A/S NORSKE SHELL E & P

OPERATIONAL END OF WELL REPORT
WELL 26/4-2, BELUGA PROSPECT
PL266, SOUTH VIKING GRABEN.

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1 Scope

The scope of this document is to summarise the operational experiences related to the execution phase of well 26/4-2 (BELUGA PROSPECT) SOUTH VIKING GRABEN, according to the requirement laid down in the REGULATIONS RELATING TO MATERIAL AND INFORMATION IN THE PETROLEUM ACTIVITIES (THE INFORMATION DUTY REGULATIONS), Chapter III Material and Information to be submitted, Section 7 – where the Guidelines letter g) refers to NORSOK D-010 chapter 4.17.

This operational end of well report refers to details found in the WELL PROGRAMME 26/4-2 Beluga (EP200402200031), signed 18.03.2004 which was prepared on the basis of the WELL FUNCTIONAL SPECIFICATIONS (WFS) (EP200402200017) signed 24.02.04.

The well programme should further be read in conjunction with APPLICATION FOR CONSENT FOR USE OF THE DEEPSEA DELTA FOR EXPLORATION DRILLING AT PL266 (signed 05.02.2004) and the DISCHARGE APPLICATION (Søknad om tillatelse til operasjonelle utslipp til sjø ifm. med boring av en letebrønn i blokk 26/4 (PL 266 – Beluga), dated 06.02.04).

Reference is also made to the uncontrolled document Detailed Drilling Guidelines 26/4-2 Beluga_rig revision, which contains the daily work orders issued at the wellsite during the execution phase.

2 Requirements

The contents of this document conforms to NORSOK D-010 chapter 4.17.3 and contains information on the following:

- Work objective and results
- Conclusions and recommendations
- Well description
- Significant deviation from the original programme, established operational procedures or legislation
- Job review
- Cost breakdown, comparison to planned cost
- Time breakdown and analysis
- Environmental impact

Note: The geological and reservoir technical data will be reported according to the requirements in the REGULATIONS RELATING TO RESOURCE MANAGEMENT IN THE PETROLEUM ACTIVITIES (RESOURCE MANAGEMENT REGULATIONS), CHAPTER 5, SECTION 24 in a separate report.

3 Work objective and results

The primary objective of well 26/4-2 was to

- Determine the presence of commercial volumes of hydrocarbons within the Hermod sands of the Beluga stratigraphic trap.
- Obtain sufficient data of good quality to quantify the volume of hydrocarbons present.
- Fully characterise the stratigraphy in the well bore.
- Obtain a high quality sample of any moveable hydrocarbons.

The well encountered 46m of water-bearing Hermod sandstone with a mean porosity of 31%. There were no indications of hydrocarbons from cuttings or wireline logs. The well was plugged and abandoned on completion of a modest data gathering programme and the rig moved off location almost 10 days ahead of schedule.

The operation was a technical success with all work, including wireline data acquisition concluded within time and budget.
The project duration was 15.21 days and the well cost 36.97MNOK in total.

With reference to the DRILLING 26/4-2 BELUGA WELL PROPOSAL, the preliminary interpretation of the subsurface data indicates the following:

Parameter	Result
STOIIP	Zero
Reservoir Quality HERMOD	As expected

For further information regarding the geological results reference is made to FINAL WELL REPORT EP200402200031.

4 Conclusions and recommendations

The technical execution of the well programme was carried out successfully with operations being completed close to 10 days and 13 Million NOK under plan.
Many operations set new best composite well times for the company locally, this was likely largely due to the timing of the well, building on the lessons learned from previous similar wells in the area, solid planning and preparation and a very much can do attitude from the drilling contractor.
Lost time could have been planned out on a couple of occasions,

1) 8.5 hours was lost due to an additional unplanned run with Red Baron's dual cutter assembly. It was found that the problem did not lie with the tool but the operational procedure being followed, the rate being pumped through the motor and tool was insufficient to make the cut.
2) 4.5 hours were lost drilling out spinning 9-5/8" cement plugs. More cement in place here or the use of a Shark Bite plug retainer could have avoided this.

One major lost time event was avoided by good preparation, a BOP specialist discovered a damaged choke line connector on the BOP in time to have it sent onshore and a repair made (twice) and sent back offshore before being required for the section. If the problem was not caught as it was it could have cost the company weeks of time.

The operation almost had a delayed start due to poor IT support. In Norwegian operations IT should have local support during mob and demob. Non GID computers should be made available to the ODE as a back up in case of severe IT problems.

The overall specific HSE targets of zero Lost Workday Cases, zero Total Recordable Case Frequency, zero Oil Spill to the Environment, more than 60% Non-hazardous Waste Recycling, and zero Lost Days due to Occupational Health Problems were also met.

The health and safety achievements was due to good management, with safety leadership events run, management and safety expert visits, offshore coaching by OWEs and the use of safety systems such as RUH and STOP.

All in all, the project was well planned and executed. The technical solutions can be recommended for similar wells in the future, and with minor operational adjustments a better performance should be expected.
Communication could however be improved upon as the majority of minor issues in the well arose from poor communication. Examples of poor communication include last minute changes to the abandonment cement plug program, not knowing the rate required to cut the casing and wellhead, the wrong calliper log being on the rig and Schlumberger logging tools not being called off using there agreed system.

5 Well description

Licence	PL 266	
Name of Field (Prospect)	26/4-2	
Partners	A/S Norske Shell	30%,
	Norsk Hydro	30%,
	RWE-Dea	30%,
	Paladin Resources	10%
Well name	26/4-2 Beluga	
NPD registration number		
Type of well	Vertical exploration well	
Latitude	59° 44' 22.044 N	
Longitude	03° 06' 03.757" E	
UTM coordinates	6622554.2mN	
	505680.5mE	
Rig name / type	Deep Sea Delta / semi-submersible	
Drillfloor elevation	29 m above MSL	
Water depth	131.0 m MSL	
Target reservoir	Intra Sele Formation Hermod Sandstones	
Top Hermod Sandstone	2040 m TVD RKB (5 m deeper than prognosed)	
Field oil-water contact	N/A (Zero hydrocarbons present)	
Spud date	13th April 2004	
Total Depth (Driller's depth)	2302m TVD RKB, 21st April 2004	
Well status	Permanently abandoned	

6 Significant deviation from the original programme, established operational procedures or legislation

None to report…

7 Environmental Impact

One minor spill to the environment was reported during the project.

Summary:
On April 18, 2004 water based mud was being sheared onboard the Deepsea delta during this operation 7.7 cubic meters of spud mud was lost to sea (total volume of chemicals lost overboard excludes seawater was less then 1 $m^{3)}$. Following the incident it was been decided that a water based mud system should be run using the same precautions as an oil based mud system.

Incident:
Mud pumps #1 and #2 were pumping seawater around what was supposed to be a closed loop on the yellow line.
Mud pump #3 was pumping mud from and to two active pits again using the yellow line.
During a ten minute period, 7.7bbl of fresh water based mud was discharged to sea.
All valves which were planned to be closed were confirmed to be so by the derrick man.
There were 3 valves leading to overboard which were intentionally left open as per what was the drilling contractors normal procedures when running a water based mud system, 2 valves on the discharge line of the gumbo box and one vent valve on the blue standpipe manifold.
Upon investigation the discharge to sea was found to be due to 1 to 3 valves leaking into the blue line and onwards to an overboard route. The spill took time to be seen as a drop in 1 to 2 cubic meters at any one time across 2 active pits is difficult to notice.
The spill did not have to be reported directly to the authorities as the volume of it composition excluding seawater was less then 1 cubic meter of “green” chemicals.

Outcome:
Since the loss of this spud mud it was decided when running a water based mud system the same procedures should be followed as when running an oil based system. If this would have been in place the overboard dump lines and the vent valves would have been closed to allow a double block system.

8 Health and Safety

No harm was done to any person throughout the operation. Leadership can be seen to have played a large part in the success of the operation

Highlights

A pre operational 3 day safety leadership event was held with all crews and Esso (as Esso was taking rig after Shell for an extended period) using’s Esso’s TATO (Take Two Minutes For Safety) theme. The event allowed both companies to emphasize the need for safety early in the project to all crews.

Management visited the rig early in the project to discuss safety expectations again to emphasize its importance.

Offshore Visit from Safety and Lifting specialists allowed a review of:

- DROPPS (felt to be very pertinent due to large amount of automated equipment in Derrick)
- Crane and deck operations
- Hoisting and Lifting operations
- Helicopter Operations against Shell Standards

Good Coaching from Offshore supervisors on basic safety:

- Safety First Stressed to crews prior to spud
- Working at height
- House Keeping

- PPE

Excellent Use of RUH and STOP. The STOP system was carried on by Odfjell following success seen using it with there previous operation with Marathon.

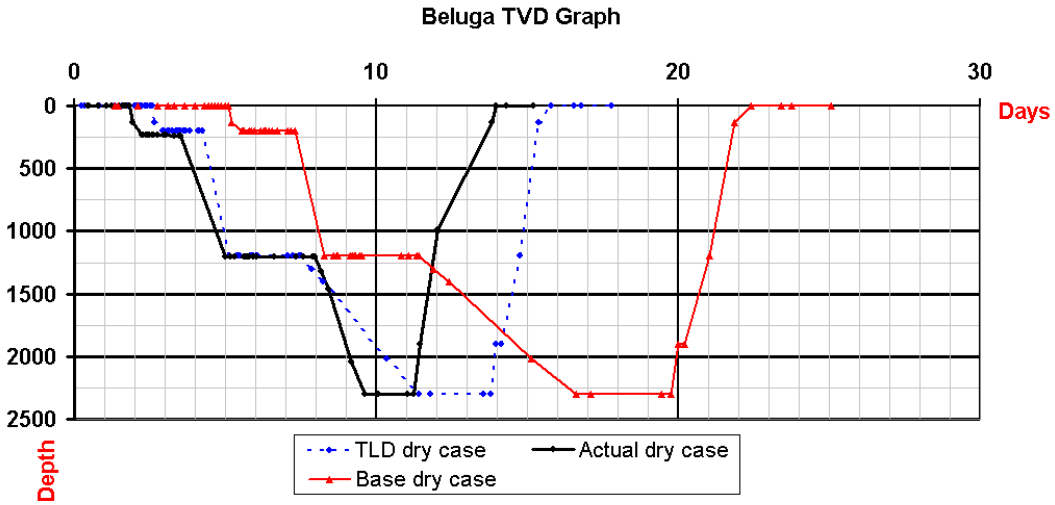
Additional deck crew were added to the crew during mobilization to ease the workload.

Lowlights

Two 3rd party personnel arriving at Helicopter without HUWET done were allowed to travel under dispensation to Shell's rule.

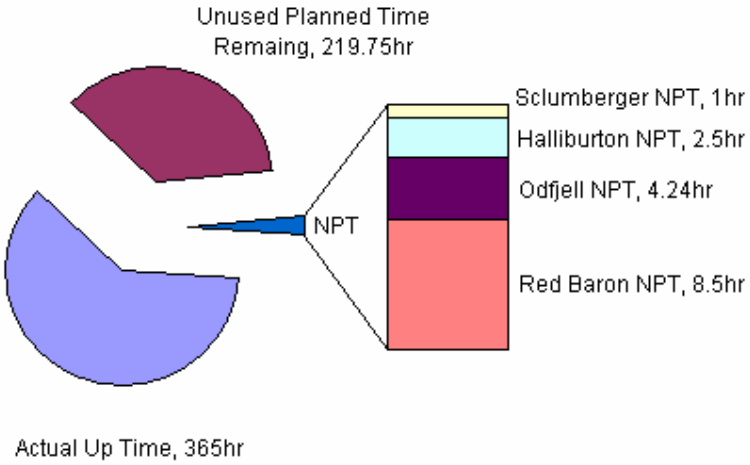
9 Time Performance analysis

The objective was achieved in 15.21 days, 85.5% of previously agreeed technical limit time, compared to a base time of 25.09 days.



Many operations were carried out at or quicker then the previously agreed technical limit rate. These included drilling the 36" hole, running and cementing conductor and drilling the 8-1/2" hole. Efficiency was also served through fewer surveys and the need for less logging due to the dry hole case.
A posistive "can do" attitude was seen from the drilling contractor throughout, enabling good performance.
NPT resulted in 4.7% of the total time spent on the project compared to a company target of 24%.

Chart of Planned and Actual Times



The largest single NPT event of 8.5 hours was due to an additional unplanned run with Red Baron's dual cutter assembly. The wellhead was not being freed from the conductor and casing, the tool was pulled for inspection. It was found that the problem did not lie with the tool but the operational procedure being followed, the rate being pumped through the motor and tool was insufficient to make the cut. The tool was re run and the flow rate increased and the operation carried out successfully.
Two other sizable lost time events included:
Losing 4.5 hours drilling out the 9-5/8" plugs as these were spinning. More cement in place here or the use of a Shark Bite plug retainer could have avoided this.
The driller accidentally allowed the elevators to strike the upper racking arm, which resulted in 2.5 hours lost to replace the sheared shear pins (designed protection system).

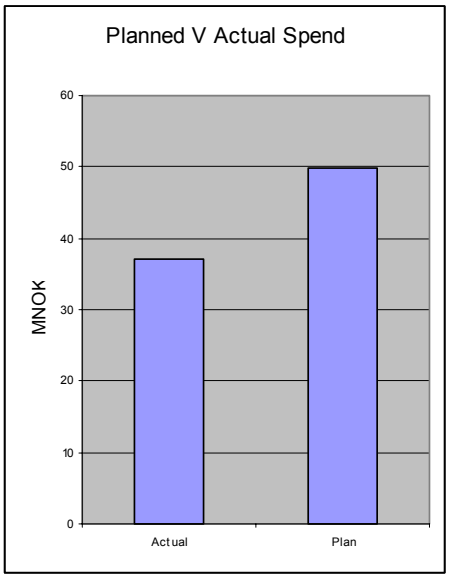
As previously mentioned, one major lost time event was avoided by good preparation, a BOP specialist discovered a damaged choke line connector on the BOP in time to have it sent onshore and a repair made (twice) and sent back offshore before being required for the section. If the problem was not caught as it was it could have cost the company weeks of time. It's recommended that similar checks should be continued in future.

A detailed time break down is given separately in tabular format with further narrative where required for each section. The breakdowns give target, budget, actual, productive, lost and down time.

10 Cost Performance analysis

Plan Versus Actual Spend (Nok)

Cost Object	Plan	Actual
Onshore Timewriting	495180	282072
Offshore Timewriting	792288	337125
General / Fixed	2816982	3569360
Time Related	23019165	14724430
Rig Move	5377500	3087813
36" Section	1567660	1767861
12-1/4" Section	2367721	2242017
8-1/2" Section	6084893	4311035
Abandonment	196920	314109
Draeger - Kontroll	0	16869
Logistics timewriting	168000	100520
Supply base services	2152500	1583269
Supply vessels	1333000	988238
Standby vessels	1500000	794706
Weather services	0	16320
Harbour & pilot services	50000	0
Helicopter services	933000	1028154
SAR services - Air	300000	0
Fuel and lubricants	216000	893840
Waste handling	250000	184648
Container Rental	200000	97644
TOTAL	49820809	36972732



The total cost of 36.97 MNOK represents a saving of near 13 MNOK on the plan. The cost saving was largely a reflection of time saved though excellent operational performance, a large saving was also seen from a low in the vessels market allowing these to be hired at 40000 NOK per day.
SAP Blueprint was used to plan, monitor and report costs throughout the project without any issue.

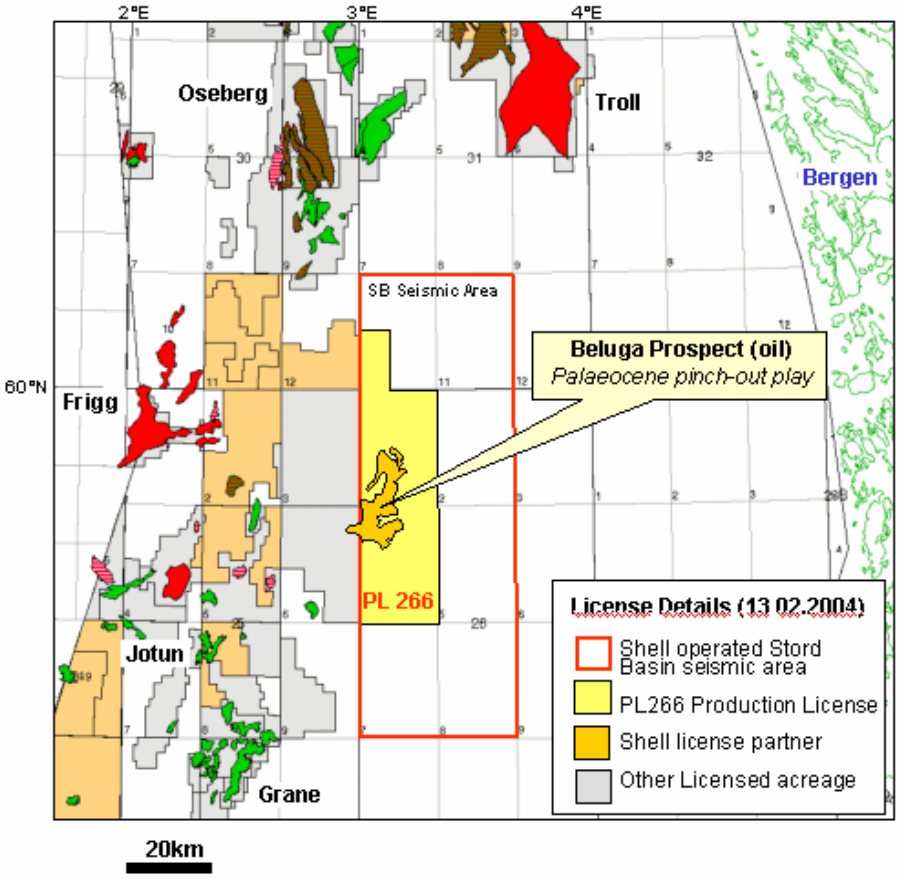
11 Job overview

To complement the above a complete listing of the lessons learned is included along with a summary listing of the DIMS daily reports, bit records, BHA records, drilling fluids summary, cementing reports and full survey listing, refer to Appendices A through F respectively.

11.1 Preamble

The Beluga exploration well was located on the eastern margin of the South Viking Graben, about 110 km off the Norwegian coast between Bergen and Haugesund. The area to the west of the licence is a prolific petroleum province with several producing fields and discoveries within the Jurassic (Frøy, Byggve and Skirne, 25/6-1 discovery) and Tertiary (Heimdal, Frigg, Frigg satellites, Jotun, Balder and Grane) sections.

Location Map

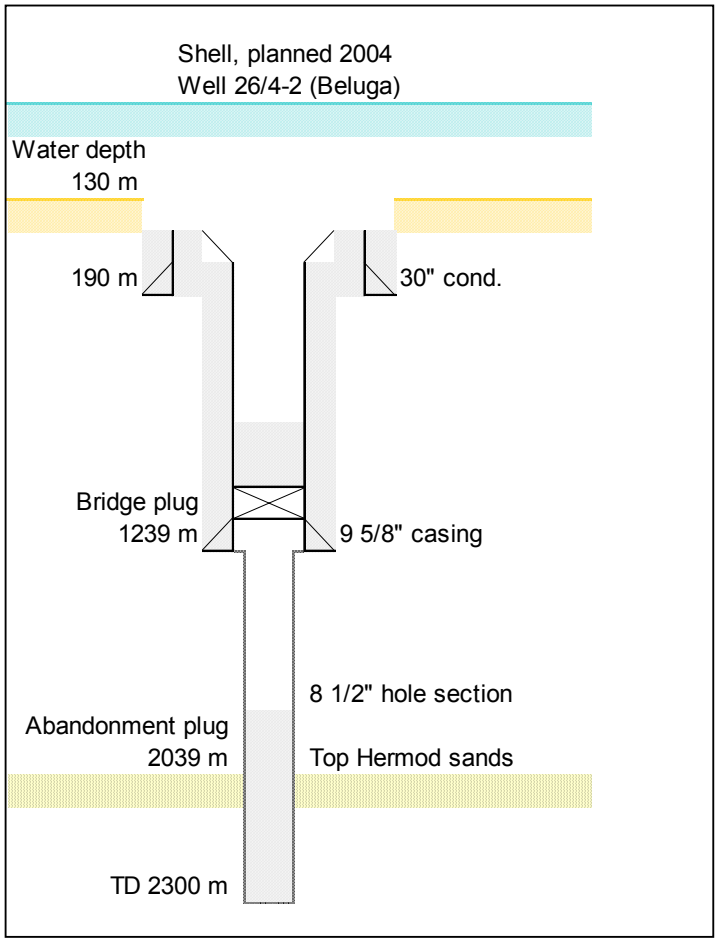


The well was drilled with Odfjell using the Deepsea Delta on a single well campaign. The design drew heavily from the successful Garn Central North well drilled with the Stena Don 2003. The Garn Central North well was based on learnings from the successful Draugen South and Hasselmus wells drilled with the Mersk Jutlander in 1999.
The well was planned with the premise that subsurface drilling risks were well understood and so allowed for operational optimisation. The well used a slim design and used no oil based mud to avoid the requirement to skip and ship and used a novel abandonment approach.
The Well Functional Specifications were relaxed as far as possible for directional and logging requirements.
This document forms:
The drilling end of well report (formation evaluation results will be reported separately)

Summary of the well after action review conducted with Odfjell, Schlumberger, Halliburton, MI, Red Baron, Security DBS, Smith along with Shell management and subsurface people.

