness/coupling strength. Source as back-up for PL214? Evaluate time penalty by using/handling 11.1/4" DCs on Jutlander.
5	Spotted a "mill-fluid" (extended bentonite) to stabilise hole when POOH. Good practise to carry a stock (N-Vis-Hi, ½ pallet) for top-hole sections.
6	Conductor; 1) look at conductor setting depths in adjacent wells. Establish why other operators run fewer/more joints, 2) have back-up string of same connection type to give possibility to go deeper if needed, 3) PL214, deep water, need to fill conductor while running to avoid collapse.
7	Top up cementation facility, TITUS, was successfully used. A modification was done for Shell to bring it back to basics. No explanation for the damaged swivel - probably done during surface handling.
8	Cement job: 1) did not land conductor on bottom in Steinbit well due to earlier problems -> WOC; 2) PL214 plan: land conductor on bottom, pump fast setting slurry; 3) map out logistics prior to cement job, need vessel alongside? (BP shallow gas top-hole: 340 MT of cement used in one job.

3.4 17.1/2" Hole Section

1	Include an alternative method of surveying in BHA (Teledrift/Anderdrift), MWD/CDR Tools are unreliable in large hole sizes where shock loads are severe. Multishot to be available on rig as back-up. Train MWD or Mærsk personnel to run multishot tools. Future wells : will always have a reservoir below - evaluate MSS times vs. pulling BHA to change tools.
2	Max GT03 bit; good drilling performance - shakers coping most of the time. PL214 - new shakers installed.
3	Drillpipe: BP use 6.5/8" DP, max. Jutlander capacity: 2400 m. For better hydraulics, may also consider 5.1/2", Full Hole connections (need to change handling equipment on rig) or 5", wedge thread connections. Tell Dril-Quip what pipe is in use for x-overs, test tool, hang-off tool etc. (BOP configuration).
4	Mud: drilled with seawater/hivis sweeps. Spotted KCl mud across deep shales for inhibition - a good idea.
5	Make sure all pipe handling equipment is in good working order before the casing jobs. 14" casing running proved to be slow and cumbersome.
6	Provide back-up single joint elevators and prepare for running the casing conventionally should pipe-handling equipment break down.
7	Have experienced Eagle Light operators at hand.
8	Man-up casing crew allowing for problems and delays - 1.5 to 2 crews needed.
9	Cement: Dril-Quip wellhead running tool cemented up. New procedure for post-job inspection in place.

3.5 12.1/4" Hole Section

1	Land off drillstring in BOP for gyro surveys run inside drillpipe. Conventional rig-up with compensated top shieve is too noisy for gyros.
2	It is possible to clean out shoetrack with PDC bits. Use PDC drillable float equipment.
3	Barasilc mud drills gauge holes. Beware on first trip out.
4	Be able to run centrifuges if needed. Premix for weight/properties control is expensive. Evaluate cost vs. staying within programme parameters.
5	Do not ream long sections with PDC bits on a heaving rig. The bit will bite and stall the motor/string. Use active heave compensation, or consider sliding to get better passive heave compensation.
6	PDC bit quit due to abrasive sands. 2nd PDC bit drilled less than 20 metres. Study offset data to determine extent of abrasive sands. PL214: remote location, have a wide range of bits for good flexibility (little offset data available).
7	Geology: discovered transparent sand while drilling; abrasive formation; no Cromer Knoll seen. Logged and evaluated sands.
8	MWD: 2 failures, seal problems in silicate (high pH mud). Dedicated team working on problems.
9	PL214: look at BHA design for long sand sections.
10	Casing planning: ITM provided good stick diagrams for the complicated casing string / cross-over scheme (surplus stock). Onshore measurement / pipe preparation worthwhile - be careful with amount of pipe dope applied - consult Odfjell.
11	Pipe handling equipment worked well for 9.5/8" tubulars.
12	The hanger/running tool was made up and set back in the derrick - the pin end of the hanger pup was damaged due to movement while stood back. Odfjell recommend to cut protector in half (to avoid jamming) and use bottoms end to protect the pin - alternatively use plastic protector.
13	Clear communication with cementer is paramount to release darts/plugs at the right time. Procedure changed to include radios. Steinbit: displaced cement slurry with bottom plug - bumped but sheared out -> over-displacement. Had to test casing with DTL packer (lost time).
14	Only "pump to bump" when it is certain that the wiper plugs have been released correctly. Positive indicators should be seen when the 1st dart picks up the bottom wiper plug, when the rupture disk in bottom wiper plug shears, when the 2nd dart picks up the top plug, and when the top plug bumps.
15	Jet wellhead thoroughly prior to running wear bushing. Note: TransOcean has cut hole in casing with 90° jet sub.

3.6 8.1/2" Hole Section

1	Contingency criteria for continuing drilling in case of a GST tool failure.
2	GST failures: got good shallow hole test on first run, then lost comms between GST and MWD (wireless telemetry through mud or formation) on subsequent tests/runs. These failures were due to insulation problems on some wires that are not regularly checked prior to tool dispatch. Changes to procedure needed. GST has an application when looking for coring points - business opportunity? - consider making comms sub / GST tool without bend.
3	Evaluation: could not complete RFT and CST programme due to problems getting tools down. Look at Barasilc mud conditioning for logging. May be an option to spot KCl mud downhole for logging.

3.7 Plug and Abandon

1	Bridge plug failure: Hydromac, good concept, but slips did not set properly. Investigation by manufacturer.
2	Fit for purpose abandonment programme was good. Do not over design. Set top cement plug prior to cutting and retrieving wellhead and housing.