The intended audience is those involved in the planning and execution of similar wells in the future. It is important to read the well program to make best advantage of this document.

11.2 Plan



36" section

The 36" hole was planned to be drilled using a 17½" bit and a 2-stage hole opener using seawater and sweeps. The hole would be displaced to bentonite mud on reaching TD to keep the hole open.
A 30"x1" conductor would be run to 215 m with the conductor housing landed on seabed and the conductor cemented to surface.

12-1/4" Section

The section was planned to be drilled vertical from shoe of the conductor to above a pressurised Hordaland clay shale sequence using no riser with seawater and sweeps.
For stability the hole should be displaced to bentonite mud at TD and MWD should be used for directional control.
The 9⅝" casing should secure the section and be crossed to 20" at seabed for the installation the Dril-quip 18¾" 10 K wellhead housing. The casing should be cemented to seabed and the BOP and riser installed.

8½" section

The section should be drilled through the over pressured shales of the Hordaland Group to reach the objective Hermod sandstone reservoir. If any shows of hydrocarbon should have been seen, the reservoir would be cored otherwise drilling should continue and TD in the Shetland formation.
A formation Integrity test to 1.58 sg EMW was planned to allow a 50 bbl swabbed gas kick from top reservoir using a 1.28 sg mud weight although gas was not expected in the section. The formation integrity test was planned to 1.70 sg EMW to allow a larger drilling window.
A 1.28 sg Glydril (an MI product) water based mud system was selected for the application. Glydril is a shale inhibitive KCL-mud with 4% glycol. Glydril has been used extensively in the area for drilling of these formations. A Minimum mud weight was planned to keep the overbalance in the reservoir to a minimum and was allowed by the vertical wellbore.
The shales were expected to be overpressured up to a maximum of 1.20 sg at 1450 mTVDMSL. The selected mud weight was expected to result in a formation overbalance of 5.5 bar (80 psi) and sufficient riser margin. The Hermod reservoir sand reservoir was expected to be sub hydrostatic resulting in 64 bar overbalance using the selected mud weight. In the success case it could have been desirable to drill a sidetrack. The main bore would then be plugged back and a kick-off plug will be set into the 9⅝" casing shoe.

Well Test

No test was planned.

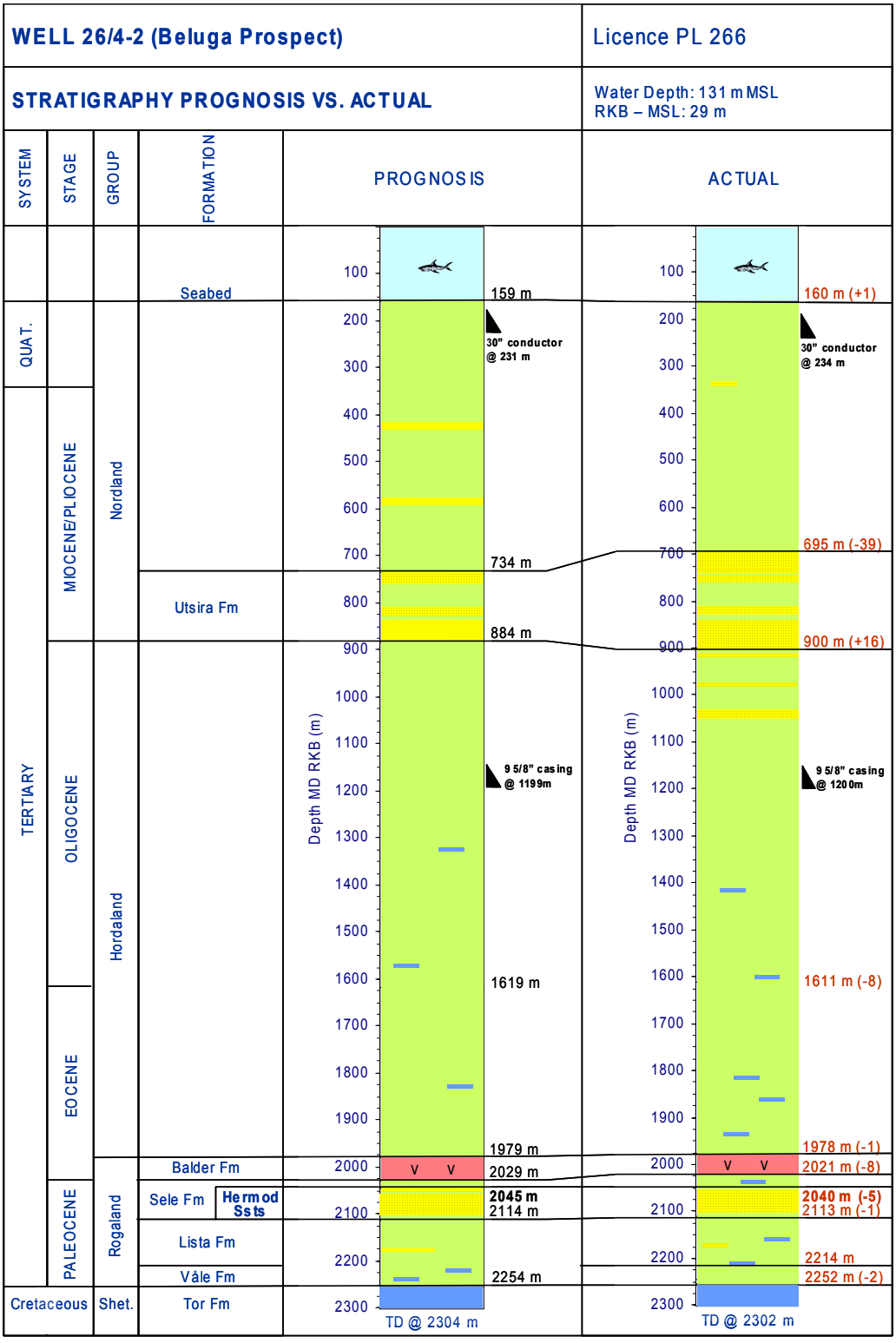
Abandonment

A cement plug should be set across the reservoir with the top of the plug being a minimum of 100 mTV above top reservoir to be verified as a barrier. A bridge plug should be set in the bottom 9⅝" casing and the plug should be pressure tested. Cement should be spotted on top of the bridge plug.

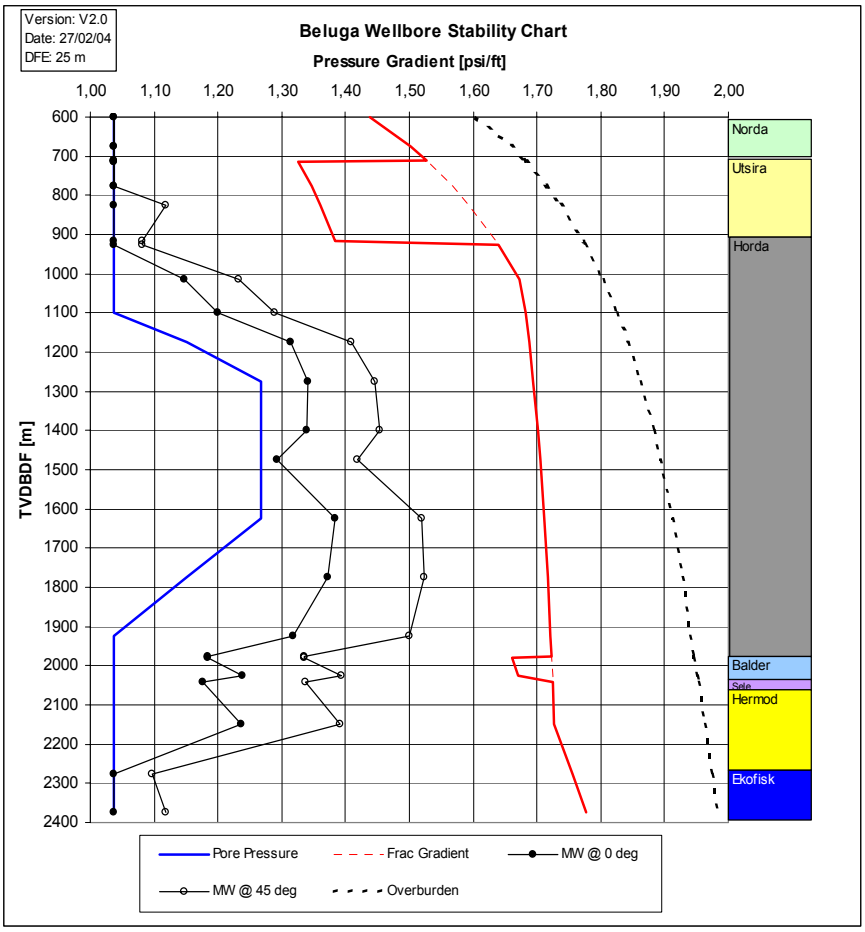
11.3 Actual

Operations were carried out to plan with few problems seen. All formation tops were seen within the excepted uncertainty margins. No hole problems were encountered. As no hydrocarbons were found no coring or sidetrack was required and a reduced logging program was run. The prognosed and actual stratigraphy and well bore stability map and final well status diagrams are seen below.

STRATIGRAPHY



WELL BORE STABILITY

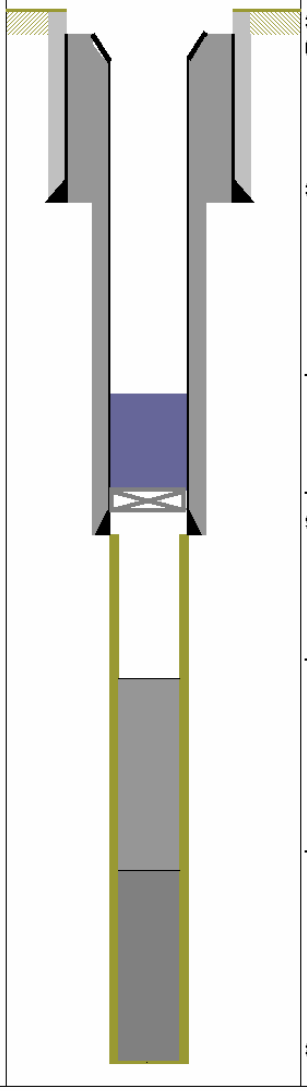


FINAL WELL STATUS DIAGRAM

BELUGA WELL 26/4-2 FINAL WELL STATUS.

ACTUAL

Depth (m) AHBDF	Depth (m) TVBDF	INC Deg	SCHEMATIC	DESCRIPTION
160,00	160,00			*Seabed*
163,45	163,45	0,00		30" Conductor x 20" WHH Extension (cut and retrieved).
233,72	233,70	1,07		30" X-52 x 1" Wall Thickness Shoe
992,00				TTOC Plug #3
1192,00	1192,00			Top 9.5/8" EZSV Bridge Plug
1200,00	1200,00	0,41		9 5/8" 47# L80 Shoe
1881,00				TTOC Plug #2
2101,00				TOC Plug #1
2302,00		1,52		8 1/2" hole



Well position: N 6622557.4 E 505675.68
The well was drilled vertical with a maximum inclination of 2.1 degrees.

12 Rig move and anchor handling

12.1 Brief outline of the objectives

Objectives

1) Safe and efficient lifting of anchors at Hamsun loctaion
2) Safe and efficient lifting transit from Hamsun to Beluga location
3) Safe and efficient anchoring operation at Beluga loctaion

Achievements

1) The operation was completed ahead of schedule in marginal weather conditions.
2) Due to the use of more powerful larger class anchor handling vessels (AHVs) the operation was relatively unaffected by loss of rig anchor winches and marginal weather.
3) No health safety or environmental issues recorded

12.2 Time Breakdown

Operation	Target Time (days)	Budget Time (days)	Actual Time (days)	Productive Time (%)	Lost Time (%)	Down Time (%)
Rig move	0.25	1.33	0.45	100	0	0
Pre-spud & Anchor handling	2.25	3.66	1.29	96.8	0	3.2

12.3 Summary of Incidents, Down Time, Lost Time, and Associated Causes

Incidents

No incidents.

Down Time (NPT)

Down Time Incident and Cause	Down Time (hrs)
Gear train failure on Anchor winch #3	1.0

Lost Time (WOW, etc)

No lost time.

12.4 Chemical Discharge

No Chemicals Discharged.

Mud

No loading of mud onto the rig conducted.

Cement

Cement was transferred to the rig prior to start of anchor handling at Hamsun location.

Rig Chemicals

No incidents or spills during the rig move and anchor handling.

12.5 Highlights, Lowlights and recommendations

Highlights

Shell spud boat unloaded at Marathon location to allow rig up during tow including checking, M/U and racking of BHA & preparation of the conductor.
Used pre operation checklist offshore to ensure fully prepared before spud.

Use of larger class AHV allowed for anchor handling in marginal weather. These larger vessels also allowed the operation to be less reliant on the rig winches as they were powerful enough to pull the anchors out from the rig with the rig not paying out line, but controlling the rate with winch brakes.

Lowlights
The agreed amount of pipe to be racked back in the derrick prior to start of operation could not be accommodated. Due to marginal weather the 3.1/2" cement stinger and some of the planned running tools had to be laid down left on deck.
Many IT problems were seen during mob, these could have cost the project time. One of the main problems was due to a lack of support, no UK staff were available initially.
Tide tables were supplied in imperial units when metric is normally used in Norway.

Recommendations
The practice of a spud boat off loading at the previous location (share of mob and demob boat) should be continued if possible.
None operational departments such as IT should be included early in the project, for example in the DWOP.
IT should be supported locally during mob and demob and none GID lap tops and printer should be available to allow essential engineering work to continue no matter what IT system problem.
Electronic tide tables should be supplied to the rig for ease of use.
Spare pendant wire should be carried in case of a snapped winch wire during the tow.

13 36" Hole Section

13.1 Brief outline of the objective

Objectives

1. To drill the well as vertical as possible with a maximum guide base inclination of 1.5 degree's.
2. To ensure good hole cleaning
3. To achieve sufficient lateral and axial support from the cemented conductor, with Top Of Cement (TOC) at, and returns to, seabed.

Achievements

1. Hole drilled with inclination near vertical.
2. Hole cleaning achieved with 10 cubic meter hi-vis sweeps before each connection and mid way in each stand.
3. The conductor was cemented successfully to seabed, guide base angle achieved less than 0.5 degree's.

13.2 Time Breakdown

Operation	Target Time (days)	Budget Time (days)	Actual Time (days)	Productive Time (%)	Lost Time (%)	Down Time (%)
Drilling 36" hole	0.61	0.81	0.64	100	0	0
Running & cementing 30" conductor	0.71	0.94	.64	100	0	0

13.3 Summary of Incidents, Down Time, Lost Time, and Associated Causes

None reported.

13.4 Chemical Discharge

No Chemicals Discharged.

13.5 Drilling Performance

Drilling Performance

Prior to drilling beginning the well head housing & running tool was racked back in derrick with 2 jts 5" HWDP below & 1 5" pup above, no further stinger was made up for cementing, this rig up omitted the need to rig up false rotary

The section was drilled with a 17 ½" bit and 26" x 36" heavy-duty hole opener assembly using seawater and viscous pills. Parameters were varied to maximise ROP while ensuring the hole was kept vertical, no boulders or cobbles were encountered. MWD tools were used for surveying with the maximum angle observed at 0.86 degrees. At section TD, 233.8m, the hole was displaced to 1.2 SG viscous mud. Shallow gas procedures were implemented throughout the section and monitoring was primarily done using an ROV mounted sonar. Drilling was completed in a time close to the agreed technical limit.

36" BHA Components (BHA#1)

Serial No	Size/OD	Component	ID	Con dn	Con up	Length	Acc length	Comment
	17 ½"	Bit	-	-	7 5/8" Reg	0.43	0.43	3x18,1x16
A30347	9 ½"	Bit sub	3 ¼"	7 5/8" Reg	7 5/8" Reg	0.89	1.32	float
	36"	Hole opener	3"	7 5/8" Reg	7 5/8" Reg	4.33	5.65	
	9 1/2"	X-over	-	7 5/8" Reg	6 5/8" Reg	0.63	6.28	float
MDC 024	8 ½"	Power pulse	-	6 5/8" Reg	6 5/8" Reg	8.8	15.08	
4-98407	12 ¼"	NM stab	-	6 5/8 Reg	6 5/8 Reg	2.12	17.2	
26071	8"	NMDC	2 7/8"	6 5/8" Reg	6 5/8" Reg	8.93	26.13	
-	8"	DC	3"	6 5/8" Reg	6 5/8" Reg	27.71	58.84	3 jts
1143	8"	Jar	3"	6 5/8" Reg	6 5/8" Reg	9.7	63.54	
-	8"	DC	2 13/16"	6 5/8" Reg	6 5/8 reg	27.22	90.76	3 jts
19821	6 ½"	X-over	2 13/16"	6 5/8 Reg	4 ½ IF	1.07	91.83	
	6 ½"	DC	2 13/16"	4 ½ IF	4 ½ IF	28.1	119.93	3 jts
	5"	HWDP		4 ½ IF	4 ½ IF			

Bit Details (Bit#1)

Size	Cone	Fixed cutter	IADC	Make	Type	Ser. No	TFA
17 ½"	√	-	115M	Smith	DSJ (New)		0.579

Dull Grading

1/1/NO/ALL/1/I/NO/TD

Hydraulics

Mud Weight	Depth	Flow Rate	Bit DP	HIS
1.03 SG	360m	4000LPM	93bar	6.2

Run Hours

	Date & Time	MD	Cumulative Run Hours					
In:	13/4/04	160	Pump	Drill	Ream	Circ	Other	TOTAL
Out:	18.30	233.8	8 hrs	7 hrs	0 hrs	1 hr	0 hrs	8 hrs
	ROP:	73.8	In	7 hrs	=	10.5	m/hr	
	Drilled:	73.8 m	Rotated:	73.8 m	100 %	Oriented:	0 m	0 %

Drilling Parameters

	FLW	SPP	RPM	WOB	TRQ		STRING WEIGHT	
	(lpm)	(bar)	(string)	T	Ft.lbs	ROT	UP	DN
Min:	1000	85	60	1	2	-	*T*	*T*
Max:	4500	126	90	5	6	-	56	52

Equipment Failures
None reported.

Conclusion and Recommendations
Avoiding the need to rig up a false rotary by racking the wellhead housing & running tool back in derrick should be taken forward.
The BHA and bit performed well, attaining close to technical limit performance. The inclusion of the MWD tools was crucial for directional control and eventual success in setting guide base near vertical. The BHA was designed is it could also be used in subsequent hole sections (designed with 8" drill collars, no 9 1/2" drill collars) with minimal change required, assemblies, including the hole opener were shipped pre assembled as far possible. Both these steps proved beneficial and time efficient. It is recommended that the flexible BHA design and premade assemblies should be used in future operations.

13.6 Drilling Fluids

Seawater / Hi-Vis sweep overview

	Planned	Actual
Mud weight	1.03	
3 RPM	12-20	
Funnel viscosity	>100 secs	100+
PH		9.0-9.2

Displacement Mud overview

	Planned	Actual
Mud weight	1.2	1.2
PV		
Yield point		
3 RPM	12-20	
10 sec. gels		
10 min. gels		
Funnel viscosity	>60 secs	80
Cl^-		
Stability		
LGS		
Solids		
Oil		
PH	9-10	10.5
Salt		
Lime		
Sand		

Hole Cleaning
The hole was drilled with seawater and 10 m3 viscous sweeps were pumped twice during each stand drilled. This proved to be an effective hole cleaning method for this section and no difficulties were experienced during the entire interval.

Solids Control Equipment
Returns to seabed, i.e. no solids control equipment was used for this section.

Drilling Fluids and Hole Cleaning Recommendations
No recommendations are made for change, the programmed hole cleaning method and displacing the hole to mud before running casing worked well. No hole cleaning difficulties, fill or hole instability were observed.

13.7 Surveying

A PowerPulse MWD tool was used for directional surveys a maximum deviation of 0.86 degree's was seen with the maximum allowed previously agreed at 1.5 degree's. The tool allowed minimum time spent obtaining surveys. Surveys were initially taken every 10m and then after each stand drilled once a trend was established.
Continued use of MWD survey tools for efficiency and minimum survey time is suggested.

13.8 Casing and Cementing

The six joint 30" conductor was set at 233.7 m with a 1.5 m stick above the seabed at 160m. The conductor was run without issue and cemented with returns observed at the seabed, no top up job required. The guide base inclination was observed to be 0.5 degree's after waiting on cement for 5 hrs. No stage collar was purchased or run, it was decided that a top up job would be done with a stinger if it should be required.
Thorough preparation and planning resulted in close to technical limit performance with 11 hrs saved on base time estimate.

30" Casing Job:	
Nominal weight	310 lbf
Grade	X-52
Connection	SL-60
Nominal ID	27"
Drift diameter	26"
Coupling OD	32"

30" Cement Job (Primary)	
Cement Type	Norcem class 'G'
Volume of slurry	45.6 m3
Excess Volume	200%
Weight	1.95 s.g.
Slurry yield	75.06 l/100kg

Additives	
$CaCl_2$	4.35 l/100kg
NF-6	0.10 l/100kg
Seawater	39.56 l/100kg

Casing and Cementing Recommendations
Good cement returns were observed at seabed despite die marker being unavailable. Mica was added to the spacer ahead to aid identification but was not observed due to poor visibility during the operation. Die is recommended for use in future conductor cementations.
The practice of keeping the conductor and running string in tension resulted in near vertical foundation and guide base, this practice should be continued.

14 12-1/4" Hole Section

14.1 Brief outline of the objective

Section Objectives

1) Time efficient clean-out of the conductor with a 26" bit.
2) Drill a vertical hole to section TD at optimised parameters.
3) Run and cement 9 5/8" surface casing c/w 18 ¾" wellhead and 20" casing extension with cement returns taken to seabed to provide a solid foundation for the BOP.
4) Perform the planned operations in a safe and efficient manner with due consideration for identified hazards and possible contingency activities.

Achievements

1) The clean-out trip was completed in 7hrs matching the planned technical limit time.
2) The 12 ¼" hole was drilled with optimised parameters without problems with the exception of one area spanning 35 meters in length when the parameters had to be reduced to alleviate the tendency of the BHA to build angle due to the BHA crossing a softer then harder formation.
3) The 9 5/8" casing was run & cemented without major problems. Both bull's eye indicators displayed less than 1 deg inclination.
4) No major safety issues were identified during this section.

14.2 Time Breakdown

Operation	Target Time (days)	Budget Time (days)	Actual Time (days)	Productive Time (%)	Lost Time (%)	Down Time (%)
Drilling 12 ¼" hole	1.56	1.84	2.15	92.2	0	7.8
Running & cementing 9 5/8" casing	0.7	0.93	0.92	97.7	0	2.3
P/U 3 ½" cmt stinger	-	-	2.25	100	0	0
Run BOP & riser	1.0	1.33				

14.3 Summary of Incidents. Down Time, Lost Time, and Associated Causes

Incidents

No incidents were reported during the 12 ¼" section. 44 RUHs were raised, as well as 31 Stop Cards.

Downtime

Down Time Incident and Cause	Down Time (hrs)
Changed out wire on standlift arm due to wear	2.00
Changed out shear pins on upper racking arm	2.00
Initial difficulties pumping from cement unit during the preparations for the 9 5/8" cement job	0.50

Total down time (NPT) for the section was 4.5 hrs

Lost Time

No lost time recorded during this section.

14.4 Chemical Discharge

No Chemicals Discharged.

Mud

Returns taken to seabed. Volumes pumped were larger than planned, however, all chemicals are Plonor/green.

Cement

Returns to seabed. Discharge to seabed was less than that planned.

Rig Chemicals:

No discharges in excess of discharge permit in this section.

14.5 Drilling Performance

Clean Out BHA (BHA #2):
The 26" clean-out BHA was run through the 30" wellhead housing with ROV assistance and cement tagged at 231m, 3m above the 30" shoe. Hard cement was drilled down to 234m, approximately the TD of the 26" hole. The BHA was washed down to 237m and the 30" shoe was reamed through several times to ensure clean. A 15 m3 Hivis pill was pumped at bottom & the remainder of the hole was displaced to 1.2 s.g. mud prior to pulling out.
Once at surface, the 26" bit, bit sub & crossover were laid down, the other BHA components were to be used in the 12 ¼" assembly.

26" Clean Out BHA Components (BHA#2)

Component	Serial No	Size/OD	ID	Con dn	Con up	Length	Acc length	Comments
26" bit		26"			6 5/8" RP	0.65	0.65	
Bit sub	588	9 ¼"		7 5/8" RB	7 5/8" RB	0.97	1.62	w/solid float
X/O	WH-11-002	9 ¼"	3"	7 5/8" RP	6 5/8" RB	1.09	2.71	
8" DC	505009	8"	3"	6 5/8" RP	6 5/8" RB	9.42	12.13	
8" DC	97010	8"	2 13/16"	6 5/8" RP	6 5/8" RB	9.32	21.45	
8" jar	1143	8"	3"	6 5/8" RP	6 5/8" RB	9.70	31.15	
8" DC	84297	8"	2 13/16"	6 5/8" RP	6 5/8" RB	8.50	39.65	
2 x 8" DC		8"	2 ¾"	6 5/8" RP	6 5/8" RB	18.72	58.34	
X/O	DOTS 19821	6 ½"	2 13/16"	6 5/8" RP	4 ½" IFB	1.07	59.44	
3 x 6 ½" DC		6 ½"	2 13/16"	4 ½" IFP	4 ½" IFB	28.1	87.54	
5" HWDP		5"	3"	4 ½" IFP	4 ½" IFB	To surface		

Clean Out Bit Details (Bit #2)

Size	Cone	Fixed cutter	IADC	Make	Type	Ser. No	TFA	Gauge length
12 1/4"	√		115	Smith	MSDSSHC		1.452	
Features:	C-center jet, sealed bearings, aggressive cutting structure, leg back hardfacing, self sharpening teeth, high-speed sealing system							
Condition in:	New							

Clean Out Bit Dull Grading (Bit #2)
1-1-NO-A-1-I-NO-TD

26" Clean Out BHA Hydraulics (BHA #2)

Mud Weight	Depth	Flow Rate	Bit DP
1.05 SG	360m	4100LPM	28 bar

26" Clean Out BHA Run Hours (BHA #2)

	Date & Time	MD	Cumulative Run Hours					
Bit BRT:	21:30; 14/April/04	231m	Pump	Drill	Ream	Circ	Other	TOTAL
Bit ART:	00:30; 15/April/04	237m	0.63	0.18	0	0.45	0	0.63
	ROP:	**6m**	**In**	**0.18hrs**	**=**	**16.6**	**m/hr**	
	Rotary Drilling	6m	In	0.0hrs		% Rotated:	100	
	Sliding	0m	In	0hrs		% Sliding:	0	

26" Clean Out BHA Drilling Parameters (BHA #2)

	FLW	SPP	RPM	WOB	TRQ		STRING WEIGHTS		Depth
	(lpm)	(bar)	(string)	(MT)	(ft-lbs)	ROT	UP	DN	(m)
Min:	3907	118	65	3.7	2.6				237
Max:	4530	125	88	5.6	7				

12-1/4" Drilling BHA (BHA #3)
The 12-1/4" hole drilled well with good parameters and low inclination until a softer a softer formation was crossed between 1025m to 1040m then harder formation to 1060m. This change in formation resulted in the hole starting to kick off slightly (maximum inclination = 1.19 deg). The area was reamed to remove any potential ledge and parameters had to be reduced to keep the well as near to vertical as possible, this resulted in reduced ROP. TD was called as per programme at 1204m where a check survey gave the inclination to be 0.41 deg. (Any stand which had an MWD survey reading above one degree was reamed. Hole cleaning was aided by monitoring data from the PWD sub).
At surface the BHA was not laid out to minimize the open hole time prior to the casing job.

12-1/4" BHA Components (BHA#3)

Component	Serial No	Size/OD	ID	Con dn	Con up	Length	Acc length	Comments
12 1/4" Bit	MM2470	12 ¼"	-		6 5/8 RP	0.33	0.33	
Bit sub	275	8"	-	6 5/8 RB	6 5/8 RB	0.91	1.24	w/solid float
ARC-8	8114	9"	-	6 5/8 RP	6 5/8 FHB	6.02	7.26	
PowerPulse	MDC-024	8 ½"	-	6 5/8 FHP	6 5/8 RB	8.32	15.58	
12 ¼" NM stab	4-98407	12 ¼"	-	6 5/8 RP	6 5/8 RB	2.12	17.70	
8" NMDC	26071	8"	2 7/8"	6 5/8 RP	6 5/8 RB	8.93	26.63	
8" DC	96990	8"	2 7/8"	6 5/8 RP	6 5/8 RB	8.97	35.60	
8" DC	505009	8"	3"	6 5/8 RP	6 5/8 RB	9.42	45.02	
8" DC	97010	8"	2 13/16"	6 5/8 RP	6 5/8 RB	9.32	54.34	
8" JAR	1143	8"	3"	6 5/8 RP	6 5/8 RB	9.70	64.04	
8" DC	84297	8"	2 13/16"	6 5/8 RP	6 5/8 RB	8.50	72.54	
8" DC	505010	8"	2 ¾"	6 5/8 RP	6 5/8 RB	9.29	81.83	
X/O	DOTS 19821	7 13/16"	2 13/16"	6 5/8 RP	4 ½ IFB	1.07	82.90	

3 x 6 ½" DC		6 ½"	2 13/16"	4 ½ IFP	4 ½ IFB	28.10	111.00	
5" HWDP		5"	3"	4 ½ IFP	4 ½ IFB	224.55	335.55	
5" DP		5"	3 ¼"	4 ½ IFP	4 ½ IFB	To surface		

12-1/4" Bit Details (Bit #3)

Size	Cone	Fixed cutter	IADC	Make	Type	Ser. No	TFA	Gauge length
12 1/4"	√		117	Smith	FGXi	ER 6058	1.065	
Features:	Twist&Shout cutting structure, full cap hardfacing, aggressive cutting structure, Gemini seal system, Spinodal-2 bearing, tungsten carbide heal inserts							
Condition in:	New							

12-1/4" Bit Dull Grading (Bit #3)
2-3-NO-A-E-I-NO-TD

12-1/4" BHA Hydraulics (BHA #3)

Mud Weight	Depth	Flow Rate	Bit DP
1.05 SG	1204m	3490	42bar

12-1/4" BHA Run Hours (BHA #3)

	Date & Time	MD	Cumulative Run Hours					
Bit BRT:	04:30; 15/April/04	237m	Pump	Drill	Ream	Circ	Other	TOTAL
Bit ART:	00:00; 16/April/04	1204m	43.2	22.5	20.7	33.9	0	43.2
	ROP:	**967m**	**In**	**22.5 hrs**	**=**	**42.3**	**m/hr**	
	Rotary Drilling	1204m	In	22.5 hrs	42.3 m/hr	% Rotated:	100%	
	Sliding	0m	In	0hrs		% Sliding:	0%	

12-1/4" BHA Drilling Parameters (BHA #3)

	FLW	SPP	RPM	WOB	TRQ		STRING WEIGHTS		Depth
	(lpm)	(bar)	(string)	(MT)	(ft-lbs)	ROT	UP	DN	(m)
Min:	2994	109	35	0	1.4	77	69	69	1204
Max:	3602	169	200	12	4.9				

14.6 Equipment Failures

No downhole equipment failures occurred.
During make up and running in of the 12-1/4" assembly the travelling block whilst travelling downwards, struck the Upper Racking Arm (URA). The clash occurred as the URA had not been retracted and it resulted in the shear pins in the URA shearing, causing two hours downtime for replacement of the shear pins.

14.7 Drilling 12-1/4" Conclusion and Recommendations

The 26" clean out run could have been omitted but it was felt that the time that would save, pulling out for an assembly change, was not worth the risk of becoming stuck with falling cement blocks.
The practice of using the majority of the previous BHA should continue to save time (only had to lay out bit, bit sub and crossover from the 26" BHA). As the total time to drill the section may have been reduced if the maximum inclination at TD would have been greater. The final maximum inclination should be questioned early in project and clear in program.

The fluids program should be maintained for future similar well types.

14.8 Drilling Fluids

12-1/4" Section Mud overview

	Hivis sweeps		Displacement mud		KCl mud	
	Planned	Actual	Planned	Actual	Planned	Actual
Mud weight	1.05 s.g	1.78-1.87 s.g.	1.2 s.g.	1.2 s.g.	1.2 s.g.	1.2 s.g.
Funnel viscosity	> 100	120 - 125	> 60	95	> 60	87
PH		9.4 - 9.5		8.9 – 9.4		8.9
Plastic viscosity			< 30	13 cP	< 30	27 cP
Yield point			> 12	17.5 Pa	> 12	17 Pa
100 rpm				36 – 40 lb/100ft^2		33 lb/100ft^2
3 rpm				15 lb/100ft^2		9 lb/100ft^2
10 sec. Gels				9 Pa		5 Pa
10 min. Gels				22 Pa		14 Pa
API Fluid loss			< 4	6 cc/30min	< 4	2.6 cc/30min
Cake				1/32"		1/32"
KCl					70 kg/m^3	76 kg/m^3
Cl^-						38,000 mg/l
LGS				87 kg/m^3		11 kg/m^3

14.9 Hole Cleaning

During drilling hi vis pills were pumped prior to connections and mid-stand, no hole problems were seen. At TD a hi vis pill was pumped and the hole circulated clean with seawater. A KCL mud pill was spotted followed by another hi vis pill prior to pulling out. During tripping out the hole was seen to be in good condition with no major overpull's or high torque seen. Care was taken whilst pulling past the previous hard and soft formations (1025 – 1060m), no indication of a ledge was observed.
At 1070m the hole was displaced to 1.2 s.g. mud, the fluid column was again added to once the BHA was inside the 30" conductor.

Solids Control Equipment
Returns to seabed, i.e. no solids control equipment was used for this section.

Drilling Fluids and Hole Cleaning Recommendations
No recommendations are made for change the programmed hole cleaning method and displacing the hole to mud before running casing worked well.
No hole cleaning difficulties, fill or hole instability were observed during drilling. The hole was in excellent condition during tripping and logging the casing was run without a wiper trip and without major difficulty.

14.10 Surveying

General Discussion

SURVEY DATA:		Comments:					VS Azimuth	135.00
	MD	Inc	Azm	TVD	VS	N/-S	E/-W	Max DLS
First survey:	239.14	1.10	299.33	239.14	-0.23	0.31	-0.23	
Last survey:	1192.05	0.41	53.00	1191.98	-3.11	3.23	-3.11	0.34

Both MWD (PowerPulse) and LWD (ARC-8) were used in this section and performed without issue.

MWD surveys were taken every 10 meters initially before being relaxed to once every stand, and later to once every 3 stands, or as required.

Recommendations:
If real-time LWD data is critical for the section, the revolutionary speed may need to be limited to allow good data quality to be acquired.

14.11 Casing and Cementing

General Discussion
The combined shoe & float collar joint was picked up and tested then made up to the intermediate joint with pre-installed centralisers and run in hole. The first 10 joints run were filled with seawater to ensure that the casing would not float.
The casing was stabbed into the 30" wellhead housing with ROV assistance and run in hole without any hole problems seen to 1030m where the casing running equipment was rigged down and the 5" drill pipe handling equipment rigged up.
The 18 ¾" wellhead joint was made up and vent valve installed prior to continuing to RIH on 5" HWDP.
The casing hung up at 1043m, this was believed to be due to the ledge created by the inclination increase during the drilling of the 12 ¼" section. As the wellhead joint was still in the rotary it was not possible to circulate, the casing was worked through the hang-up point.
The casing string hung up 6 meters off bottom at 1198m, likely due to fill, the string was worked down to the programmed setting depth of 1200m.
The 18 ¾" wellhead was landed in the 30" wellhead housing and a 25 MT overpull test carried out.
Prior to beginning the cement job 110% of casing contents was displaced with the mud pumps. During trying to flush the cement line an immediate pressure build up of 10 bar was seen at the cement unit. The problem was traced to a leaking lo-torque valve.
The spacer & cement pumped as per programme.
The bottom plug was launched prior to pumping the lead slurry and a dart was released as a top plug behind the tail slurry and chased with the cement unit using 1.2 s.g. mud.
The top plug was seen to shear free at 131 Bar after 1054 litres had been pumped.
The top plug bumped after 52.7 m3 after which the casing was pressure tested to 207 Bar for 10 minutes using the rig pumps isolated at the standpipe manifold. No back flow was observed after the pressure was bled off.
The 18 ¾" wellhead running tool was released as per Dril Quip procedures. The string was picked up to above the wellhead and the wellhead/RGB was flushed at the maximum rate using the rig pumps.
After the completion of the cement job, the 12 ¼" BHA was laid out and prepared for back load. The EDPHOT was made up to 5" DP and racked back in the derrick in preparation for the 8 ½" section.

Earlier during the operation, a fault with a choke line connector was detected whilst inspecting the BOP. The component was sent ashore for repairs and brought back out to the rig on a helicopter once it had been successfully pressure tested. The choke line was subjected to a further, successful, pressure test to 5000 psi once the connector had been re-installed. Whilst completing the BOP repairs the TDS and lower IBOP were pressure tested to 5000 psi.
Schlumberger prepared the 8½" MWD/LWD tools, as well as downloading the memory data from the 12¼" BHA.

9 5/8" Casing Job

9 5/8" casing

Nominal weight:	47 lbf
Grade:	L-80
Connection:	NEW VAM
Nominal ID:	8.681"
Drift diameter:	8.525"
Coupling OD:	10.65"

Make-up torque: 14,450 lbf

Apart from the two hang-up points as described in section 7.5.7, the 9 5/8" casing job went very smoothly. Due to slight discrepancies in the tally compared with the actual length painted on the joints, the shoe depth was 1.38m deeper than that planned, i.e. at 1200m.

9 5/8" Cement Job

Spacer: 6 m^3 seawater

Lead slurry
Volume of slurry: 67 m^3
Pump rate: 500 lpm
Weight: 1.56 s.g.
Slurry yield: 129.42 l/100kg

Additives:
Econolite 3.20 ltr/100 kg
HR-4L 0.80 ltr/100 kg
NF-6 0.10 ltr/100 kg

Tail slurry
Volume of slurry: 10 m^3
Pump rate: 375 lpm
Weight: 1.92 s.g.
Slurry yield: 74.93 l/100kg

Additives:
NF-6 0.10 ltr/100kg

The casing job went very well, with the casing crew attentive at crucial points in the job, such as the handling of the wellhead joint.
Apart from the start-up problems due to a leaking valve when attempting to pressure test the cement line the cement job went very smoothly with a plug bump observed and the casing pressure tested as per program.

14.12 Casing and Cementing Recommendations

No shoe joint was run as cement around the shoe was not critical, in such cases a short shoe track should reduce ILT during drilling out.
A three metre pup joint was added above the running tool, to assist in handling the hanger, (particularly removing and replacing rotary table bushings). It is recommended that a pup joint should be added between the housing running tool and the cementing assembly to allow the iron roughneck to be used for break-out, rather than rig tongs.
It is recommended to either use a Shark Bite plug retainer or displace a small volume of cement behind the plug to avoid lost time due to plug rotation
The initial problems with testing the cement line can be attributed mainly to problems in communication.

15 8-1/2" Hole Section

15.1 Brief outline of the objective

The section objectives were:

1) Install BOP and verify connector integrity with one pressure test.
2) Drill out shoetrack with the primary drilling BHA and PDC bit.
3) Displace well to Glydril concurrently while drilling the shoetrack without contaminating the mud.

4) Drill a vertical wellbore to section TD (or coring point) with optimised drilling parameters.
5) Perform the planned operations in a safe and efficient manner with due consideration for identified hazards and possible contingency activities. Ensure preventative measures are instituted against stuck pipe, drilling and/or tripping difficulties.

Achievements were:

1) The BOP running was reviewed in the 12 ¼" section review.
2) The shoetrack was drilled out with the 8 ½" BHA as planned.
3) The well was displaced to Glydril mud whilst drilling the plugs, float and shoe.
4) Final hole inclination was 1.53deg. Drilling parameters were as per programme.
5) No reportable incidents during this section. Toolbox talks & SJA's were performed prior to all major activities.

15.2 Time Breakdown

Operation	Target Time (days)	Budget Time (days)	Actual Time (days)	Productive Time (%)	Lost Time (%)	Down Time (%)
Drill 8 ½" hole + BHA handling	4.72	6.28	2.73	100	0	0
Logging 8 ½" hole	1.75	2.33	0.96	94.6	0	5.4

15.3 Summary of Incidents. Down Time, Lost Time, and Associated Causes

Incidents

A total of 43 RUHs (37 green, 6 red) and 25 Stop-cards (7 safe, 18 unsafe) were raised during the 8 ½" section.

Down Time (NPT)

Down Time Incident and Cause	Down Time (hrs)
TDS hoses blowing onto wireline	0.25
HRLA image not displayed on wireline unit computer	0.25
Misalignment on wireline drum cable mounted tension device	0.25
Leaking air hose connection on VSP gun assembly	0.5

Total down time (NPT) for the section was 1.25 hrs.