4 SAFETY AND ENVIRONMENT

Category	LTI	MTC/RWC	FAC	NM (with potential for personnel injury	Total NM reports (including personnel, environment and asset)	Actual accidents environment and asset
Numbers	0	2	1	15	24	2

LTI: Lost Time Injuries

MTC: Medical Treatment Case

RWC: Restricted Work Case

FAC: First Aid Case

NM: Near Miss

A total number of 29 accident/incident reports were received from the rig and evaluated/reviewed during the drilling operation of Steinbit. No LTI's were reported during this period. An serious incident/near miss was investigated by a team from on, and offshore. A person was in danger of being crushed while working on the Top Drive.

One general safety inspection was carried out on the rig during the drilling operation of Steinbit.

An Emergency Preparedness Notification Exercise was conducted. The purpose for the exercise was to test the notification procedures and communication lines between Maersk Jutlander. Kristiansund switchboard, the Emergency Action Group (EAG), EAG Drilling duty rep., Risavika, MCN Drilling support and MCN personnel department (next of kin).

The monthly HSE meeting, Shell and main contractor companies was performed in December.

A supplement to the generic drilling operation HSE Case (risk analyses) was performed prior to the drilling operation and submitted to NPD.

Information/status regarding Non-Conformance's related to Consent for Exploration Drilling, Maersk Jutlander, submitted to NPD.

The well was drilled with a water based mud (silica-mud).

No discharge permit was required. Chemicals used were registered by Maersk Contractors Norge A/S, Baroid and Dowell Schlumberger and reported to NSEP as input to the yearly report to the authority. (SFT årsrapport).

An environmental evaluation of all chemicals planned to be used/discharged was carried out. (ref. HSE file Steinbit).

A plan for waste handling on Maersk Jutlander was implemented. The first waste handling training session took place on the rig in week 51.

5 GEOLOGICAL EVALUATION

Reference is made to the Petroleum Engineering End Of Well Report - Steinbit, Well 30/11-5 to be issued separately. NSEP 97.03

This report will be issued June 97

6 PERFORMANCE REVIEW

6.1 Overview

	Including NPT		Actual	Excluding NPT		
	Plan	Actual	NPT	Plan	Actual	Pl - Ac
Phase	**(hrs)**	**(hrs)**	**(hrs)**	**(hrs)**	**(hrs)**	**(hrs)**
Preparation	128.40	102.25	28.50	100	73.75	26.25
36" Hole Section	55.92	122.25	7.00	44	115.25	-71.25
17.1/2" Hole Section	227.76	148.25	19.00	178	129.25	48.75
12.1/4" Hole Section	284.64	310.75	40.75	222	270.00	-48.00
8.1/2" Hole Section	382.32	132.50	36.50	299	96.00	203.00
Logging And Evaluation	46.08	36.50	1.75	36	34.75	1.25
Plug and Abandonment	98.88	101.50	3.75	77	97.75	-20.75
Total	**1224.00**	**954.00**	**137.25**	**956**	**816.75**	**139.25**

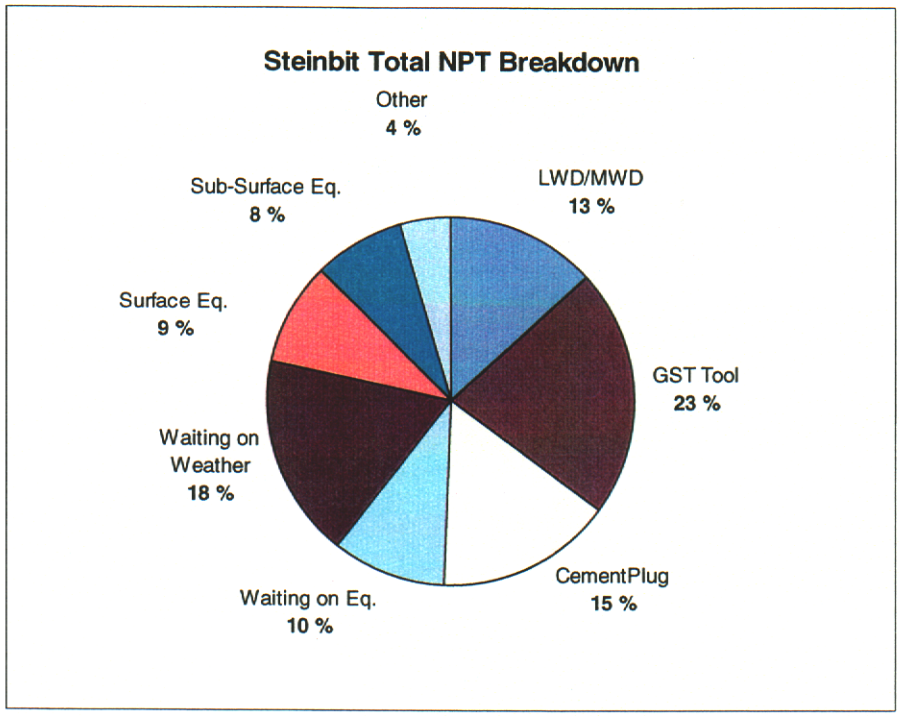
6.2 Drilling Operations Performance vs. Objectives

Time
Well 30/11-5 was finished 11.1/4 day ahead of schedule. Total downtime and non-productive time accounted for 14.4%. The main contributing factors to total NPT were LWD/MWD equipment failures (13.3%), cementation plug failure (15.5%), and waiting on weather (18.0%).

76.25 hrs were classed as "Additional Time". This is not included in the lost time figures, but were given an "A" code to highlight unusual length of time spent on operations. The majority of this additional time was incurred during anchor handling, as eight piggy-backs were needed, and during running the conductor string through gravel beds.

Cost
The well was drilled for NOK 55.94 million, having an AFE of NOK 69.2 million (17% under budget). Well cost are summarised below:

Cost item:	Actual million NOK	Original Estimate million NOK	Difference million NOK
Total Well Cost:	56.8	69.2	13.3



6.3 NPT Breakdown

Class Code	Op Code	Hrs	Description	Date
			LWD/MWD Equipment Failures	
L2	10	0,25	Directional Survey, 225m, 0.5 deg.	08.12.96
L4	10	0,75	RIH with SDC Keeper gyro survey inside drillpipe.	16.12.96
L4	10	1,00	POOH with gyro survey. R/D top shieve.	16.12.96
L2	10	1,50	RIH magnetic single shot with monel sensor on slickline.	23.12.96
L2	10	1,25	Run magnetic single shot on slickline. Depth, 2824 m, Inc. 0.25, Azi 356.	24.12.96
A2	10	1,25	Run magnetic single shot on slickline. Depth 2912 m, Inc 0.5, Azi 266.	24.12.96
A2	10	1,00	Run magnetic single shot survey on slick line. Depth 2999 m, Inc 0.75, Azi 241.	25.12.96
L2	10	0,50	Drop single shot survey.	25.12.96
L3	11A	1,75	No response from toolstring,fault find same.	04.01.97
L2	6C	1,50	P/U MWD. Observe LTB connector damaged in CDR. Anadrill repair same.	22.12.96
L2	6C	2,25	Remove sleeve stab from motor (welder cut same). B/O stab from spare motor.	18.12.96
L2	5	0,25	Circulate hole clean.	19.12.96
A2	5	1,00	Circulate bottoms up.	23.12.96
L2	5	1,50	Circulate bottoms up. Max. gas: 3%.	24.12.96
L2	5	1,25	Circulate bottoms up.	24.12.96
L2	5	1,50	Circulate bottoms up.	25.12.96
		18,5	**Sum of hours**	
			GST Tool Failures	

L2	6C	4,00	Fault find MWD/GST problem, change out MWD,Motor, surface test same,	29.12.96
L2	6C	2,75	Make up rotary BHA with MWD/CDR. Surface test same , OK.	30.12.96
L2	5	1,00	Pull back to shoe and circulate bottoms up. Max. gas 16%.	29.12.96
L2	6B	3,00	BHA Trip	29.12.96
L2	6B	1,50	BHA Trip	29.12.96
L2	6B	4,00	BHA Trip	30.12.96
L2	6B	3,50	BHA Trip to 3112m.	30.12.96
L2	6F	2,25	RIH to 3206m, filling drillstring, washing last 30m to bottom, no resistance.	31.12.96
L2	18	0,50	Flow Check, static, pump slug.	29.12.96
L2	18	0,25	Flow check, static, pump slug.	30.12.96
L2	6B	3,25	BHA Trip to 3087m	30.12.96
L2	6C	1,50	BHA Handling	29.12.96
L2	6C	1,25	Pull BHA, lay out motor, float and RCV subs.	30.12.96
L2	3B	0,75	Wash & ream to 3122m.	30.12.96
L2	3B	0,75	Reaming to 3130m, no resistance.	30.12.96
		30,25	**Sum of Hours**	
			Cementation Plug Failure	
L4	15B	1,00	Test 9 5/8" casing, leaking off at 3000 psi.	28.12.96
L4	15B	0,50	Unable to test 9 5/8" casing.	28.12.96
A4	15B	1,00	Test 9 5/8" casing to 5000psi, OK.	28.12.96
A4	15B	1,00	Test 9 5/8" casing to 5000psi.	28.12.96
A4	5	1,00	Circulate bottoms up.	28.12.96
A4	5	0,50	Circulate well at maximum rate.	28.12.96
A4	6C	0,50	POOH BHA.	28.12.96
A4	6C	1,00	Make up 9 5/8" casing packer assembly.	28.12.96
A4	6C	1,00	Make up 8 1/2" bit and RIH slick assembly.	28.12.96
A4	6C	2,00	Continue handling 8 1/2" BHA.	28.12.96
A4	6F	2,50	POOH	28.12.96
A4	6F	2,25	Trip, drillstring to 2350m.	28.12.96
A4	6F	1,00	POOH	28.12.96
A4	6D	2,25	RIH to 1500m and set casing packer.	28.12.96
A4	6D	1,75	Unseat packer and RIH to 2390m, set packer.	28.12.96
A4	6D	0,25	RIH to 2400m	28.12.96
A4	6F	2,00	POOH and lay out packer assembly.	29.12.96
		21,5	**Sum of Hours**	
			Waiting on Equipment	
L1D	29A	8,00	Waiting on supply of piggy-back anchors. Boats preparing pennant wires.	03.12.96

L1D	29A	5,00	Waiting, Equipment, piggy-back anchors.	03.12.96
L2	29C	0,75	Waiting, Orders	07.12.96
		13,75	**Sum of Hours**	
			Waiting on Weather	
L1D	29B	2,00	Waiting, Weather	04.12.96
L1D	29B	13,50	Waiting, Weather (Anchor handlers preparing pennant wires.)	04.12.96
L4	29B	3,00	Waiting, Weather	12.12.96
L4	29B	6,50	Waiting on weather. Excessive heave to stab into hole.	13.12.96
		25	**Sum of Hours**	
			Surface Equipment Failure	
L4	42B	1,00	Repair Eagle Light pipe handler.	13.12.96
L4	42B	0,50	Repair Eagle Light pipe handler.	14.12.96
L2	42B	4,50	Change washpipe. Pressure test to 3000 psi. Observe leak at goose neck .	17.12.96
L2	42B	0,50	Reciprocate pipe while changing out both pop-offs.	25.12.96
L3	42B	0,25	Shorten sheave chain.	04.01.97
L14	8D	1,00	Change out washpipe.	03.01.97
L14	8D	0,75	Repair drilling equipment (change out saver sub and HWDP.)	07.12.96
L14	8D	1,50	Repair drilling equipment. (DDM hyd valve on rotating head.)	28.12.96
L4	28	2,50	R/U to run 14" casing	12.12.96
		12,5	**Sum of Hours**	