Lost Time
No lost time during this section.

15.4 Chemical Discharge

No Chemicals Discharged.

Mud
During the preparation (shearing) of the Glydril mud prior to drilling out the 9 5/8" shoe, 7.7 m^3 of Glydril mud was discharged to sea, the root cause was treated to a leaking valve. The total volume of chemicals lost overboard (excludes seawater) was les then 1 m^3. This occurrence would not have happened if an oil based system was being prepared or in use as a double block system would have been employed by Odfjell. The outcome was that any mud mixing operations should be done using a double block policy, no mater if the mud should be OBM or WBM.

Cement
No cement was used in the 8-1/2" section.

Rig Chemicals
No Chemicals Discharged.

15.5 Operational Performance

Following the installation of the BOP, the 8 ½" BHA was picked up and run in the hole. The shallow MWD test was good. With 5" drillpipe across the BOPs the BOPs were function tested on the blue pod from the driller's panel and the yellow pod from the remote panel in the toolpusher's office. The acoustic system was tested using the upper pipe ram. Circulation was broken approximately every one stand above the 9 5/8" shoe at 1168m. 20 bar pressure was observed on the standpipe manifold due to the hydrostatic difference of the fluids in the string and annulus, seawater and spud mud respectively. The string was run to 1178m, a further joint, and the system displaced to a homogeneous fluid all round. The bit was washed down to 1197 m where the top of the plug was tagged.
A choke drill with driller, assistant driller and toolpusher was carried out and a pre-job safety meeting held to cover the displacement of the well to Glydrill mud prior to the same. The well was displaced the well to 1.29 s.g. Glydrill mud whilst the plugs, float collar and shoe were drilled. The plugs proved difficult to drill through, likely due to plug rotation, as they were not held in place by either cement or a shark bite and also because of the lack of bite of the PDC bit.
Note that the well was displaced to 1.29 s.g. mud, after doing a mud check it was found that the weight of the mud was 1.29 s.g. rather than 1.31 s.g. and as the mud weight in and out was the same it was decided to conduct the FIT with this mud weight and then weight up the mud to 1.31 s.g. mud as drilling continued. The casing shoe was drilled out at 1199m and no cement was found below the shoe. The rat hole was cleaned out and 2m of new formation drilled (to 1206m) in preparation for the FIT. Circulated bottoms up and reamed past the casing shoe several times to ensure a slick shoe. Circulated to an even mud weight of 1.29 s.g., closed the middle pipe rams and conducted an LOT (leak-off was apparent) to 1.67 s.g., with the following data:
Cement unit surface pressure = 43.9 bar
Volume pumped = 511 litres
Volume returned = 330 litres
As the result of the LOT was less than the limit test required by the program of 1.70 s.g. and also to confirm that there were no surface leaks, the test was repeated, this time with the annular preventer also closed (two barriers). The result of the LOT (again leak-off was apparent) was 1.65 s.g., with the following data:
Cement unit surface pressure = 42.1 bar
Volume pumped = 606 litres
Volume returned = 480 litres
Took slow circulation rates at 20, 30 and 45 spm and drilled 8 ½" hole to 1863m. At this point the ROP was restricted to allow full real time LWD logs. Reamed each stand once prior to connections. Hit top of the Hermod reservoir at 2045m bdf. Further drilling showed the reservoir sand to be water bearing and hence the decision was made, as per programme, to drill to TD at the prognosed depth of 2,304m. To reduce the potential of differential sticking no further MWD surveys were taken in the reservoir. Drilled to TD @ 2302m, which was 54.5m into the Ekofisk formation. Took an MWD survey at TD, giving an inclination of 1.53 deg and an azimuth 159.99 deg.
The hole was circulated clean, flowchecked and the BHA pulled out of hole. The string had to be worked through tight hole at 2100m, 2087m, 2079m and 2043m. These depths tally with the transition from the Lista formation to the Hermod formation. The hole was reamed until no additional torque was observed whilst pulling past the tight spots without rotating the pipe.
At surface the BHA was laid down, apart from the 5" NM HWDP, 6 ½" jar and 6 ½" accelerator, which were racked back in the derrick. The rig floor was then cleared and prepared for wireline logging.

8-1/2" BHA Components (BHA#4)

Component	Serial No	Size/OD	ID	Con dn	Con up	Length	Acc length	Comments
8 ½" Bit	10425703	8 ½"	-		4 ½" R	0.33	0.33	
RAB-6	31375	8 ¼"	-	4 ½" R	5 ½" FH	3.68	4.01	
PowerPulse	109	6.875"	-	5 ½" FH	5 ½" FH	9.65	13.66	
ARC 6	1704	7.625"	-	5 ½" FH	4 ½" IF	6.64	20.3	
8 ¼" NM stab	26882	8.25"	-	4 ½" IF	4 ½" IF	2.26	22.56	

5″NM HWDP	25088	5″	2.813″	4 ½" IF	4 ½" IF	9.14	31.7	
5" HWDP	96990	5"	3″	4 ½" IF	4 ½" IF	159.17	190.87	
6 ½" Jar	2983	6.375"	2.75″	4 ½" IF	4 ½" IF	9.76	200.63	
5" HWDP		5″	3″	4 ½" IF	4 ½" IF	46.70	247.33	
Accelerator	1019	6.5″	2.75″	4 ½" IF	4 ½" IF	9.76	257.09	
5″ HWDP		5″	3″	4 ½" IF	4 ½" IF	18.76	275.85	

The BHA performed as expected, no bit balling was seen, this was previously considered to be a realistic risk.

8-1/2" Bit Details (Bit #4)

Size	Cone	Fixed cutter	IADC	Make	Type	Ser. No	TFA	Gauge length
8 ½"	-	√	S424	DBS	FS2565	10425703	0.5522 in^2	2.5"
Condition in:	New							

8-1/2" Bit Dull Grading (Bit #4)

1-1-NO-A-X-I-NO-TD

8-1/2" BHA Hydraulics (BHA #4)

Mud Weight	Depth	Flow Rate	Bit DP
1.31 SG	2302m	2500	86.6bar

8-1/2" BHA Run Hours (BHA #4)

	Date & Time	MD	Cumulative Run Hours					
Bit BRT:	04:30; 19/April/04	1204m	Pump	Drill	Ream	Circ	Other	TOTAL
Bit ART:	20:00; 21/April/04	2302m	-	27.9	3.78	15.92	15.88	63.5
	ROP:	**1098 m**	**in**	**27.9 hrs**	**=**	**39.4**	**m/hr**	
	Rotary Drilling	1098m	in	27.9 hrs		% Rotated:	100	
	Sliding	0 m	in	0 hrs		% Sliding:	0	

8-1/2" BHA Drilling Parameters from 1204m to 2302m (BHA #4)

PARAMETERS:	Comments:							
	FLW	SPP	RPM	WOB	TRQ	STRING WEIGHTS		
	(lpm)	(bar)	(string)	(MT)	(kft-lbs)	ROT	UP	DN
Min:	2178	201	41	0	1.1	(kdaN)	(kdaN)	(kdaN)
Max:	2514	267	173	14	12.4	19.1	20.9	20.4

15.6 Equipment Failures

Prior to starting drilling it was discovered that the depth sensor for the MWD/LWD system had failed, there was no signal from the sensor to the MWD unit. It was decided to drill ahead as the BHI depth sensor links into the same line, and the driller's tally depth could be used as a double check to calibrate the MWD/LWD logs. The problem was rectified prior to drilling into top reservoir.

During the drilling of the 8 ½" hole it was discovered that the ECD readings from the PWD sub did not match the actual conditions of the hole, e.g. high ECD values from the PWD sub coupled with a large amount of cuttings coming over the shakers, and vice versa. The ECD reading did not change as drilling continued, staying around 1.54 s.g..

15.7 Drilling 8-1/2" Conclusion and Recommendations

The practice of displacing the well to mud whilst drilling out the shoe should continue.
The assembly worked as per plan. As loses were not expected to be an issue the PWD sub could have been omitted from the designed BHA as it's failure appeared to make no difference to the drilling performance.
Some time was lost due to repeating the FIT, this could have been avoided if the rig understood what the minimum acceptable value was. The reasoning of the values of such tests along with the acceptable minimum should be included inn the program to avoid any potential lost time.
The ROP was restricted from 45 to 40 meters per hour to obtain a full LWD log, when LWD is crucial the ROP be reduced further to 30 meters per hour.
Although expensive the RAB tool's cost was justified with the higher ROP near core point and avoiding the need to circulate bottoms up.
There was a risk of bit balling with the water based mud used, this did not materialize and use of the same bit in a similar situation in the future should be considered.
The hole required reaming across the boundary between the Lista and Hermoid formations when pulling out. In future operations running a similar system consideration should be given to reaming across these formations before drilling into the reservoir.

15.8 Drilling Fluids

8-1/2" Section Mud overview

Glydril WBM

	Planned	Actual
Mud weight	1.31 – 1.40 s.g.	1.31 s.g.
PV	< 22 cP	15.5 - 25 cP
Yield point		10 - 24 Pa
100 rpm		28 - 36 lbs/100sqft
3 rpm	8 – 12 lb/100sqft	8 - 10 lb/100sqft
10 sec. Gels	> 4 Pa	3.5 – 5.5 Pa
10 min. Gels	< 20 Pa	6 - 10 Pa
API Fluid loss	2 – 4 ml	2.2 – 2.8 ml
KCl	140 – 160 kg/m^3	150 – 160 kg/m^3
Glycol		3.2 – 3.8%
Cl^-		75,000 – 85,000 g/l
MBT	< 60 kg/m^3	22 g/l
LGS	< 200 kg/m^3	25.7 – 155.3 kg/m^3

Hole Cleaning

The following techniques were used successfully to keep the hole clean,
1) String drags were monitored with the Driller's weight indicator.
2) Stands were reamed prior to connections.
3) Yield Point was maintained around 16 Pa
4) Low End Rheology was maintained at 10 lbs/100sqft (3 rpm).

Solids Control Equipment

4 shale shakers, utilising 4 230 mesh screens, 2 on each decks were used during the drilling of the 8 ½" section. The 5th shale shaker was dressed with 84 mesh screens and was only used whilst changing out screens on the other shale shakers. No problems were experienced during the drilling of this section.

Gas Peak Summary

Depth MD	Total %	Backgro %	C1 ppm	C2 ppm	C3 Ppm	iC4 ppm	nC4 ppm	IC5 ppm	nC5 ppm	Remarks
1692	0.07	0.04	403	3	1					Formation gas
1871	0.08	0.05	401	4	3					Formation gas
1990	0.07	0.03	232	1	3					Formation gas

15.9 Drilling Fluids and Hole Cleaning Recommendations

The Glydril WBM system worked well and avoided the need and expense of skip and ship and the issue of land fill. WBM's should be used in similar sections again. Despite the well bore stability model ideally requesting a higher planned mud weight for the section the actual mud weight of 1.31 s.g. was believed to be at the upper end of the useable scale, the mud loggers offshore suggested that 1.28 s.g. would have been ample to drill the section with (due to a small amount of cavings seen in well at TD).
No hole cleaning difficulties, fill or hole instability was observed during drilling.
Although the value of the PWD sub is questioned no recommendations are made for change to the hole cleaning operations as these along with displacing the hole to mud before running casing worked well.
Large, 5 litre, samples were collected, washed and dried by the mud loggers offshore to allow them to concentrate on collecting samples with high ROP (the large samples would be split onshore).

15.10 Geology

General Discussion

Formation tops penetrated:

GROUP	FORMATION	PROGNOSED (m)		ACTUAL (m)		H/L	LWD/LOG
		AHBDF	TVMSL	AHBDF	TVMSL		
Nordland		159	130	**160**	**130**	1L	LITH
	Utsira	734	705	**695**	**666**	39H	LITH
Hordaland		884	855	**900**	**871**	16L	LITH
	Eocene marker	1619	1590	**1611**	**1582**	8H	LITH
	Frigg marker	1844	1815	**1827**	**1798**	17H	LITH
Rogaland	Balder	1979	1950	**1962**	**1933**	17H	LITH
	Sele	2029	2000	**2019**	**1990**	10H	LITH
	Hermod	2045	2016	**2047**	**2018**	2L	LITH
	Lista	2114	2085	**2100**	**2071**	14H	LITH
Shetland	Ekofisk	2254	2225	**2247.5**	**2218.5**	7H	LITH
	TD	2304	2275	**2302**	**2273**		

Conclusions and Recommendations
None, all tops of formation were within the given seismic error bar.

15.11 Surveying

General Discussion

SURVEY DATA: Comments: VS Azimuth: 251.53

	MD	Inc	Azm	TVD	VS	N/-S	E/-W	Max DLS
First survey:	1252.4	0.51	47.19	1252.32	-2.71	2.05	-2.74	0.13
Last survey:	2292.46	1.53	159.99	2292.02	9.53	-17.61	9.53	

The MWD unit depth sensor failed prior to drilling out the 9 5/8" shoe.

15.12 Surveying Conclusions and Recommendations:

Survey data was obtained without problems.

16 Electric Wireline Logging

16.1 General Discussion

Logging suite #1 – GR/PEX/DSI/HRLA
The wireline sheave was rigged to the compensator wire and a toolbox was held prior to the picking up the wireline tools to the drill floor. The tools were surface tested and the radioactive sources were loaded prior to running in.
The casing shoe was observed at 1200m. Before running into open hole the operation was stopped to move TDS hoses that were blowing onto the wire due to the high winds. These should have been secured prior to the job starting and resulted in 15 minutes downtime. The neutron logging tool (CNL) was activated and the logging suite was continued to be run in hole, logging down at 2300 ft/hr. At 1,256m it was noticed that the HRLA (laterolog) image was not being displayed on the wireline unit computer. The tools were pulled into the shoe & the problem corrected.
Logging was resumed down to 2031m, where the tools were changed to log in high-resolution mode. The hole was logged up to 1999m and the tools ran in hole (not logging) through the Hermod formation to 2,200m. The logging string was pulled up to 2194m to check up-tension and the wireline was reflagged.
The suite continued running in hole and tagged TD at 2293m logger's depth. Opened the HRLA one-armed calliper & logged up to 2,079m. At this depth the wireline jumped off the guide wheels in the unit, and logging had to be stopped for a few minutes to re-attach the wire. Continued to log up until 2030m, above Hermod formation. Ran in hole to 2,130m and logged up (main pass) at 1,800 ft/hr. The cable was observed not to be spooling correctly, however, the up log was continued. The casing shoe was measured at 1199.5m logger's depth. Once inside the shoe all tools were turned off apart from the GR. Logged up with GR to 930m, at which point, the wireline spooling had to be corrected, causing 15 minutes downtime. The GR was stopped and the wire pulled to 100m. The compensator was turned off and the toolstring pulled out of the hole. Removed the radioactive sources and rigged down the tools in preparation for the VSP run.

Logging suite #2 – VSI-4
During this short period of logging the weather was very heavy, with the standby boat reporting a maximum wind speed of 40 knots and maximum wave heights of 6m. Although the crane was within weather limits, it was discussed whether it was prudent to run the gun assembly or not. Schlumberger did not have any weather limitations on the tool, leaving it up to operator to decide whether to run them or not, however, the crane operator on shift had had experience with running VSP gun assemblies in rough weather previously, and was worried about damaging the guns.
A safe job analysis was therefore done to prepare for the gun deployment. Additionally a toolbox talk was held prior to rigging up the toolstring.
The tools were surface checked and calibrated before being run in hole. Set zero depth referenced to the top of the first receiver, as this was a known depth (receivers are coupled by wire only and is flexible). Calibrated the depth with GR and continued running in hole to 1978m. Fired check shots, tools working. Ran in hole to 2234m and pulled up to first station at 2220.5m (top of receiver). Conducted VSP survey as per programme. At the third VSP station, a leak was observed in the gun assembly. Pulled the guns to the helideck and found a loose air hose connection. The connection was tightened and the tools returned to sea. This resulted in 30 minutes downtime. Continued conducting the VSP survey as per programme. At 345m the survey had to be terminated due to loss of signal, the tool string was pulled out of hole and rigged down and the gun assembly removed from the water.

Pass	Interval logged (m)	Log Acquired	Operation Time (hrs)	Down time (hrs)	Max BHT (°C)	Time since last Circ. (hrs)
1	1201 - 2278	GR/PEX/ DSI/HRLA	14	0.75	85	6
2	435.4 - 2280	VSI-4	9	0.5	85	19

16.2 Conclusions and Recommendations

The multi-armed calliper indicated on the tool sketches was not run in the dry case scenario. Although the one-armed calliper supplied with the HRLA tool indicated gauge hole, the use of the multi-armed calliper would have been more accurate.
Some of the VSI tools were not ready to be sent to the rig in time and a back up option had to be used instead. The reason for this was due to the lack of understanding of how to call category 3 tools from Schlumberger in the big lever contract, a good understanding of the contract is required.
Although some downtime was incurred, Schlumberger did an excellent job, survey data quality was very good.
Reservoir engineering support was supposed to be supplied from Aberdeen, this was not easy and it was believed that the core team should have been co-located.

17 Plug and Abandon

17.1 Brief outline of the objective

Objectives

1) To isolate the reservoir fluids form the wellbore by setting a competent cement plug from TD to minimum 50m above the top reservoir formation (legislative requirement).
2) To set a competent mechanical barrier (bridge plug) at the bottom of the 9 5/8" casing.
3) To set a 200m competent cement plug inside the casing, using the bridge plug as a cement retainer.
4) To displace the Glydril mud from the well and recover as much as possible for re-use.
5) To cut the 20" casing and 30" conductor minimum 5m below the seabed and retrieve the wellhead in one run.
6) To conduct a seabed survey that confirms that the site is left in a clean condition.

Achievements

1) 2 open hole cement plugs were set, one from TD at 2302m to 2102m, the other from 2102m to theoretical top of cement of 1881m. This constituted a 420m plug.
2) A Halliburton EZSV bridge plug was installed at 1192m (top plug depth).
3) A 200m cement plug was set above the bridge plug. Theoretical top of cement 992m.
4) A total of 23 m^3 Glydril mud was discharged due to cement contamination during the cement job displacements and final well displacement. A total of 28 m^3 Glydril mud was left in the well. The remaining Glydril mud was backloaded.
5) Two runs were required to cut the 20" casing and 30" conductor, the first run being a misrun. The casing & conductor was cut and removed.

17.2 Time Breakdown

Operation	Target Time (days)	Budget Time (days)	Actual Time (days)	Productive Time (%)	Lost Time (%)	Down Time (%)
Abandonment	2.25	2.99	3.05	88.4	0	11.6
Anchor handling	2.00	2.66	1.10	100	0	0

17.3 Summary of Incidents. Down Time, Lost Time, and Associated Causes

Incidents
A total of 26 RUHs were raised during the P&A (not including last day of anchor handling). A total of 21 Stop-cards were received, again not including last day of anchor handling.

No major incidents or near misses.

Down Time (NPT)

Down Time Incident and Cause	Down Time (hrs)
Red Baron pipe cutter misrun	8.5

Total down time (NPT) for the section was 8.5 hrs.

Lost Time
No lost time during this section.

17.4 Chemical Discharge

No Chemicals Discharged.

Mud:
33 m^3 Glydril mud was discharged during the displacement of the cement jobs and final well displacement to seawater. No chemicals exceeded their discharge permit..

Cement:
Usage of most chemicals used in this section exceeded that planned, as only one open hole cement job was accounted for in the plan.

Rig Chemicals:
No comments.

17.5 Operational Performance

Once the diverter installed, a ported mule shoe was run in hole on 9 stands of 3-½" stinger on 5" DP. One stand off bottom, the cement stand was made up and the string was washed down to 2301m.

For cementing operations summary, see cementing below.

After setting plug #2 in open hole, the well was flow checked and found static. Pumped a slug and pulled out of hole in order to run the EZSV plug at the bottom of the 9 5/8" casing. 94 joints 5" DP were laid out as they were pulled out of hole. The mule shoe was laid out and an EZSV packer, running tool and crossover was made up to the 3 ½" cement stinger. Ran in hole slowly to avoid inadvertently setting the plug. Set the plug as per Halliburton procedures at 1192m (top of plug depth). Pulled off the packer and weight tested the plug with 4 MT. Picked up 8m above the plug, closed the BOP and pressure tested the EZSV plug to 111 bar / 10 mins, taking the pressure up in 25 bar steps.

Made up cement stand and cement hose and pressure tested the surface lines to 100 bar / 5mins.

For cementing operations summary, see cementing below.

Following the completion of cement plug #3, all remaining 5" DP and 3 ½" DP was laid down, leaving only 2 stands of 6 ½" DCs and x jts 5" HWDP in the derrick. Also laid down one 6 ½" DC, the EDPHOT stand and the cementing stand.

Ran in hole with MUT and recovered wearbushing as per Dril-Quip procedures.