			Sub-Surface Equipment Failure	
L4	42A	1,00	Worked and rocked running tool until release facilitated.	09.12.96
L14	8B	0,50	Change out washed out connection.	10.12.96
L2	6F	3,00	Trip, drillstring checking for washout.	31.12.96
L14	6D	0,25	Short Trip and pull back to shoe.	10.12.96
L14	6D	0,25	Short Tripping, RIH to bottom.	10.12.96
L2	6D	0,25	Short Tripping	30.12.96
L4	13A	1,50	Problems with the running tool. Cannot turn into locked position.	22.12.96
L2	23	0,25	Wash out located 0.6m from pin end of drillpipe connection at 1536m.	31.12.96
L2	15F	0,25	Pressure test surface circ lines / eqpt OK.	31.12.96
L2	15F	0,25	Test drillstring and MWD, OK.	31.12.96
L5	12C	1,00	Unable to set bridge plug.	07.01.97
L5	12C	2,75	Set 13 3/8" bridge plug on wireline at 379m. Test to 1300psi, OK.	07.01.97
		11,25	**Sum of Hours**	
			Lost Time Other	
L14	29A	1,75	Waiting, ROV repair.	10.12.96
L4	42B	2,50	Repair ROV.	13.12.96
P2	29B	2,00	Unable to establish hole and marker buoy position with ROV due to poor,	06.12.96
		6,25	**Sum of Hours**	

7 REFERENCES

- Schlumberger End of Well Report
- Petroleum Engineering End Of Well Report - NSEP 97.03
- Drilling Programme - Steinbit 30/11-5, Exploration Well, SEPOD-1046.E
- HSE Case Steinbit
- Anadrill End of Well Report
- Baroid Spekkhugger close out report

8 ATTACHMENTS FROM WELLPLAN

- Activity Summary Report
- Activity Report by Phase
- Bit Performance Summary Report
- Bit Hydraulics Summary Report

A/S Norske Shell
Activity Summary Report

Well Name: Steinbit-30/11-5-J/lander-PL035 **Page:** 1

AFE Number: X035305E

Phase Summary

PH	Description	Hours	Days	%
1	Site Preparation, Mobilizatio	102.25	4.26	10.72
3	Conductor Hole	122.25	5.09	12.81
4	Surface Hole	148.25	6.18	15.54
5	Intermediate 1 Hole	310.75	12.95	32.57
8	Production Hole	169.00	7.04	17.71
12	P&A/TA	86.50	3.60	9.07
13	Rig Down, Demobilization, and	15.00	0.62	1.57
	TOTALS	954.00	39.75	100.00

Class Summary

	Hours	Days	%
PLANNED	740.50	30.85	77.62
LOST	137.25	5.72	14.39
TROUBLE	0.00	0.00	0.00
ADD	76.25	3.18	7.99

Class

CL	Description	Hours	Days	%
P1A	Site Preparation	2.75	0.11	0.29
P1B	RU, RD, Move, Skid Rig	33.00	1.37	3.46
P2	Drilling	373.75	15.57	39.18
P3	Formation Evaluation	40.25	1.68	4.22
P4	Casing/Cement	176.75	7.36	18.53
P5	P&A/TA	82.75	3.45	8.67
P11	Safety/Environment/Regulatory	0.25	0.01	0.03
L2	Drilling	56.50	2.35	5.92
L3	Formation Evaluation	2.00	0.08	0.21
L4	Casing/Cement	40.75	1.70	4.27
L5	P&A/TA	3.75	0.16	0.39
L14	Rig Mods/Repairs	5.75	0.24	0.60
A1B	RU, RD, Move, Skid Rig	22.00	0.92	2.31
A2	Drilling	36.00	1.50	3.77
A4	Casing/Cement	18.25	0.76	1.91
L1D		28.50	1.19	2.99
P1D		31.00	1.29	3.25

Operation

OP	Description	Hours	Days	%
1A	Rig In Transit	29.50	1.23	3.09
1B	Anchoring	31.25	1.30	3.28
1C	Position Rig	6.00	0.25	0.63
1D	Jack Up/Down	2.75	0.11	0.29
1E	Rig Up/Down Rig	0.75	0.03	0.08
1F	Skidding Rig	0.50	0.02	0.05
2A	Drilling, Rotary	200.50	8.35	21.02
2B	Drilling, W/Motor	86.25	3.59	9.04
3B	Reaming/Backreaming	12.00	0.50	1.26
5	Circulate & Condition	36.00	1.50	3.77
6A	Bit Trip	25.00	1.04	2.62
6B	BHA Trip	25.00	1.04	2.62
6C	BHA Handling	76.00	3.17	7.97
6D	Short Tripping	21.50	0.90	2.25
6F	Trip, Other	31.25	1.30	3.28
7	Lubricate Rig/Routine Mainten	4.00	0.17	0.42
8B	Repairs, Mechanical	0.50	0.02	0.05
9	Cut Drill Line	1.00	0.04	0.10
10	Directional Survey	11.75	0.49	1.23
11A	Logging, Open Hole	20.00	0.83	2.10
11B	Logging, RFT's	12.25	0.51	1.28
11D	Logging, Velocity Surveys	6.25	0.26	0.66
12A	Cementing, Primary	7.50	0.31	0.79
12C	Cementing, Plugs	11.50	0.48	1.21
12D	WO Cement	3.25	0.14	0.34
13A	Run Csg/Lnr/Tbg	75.00	3.12	7.86
14A	NU/ND BOP's	16.00	0.67	1.68
14B	NU/ND Wellhead	1.25	0.05	0.13
15A	Test BOP's	7.00	0.29	0.73
15B	Test Tubulars	3.75	0.16	0.39
15D	Test P&A/TA Plugs	0.75	0.03	0.08
15F	Test Equipment/Lines	6.00	0.25	0.63
17	Leak-Off Test/Fit	1.25	0.05	0.13
18	Flow Check	3.25	0.14	0.34
19	Working Stuck Pipe	2.25	0.09	0.24
22	Run/Pull Riser	12.25	0.51	1.28
23	PU/LD Tubulars	23.00	0.96	2.41
24	Run/Pull Wear Bushing/Test Pl	6.75	0.28	0.71
28	RU/MU/RD Equipment/Tools	31.00	1.29	3.25
29A	Waiting, Equipment	14.75	0.61	1.55
29B	Waiting, Weather	29.00	1.21	3.04
29C	Waiting, Orders	0.75	0.03	0.08
37	Safety Meeting	0.25	0.01	0.03
42A	Failure, Subsurface Equipment	1.00	0.04	0.10
42B	Failure, Surface Equipment	10.00	0.42	1.05
45	Other	30.75	1.28	3.22
		5.00	0.21	0.52
12E		1.25	0.05	0.13
2C		6.25	0.26	0.66

A/S Norske Shell
Activity Report By Phase

Well Name: Steinbit-30/11-5 Hander-PL035 **Page:** 1

AFE Number: X035305E

PH	Description	CL	Description	Hours	Days	%
1	Site Preparation, Mobilizatio	P1A	Site Preparation	2.75	0.11	2.69
		P1B	RU, RD, Move, Skid Rig	33.00	1.37	32.27
		A1B	RU, RD, Move, Skid Rig	22.00	0.92	21.52
		L1D		28.50	1.19	27.87
		P1D		16.00	0.67	15.65
3	Conductor Hole	P2	Drilling	30.00	1.25	24.54
		P4	Casing/Cement	40.00	1.67	32.72
		P11	Safety/Environment/Regulatory	0.25	0.01	0.20
		L2	Drilling	2.75	0.11	2.25
		L4	Casing/Cement	1.00	0.04	0.82
		L14	Rig Mods/Repairs	3.25	0.14	2.66
		A2	Drilling	27.75	1.16	22.70
		A4	Casing/Cement	17.25	0.72	14.11
4	Surface Hole	P2	Drilling	51.25	2.14	34.57
		P4	Casing/Cement	78.00	3.25	52.61
		L2	Drilling	1.25	0.05	0.84
		L4	Casing/Cement	17.75	0.74	11.97
	Intermediate 1 Hole	P2	Drilling	196.25	8.18	63.15
		P3	Formation Evaluation	5.75	0.24	1.85
		P4	Casing/Cement	58.75	2.45	18.91
		L2	Drilling	17.25	0.72	5.55
		L4	Casing/Cement	22.00	0.92	7.08
		L14	Rig Mods/Repairs	1.50	0.06	0.48
		A2	Drilling	8.25	0.34	2.65
		A4	Casing/Cement	1.00	0.04	0.32
8	Production Hole	P2	Drilling	96.25	4.01	56.95
		P3	Formation Evaluation	34.50	1.44	20.41
		L2	Drilling	35.25	1.47	20.86
		L3	Formation Evaluation	2.00	0.08	1.18
		L14	Rig Mods/Repairs	1.00	0.04	0.59
12	P&A/TA	P5	P&A/TA	82.75	3.45	95.66
		L5	P&A/TA	3.75	0.16	4.34
13	Rig Down, Demobilization, and	P1D		15.00	0.62	100.00

A/S Norske Shell

Bit Performance Summary Report

Well Name: Steinbit-30/11-5-Jlander-PL035 Page: 1

Number	Size in	MF	Type	IADC	MD m	Dist. m	Hrs.	ROP m/hr	WOB Min/Max klp	RPM Min/Max rpm	TORQ Min/Max ft-lbf	I	O	D	L	B	G	O	R
1	17.500	SM		111S	191	64	12.00	5.33	5.0	120	4000.0								
									15.0	140	4000.0								
1rr	17.500	SM		111S	231	40	10.75	3.72	5.0	60	4000.0	2	2	FC	A	2	I	NO	TD
									15.0	120	5000.0								
2rr	26.000	RD	S11	111S	228	9	2.00	4.50	10.0	70	0.0	1	1	NO	A	1	I	NO	TD
									20.0	1000	4000.0								
3	17.500	HT	MaxGT03	411C	1430	1199	38.75	30.94	0.0	80	3000.0	1	1	NO	A	E	I	NO	TD
									25.0	160	8000.0								
4	12.250	SM	M91X	M123	2205	775	37.75	20.53	0.0	0	0.0	3	6	WT	T	X	O	CT	PR
									25.0	120	5000.0								
5	12.250	CH	R535XLG4	M323	2222	17	4.25	4.00	0.0	0	2000.0	3	5	WT	G	X	O	CT	PR
									20.0	150	6000.0								
6	12.250	RD	EHP53AD	537	2597	375	59.25	6.33	10.0	85	0.0	2	4	BT	H	E	1	NO	PR
									50.0	110	4000.0								
7	12.250	SM	M37P	M433	3096	499	41.75	11.95	0.0	0	0.0	2	1	WT	N	X	I	NO	TD
									45.0	160	8000.0								
8	8.500	SM	M73	M223	3096	0	0.00	0.00	0.0	0	0.0								
									0.0	0	0.0								
9	8.500	RD	HP21G	215G	2400	0	0.00	0.00	0.0	0	0.0								
									0.0	0	0.0								
0	8.500	SM	M73P	M223	3122	24	1.50	16.00	15.0	60	0.0	1	1	SS	A	X	I	NO	BHA
									20.0	60	0.0								
10rr	8.500	SM	M73P	M223	3726	605	69.00	8.77	5.0	60	7.0	4	4	FC	A	X	2	SS	TD
									25.0	160	16.0								