The BOP was disconnected and pulled as per Odfjell's procedures. Operations were suspended during BOP/riser pulling operations due to the cranes being occupied with the backload to the Far Fosna. This resulted in 1.5 hrs lost time.

The Red Baron pipe cutter assembly was made up and run to below the seabed and the engagement of the knives tested with 1700 lpm. The assembly was run in hole and engaged at the stop plate in the wellhead recess with 5 MT set down weight, 20 MT overpull and 10 MT set down weight. The pump rate was brought to 2000 lpm and the knives engaged to

begin cutting. The flow rate was increased in stages to 2500 lpm and cutting continued of the 20" extension joint. A slight increase in string vibration was observed and a small cloud of mud returns after approx. 6 hrs, however as the amount of mud did not indicate a clean cut through the 20" extension joint. Cutting continued for approx. 8 hrs, more than the expected time to cut both casings. An attempt was made to pull the wellhead with maximum 160 MT overpull without success. Decided to pull out to inspect the knives at surface, some wear was observed at the front edges of the knives although no major wear was seen.
The cutter was re dressed and again run in hole. Tested the engagement of the knives below seabed, knives engaged at 2200 lpm, (500 lpm higher than previous surface test). Engaged the stop sub as before, and started cutting the 20"/30", this time using 2800 lpm, increasing to 4000 lpm (higher range of Drillex motor). Metal shavings were observed at the 30" conductor annulus ports, indicating a successful cut of the 20" extension joint. A total of 5 attempts were made at pulling free to a maximum of 260 MT overpull, without success. Cutting continued and the RGB & wellhead came free during this opeation. Pulled the RGB & wellhead out of the hole and secured the assembly on the work skid. Made up the 18 ¾" wellhead running tool and removed the wellhead/conductor housing from the RGB.
Laid down pipe prior to commencement of anchor handling operations. Again, operations had to be suspended to allow the crane to work on priority backload.

Component	Serial No	Size/OD	ID	Con dn	Con up	Length	Acc length	Comments
8½"soft blade stab	RB 12836		-	4 ½" IF	4 ½" IF			
X/O	RB 26566	7 3/4"	-	4 ½" IF	6 5/8" R			
Pipe Cutter	E 09423		-					
Top sub	RB 12426	11 3/4"	-					
Jet sub	SIN 5362	8"	-	6 5/8" R	6 5/8" R			
No Go	4530007		-	6 5/8" R	6 5/8" R			
9 ½" Drillex motor	XA 95018	9 7/16"	-	6 5/8" R	6 5/8" R			
8" bumper sub	D 93658	7 5/16"	3 ½"	6 5/8" R	6 5/8" R			
8" DC		8"	-	6 5/8" R	6 5/8" R			6 DC's
X/0			-	6 5/8" R	6 5/8" R			
5" HWDP		5"	3"	4 ½" IF	4 ½" IF			To Surface

This assembly was used to cut the 30" conductor & 20" extension joint to retrieve the WH & RGB.

Equipment Failures
The first pipe cutter run was a misrun due to too low flowrates being used to drive the Drillex motor.

17.6 Conclusion and Recommendations

Sufficient QA/QC needs to be performed on key components, such as the Drillex motor. A shallow hole shore based test could be considered prior to shipment.
It is suggested that the 20" pup should be increased to 8 meters in length to easily accommodate a cut at the programmed depth.

17.7 Drilling Fluids

Glydril WBM

	Planned	Actual
Mud weight	1.31 – 1.40 s.g.	1.31 s.g.
PV	< 22 cP	25 cP
Yield point		17 Pa
100 rpm		36 lbs/100sqft
3 rpm	8 – 12 lb/100sqft	10 lbs/100sqft
10 sec. Gels	> 4 Pa	5.5 Pa
10 min. Gels	< 20 Pa	10 Pa

API Fluid loss	2 – 4 ml	2.2 ml
KCl	140 – 160 kg/m^3	150 kg/m^3
Glycol		3.2%
Cl^-		75,000 g/l
LGS	< 200 kg/m^3	77.8 kg/m^3

Mud properties were stable, and no problems occurred during this section. Displaced well to seawater whilst circulating clean above cement plug #3.

17.8 Conclusion and Recommendations

The system worked well, no recommendation is made change.

18 Cementing: Plug and abandonment program

18.1 General Discussion

Two cement plugs were set to isolate the 8 ½" open hole and abandon the well.

Plug #1: OH cement plug from 2302 – 2102m bdf

	Spacer:		*Cement slurry:*	
Volume:	5 m^3 ahead, 1.75 m^3 behind		8.05 m^3	
Density:	1.60 s.g.		.90 s.g.	
Additives:	Drill water	4,040 ltr	Gascon	3.5 ltr/100 kg
	NF-6	As req	HR-5L	0.40 ltr/100 kg
	Halad-99LE+	14 ltr	Halad-613L	9.00 ltr/100 kg
	Tuned Spacer E+	270 kg	CFR-5LE+	2.50 ltr/100 kg
	Barite	5,211 kg	NF-6	0.10 ltr/100 kg
			Drill water	34.19 ltr/100 kg
			Yield:	**77.74 ltr/100 kg**

The hole was circulated clean with 78.5 kg/m^3 1.31 s.g. mud prior to making up the cement hose. The spacer and cement slurry as detailed above was pumped with the cement unit. The plug was under-displaced by 0.58 m^3. The slurry and postflush was displaced with 16 m^3 1.31 s.g. mud using the rig pumps. The cementing stand was broken out and pulled slowly above cement plug to 2102m. Attempted to reverse circulate clean above the cement plug, but due to the high friction losses in the 3 ½" DP the pump pressure reached 35 bar (the maximum allowable) at 170 lpm. The well was circulated clean conventionally with 104.1 m^3 1.31 s.g. mud. Clear traces of both cement and spacer were observed; 23 m^3 of contaminated mud was discharged.
Broke out cementing stand and pulled slowly above cement plug to 2102m.

Plug #2: OH cement plug from 2102 – 1902m bdf

	Spacer:		*Cement slurry:*	
Volume:	5 m^3 ahead, 1.75 m^3 behind		8.05 m^3	
Density:	1.60 s.g.		1.90 s.g.	
Additives:	Drill water	4,040 ltr	Gascon	3.5 ltr/100 kg
	NF-6	As req	HR-5L	0.40 ltr/100 kg
	Halad-99LE+	14 ltr	Halad-613L	9.00 ltr/100 kg
	Tuned Spacer E+	270 kg	CFR-5LE+	2.50 ltr/100 kg
	Barite	5,211 kg	NF-6	0.10 ltr/100 kg
			Drill water	34.19 ltr/100 kg
			Yield:	**77.74 ltr/100 kg**

Pumped spacer and cement as detailed above with cement unit. Displaced slurry with 14.3 m^3 1.31 s.g. mud using the rig pumps. The plug was underdisplaced by 0.5 m^3. Broke out cement stand and pulled up slowly to 1800m (81m above theoretical top of cement at 1,881m). Circulated clean conventionally with 1.31 s.g. mud, with total volume pumped 77.5 m^3. Saw clear traces of both cement and spacer when circulating bottoms up; 10 m^3 contaminated mud was discharged.

Plug #3: Cement plug inside 9 5/8" casing: from 1192 - 992m bdf

	Spacer:		*Cement slurry:*	
Volume:	8 m^3 ahead, 2.53 m^3 behind		12.94 m^3	
Density:	1.00 s.g.		2.10 s.g.	
Additives:	Drill water	10,530 ltr	NF-6	0.10 ltr/100 kg
			Drill water	45.44 ltr/100 kg
			Yield:	**110.21 ltr/100 kg**

Pumped spacer and cement slurry with cement unit as per details above. Displaced slurry with 5.5 m^3 1.31 s.g. mud using the rig pumps. Broke out the cement stand and pulled out of hole slowly to 916m (theoretical top of cement at 992m). Attempted to pump wiper ball to clean the DP and stinger, however, this was not possible due to 20 bar back-pressure on the standpipe, indicating an over displacement of the plug. Displaced the well to 96.1 m^3 seawater as per MI displacement plan, no cement, spacer or hi vis was observed on shakers whilst displacing. Pulled the cementing stinger out of hole.

18.2 Abandonment Cementing Recommendations

A late change was requested to the thickening time of the abandonment plugs slurry, although this caused no problem this time the criteria should have been communicated earlier to avoid any risk from last minute changes.
A flow chart could be used to quickly decide offshore how much excess cement should be pumped following reading the actual size of the hole from a caliper log.

APPENDICES

A: Lessons Learned

Operations Phase: HS&E			
INTENT	**ACTUAL**	**LEARNED**	**DO**
No Harm to people or Environmental Incident (through coaching, systems and procedures)	i No harm or reportable incident. 1) Prior to project start up all rig crews joined a 3 day safety leadership course to set the scene, meet people and communicate the emphasis on safety. 2) During the start up of the project additional personnel were assigned to the rig amongst these were a lifting specialist and a HSEQ specialist. These men allowed a review of the DROPPS action status, hoisting and lifting procedures (against Norsok standards) and a heli deck procedures. Meetings were held with both crane operators and deck crews to discuss Shell's expectations. 3) Shell and Odfjell rig management met to discuss safety expectations. 4) Additional deck crew were added to the team during mob to ease workload. 5) Shell DSV's seen to have done sound job in coaching HSE, for example by following up on Stop cards or recent issues in safety meetings for working at height, house keeping, barrier policy and spills. (Safety	1) Advantage from having crew early in project to ensure common understanding of audience and safety focus for cooperation (typically to a wider audience then DWOP). 2) Specialist visits important for communicating company's need. (DROPPS review was thought to be especially valuable for rig working in Norwegian sector due to the high amount of automated equipment in the derrick). 3) Managers visit important to emphasise the importance our company places on safety. 4) Additional crew allows busy periods, such as mob and prepare, to be worked safely. 5) Continued focus on basic's required. Need to focus on interface procedures (amount of isolations required for varying degrees of chemical strength). 6) Odfjell "red banded" at corporate level due to concerns over companies safety systems. Odjfell was considered for Beluga single well campaign following excellent safety record on recent Norske Shell well. Following Odfjell's performance it's thought that individual company's can perform differently in different regions. 7) No lighters allowed offshore, passed on concerns	1) Consider leading for safety type courses to all new rig crews. 2) Lifting and Safety specialists to go offshore early in project for audits and to communicate company expectations. Lifting specialist should also carry out a same operation in shore base (10 commitments). It was suggested in the AAR that someone from outside drilling should also attend to act as a fresh pair of eyes to challenge the beliefs and givens. 3) Shell manager to go offshore early in project to re enforce safety message. 4) Continue using additional personnel during times with multiple operations. 5) Focus on interfaces during operational changes. 6) Odfjell should continue to be considered for use by Norske Shell when going to tender following safety performance seen. 7) Heli-base informed of potential

Operations Phase: HS&E			
INTENT	**ACTUAL**	**LEARNED**	**DO**
	meetings held in Norwegian and English). 6) Good attitude sent toward safety in general from Odfjell. (Stop and RUH reporting systems were seen to work well with good buy in from Odfjell's rig crew giving high number of quality interventions. Rig crew thought to have very positive attitude following Odfjell's empowerment training). 7) Cigarette lighter found in smoke shack. 8) Contractor did not have discharge permit available to prepare weekly discharge data (Medic). Also to be able to confirm correct datablad available. 9) Logging unit onboard for previous operator had to be changed out for similar unit of another 3rd party company.	to heli-base. 9) Would be ideal if same unit could be operated between 3rd parties to avoid additional HS&E exposure from unnecessary work changing what appeared to be similar units out.	problem. 8) Send discharge application to the contractor office/rig prior to mobilisation (For attn: Medic) 9) Ask if 3rd party can utilise each others unit's.

Operations Phase: Preparation			
INTENT	**ACTUAL**	**LEARNED**	**DO**
Provide sufficient time between planning phase and spud date to efficiently prepare operational activities	i Sufficient time available between planning and operation but no slack time. 1) Appeared to be last minute "scramble" from Shell IT for the provision of	1) Early involvement of all parties required for smooth operation. Less obvious operations such as IT very nearly hampered operational efficiency.	1) Continue to engage all parties as early as practically sensible. Bear in mind non-operational activities.

Operations Phase: Preparation			
INTENT	**ACTUAL**	**LEARNED**	**DO**
	hardware and people.		
Establish relationship with Drilling Contractor and Service Company personnel.	1) Early contact with all involved in planning along with DWOP, TATO (Safety Leadership Course), yard or rig visits, risk reviews and table top exercises made for easier and easier communication throughout.	1) Early or face to face contact helps build relationships which should ease communication during ops.	1) Continue to focus on team building to gain spirit and common goal.
Hold a successful DWOP.	1) Meeting held 1 month prior to planned start with all parties as per RTL guides and all objectives were considered. Good personal contact made between all parties.	1a) Earlier challenge may have allowed more scope change to the program (ie could have considered swedged conductor as opposed to clean up run (possible saving of 6 hours)) not enough time to order swedged joint even if this was supported). If more time was available then higher focus on technical limit enablers may have been worthwhile as time could be available for procurement. 1b) Difficulties found engaging Norwegians with RTL blockers such as Paradigms purely due to English being second languish. 1c) Boston Square found to be a good tool for ranking ideas. 1d) The DWOP broke into 3 focus groups for syndicate work, effort was placed on putting relevant people to each group to avoid time wasting. One person in the meeting voiced he would have wished to have been involved in all 3 groups (ie hold a longer DWOP), the remainder of the room strongly	1a) Continue to hold DWOP no later then 1 month prior to spud and earlier if possible (previous technical challenge session from peers should take care of most issues). 1b) For non-native English speaking people keep communication relatively straightforward. 1c) Use facilitator from RTL group to help keep meetings fresh. 1d) Continue with syndicate work. 1e) Ensure correct people invited to DWOP (not only people who are hands on to the operation).

Operations Phase: Preparation			
INTENT	**ACTUAL**	**LEARNED**	**DO**
		supported the arrangement used. 1e) Logistics personnel were not invited to the DWOP although the topic was discussed in depth.	
Maximise preparation opportunities during pre-spud time off location and pre-spud time at location.	1) Same drill string as used by Marathon on previous occasion, took opportunity to save time by avoiding having to pick up pipe. Shell spud boat sailed to and unloaded at Marathon location to allow rig up during tow. (Includes checking, M/U and racking of BHA & preparation of conductor). 2) Pressure testing of surface lines and performed maintenance on top drive, mud pumps and BOP's. Prepared guide base in moon pool and checked cementing equipment for conductor job. Constant concurrent activity ongoing to minimise lost time. String laid out during final trip from TD. Good use of pre operation checklist offshore to ensure fully prepared before spud. 3) BOP found to have problem with cracked mini connector, this had the potential to stop the operation by weeks if it could not be repaired. 4) On start of operations it was found	1) Good relations / corporation with other operators saves time. 2) Value of good offshore preparation. 3a) Importance of BOP inspection. 3b) Question the spares held in stock for BOP. 3c) BOP connector repaired on 2nd attempt, no NDE was done on first attempt to show flaw. 4) It was later found that a "Crane master" was available for mobilization from onshore that increases the cranes lifting Capability.	3a) Have 3rd party BOP inspector available to rig early. 3a, 3b) Question the BOP's history and if the BOP will be open to any unusual operations after the time of discussion prior coming onto the Shell contract (such as maintenance or detailed inspection requiring split or strip of equipment). Consider part which could be damaged. 3c) Carry out full work scope initially (should have included NDE) to avoid double working. 4a) Establish crane operating limitations prior to start of operations. Plan for max cargo weight to comply with limitations. 4b) Investigate the availability of "crane master" for increased lifting capability.

Operations Phase: Preparation			
INTENT	**ACTUAL**	**LEARNED**	**DO**
	that crane lift capability was restricted in seas > 3m to 8MT or less. Several lifts were >8MT but could have been broken down further to be under 8MT prior to shipping if this restriction had been known up front.		
Rig up services and service company equipment efficiently.	1) Tide tables provide as hard copies and in feet from UK. Norway works in metres. (Potential error factor of +/-3) 2) BHI mud logging unit taken aboard Deep sea Delta for first time without issue.	2) Can be done without issue providing interface is given sufficient attention.	1) Tables should be provided also electronic format for easy reproduction offshore. Tables should be in metres. 2) See learned.
Install fit for purpose IT and communication channels.	i The IT set-up was plagued by numerous problems. The offshore engineer struggled to get the rig up and running which took near five days to get running smoothly. This put considerable strain on the offshore team to perform during an intense high activity start up period. Onshore support over an Easter holiday weekend was abysmal (problems happened historically in UK sector). - Person with password to access server on holiday. - Server not correctly set up for offshore (Even after 2 week delay in original start up)	1a) Better focus on IT required, similar level of service from Shell IT services should be expected as would be from any other service company. 1b) At least one standalone laptop and printer should be available to the ODE to allow to prepare instructions, tallies etc. 2) GID is inflexible with third party computer packages. Have a standalone option available. 3) Interact system reliable.	1a) Focus on plan for IT mob and demob. No local Norwegian expertise was employed. Tor Alm (IT expert from Stavanger office) should be involved early in project and report needs larger Shell IT services group. 1b) Arrange stand alone equipment for back up to ODE's GID set up. 2) Have a standalone option available as backup. 3) Consider interact if drilling and logging monitoring system required real-time onshore.

Operations Phase: Preparation			
INTENT	**ACTUAL**	**LEARNED**	**DO**
	- "Experts" on set-up not available. No duty replacement briefed. - UK keyboards provided for a Norwegian operation - Server had to be physically dismantled offshore to be able to move it into accommodation. Should have been done onshore or more fit for purpose server found (lighter & smaller) - Back-up free standing laptop (NOT GI-D) with printer should be hand carried out on mobilisation so that documents schedules can be produced immediately - Offshore accounts incorrectly set up. No access to livelink; OLS; Not equipped with Adobe Distiller (For DIMS); No CD Rom software (Create copies) - No "Clue" English<>Norwegian dictionary. - Requested to provide "Password" authentication over an open radio link by GI-D support desk (Whole of Norway now aware of that one!) – supposed security feature.		

Operations Phase: Preparation			
INTENT	**ACTUAL**	**LEARNED**	**DO**
	1) Above problems were seen with IT. Computers were available in time but only just. Problems with link to shore during project resulting in faxed reports etc. Offshore accounts saw difficulty on using internet. IT service could have been better arranged both during the beginning of the project and at the end. (Onshore ops personnel involved with sending server offshore and DSV initially tasked to dismantle same to send ashore). 2) The wellsite geologist could not install his proprietary geological software onto the Shell GID computer. He was provided with a standalone laptop as a solution. 3) Interact system from Schlumberger worked well in general and was supported.		

Operations Phase: 36" & 12-1/4 " Hole Section			
INTENT	**ACTUAL**	**LEARNED**	**DO**
Drill 36'' Hole **(BHA, Direction, Bit, ROP, Condition, Fluids, Reliability, Problems)**	i Drilled 36" hole section at technical limit rate. i Good operational practice seen throughout section such as marking pipe with ROV after having drilled 10m to avoid pulling out of hole if check trip required. i 17-1/2" Smith bit 115M Dull Graded: 1-1-	1) ODE and DSV stretched further at this time due to additional work from having little to no coms available to them and no computing power until the last minute. Standalone computers as back up should alleviate this in future.	2) Continue to have two drilling systems available.