A/S Norske Shell

Bit Hydraulics Summary Report

Well Name: Stelnbit-30/11-5-Jfander-PL035 Page: 1

Number	Size	MF	Type	Flow	Press	Jet Sizes 1	2	3	4	TFA	PD@Bit	%@Bit	MD	Pow/AA	Impact	Jet Vel.
	in			gpm	psi	32nd"				in2	psi		m	hp/in2	lbf	ft/s
1	17.500	SM		1050.0	1400	2 20	1 18	0	0 0 0	0.862	1197	85.49	191	3.0	1862.4	390.8
1rr	17.500	SM		1050.0	1600	2 20	1 18	0	0 0 0	0.862	1197	85.49	231	3.0	1862.4	390.8
2rr	26.000	RD	S11	1000.0	1700	3 20	0 0	0	0 0 0	0.920	952	56.03	228	1.0	1582.3	348.6
3	17.500	HT	MaxGT03	1080.0	2990	0 0	3 18	1	14 0 0	0.896	1173	39.26	1430	3.1	1896.2	386.8
4	12.250	SM	M91X	836.6	3473	7 13	0 0	0	0 0 0	0.907	918	26.36	2205	3.8	1502.9	295.8
5	12.250	CH	R535XLG4	795.0	3200	3 14	3 15	0	0 0 0	0.969	725	22.64	2222	2.9	1266.9	263.3
6	12.250	RD	EHP53AD	792.4	3837	3 18	0 0	0	0 0 0	0.746	1233	32.14	2597	4.8	1658.9	341.0
7	12.250	SM	M37P	802.1	3830	4 10	4 14	0	0 0 0	0.908	843	22.02	3096	3.3	1381.8	283.4
8	8.500	SM	M73	0.0	0	0 0	0 0	0	0 0 0	0.000	0	0.00	3096	0.0	0.0	0.0
9	8.500	RD	HP21G	0.0	0	3 32	0 0	0	0 0 0	2.356	0	0.00	2400	0.0	0.0	0.0
10	8.500	SM	M73P	496.0	3700	6 11	0 0	0	0 0 0	0.557	835	22.57	3122	4.3	839.5	285.8
10rr	8.500	SM	M73P	545.7	3650	6 11	0 0	0	0 0 0	0.557	1019	27.96	3726	5.7	1024.1	314.4

9 FIGURES

Figure 1. Well Status Diagram Steinbit 30/11-5

Figure 1

ABANDONMENT WELL STATUS DIAGRAM

Steinbit 30/11-5

Date Spudded:	05.12.96	Well coordinates:	6 668 054.4 m N	Tbg. vol to Top Perf:	n/a	Well no:	30/11-5
Date Abandoned:	08.01.97		475 929.5 m E	Tbg. vol. to ELTSR ports:	n/a	Production Licence no:	PL036
Re-entered:		Rig:	Maersk Jutlander	Ann. Vol. to SAB-3 packer:	n/a	Well type:	Vertical Exploration
Completed:		DFE:	23.2 m	Annular fluid:	n/a	Reservoir:	Upper Jurassic
Drilling Fluid (intermediate):	BARASILC	KOP (AHBDF):	n/a			Res. Pressure:	
Drilling Fluid (reservoir):	KCl/Polymer	Max. Dev. (recorded):	8.3° @ 3561 m	Completion fluid:	n/a	Res. Temperature:	
Mud Weight:	1.32 SG	Min ID:	8.5" @ open hole			Date Perf.:	n/a
Weight Material:	Barite	Max. Dogleg:	1.5° @ 3423 m			Drillers T.D.:	3726 m

Wellhead Data

Item	Rating	Notes
Dril-Quip SS - 15	10000	
30" Wellhead Housing	2000	P/N 380006-02
18.3/4" Wellhead	15000	S/N RW5029
(Wellhead and Housing retieved on abandonment)		

Casing Scheme

Size (in)	Wt (lbs/ft)	Grade	Couplings	AHBDF (m)	TVBDF (m)	TTOC (m)	Annular Fluid	EMMG (SG)
30	310	X52	RL4	225	225	Seabed	Cement	not tested
20	(x-over from wellhead to 14")			131.5	131.5			n/a
14	93/86	Q125	BTC	1419	1419	Seabed	Cement	1.66
9.5/8	47	L80	NSCC	(x-over @ 1887 m)		2380	Mud	n/a
9.5/8	53.5	C95	VAM ACE	3090	3090		Cmt/mud	not tested

Depth m ahbdf	Depth m tvbdf	Inc. (deg.)	Downhole Schematic	Description	Formation	Top Depth AHBDF	Completion Dimensions Min ID	Completion Dimensions Max OD
(124.5)	(124.5)			(Top of 18.3/4" Wellhead, retrieved)				
(125.5)	(125.5)			(30" Wellhead Housing, retrieved)				
127	127	0		Seabed				
131	*131*			*20" & 30" Casings Cut*		Seabed		
131.5	131.5			20" x 14" Cross-Over				
180	*180*			*Top of Cement Plug*				
225	225			30" Conductor Shoe (36" section TD: 225 m)				
228	228			26" Clean-out Run				
					Nordland - Group			
380	*380*	*1.1*		*14" csg Bridge Plug*				
394	*394*			*9.5/8" Casing Cut*				
1419	1419	1.4		14" Casing Shoe (17.1/2" section TD: 1430 m)				
					Hordaland - Group			
				12.1/4" Hole Section				
					Balder	2168		
					Sele	2229		
				(Top of cement appr. 2380 m)	Lista	2309		
					Vaale	2465		
					Shetland Group	2560		
2948	*2948*			*9.5/8" csg Bridge Plug*				
3000	*3000*	*0.8*		*Top of 2nd Cement Plug*				
				(Bottom of annulus cement appr. 3042 m)	Cromer Knoll	3071		
3090	3090	1.0		9.5/8" Casing Shoe (12.1/4" section TD: 3096 m)	Draupne	3079		
3200	*3200*	*1.5*		*Top of 1st Cement Plug*	Heather	3108		
				8.1/2" Hole Section	Tarbert	3248		
3450	*3450*	*4.8*		*Top of viscous pill*	Ness	3384		
3560.6	3560.6	8.32		Last MWD Survey				
3726	3726			Total Depth	Drake	3712		

Perforation Data

Objectives	Perf. Int.	Gun details

Logging Data

Contractor	Details	Date
Anadrill GR-Res		continuous
Schlumberger NGT/CNT/LDT/SRT/FDT		04.01.97
Schlumberger VSP		04.01.97
Schlumberger RFT		05.01.97

Survey Data

Type	Details	Date
Teledrift inclination	127 - 225 m	continuous
Anadrill MWD	225 - 649 m	continuous
Teledrift inclination	649 - 1348 m	continuous
SDC Keeper Gyro	127 - 1347 m	16.12.96
Anadrill MWD	1347 - 2628 m	continuous
Magnetic Single Shots	2736 - 3082 m	continuous
Anadrill MWD	3130 - 3560 m	continuous

Note:

Drawn by: Tim Tennessen/Anne Idsøe/Harald Nevøy Checked by: Alan Busby/Ian Mills Date: 22.01.97

STEI_FWS.XLS, 30.01.97

10 ENCLOSURES

- **Borehole Survey Summary Report**
- **Survey Listing and Well Plot**

Client:	A/S NORSKE SHELL
Field:	STEINBIT
Well Name:	30/11-5
Permanent datum	MSL
Depth measured from	DRILL-FLOOR
Elevation of kelly bushing	23.16 M
Elevation of drill floor	23.16 M
Elevation of ground level	-104.00 M
Total Correction	-3.81 DEG

TIE IN POINT

Measured depth	127.00 M	Inclination	0.00 DEG
True vertical depth	127.00 M	Azimuth	0.00 DEG
N/S disp (-ve for S)	0.00 M	Azimuth from rotary table	
E/W disp (-ve for W)	0.00 M	to the target	245.00 DEG

Minimum Curvature Method

MEASURED DEPTH	INTERVAL	VERTICAL DEPTH	TARGET SECTION	STATION INCLN.	AZIMUTH	LATITUDE N/-S	DEPARTURE E/-W	DISPLA-CEMENT	at AZIMUTH	DLS
M	M	M	M	DEG	DEG	M	M	M	DEG	D/DM
127.0	0.00	127.00	0.00	0.00	0.0	0.00	0.00	0.00	0.00	0.00
270.5	143.50	270.49	1.30	1.04	246.7	-0.52	-1.20	1.30	246.70	0.07
299.1	28.60	299.09	1.77	0.83	236.0	-0.73	-1.61	1.77	245.45	0.10
327.7	28.60	327.69	2.17	0.79	242.0	-0.94	-1.95	2.17	244.24	0.03
357.2	29.50	357.18	2.65	1.09	250.2	-1.13	-2.40	2.65	244.70	0.11
387.6	30.40	387.58	3.21	1.07	227.6	-1.42	-2.88	3.21	243.70	0.14
415.9	28.30	415.87	3.53	0.41	200.5	-1.69	-3.11	3.54	241.39	0.26
445.4	29.50	445.37	3.72	0.43	250.3	-1.83	-3.25	3.73	240.60	0.12
475.0	29.60	474.97	3.89	0.35	194.6	-1.96	-3.38	3.90	239.92	0.13
504.4	29.40	504.37	4.04	0.49	204.1	-2.16	-3.45	4.07	237.98	0.05
533.3	28.90	533.27	4.23	0.38	248.7	-2.31	-3.59	4.27	237.29	0.12
561.7	28.40	561.67	4.40	0.33	221.2	-2.40	-3.73	4.44	237.24	0.06
591.5	29.80	591.47	4.46	0.29	144.7	-2.53	-3.74	4.52	235.99	0.13
621.1	29.60	621.07	4.49	0.18	233.0	-2.62	-3.74	4.56	235.02	0.11
649.4	28.30	649.37	4.51	0.20	122.3	-2.67	-3.73	4.59	234.43	0.11
678.2	28.80	678.17	4.52	0.89	324.4	-2.51	-3.82	4.57	236.65	0.37
708.1	29.90	708.06	4.58	1.11	332.1	-2.07	-4.09	4.58	243.16	0.09
737.4	29.30	737.36	4.59	1.18	336.9	-1.54	-4.34	4.61	250.46	0.04
1435.3	697.90	1435.19	7.65	1.44	177.1	-3.69	-6.72	7.66	241.22	0.04
1457.6	22.30	1457.48	7.85	1.54	173.1	-4.27	-6.67	7.92	237.38	0.06
1485.3	27.70	1485.18	8.03	1.43	165.7	-4.97	-6.54	8.21	232.75	0.08
1513.5	28.20	1513.37	8.22	1.48	175.4	-5.68	-6.42	8.57	228.53	0.09
1541.1	27.60	1540.96	8.42	1.54	167.3	-6.39	-6.31	8.98	224.63	0.08
1571.8	30.70	1571.65	8.64	1.55	173.3	-7.21	-6.17	9.49	220.58	0.05
1599.3	27.50	1599.14	8.83	1.50	166.2	-7.93	-6.04	9.97	217.32	0.07
1630.6	31.30	1630.42	9.04	1.54	174.2	-8.74	-5.90	10.55	214.03	0.07
1658.4	27.80	1658.22	9.30	1.47	176.0	-9.47	-5.84	11.13	211.66	0.03
1689.6	31.20	1689.41	9.53	1.30	169.3	-10.22	-5.75	11.72	209.36	0.08
1718.4	28.80	1718.20	9.72	1.22	176.9	-10.84	-5.67	12.24	207.60	0.06
1748.0	29.60	1747.79	9.91	1.30	167.7	-11.49	-5.58	12.77	205.91	0.07
1778.7	30.70	1778.48	10.12	1.30	177.7	-12.18	-5.49	13.36	204.28	0.07
1807.7	29.00	1807.48	10.35	1.19	174.8	-12.80	-5.45	13.92	203.07	0.04
1836.9	29.20	1836.67	10.57	1.20	177.2	-13.41	-5.41	14.46	201.97	0.02
1866.2	29.30	1865.96	10.87	1.43	184.7	-14.08	-5.42	15.09	201.07	0.10
1895.4	29.20	1895.15	11.21	1.28	184.3	-14.77	-5.48	15.75	200.35	0.05
1924.2	28.80	1923.95	11.52	1.41	180.2	-15.45	-5.50	16.40	199.62	0.06
1953.6	29.40	1953.34	11.86	1.40	186.6	-16.16	-5.55	17.09	198.94	0.05
1982.3	28.70	1982.03	12.26	1.64	187.5	-16.92	-5.64	17.83	198.44	0.08
2012.4	30.10	2012.12	12.72	1.65	186.4	-17.78	-5.75	18.68	197.91	0.01
2041.0	28.60	2040.70	13.16	1.62	188.5	-18.59	-5.85	19.49	197.47	0.02