Operations Phase: 36" & 12-1/4 " Hole Section			
INTENT	**ACTUAL**	**LEARNED**	**DO**
	NO-ALL-1-I-NO-TD. 1) Minor confusion appeared over BHA, two floats or not? Questioned if the hole opener supplied was not as agreed due to rig schedule slipping back 1 week, actual assembly was good for use. 2) 2 Drilling systems available, PDC & milled tooth.		
Run and Cement 30" Conductor	i Ran and cemented conductor at technical limit rate. 1) Dril-quip wellhead drawings displayed dimensions in inches. 2) No marker dye available for cement job, had to use Mica, which was not planned due to risk of hole bridging. (Wiper balls found in container for dye, no dye in container intended for balls). 3) No stage collar was run for a top up job if need be. Used 2 singles of 5" heavy weight drill pipe as cement stinger as opposed to plastic stinger. If required the plan would have been to pull the stinger and place it in the annulus and run a top up job through here. 4) 3/4hr down time lost during cementing operations due to no water supply and no cement feed from silo.	1) The use of varying units can lead to confusion. 2) Inventories from 3rd parties should be reliable, but containers should be checked in good time when onboard to ensure equipment could be resent if need be. (As said above Shell personnel stretched at this time). 3) Continue to use a double of HWDP for cement stinger (no plastic), to double as stinger for top up job if need be, avoiding cost of stage collar. 4) Parallel operations caused a differential pressure in the water line, which resulted in no water for the cement job.	1) Dimensions should be supplied in metric to avoid possible confusion. 2) Check inventories in good time. 3) Use double HWDP as stinger. 4) Focus should be kept on the main operation. 5) Continue to take 10L samples of cement for 30 * 36" annular cementation jobs. 6) Extension pups should be made up onshore to the running tool BOTH above and below with sufficient length to allow use of the iron roughneck. 7) 18-3/4" WHH running tool should be supplied with a pre-made extension pup of length to space out the TDS above the tool sufficiently to allow easy placement of master

Operations Phase: 36" & 12-1/4 " Hole Section			
INTENT	**ACTUAL**	**LEARNED**	**DO**
	5) 10 Litre sample of slurry taken to better represent top hole annulus conditions. 6) Difficulty in making up 30" conductor running tool. Unable to use Iron roughneck. Forced to use rig manual tongs. 7) Master bushings have to be removed to run 18-3/4" WHH through the rotary. If the space out to the TDS is too short it creates problems in getting the master bushing back in under the TDS.		bushings.
Drill 26" to Clean Out Conductor	i 26" Smith MSDSSHC Bit Dull Graded, 1-1-NO-A-1-I-NO –TD. 1) 3 hours in total to clean out conductor.	1) Could have ignored this run and drilled cement with 12-1/4" assembly (would have saved very little time ie pulling out for assembly change). If the clean out run was omitted the risk of cement blocks causing mechanical sticking could have been reduced by use of swedged conductor at shoe. Cost of lost time (shallow bit trip and ILT from removing larger volume) versus cost of swedge must be almost neutral, best to run clean up and avoid risk of cement blocks almost entirely.	1) Continue to run 26" conductor clean out run in future.
Drill 12-1/4" Hole **(BHA, Direction, Bit, ROP, Condition, Fluids, Reliability, Problems)**	i 12-1/4" Smith Bit FGXi Dull Graded: 2-3-NO-A-E-I-NO-TD. i 12-1/4" hole drilled between agreed technical limit rate and mean planned rate, hole inclination kept below 1 degree. The hole was seen to remain in excellent shape	1) Could have questioned maximum inclination target size could handle and "risked" to drill with more emphasis on ROP and less on inclination. 2) Reduced surveying saved time. 3) LWD is suitable for top hole data acquisition, saving additional logging runs.	1) Question maximum inclination allowed at TD of section to possibly allow faster drilling. Drilling performance could have been improved by more constant WOB. 2) Question need to survey every

Operations Phase: 36" & 12-1/4 " Hole Section			
INTENT	**ACTUAL**	**LEARNED**	**DO**
	though out. During operations around picking up drilling assembly the driller moved travelling block downwards which caused the elevator to hit the upper racking arms which in turn sheared the shear pins (as design). 2 hours were lost making repair. 1) If inclination above 1 degree stand was reamed. 2) MWD surveys taken every 3 stands to reduce time spent surveying hole. (A harder formation was hit between 1020 and 1060m and ROP slowed to avoid kicking off). 3) LWD Resistivity and GR data were the only logs run in this section and were of good quality.		stand. 3) Consider LWD.
Run and Cement 9-5/8" Casing	i Flat time between 12-1/4" and 8-1/2" drilling under agreed technical limit time. Casing had to be worked down past 1043m, believed to be a ledge due to inclination increase from harder formation seen here. Casing had to be worked down the final 6m, likely due to fill. Casing crew were seen to be very attentive at crucial points of the job such as handling of wellhead joint.	1) Minimal length of shoe track acceptable when cement around shoe is not critical. 2) Need to be able to rely on cementing contractor to both clean lines following use and check equipment properly prior to cement job.	1) Use minimal cement in shoe track where cement at shoe is not critical. 2) Check cementing contractor has fully carried out clean up or check of unit following or prior to job. 3) Paint flag bright colour. Differentiate between background and flag with contrasting colours.

Operations Phase: 36" & 12-1/4 " Hole Section			
INTENT	**ACTUAL**	**LEARNED**	**DO**
	Plugs bumped and sheared as planned. Little cement pumped behind plugs. Bull's eyes showed inclination to be less then one degree. 1) No shoe track joint planned to minimise ILT from drilling cement. 2) 1/2 hr lost time due to being unable to pump from cement unit. 3) Difficult to see cement flag functioning from rig floor.		
NU Drilling Riser and BOPs	i Performed operation without difficulty. Excellent turn around of damaged BOP mini connector due to effort of Odfjell and Shell's hire of BOP specialist. 1) 1-1/2 hours lost due to leaking pop off valve on cement unit prior to testing of lower Kelly cock.	1) Need to be able to rely on cementing contractor to check equipment fully prior to cement job.	2) Check cementing contractor has fully carried out check of unit prior to job.

Operations Phase: 8-1/2" Hole Section			
INTENT	**ACTUAL**	**LEARNED**	**DO**
Drill Shoe Track and Perform LLOT	1) 4-1/2 hours spent drilling plugs and minimal shoe track, ca. 3 hours ILT could have been avoided here by the use of "Shark Bite" plug retainers (drilling plugs was likely further slowed by use of PDC bit).	1) Could have pumped more cement behind plugs to stabilise these (no cement seen in rat hole) but this would not have guaranteed to have stopped the plugs spinning, whilst there would be little doubt if "Shark Bite" system was employed.	1) Run "Shark Bite" plug retainers in future (inexpensive easy fix to potential problem for any well). 2, 3) Continue with good drilling practice such as changing fluids in well when drilling shoe's if possible to

Operations Phase: 8-1/2" Hole Section			
INTENT	**ACTUAL**	**LEARNED**	**DO**
	2) Displaced well to mud while drilling shoe. 3) Reamed past casing shoe several times to ensure clean prior to drilling on. i LLOT failed to reach limit of 1.7sg EMG, actual value of 1.65sg seen.		minimise lost time and reaming shoe prior to drilling on.
Drill 8-1/2" Hole **(BHA, Direction, Bit, ROP, Condition, Fluids, Reliability, Problems)**	i ROP beat agreed technical limit rate. Reamed stand and took MWD survey every connection. Held kick drill prior to entering reservoir. 1) Average ROP of 45m/hr restricted to 40m/hr from 1407m to obtain full LWD log for top reservoir identification. 2) The APWD sub was thought to be operating incorrectly as the reading wasn't altering from 1.54sg no mater what amount of cuttings were returning from the hole. 3) No surveys taken between Top Hermod reservoir and TD to minimize risk of differential sticking (final inclination, 1.53°). 4) Hole reamed during pull at 4 points due to "sticky area" believed to be at boundary between Lista and Hermoid formations. 5) Real time LWD Resistivity and GR data was very poor due to a malfunctioning Anadril depth sensor. This was rectified	1) Schlumberger recommend maximum ROP's of 30 m/h for high quality LWD data. 2)Effectively managed operation without use of APWD sub. 3) Reduced surveys in reservoir lowering risk of differential sticking. 5) Real time LWD data quality is compromised by the loss of depth data from Anadril.	1) When relying on LWD data for a key decision point do not exceed 30 m/h 2) Value of APWD sub to be questioned in future wells as Beluga appeared to drill without problem without employing this sub. 3) Reduce survey points if possible in reservoir if risk of differential sticking. 4) Consider reaming hole across Lista and Hermoid formations before drilling on if in same formations in future with WBM. 5) Investigate reliability of depth sensors, ensure backup equipment.

Operations Phase: 8-1/2" Hole Section			
INTENT	**ACTUAL**	**LEARNED**	**DO**
	100 meters above top reservoir. This problem was magnified by high ROP through this section.		
Identify Core Point	1) Using Resistivity and GR at bit, the reservoir section was clearly identified without significantly reducing ROP and without having to circulate bottoms up. The recognition of the fluid type in the reservoir was straight forward, enabling an immediate decision to drill as quickly as possible to TD.	1) The higher cost of the tools at bit was more than offset by the saving in rig time because a higher ROP was maintained and circulating bottoms up was avoided.	1) Use RAB to help pick coring point.
Mud systems and equipment	i Glydrill used with good success. No hole problems seen (worst being "handful" of cavings at TD and tight hole which required reaming during pull at 4 points believed to be at boundary between Lista and Hermoid formations). 1) Security DBS Bit was Dull Graded 1-1-NO-A-X-I-NO-TD. 2) WBM allowed cheaper mud bills and avoidance of additional work and cost from skip and ship as would be required for OBM. 1.31sg was run (lower then minimum mud weight suggested that should be run by EPE well bore stability focal point). 3) There was a push to use Tritium in the system for the success case.	1)No problems with PDC bit form DBS (Type: FS2565), concerns over bit balling did not materialize. 2) Mud loggers suggested that 1.28sg Glydrill mud should have sufficed for this section (as per early plan). 3) The wish to use Tritium was poorly communicated to the SWE (by cc on email) and so was unexpected at the time. The suppliers of the chemical "Petrotech" were very helpful along with MI. The fluids company gave Tritium's potential use high focus in the short time frame to ensure it would be acceptable from an HSE stand point.	1) Consider running same bit in future operations. 2) Continue to us Glydrill mud in future similar sections. 3) SWE has addressed issue of CC'ing on email and expecting results.

Operations Phase: 8-1/2" Data Acquisition			
INTENT	**ACTUAL**	**LEARNED**	**DO**
Mud logging	1) The sampling interval of cuttings in the section above top Balder was increased due to the very high ROP. This decision was made during the operation, on the grounds of sample quality and safety. 2) The quality of the data stream from the LWD tools was compromised by the loss of the Anadril depth sensor throughout the 8 1/2" hole until 100m above the reservoir target. Depth data supplied by Baker Hughes Inteq enabled Schlumberger to maintain a poorer quality data stream, until the Anadril problem was fixed.	1) Could have discussed the option up front during planning as opposed to reacting. 2) Real time LWD data quality is compromised by the loss of depth data from Anadril.	1) Consider if the sample rate can be varied with ROP in planning phase. 2) Investigate reliability of depth sensors, ensure backup equipment.
Handling cuttings on the rig.	1) One washed and dried sample prepared on rig. 5 litre span containers were used to collect samples on the rig to save time whilst drilling. This allowed the mudlogger to concentrate on logging and collecting the sample whilst drilling at high ROP	1) The 5 litre span container is an efficient method of collecting bulk samples.	1) Collect a single bulk sample offshore and split onshore.
Offset data package supplied to the rig	1) The offset data package supplied to the rig included the key composite well logs, mudlogs and digital end of well reports. The site survey information was also available.	1)The key offset well was useful for correlating whilst drilling. Prognosis was accurate to 3 meters at top of reservoir, expected pressure also correct.	1) Supply offset well data to the rig.

Operations Phase: 8-1/2" Data Acquisition			
INTENT	**ACTUAL**	**LEARNED**	**DO**
Dry Hole Logging (triple combo + VSI)	i Although some down time occured Schlumberger did an excellent job and data quality was very good. 1) VSI run in 40 knot winds and 6 meter sea, required full SJA before commencing ops. 2) The multi arm calliper tool as indicated on drawing was not available to rig, a single arm tool had to be run instead. 3) Some VSI tools were not ready to be sent out with the rest of equipment and were transported by helicopter to be there in time, the back up option was an ASI. 4) 30 minutes down time was seen during HRLA log (15 min due to TDS hoses blowing onto wire, 15 min due to spooling on reel required correcting). The VSP data was acquired with a 30 minute delay due to a leaking air hose connection to the air guns. 5) Drilling Engineer was required to be present at unit during VSI logging. 6) Reservoir Engineering support was supposed to be supplied from Aberdeen. 7) Late changes were made to program without core team involvement.	1) Can run air guns for VSI in heavy weather. 2) 3rd party should supply said tools (single arm instead of multi arm calliper). 3a) 3rd party needs to be more aware of communication arrangement. Sclumberger were expecting call to mobilise VSI not only to read logistics sheet sent. 3b) Big Lever Contract requires written notification from Shell to Schlumberger for Category 3 tools, led to difficulty in sourcing tool at late stage. 4) More focus on adverse weather may have avoided downtime. 5) No value was seen by offshore team from D.E.'s presence at unit during VSI logging. 6) R.E. support from Aberdeen did not work.	3a) Ensure communication channels properly understood. 3b) Better understanding of Schlumberger contract required. 5) Consider if D.E. actually needs to be on unit before being "posted". 6) Consider how to improve R.E. support structure. 7) Core team should be co-located.

Operations Phase: Abandonment			
INTENT	**ACTUAL**	**LEARNED**	**DO**
Set 2 * Open Hole plugs across reservoir	i Both cement plugs set with only minor operational issue. 1) Could not reverse circulate clean due to high ECD. 2) Last minute changes from 3 hour to 5 hour hardening time and 20% to 10% excess could have been better managed.	1) If intending to reverse out cement, model first to ensure possible. 2a) Last minute changes add additional work this can remove focus from future operations. 2b) Could use decision tree in program to decide on percentage of open hole excess to pump depending on out come of calliper log.	1) Check ECD modelling before deciding on reverse circulating in plan. 2a) Avoid last minute changes if at all possible. 2b) Use decision tree for volume of open hole excess to pump depending on calliper log results.
Set mechanical bridge plug inside 9-5/8" shoe	i Set EZSV at top plug depth and pressure tested same to 111 bar without issue.		
Set final abandonment plug on mechanical bridge plug	i Set final plug without issue, unable to drop wiper ball due to 20bar back pressure, conventionally circulated hole clean.		
Pull BOP and riser	i Pulled with no issues		
Cut 30" and 20" @ 5m below seabed and retrieve with RGB.	1) Smith Red Baron cutting assembly run into well and landed off in wellhead, knifes at 163.4m, 5.88m below top WH. Started cutting with 2000lpm increased to 2520lpm, attempted to pull ca 8 hours after landing in WH, casings would not pull free. POOH with cutter assembly and changed knifes, 10hours lost on miss run. Performed shallow test, knifes opened at	1) 3rd Party person wrongly instructed flow rate to cut with. No shallow hole test was done for the first run (2000lpm pumped less than 2300lpm required to activate knifes). 2) Spacing of no go shoulder should be checked before agreeing cut depth in program (Virtually impossible to cut at 5m below seabed with 6meter 20" pup.	1) 3rd party to know flow rate required to activate tool, operational procedures on equipment should be carried by same. Consider shore based shallow hole test witnessed by operator or representative. 2) Check spacing of no go allows cut depth as said, 20" pup below wellhead housing should be increased to

Operations Phase: Abandonment			
INTENT	**ACTUAL**	**LEARNED**	**DO**
	2300lpm. RIH with cutter assembly and cut casings with 2800 - 4000lpm. Pulled PGB to surface (after checking derrick for potential dropped objects). 2) Space out of tool did (no go) did not allow the cut to be made 5m below the seabed as per program.		8meter in length to allow easy cut 5meters below seabed.

Operations Phase: Rig Move			
INTENT	**ACTUAL**	**LEARNED**	**DO**
Maximize Efficiency in Rig Move / Minimize cost to Operation	i Good communication evident with Marathon aided smooth handover. Refer to "Maximise preparation opportunities during pre-spud time off location and pre-spud time at location" in preparation section above for more points. 1) During anchor handling two winches failed (1x gearbox 1x Disc brake). Operations could continue as the AHV were powerful enough to "pull" the lines out from the rig. Weather was marginal for anchor handling but again due to the size and power of the AHV available operations were able to proceed. 2) Accepted ca 170bbl of base oil from MI during hand over of rig from Marathon, this was not planned.	2 & 3) Communication could be improved upon.	1a) 4x Powerful AHV made for a slick safe and efficient operation. Money well spent in this case, ideally would be done for all moves. 1b) Spare pendant wire should be carried to allow the use of other winch. 1c) Additional winch crew should be considered. 2) SWE has discussed issue with 3rd party.

Operations Phase: Rig Move			
INTENT	**ACTUAL**	**LEARNED**	**DO**
	3) Crane limit was found to be reduced, had to work with a crane capacity lower then originally expected.		

Logistics			
INTENT	**ACTUAL**	**LEARNED**	**DO**
Flexible Load Out List Arrangement pre agreed for least confusion.	1) Planned Loadouts could not be easily accommodated on the rig. 2) Success case boat option difficult to manage due to time pressures.	1) Load out lists should be sent to the rig and confirmed problem free.	1) Right person needs to be found from contractor to study loadout list and agree capacities… Contractor to produce deck layout drawings/sackstore diagrams etc to prove cargo proposed can be accommodated.
Inventory of equipment supplied to rig from vendor in good time.	i As mentioned previously: Excellent job effecting BOP mini connector in time. VSI struggled to be at rig on time.		
Agreed equipment arriving as expected, correctly sea fastened and workable to offshore crew.	1) Corepro sent basket with box inside which would have been very difficult to remove safely as box was very neat fit inside container. 2) Big Bags of calcium carbonate was sent out to rig in open top skips. Nylon lifting strops had "lift only once" labelled on them, rendering the question of how many times had they been lifted to get onto the	2) Question over method of how big bags are shipped. 3) Rigid signs size not matching rigs supports. Potential falling object. 4) Could have contract specific details available to logistics managers to allow them improved cost control.	1a) Corepro made aware that arrangement was not acceptable. 2)Question proper means to ship big bags. 3) Consider getting printed canvas signs with eyehole rings around edge that can easily be tied. 4) Specific Terms and Conditions of

Logistics			
INTENT	**ACTUAL**	**LEARNED**	**DO**
	boat in the first place. Big bags not water proof, hence not recommended to send them in open top skips. 3) Well Number signs were awkward to set up on rig. 4) No Terms and Conditions of contracts were readily available for logistics managers.		contracts should be made available to logistics managers.
Deck space control, Deck planning.			
Correct people to rig in time for job with relevant paper work in order.	i Two planned personnel arrived at rig without HUET training although message of requirement was past to all companies. Halliburton person taken to rig who was not cementer or intended for DSD.		
Control	1) There was no company focal point for logistics offshore unlike normal. 2) At was difficult to "Cherry pick" priority lifts from the boat.		1) Consider Shell providing a logistics co-ordinator (Drilling Engineer) or second Odfjell storeman for 24hr cover. 2) When a draft manifest is received offshore (Time allowing) the rig should prioritise lifts and send this information to logistics onshore so that they can attempt to arrange cargo on deck for easier removal offshore based on prioritisation.

B: DIMS DAILY OPERATION SUMMARY

A/S Norske Shell

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Operations Summary Report

Legal Well Name: 26/4-2 Beluga
Common Well Name: Beluga
Event Name: ORIG DRILLING
Contractor Name: Odfjell
Rig Name: Deep Sea Delta
Start: 11/04/2004
Rig Release: 27/04/2004
Rig Number:
Spud Date: 13/04/2004
End:

Date	From - To	Hours	Code	Sub Code	Phase	Description of Operations
						Last anchor #4 bolstered on AHV Olympic Hercules. Rig Deepsea Delta off contract with Marathon on contract with Shell. Rig in transit from Hamsun well 24/9-7 to Beluga prospect.
12/04/2004	00:00 - 05:00	5.00	MOV	1a		In transit to Beluga prospect. 21Nm to go.
	05:00 - 06:30	1.50	MOV	5a		Problem with telemetry data. AHV's to rig good. Data from rig to AHV's not recieved. Worked around problem to position rig.
	06:30 - 07:30	1.00	MOV	2a		07:21 - Anchor #9 on seabed. Middle fluke confirmed. AHV Olympic Pegasus.
	09:00 - 10:00	1.00	NPO	11a		Winch #3 problems with gear.
	10:00 - 11:00	1.00	MOV	2a		10:49 - Anchor #4 on seabed. Middle Fluke confirmed. AHV Olympic Hercules.
	11:00 - 13:00	2.00	MOV	2a		11:06 - Anchor #3 on seabed. Middle Fluke confirmed. AHV Olympic Pegasus.
	13:00 - 13:15	0.25	MOV	2a		13:05 - Anchor #10 on seabed. Middle Fluke confirmed. AHV Olympic Poseidon.
	13:15 - 14:35	1.33	MOV	2a		13:22 - Anchor #8 on seabed. Middle Fluke confirmed. AHV Far Scout.
	14:35 - 14:36	0.02	MOV	2a		AHV re-establish receipt of telemetry data from rig.
	14:36 - 14:45	0.15	MOV	2a		14:45 - Anchor #2 on seabed. Middle Fluke confirmed. AHV Olympic Pegasus.
	14:45 - 16:15	1.50	MOV	2a		16:07 - Anchor #11 on seabed. Middle Fluke confirmed. AHV Olympic Poseidon.
	16:15 - 16:30	0.25	MOV	2a		16:18 - Anchor #7 on seabed. Middle Fluke confirmed. AHV Far Scout.
	16:30 - 17:15	0.75	MOV	2a		17:12 - Anchor #1 on seabed. Middle Fluke confirmed. AHV Olympic Pegasus.
	17:15 - 17:45	0.50	MOV	2a		17:39 - Anchor #5 on seabed. Middle Fluke confirmed. AHV Olympic Hercules.
	17:45 - 19:00	1.25	MOV	2a		18:45 Olympic Pegasus left location Fuel 345m3 lube 26267ltr FW 61m3 ETA Aberdeen 13.04.04 13:40 18:54 - Anchor #12 on seabed. Middle Fluke confirmed. AHV Olympic Poseidon.
	19:00 - 21:15	2.25	MOV	2a		21:09 - Anchor #6 on seabed. Middle Fluke confirmed. AHV Olympic Hercules. 20:54 - 200tn Tension test #2 & #8 OK.
	21:15 - 00:00	2.75	MOV	2c		21:32 - 200tn Tension test #3 & #9 OK. 21:35 - 200tn Tension test #1 & #7 OK. 22:30 - 200tn Tension test #4 & #10 OK. 23:50 - 200tn Tension test #5 & #11 OK.
13/04/2004	00:00 - 01:15	1.25	MOV	2c		Continued pre-tensioning operations 00:36 - 200tn Tension test #5 & #11 OK. 00:005 Olympic Hercules Depart location Fuel 455m3 Lube 33930ltr FW 80m3 ETA Dusavik 13.04.04 08:30
	01:15 - 02:00	0.75	MOV	2a		01:20 - 200tn Tension test #6 & #12 OK. 01:25 Olympic Poseidon Depart location. Fuel 354.4m3 Lube 16750ltr FW 635m3 ETA Dusavik 13.04.04 08:30 01:50 Far Scout Depart location. Fuel 530m3 Lube 28131ltr FW 260m3 ETA Dusavik 13.04.04 08:00
	02:00 - 06:30	4.50	MOV	5b		Commence ballasting rig down to drilling draft.

A/S Norske Shell

Operations Summary Report

Legal Well Name: 26/4-2 Beluga
Common Well Name: Beluga
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Contractor Name: Odfjell
Rig Name: Deep Sea Delta

Start: 11/04/2004
Rig Release: 27/04/2004
Rig Number:

Spud Date: 13/04/2004
End:

Date	From - To	Hours	Code	Sub Code	Phase	Description of Operations
13/04/2004	06:30 - 07:00	0.50	MOV	5b		Held Pre-spud meeting with both shifts. Completed ballasting down operation at 07:00.
	07:00 - 10:30	3.50	DRI	5b		M/U cmt. stand. 1jnt 5" HWDP x kelly cock x pump in sub w/low-torque x 2jnts 5" HWDP. Racked back same in derrick.
	10:30 - 12:00	1.50	DRI	5b		M/U 30" WHHRT and cmt stinger. 1jnt 5" HWDP x pup x RT x 2jnts 5" HWDP. Racked back same in derrick.
	12:00 - 17:00	5.00	DRI	5b		P/U BHA # 1. RIH to 148m.
	17:00 - 18:30	1.50	DRI	5b		Installed saver sub to TDS. Function tested MWD. Held toolbox talk prior to spud well. RIH and tagged sea bottom at 160m.
	18:30 - 00:00	5.50	DRI	DMH1		Drilled 36" hole from 160m to 227m. Pumped 2x10m3 hi-vis mud every stand. Max. incl. 0.86deg. Shallow gas procedures in place.
14/04/2004	00:00 - 01:30	1.50	DRI	DMH1		Cont. drilling 36" hole from 227m to 233,8m. Confirmed depth with ROV. Called section TD.
	01:30 - 02:00	0.50	DRI	9b		Pumped 25m3 hi-vis pill. Circulated same OOH. Made check survey and displaced hole to 1.20 s.g. mud.
	02:00 - 02:30	0.50	DRI	5a		POOH 5"HWDP from 237m to 163m while displacing steel volume. No restrictions observed.
	02:30 - 03:00	0.50	DRI	16b		Installed marker buoys on seabed with ROV.
	03:00 - 05:00	2.00	DRI	5a		POOH BHA #1. L/D 36" HO. 17 1/2" dull grading: 1-1-No-A-1-I-No-TD. Tidied rig floor.
	05:00 - 05:30	0.50	DRI	16a		Changed bails & elevators.
	05:30 - 06:00	0.50	DRI	16a		Held toolbox talk prior to running 30" conductor.
	06:00 - 09:30	3.50	CAS	SCA2		P/U 30" shoe jnt. Checked function of shoe. Ran 30" conductor as per tally. P/U 30" housing jnt. Changed to DP elevators. Installed RT in housing and housing in RGB on cellar deck as pr. Dril-Quip instructions. RIH to seabed while filling 30" conductor with seawater (until RGB below sealevel). Stabbed 30" conductor in 36" hole assisted by ROV. Closed fill-up valve on RT w/ROV. RIH to TD (233.7m)
	09:30 - 11:00	1.50	CAS	SCA4		Inspected RGB heading & bullseye - 0.5deg fwd. Held toolbox talk prior to 30" cmt job. Circulated 50m3 seawater at 4000lpm. PT surface lines to 100bar.
	11:00 - 11:15	0.25	CEM	1d		Pumped 8m3 hi-vis pill w/mica.
	11:15 - 11:30	0.25	NPE	NOS2		Preparing mixwater: Unable to pump seawater in displacemet tanks - no pressure on fill lines - troubleshoot seawater supply.
	11:30 - 11:45	0.25	CEM	1b		Able to pump seawater - prepared mixwater.
	11:45 - 12:00	0.25	CEM	1c		Started to mix cmt. in batch tank using silo no. 11.
	12:00 - 12:30	0.50	NPE	NOS2		Unstable flow of cmt. from silo no. 11. Switched to manual mixing - no improvement. Stopped mixing cmt. - switched to silo no. 10.
	12:30 - 13:45	1.25	CEM	1c		Pumped total 45.5m3 (18 x 1.5m3 tanks of mixwater) 1.95sg class G cmt (CaCl2 - 4.35l/100kg) at 800lpm. using silo no.10 and no.12. Collected 10l sample and placed submerged in seawater at approx. 6 deg C. Collected mixwater sample.
	13:45 - 14:00	0.25	CEM	1d		Displaced cmt. with 22.95m3 (14 x 1.5m3 tanks + 950l) seawater at 1300lpm using the cmt unit. Recorded final circulating pressure - 3.5bar (TTOC - 4.4m bellow seabed). No backflow.
	14:00 - 18:30	4.50	CEM	SCA5		WOC while holding string in tension. Monitored conductor with ROV.
	18:30 - 19:00	0.50	CEM	1f		Set down string weight to neutral. Bullseye reading - 0deg. Released RT as per Dril-Quip instructions. Pulled and racked back cmt stand in derrick. Flushed landing string and washed PGB w/seawater.
	19:00 - 19:30	0.50	CAS	SCA6		POOH landing string.
	19:30 - 20:00	0.50	CAS	SCA1		Broke out and L/D CAM tool.
	20:00 - 20:30	0.50	CAS	SCA1		Flushed through cmt. stand and and racked back same.
	20:30 - 21:30	1.00	DRI	16a		Changed to drilling bails on TDS. Changed rotary bowls. Rearranged

A/S Norske Shell

Operations Summary Report

Legal Well Name: 26/4-2 Beluga
Common Well Name: Beluga
Event Name: ORIG DRILLING
Contractor Name: Odfjell
Rig Name: Deep Sea Delta

Start: 11/04/2004
Rig Release: 27/04/2004
Rig Number:

Spud Date: 13/04/2004
End:

Date	From - To	Hours	Code	Sub Code	Phase	Description of Operations
14/04/2004	20:30 - 21:30	1.00	DRI	16a		stands in derrick.
	21:30 - 23:00	1.50	DRI	5a		M/U and RIH with 26" clean out assy (BHA #2) to 160m (seabed). Stabbed in well assisted by ROV. Cont. RIH from 160m to 218m. Washed down from 218m. Tagged TOC at 231m (3m above shoe).
	23:00 - 23:30	0.50	DRI	DMH1		Drilled hard cmt from 231m to 234m. Washed down from 234m to 237m. Reamed through 30" shoe several times . Pumped 15m3 hi-vis pill of seawater. Spotted 5m3 1.20sg mud in open hole.
	23:30 - 00:00	0.50	DRI	5a		POOH from 237m. 06:00: cont POOH. Slip & cut block line. Started to M/U 12 1/4" BHA. Reparing Upper racking arm.
15/04/2004	00:00 - 00:30	0.50	DRI	5b		L/D 26" bit, bitsub & X-over (BHA#2 - Clean out assy). Dullgrading: 1-1-No-A-1-I-No-TD. Cleared rigfloor.
	00:30 - 02:30	2.00	NPE	NSL		Changed out wire on standlift arm due to excess wear.
	02:30 - 04:00	1.50	MNT	RMA2		Slipped & cut 35m of drilling line.
	04:00 - 04:30	0.50	DRI	5b		M/U 12 1/4" bit w/bit sub and ARC-sub.
	04:30 - 05:00	0.50	DRI	5b		RIH BHA#3 to 36m.
	05:00 - 07:00	2.00	NPE	NSL		Changed out shearpins. Upper Racking arm was not retracted. Travelling block moving downwards causing elevator to hit URA. Shearpins in URA sheared (as per design).
	07:00 - 08:30	1.50	DRI	5b		Cont. to RIH BHA#3 from 36m to 130m. Function tested MWD. RIH to seabottom and stabbed in well w/string assisted by ROV. RIH to 237m.
	08:30 - 00:00	15.50	DRI	DMH1		Drilled 12 1/4" hole from 237m to 654m. Taking surveys every 10m. Survey requirement relaxed to one every stand as BHA trend was found. Hole incl. less than 1deg. Hole in good shape. Pumped 2x 10m3 hi-vis pills. One at mid stand and one prior to connection. Drilling parameters: - WOB 0-5ton - Torque 2-6kft-lbs - RPM 150 - SPP 138bar 06:00 update: Drilling ahead at 866m HSE: RUH - 13 Green stop cards - 9 Red stop cards - 4
16/04/2004	00:00 - 20:00	20.00	DRI	DMH1		Drilled 12 1/4" hole from 654m to 1,057m. Pumped 2 x 10 m3 HIVIS pills each stand. Took MWD surveys every 3 stands or as required. Maximum inclination 1.19 deg. Drilling parameters: ROP: average 42.2 m/hr WOB: 0 - 12 MT, average 3 MT Rotary torque: 1.7 - 4.9 kft-lbs, average 2.9 kft-lbs RPM: 101 - 200 rpm, average 144 rpm Pump rate: 2,994 - 3,602 lpm, average 3,490 lpm SPP: 116 - 169 bar, average 147 bar Softer formation was observed at 1,025 - 1,040m, followed by a harder

A/S Norske Shell

Operations Summary Report

Legal Well Name: 26/4-2 Beluga
Common Well Name: Beluga
Event Name: ORIG DRILLING
Contractor Name: Odfjell
Rig Name: Deep Sea Delta

Start: 11/04/2004
Rig Release: 27/04/2004
Rig Number:

Spud Date: 13/04/2004
End:

Date	From - To	Hours	Code	Sub Code	Phase	Description of Operations
16/04/2004	00:00 - 20:00	20.00	DRI	DMH1		formation to 1,060m. Reduced WOB to max 5 MT to reduce inclination. Drilled with reduced WOB (max 5 - 7 MT) to TD @ 1,204m. Reamed stand if inclination greater than 1 deg.
	20:00 - 20:30	0.50	DRI	9a		Pumped a 15 m3 HIVIS pill and circulated hole clean with seawater.
	20:30 - 21:00	0.50	DRI	9a		Took an MWD check survey @ TD, inclination 0.41 deg. Pumped a 10 m3 KCl mud pill & a 8 m3 HIVIS pill.
	21:00 - 21:30	0.50	DRI	5a		POOH from 1,204m to 1,070m. Hole in good conditions - no major overpull or additional torque observed at Utsira formation.
	21:30 - 22:00	0.50	DRI	9b		Displaced hole to 1.2 s.g. spud mud.
	22:00 - 00:00	2.00	DRI	5a		Continued POOH to 230m. Topped up well with 3.68 m3 1.2 s.g. spud mud. POOH. R/B BHA. 06:00 update: Cleared rig floor. R/U casing running equipment. P/U shoe/float collar joint & tested same - ok. P/U intermediate joint, bakerlocked same to shoe & RIH. RIH casing to 378m (total of 29 joints run, incl shoe & intermediate). Average running speed 15 jts/hr. HSE: Conducted safety inspection with night crew. Areas covered: Koomey unit, engine room & cement room. No major findings. Minor housekeeping issues. Number of Stop-cards received: 2 safe, 4 unsafe RUHs: 6 green Incidents: 0 Near- misses: 0
17/04/2004	00:00 - 01:30	1.50	CEM	1f		M/U & R/B cement stand.
	01:30 - 03:00	1.50	CAS	SCA1		R/U to run 9 5/8" casing.
	03:00 - 03:30	0.50	CAS	SCA1		Held pre-job meeting with all involved personnel.
	03:30 - 04:00	0.50	CAS	SCA2		P/U shoe/collar joint & tested same. P/U intermediate joint & M/U & bakerlocked same to the shoe/collar joint.
	04:00 - 05:00	1.00	CAS	SCA2		RIH 9 5/8" casing as per tally to 158m, filled the first 10 with seawater. Stabbed into 30" wellhead housing with ROV assistance.
	05:00 - 10:00	5.00	CAS	SCA2		Continued RIH 9 5/8" to 1,030m, filling joints with seawater as required. No hole problems observed whilst RIH casing.
	10:00 - 10:30	0.50	CAS	SCA5		R/D casing elevator & R/U DP elevator. Filled casing with seawater.
	10:30 - 11:30	1.00	CAS	SCA5		P/U & M/U 18 3/4" wellhead joint. R/D casing running equipment. Installed vent valve in the WH running tool. Continued RIH, casing hung up at 1,043m. Worked casing string through hang-up point.
	11:30 - 12:00	0.50	CAS	SCA2		RIH 9 5/8" casing on HWDP landing string to 1,100m.
	12:00 - 12:30	0.50	CAS	SCA2		Filled casing with seawater.
	12:30 - 13:00	0.50	CAS	SCA2		Continued RIH 9 5/8" casing on landing string - casing hung up at 1,198m. Worked string down 2m to 1,200m. Latched onto 30" wellhead housing. Conducted a 25 MT overpull test. Shoe depth of 9 5/8" casing: 1200.0m

A/S Norske Shell

Operations Summary Report

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Start: 11/04/2004
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Date	From - To	Hours	Code	Sub Code	Phase	Description of Operations
17/04/2004	12:30 - 13:00	0.50	CAS	SCA2		Top of 18 3/4" wellhead (datum): 157.57m
	13:00 - 14:15	1.25	CAS	SCA4		Circulated 110% casing contents with mud pumps. Meanwhile, R/U cement head control lines. Held pre-job safety meeting prior to cement job.
	14:15 - 14:45	0.50	NPE	NSI		Attempted to pump from cement unit - immediate pressure build up. Checked surface lines - no leaks. Checked valves - no problems identified. Isolated cement unit & tested same - good test. Broke out cement line at rig floor & attempted to pump from cement unit - able to pump. M/U the cement line & pressure tested line against cement head lo-torque - found lo-torque valve to be passing fluid down drill string.
	14:45 - 15:00	0.25	CEM	1f		Pressure tested cement line to 240 bar / 10 mins.
	15:00 - 15:45	0.75	CEM	SCA4		Pumped 6 m3 seawater spacer with cement pump. Dropped ball for bottom wiper plug.
	15:45 - 17:30	1.75	CEM	1a		Mixed and pumped 67 m3 1.56 s.g. lead cement slurry as per programme.
	17:30 - 17:45	0.25	CEM	1a		Mixed and pumped 10 m3 1.92 s.g. tail cement slurry as per programme.
	17:45 - 18:30	0.75	CEM	1d		Dropped dart for top plug. Flag functioned ok. Chased dart with seawater using cement pump. Plug sheared at 131 bar @ 1,054 litres pumped. Displaced cement with 52.7m3 1.2 s.g. mud using rig pumps. Bumped top plug & pressure tested casing with rig pumps to 207 bar / 10 mins. Bled off pressure. Checked for backflow - no backflow.
	18:30 - 19:00	0.50	CAS	SCA6		Disconnected cement head control lines. Released 18 3/4" WHRT as per programme. B/O & R/B cement stand.
	19:00 - 19:30	0.50	CAS	16a		P/U landing string & flushed WH & RGB area at 4,800 lpm using rig pumps with ROV assistance.
	19:30 - 20:30	1.00	CAS	SCA6		POOH landing string & WHRT. L/D R/T. Cleared rig floor.
	20:30 - 21:30	1.00	CEM	1f		B/O & L/D cement head.
	21:30 - 22:00	0.50	CAS	SCA1		L/D casing tong. Changed to drilling bails.
	22:00 - 23:00	1.00	DRI	5c		M/U EDPHOT on 5" DP & R/B same in derrick.
	23:00 - 00:00	1.00	DRI	5b		L/D 12 1/4" BHA & prepared same for backload. Note: BOP choke line connector arrived on helicopter @ 23:00 hrs. 06:00 hrs update: R/U 3 1/2" handling equipment. M/U 3 1/2" cement stinger & R/B same. Pressure tested TDS & IBOP. Prepared MWD tools for 8 1/2" BHA. Downloaded memory data from 12 1/4" MWD/ARC. Meanwhile, worked on choke line connector for BOP. Continued backloading to boat. HSE: Conducted a fire&abandonment drill. Number of Stop-cards received: 7, 1 safe, 6 unsafe Number of RUHs: 8, 7 green, 1 red Incidents: 0 Near-misses: 0
18/04/2004	00:00 - 01:30	1.50	DRI	5b		L/D 12 1/4" BHA.
	01:30 - 02:00	0.50	DRI	16a		Installed 3 1/2" bushing on BX elevator.
	02:00 - 05:30	3.50	DRI	5c		P/U & R/B 36 joints 3 1/2" cement stinger.
	05:30 - 06:00	0.50	DRI	16a		L/D 3 1/2" BX elevator bushing.

A/S Norske Shell

Operations Summary Report

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Start: 11/04/2004
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Date	From - To	Hours	Code	Sub Code	Phase	Description of Operations
18/04/2004	06:00 - 08:00	2.00	BOP	SBO3		M/U swedge & cement hose to TDS. Pressure tested mud hose & upper kelly cock to 35 bar/5 mins & 345 bar/15 mins.
	08:00 - 09:30	1.50	NPE	NSI		Observed pressure drop on cement unit. Investigated same. Found pop-off valve to be leaking. Changed the rubbers on the discharge valves, replaced the bleed-off valve and changed pop-off valve. Greased & re-tested the unit, good test.
	09:30 - 10:00	0.50	BOP	SBO3		Pressure tested lower kelly cock to 35 bar/5 mins & 345 bar/15 mins.
	10:00 - 13:30	3.50	BOP	SBO		Prepared to run BOP & riser. Changed to 500 ST bails & elevator. Installed riser spider. Held pre-job meeting with involved personnel prior to running BOP.
	13:30 - 16:00	2.50	BOP	SBO		Moved rig 30m off location. M/U 2 x 50' riser joints. Skidded BOP under rotary & M/U riser to BOP. Connected guide & pod wires.
	16:00 - 16:30	0.50	BOP	SBO1		P/U BOP off skid & ran BOP & riser through moonpool.
	16:30 - 17:00	0.50	BOP	SBO1		Pressure tested kill & choke lines to 35 bar/5 mins & 345 bar/15 mins.
	17:00 - 18:30	1.50	BOP	SBO1		Continued running BOP on riser to 105m.
	18:30 - 19:00	0.50	BOP	SBO1		Pressure tested kill & choke lines to 35 bar/5 mins & 345 bar/15 mins.
	19:00 - 20:00	1.00	BOP	SBO1		Continued running BOP on riser to 126m.
	20:00 - 21:30	1.50	BOP	SBO1		P/U & installed slip joint & landing joint. Closed rotating dogs & conducted a 5 MT overpull test. Released support dogs.
	21:30 - 22:00	0.50	BOP	SBO1		Installed choke & kill lines onto slip joint.
	22:00 - 00:00	2.00	BOP	SBO1		Installed support ring & pod saddles. 06:00 hrs update: Moved rig to above wellhead. Inspected BOP bullseyes with ROV assistance, latched guide wires with ROV. Adjusted compensator & landed BOP. Locked BOP connector & inspected lock indicator with ROV assistance. Conducted a 50 MT overpull test. Inspected bullseyes - no change. Unlocked slip joint inner barrel & L/O landing joint. Installed diverter. R/D riser running equipment. Pressure tested riser connector to 207 bar/15 mins. Started M/U & RIH 8 1/2" BHA. HSE: Conducted a safety tour with OIM. Held Norwegian & English speaking safety meetings. Number of Stop-cards received: 5, 5 unsafe Number of RUHs: 17, 14 green, 3 red Incidents: 0 Near-misses: 0
19/04/2004	00:00 - 01:00	1.00	BOP	SBO1		Moved rig to above wellhead. Inspected BOP bullseyes with ROV assistance. Latched guidewires with ROV.
	01:00 - 01:30	0.50	BOP	SBO1		Adjusted compensator & landed BOP. Locked WH connector & inspected indicator pin with ROV assistance. Conducted a 50 MT overpull test. Inspected bullseyes - no change. Stroked out slip joint inner barrel.
	01:30 - 03:00	1.50	BOP	SBO1		L/O landing joint. Pressure tested BOP connector to 35 bar/5 mins, 207 bar/10 mins. P/U & Installed diverter.
	03:00 - 04:30	1.50	BOP	SBO1		R/D riser spider & BOP running equipment. Changed to drilling bails and BX-elevator.
	04:30 - 08:30	4.00	DRI	5b		M/U 8 1/2" BHA (#4) & RIH same to 485m. Tested MWD with 2000 lpm, 85 bar.