Minimum Curvature Method

MEASURED DEPTH M	INTERVAL M	VERTICAL DEPTH M	TARGET SECTION M	STATION INCLN. DEG	AZIMUTH DEG	LATITUDE N/-S M	DEPARTURE E/-W M	DISPLA- CEMENT M	at AZIMUTH DEG	DLS D/DM
2100.1	59.10	2099.78	14.17	1.65	195.2	-20.23	-6.20	21.16	197.03	0.03
2160.0	59.90	2159.65	15.30	1.66	196.2	-21.90	-6.67	22.89	196.93	0.01
2217.3	57.30	2216.93	16.43	1.69	198.7	-23.50	-7.17	24.56	196.97	0.01
2276.4	59.10	2276.01	17.60	1.40	206.7	-24.97	-7.77	26.15	197.29	0.06
2335.5	59.10	2335.09	18.73	1.21	221.4	-26.08	-8.51	27.43	198.07	0.06
2395.0	59.50	2394.58	19.95	1.28	230.0	-26.98	-9.43	28.58	199.27	0.03
2453.3	58.30	2452.87	20.67	0.23	281.8	-27.37	-10.05	29.16	200.16	0.20
2511.6	58.30	2511.17	20.33	0.98	35.2	-26.94	-9.87	28.69	200.13	0.19
2570.0	58.40	2569.56	19.44	1.10	29.7	-26.05	-9.31	27.66	199.67	0.03
2628.3	58.30	2627.85	18.66	1.02	14.1	-25.06	-8.90	26.59	199.56	0.05
2736.0	107.70	2735.54	17.62	0.90	6.0	-23.29	-8.58	24.82	200.23	0.02
2824.0	88.00	2823.53	17.19	0.25	356.0	-22.41	-8.52	23.97	200.83	0.07
2912.0	88.00	2911.53	17.48	0.50	266.0	-22.24	-8.92	23.96	201.85	0.06
2999.0	87.00	2998.53	18.41	0.75	241.0	-22.54	-9.80	24.58	203.49	0.04
3062.0	63.00	3061.52	19.34	1.00	226.0	-23.13	-10.55	25.42	204.53	0.05
3101.0	39.00	3100.51	20.05	1.21	228.5	-23.64	-11.11	26.12	205.17	0.06
3129.6	28.60	3129.11	20.61	1.06	241.0	-23.96	-11.56	26.61	205.76	0.10
3158.5	28.90	3158.00	21.16	1.14	244.7	-24.22	-12.06	27.05	206.47	0.04
3189.7	31.20	3189.19	21.83	1.32	251.2	-24.47	-12.68	27.56	207.39	0.07
3218.9	29.20	3218.38	22.54	1.50	256.0	-24.67	-13.37	28.06	208.46	0.07
3246.0	27.10	3245.47	23.23	1.47	256.8	-24.83	-14.05	28.53	209.50	0.01
3277.1	31.10	3276.56	24.10	1.78	249.4	-25.09	-14.89	29.18	210.69	0.12
3306.1	29.00	3305.54	25.12	2.24	247.5	-25.47	-15.84	29.99	211.87	0.16
3334.5	28.40	3333.92	26.35	2.73	247.1	-25.94	-16.97	31.00	213.19	0.17
3363.8	29.30	3363.18	27.85	3.17	245.3	-26.55	-18.35	32.28	214.65	0.15
3394.1	30.30	3393.43	29.62	3.50	244.1	-27.31	-19.94	33.81	216.14	0.11
3422.8	28.70	3422.06	31.51	4.07	243.2	-28.15	-21.64	35.51	217.55	0.20
3453.6	30.80	3452.77	33.90	4.83	244.7	-29.20	-23.79	37.66	219.17	0.25
3481.4	27.80	3480.46	36.42	5.56	245.6	-30.25	-26.07	39.94	220.76	0.26
3511.4	30.00	3510.29	39.56	6.49	246.6	-31.53	-28.95	42.80	222.56	0.31
3539.8	28.40	3538.48	43.04	7.56	246.8	-32.90	-32.14	46.00	224.33	0.38
3560.6	20.80	3559.08	45.91	8.32	246.2	-34.05	-34.78	48.67	225.61	0.37