A/S Norske Shell

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Start: 11/04/2004
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Spud Date: 13/04/2004
End:

Date	From - To	Hours	Code	Sub Code	Phase	Description of Operations
19/04/2004	08:30 - 09:30	1.00	BOP	SBO2		Function tested BOP on blue pod from driller's panel & on yellow pod from toolpusher's office. Tested upper pipe ram with acoustic system.
	09:30 - 10:30	1.00	DRI	5a		Continued RIH BHA #4 to 1,168m.
	10:30 - 11:30	1.00	DRI	9a		Installed drilling pup. Broke circulation, observed 20 bar back pressure due to hydrostatic difference (seawater in string, mud in annulus). Continued RIH to 1,178m. Circulated mud out of annulus.
	11:30 - 12:00	0.50	DRI	5a		Washed down & tagged plugs at 1,197m. Conducted choke drill.
	12:00 - 12:30	0.50	DRI	16a		Held pre-job meeting prior to displacing well to Glydril mud.
	12:30 - 17:00	4.50	DRI	DMH1		Drilled plugs and float collar from 1,197m to 1,199m. Found plugs difficult to drill. Pumped a 13.5 m3 Hivis pill & 10 m3 seawater prior to displacing the well to 1.29 s.g. Glydril mud. Displaced well whilst drilling the plugs.
	17:00 - 17:30	0.50	DRI	DMH1		Drilled out casing shoe at 1,199m. No cement below casing shoe. Cleaned out rat hole and drilled 2m new formation from 1,204m from 1,206m. Circulated bottoms up. Reamed past casing shoe several times.
	17:30 - 19:30	2.00	FOR	EFS		Circulated to an even mud weight of 1.29 s.g. Closed middle pipe rams & performed LOT to an equivalent mud weight of 1.65 s.g (expected valve of a limit test was 1.70 s.g.). Repeated LOT twice to confirm result. Closed annular preventer on second test to confirm no leaks at BOP. Volume pumped 606 litres, volume returned 480 litres, cement unit surface pressure 42.1 bar.
	19:30 - 00:00	4.50	DRI	DMH1		Took SCRs. Drilled 8 1/2" hole from 1,206m to 1,324m. Reamed each stand once prior to connections. Drilling parameters: ROP: average 38.7 m/hr WOB: 0 - 9 MT, average 4 MT Flow: 2,337 - 2,514 lpm, average 2,400 lpm SPP: 201 - 234 bar, average 217 bar Torque: 1.1 - 5.6 kft-lbs, average 3.6 kft-lbs RPM: 41 - 147 rpm, average 126 rpm 06:00 hrs update: Continued drilling 8 1/2" hole to 1,461m. Conducted a kick drill during a connection. HSE: Management visit from Shell & Odfjell Drilling. Number of Stop-cards received: 8, 1 safe, 7 unsafe Number of RUHs raised: 11, 10 green, 1 red Incidents: 0 Near misses: 0
20/04/2004	00:00 - 18:30	18.50	DRI	DMH1		Drilled 8 1/2" hole from 1,324m to 1,893m. Reamed stand once every connection & took MWD surveys every stand. Conducted a kick drill during a connection at 1,407m. Drilling parameters: ROP: 12.5- 179.7 m/hr, average 45 m/hr WOB: 0.0 - 11.9 MT, average 6 MT

A/S Norske Shell

Operations Summary Report

Legal Well Name: 26/4-2 Beluga
Common Well Name: Beluga
Event Name: ORIG DRILLING
Contractor Name: Odfjell
Rig Name: Deep Sea Delta
Start: 11/04/2004
Rig Release: 27/04/2004
Rig Number:
Spud Date: 13/04/2004
End:

Date	From - To	Hours	Code	Sub Code	Phase	Description of Operations
20/04/2004	00:00 - 18:30	18.50	DRI	DMH1		Torque: 1.2 - 5.2 kft-lbs, average 4.4 kft-lbs RPM: 94 - 166 rpm, average 137 rpm SPP: 206 - 257 bar, average 231 bar Flow: 2,274 - 2,462 lpm, average 2,340 lpm
	18:30 - 00:00	5.50	DRI	DMH1		Restricted ROP to 40 m/hr maximum to obtain full LWD log data for top reservoir identification. Continued drilling 8 1/2" hole to 2,020 m/hr. Reamed stand once every connection & took MWD surveys every stand. Drilling parameters: ROP: 17.4 - 62.6 m/hr, average 33.8 m/hr WOB: 0.0 - 11.9 MT, average 6 MT Torque: 2.4 - 4.7 kft-lbs, average 4.2 kft-lbs RPM: 131 - 165 rpm, average 139 rpm SPP: 229 - 252 bar, average 235 bar Flow: 2,279 - 2,394 lpm, average 2,335 lpm Conducted a kick drill during a connection prior to drilling into reservoir. 06:00 hrs update: Drilled 8 1/2" hole to top Hermod reservoir at 2,045m bdf. No further MWD surveys were taken in the reservoir to reduce the potential for differential sticking. Confirmed reservoir sand to be water bearing. Continued drilling 8 1/2" hole to 2,180m. HSE: Conducted an inspection of the derrick. Number of Stop-cards received: 5; 2 safe, 3 unsafe Number of RUHs raised: 12; 11 green, 1 red Incidents: 0 Near-misses: 0
21/04/2004	00:00 - 11:00	11.00	DRI	DMH1		Drilled 8 1/2" hole to top Hermod at 2,045m. No further MWD surveys were taken in the reservoir to reduce the potential of differential sticking. Confirmed reservoir sand to be water bearing. Continued drilling to TD @ 2,302m. Took SCR's at 2,243m. Took an MWD check survey at TD (2,292m survey depth), inclination 1.53 deg, azimuth 159.99 deg. Drilling parameters: ROP: average 34 m/hr WOB: 0 - 14 MT, average 7 MT SPP: 219 - 267 bar, average 235 bar Torque: 2.7 - 12.4 kft-lbs, average 5.3 kft-lbs Flow: 2,177 - 2,434 lpm, average 2,305 lpm RPM: 108 - 173 rpm, average 137 rpm
	11:00 - 13:00	2.00	DRI	9a		Circulated hole clean with 2,420 lpm, 253 bar. Total volume pumped 251.4 m3.

A/S Norske Shell

Operations Summary Report

Legal Well Name: 26/4-2 Beluga
Common Well Name: Beluga
Event Name: ORIG DRILLING
Contractor Name: Odfjell
Rig Name: Deep Sea Delta
Start: 11/04/2004
Rig Release: 27/04/2004
Rig Number:
Spud Date: 13/04/2004
End:

Date	From - To	Hours	Code	Sub Code	Phase	Description of Operations
21/04/2004	13:00 - 13:30	0.50	DRI	8a		Flowchecked well - static.
	13:30 - 15:30	2.00	DRI	5a		POOH from 2,302m to 1,955m. Worked through tight spots at 2,100m, 2,087m, 2,079m and 2,043m. Maximum overpull observed 20 MT.
	15:30 - 16:30	1.00	DRI	9a		Circulated bottoms up with 2,400 lpm, 236 bar.
	16:30 - 17:00	0.50	DRI	5a		Continued POOH to 1,840m.
	17:00 - 20:00	3.00	DRI	5a		Slugged pipe and continued POOH to 276m. Flowchecked well at 1,178m & 448m, well static. L/D 12 jts 5" DP.
	20:00 - 21:30	1.50	DRI	5b		POOH 8 1/2" BHA #4. L/D NM HWDP, NM stab, ARC-6, PowerPulse, RAB-6 & 8 1/2" bit. R/B HWDP, jar & accelerator. Bit grading: 1-1-NO-A-X-I-NO-TD. No evidence of bit balling, as anticipated.
	21:30 - 22:30	1.00	FOR	EME		Cleared rig floor. R/U wireline sheave & compensator wire.
	22:30 - 00:00	1.50	FOR	EM2a		Held prejob meeting. P/U Schlumberger toolstring #1; LEH-V - ACTS - GR - PEX - DSI - HRLA. 06:00 hrs update: M/U Schlumberger toolstring #1. RIH same. Logged down to TD @ 2,292m logging depth. Started logging up to casing shoe. Observed a misalignment on wireline drum cable mounted tension device, corrected same. Continued logging into shoe. HSE: Number of Stop-cards received:5; 2 safe, 3 unsafe Number of RUHs raised: 14; 11 green, 3 red Incidents: 0 Near-misses: 0
22/04/2004	00:00 - 01:45	1.75	FOR	EM2a		Tested toolstring #1: LEH-V - ACTS - GR- PEX - DSI - HRLA at surface. Loaded radioactive sources.
	01:45 - 03:15	1.50	FOR	EM2b		RIH to casing shoe @ 1,201m logging depth.
	03:15 - 03:30	0.25	NPE	NOS2		TDS hoses blowing onto logging cable on rig floor. Moved hoses. Continued RIH to 1,256m. HRLA image not displayed on logging unit computer. Pulled into shoe & corrected problem.
	03:30 - 03:45	0.25	NPL	1c		Continued RIH to 1,256m. HRLA image not displayed on logging unit computer. Pulled into shoe & corrected problem.
	03:45 - 05:30	1.75	FOR	EM2b		Continued RIH toolstring #1. Tagged TD @ 2,292m.
	05:30 - 06:00	0.50	FOR	EM2c		Logged up to 2,030m - 17m above Hermod reservoir.
	06:00 - 08:15	2.25	FOR	EM2c		RIH to 2,130m & logged main log into shoe to 1,150m. Recorded shoe depth @ 1,199.5m. Caliper indicated full gauge (8 1/2") hole.
	08:15 - 08:45	0.50	FOR	EM2c		RIH to 2,130m. Logged up with GR only to 930m.
	08:45 - 09:00	0.25	NPL	1c		Observed misalignment on wireline drum cable mounted tension device. Corrected same.
	09:00 - 09:30	0.50	FOR	EM2b		POOH toolstring #1 to surface.
	09:30 - 11:30	2.00	FOR	EME		Unloaded radioactive sources. R/D toolstring #1.
	11:30 - 11:45	0.25	FOR	EM4a		Held toolbox talk prior to deploying gun assembly & rigging up seismic tools.
	11:45 - 12:30	0.75	FOR	EM4a		R/U toolstring #2: LEH-V - ACTS - DTC - SGT - VSI-4. Checked & calibrated tools at surface. Set zero depth.
	12:30 - 14:15	1.75	FOR	EM4b		Calibrated depth with GR & RIH toolstring #2 to 1,978.6m. Fired check shots - 5 in total.

A/S Norske Shell

Operations Summary Report

Legal Well Name: 26/4-2 Beluga
Common Well Name: Beluga
Event Name: ORIG DRILLING
Contractor Name: Odfjell
Rig Name: Deep Sea Delta
Start: 11/04/2004
Rig Release: 27/04/2004
Rig Number:
Spud Date: 13/04/2004
End:

Date	From - To	Hours	Code	Sub Code	Phase	Description of Operations
22/04/2004	14:15 - 14:30	0.25	FOR	EM4b		Continued RIH toolstring #2 to 2,234m. Depth calibrated GR & reset logging depth (1.5m correction)
	14:30 - 15:00	0.50	FOR	EM4c		Started VSP logging @ 2,220.5m (winch depth - bottom tool depth 2,280m).
	15:00 - 15:30	0.50	NPL	1c		Observed leak in gun assembly. Pulled guns to Helideck & inspected same. Found a loose air hose connection. Tightenened connection & returned guns to sea.
	15:30 - 18:45	3.25	FOR	EM4c		Continued logging with VSP to 345m. Stopped VSI survey due to loss of signal.
	18:45 - 19:30	0.75	FOR	EM4b		POOH toolstring #2.
	19:30 - 20:30	1.00	FOR	EM4a		L/O toolstring#2 & R/D wireline. Removed gun assembly from sea. Cleared rig floor.
	20:30 - 21:00	0.50	DRI	5c		L/D 4 jts 5" HWDP, 6 1/2" jar & 6 1/2" accelerator.
	21:00 - 22:00	1.00	CEM	ACP		Installed diverter element. Installed 3 1/2" handling equipment & RIH 9 stands 3 1/2" cement stinger & muleshoe to 262m.
	22:00 - 00:00	2.00	CEM	ACP		Changed to 5" handling equipment & continued RIH cement stinger on 5" DP to 2,170m. 06:00 hrs update: Continued RIH cement stinger to 2,270m. M/U cement stand, broke circulation & washed down to 2,301m. Pumped 16 m3 1.31 s.g. mud. M/U cement hose & P/T same to 100 bar/5 mins. Set cement plug #1. POOH to above plug. Cement returns observed on shaker when circulating clean above plug. Set cement plug #2. POOH above plug. Circulated clean above plug #2. Spacer returns observed on shaker. HSE: Number of Stop-cards received: 7; 2 safe, 5 unsafe Number of RUHs raised: 6; 5 green, 1 red Incidents: 0 Near-misses: 0
23/04/2004	00:00 - 00:30	0.50	CEM	ACP		RIH cement stinger from 2,170m. M/U cement stand, broke circulation & washed down last stand to 2,301m with 2,000 lpm.
	00:30 - 01:00	0.50	CEM	SCA4		Circulated 78.5 m3 1.31 s.g. mud with 2,000 lpm, 107 bar SPP. M/U cement hose & pressure tested same to 100 bar/5 mins. Meanwhile, held pre-job safety meeting prior to cement job.
	01:00 - 02:00	1.00	CEM	ACP		Pumped 5 m3 1.6 s.g. spacer & 8.05 m3 1.9 s.g. cement slurry with cement unit. Displaced slurry to rig floor with 1.75 m3 1.6 s.g. spacer & 600 ltrs 1.31 s.g. mud. Displaced slurry using rig pumps with 16 m3 1.31 s.g. mud (0.58 m3 under-displaced) with 2,000 lpm.
	02:00 - 03:00	1.00	CEM	ACP		Broke out cement stand & POOH to 2,102m. Attempted to reverse circulate - no go due to high friction losses, pump pressure 35 bar at 170 lpm.
	03:00 - 04:00	1.00	CEM	ACP		Circulated conventionally above plug with 2,500 lpm, 160 bar pump pressure. Observed cement returns on shaker after 81.7 m3. Circulated clean, total volume pumped 104.1 m3.
	04:00 - 04:30	0.50	CEM	1f		POOH 1 stand & R/B same. M/U cementing stand & RIH to 2,102m. M/U cement hose & pressure tested same to 100 bar/5 mins.
	04:30 - 05:00	0.50	CEM	ACP		Pumped 5 m3 1.6 s.g. spacer & 8.05 m3 1.9 s.g. cement slurry with

A/S Norske Shell

Operations Summary Report

Legal Well Name: 26/4-2 Beluga
Common Well Name: Beluga
Event Name: ORIG DRILLING
Contractor Name: Odfjell
Rig Name: Deep Sea Delta

Start: 11/04/2004
Rig Release: 27/04/2004
Rig Number:

Spud Date: 13/04/2004
End:

Date	From - To	Hours	Code	Sub Code	Phase	Description of Operations
23/04/2004	04:30 - 05:00	0.50	CEM	ACP		cement unit. Displaced slurry to rig floor with 1.75 m3 1.6 s.g. spacer & 600 ltrs 1.31 s.g. mud. Displaced slurry using rig pumps with 14.3 m3 1.31 s.g. mud (0.5 m3 under-displaced) at 2,000 lpm.
	05:00 - 05:30	0.50	CEM	ACP		Broke out cement stand & POOH to 1,800m.
	05:30 - 06:30	1.00	CEM	ACP		Drop wiper ball & circulated 77.5 m3 1.31 s.g. mud conventionally above plug with 2,500 lpm, 145 bar. Observed spacer & cement returns on shaker. Theoretical top of cement of plug # 2 is 1,881m. Flowchecked well prior to POOH.
	06:30 - 07:30	1.00	CEM	ACP		Pumped slug & POOH to 1,165m. Flowchecked.
	07:30 - 11:30	4.00	CEM	ACP		Continued POOH to 262m. L/D 94 jts 5" DP.
	11:30 - 12:00	0.50	CEM	ACP		Changed to 3 1/2" handling equipment & POOH cement stinger. L/D muleshoe.
	12:00 - 12:30	0.50	CAS	AMP		M/U EZSV, running tool & X/O.
	12:30 - 16:30	4.00	CAS	AMP		RIH EZSV on 3 1/2" DP to 350m. Changed to 5" handling equipment & continued RIH EZSV on 5" DP to 1,192m. Filled pipe.
	16:30 - 17:00	0.50	CAS	AMP		Set EZSV plug at 1,192m (top plug) as per Halliburton procedures. P/U 8m above plug & pressure tested same to 111 bar/10 mins.
	17:00 - 17:30	0.50	CEM	1f		POOH 1 stand & R/B same. M/U cementing stand & cement hose. Pressure tested surface lines to 100 bar/5 mins.
	17:30 - 18:30	1.00	CEM	ACP		Pumped 8 m3 fresh water spacer, 7.4 m3 1.9 s.g. cement slurry & 2.53 m3 post-flush with cement unit. Displaced cement slurry using rig pumps with 5.5 m3 1.31 s.g. mud.
	18:30 - 20:30	2.00	CEM	ACP		Broke out cement stand & POOH to 916m. Attempted to drop wiper ball - no go due to 20 bar back-pressure. Displaced well to 96.1 m3 seawater. No cement, spacer or Hivis returns observed on shaker. Theoretical top of cement of plug #3 is 992m.
	20:30 - 22:00	1.50	DRI	5c		POOH to 350m. L/D 57 jts 5" DP.
	22:00 - 00:00	2.00	DRI	5c		Changed to 3 1/2" handling equipment. POOH to surface. L/D 36 jts 3 1/2" DP & EZSV running tool. 06:00 hrs update: L/D remaining 5" DP from derrick, 1 stand 6 1/2" DC, EPHOT stand & cementing stand. Recovered wearbushing. HSE: Number of Stop-cards received: 10; 4 safe, 6 unsafe Number of RUHs raised: 7 green Incidents: 0 Near-misses: 0
24/04/2004	00:00 - 04:00	4.00	DRI	5c		L/D 19 joints 5" DP - total 5" DP L/D 57 jts. L/D cement stand & EDPHOT. L/D 3 jts 6 1/2" DC.
	04:00 - 05:30	1.50	BOP	7c		M/U Multi Utility Tool (MUT) & RIH same. Washed down past BOP to wellhead with 3,400 lpm. Pulled wearbushing with 30 MT overpull. POOH wearbushing & L/D same. L/D MUT.
	05:30 - 08:30	3.00	P&A	SBO		Cleared rig floor & R/U riser pulling equipment. Held pre-job meeting prior to pulling BOP.
	08:30 - 10:00	1.50	P&A	SBO		L/D diverter. P/U landing joint. Collapsed slip joint.
	10:00 - 10:30	0.50	P&A	SBO		Disconnected BOP as per Odjfell procedures. Unlatched guidewires with ROV assistance.

A/S Norske Shell

Operations Summary Report

Legal Well Name: 26/4-2 Beluga
Common Well Name: Beluga
Event Name: ORIG DRILLING
Contractor Name: Odfjell
Rig Name: Deep Sea Delta
Start: 11/04/2004
Rig Release: 27/04/2004
Rig Number:
Spud Date: 13/04/2004
End:

Date	From - To	Hours	Code	Sub Code	Phase	Description of Operations
24/04/2004	10:30 - 11:30	1.00	MOV	5a		Moved rig 20m off location.
	11:30 - 14:00	2.50	P&A	SBO		Removed choke & kill lines, pod wires and clamps from slip joint. L/O landing joint and slip joint.
	14:00 - 15:30	1.50	NPW	NWB		Suspended riser pulling operations. Waiting for crane - crane working on priority backload.
	15:30 - 19:00	3.50	P&A	SBO		Continued pulling riser & BOP. Landed BOP on BOP trolley. Removed guidewires & disconnected riser from BOP. Skidded BOP. L/D 2 riser joints. Moved rig back onto location.
	19:00 - 20:00	1.00	P&A	SBO		R/D riser pulling equipment. Cleared rig floor.
	20:00 - 22:00	2.00	P&A	SBO		P/U Smith Red Baron cutting assembly. RIH same to 166m (knives at 163.45m, 5.88m below top WH).
	22:00 - 00:00	2.00	P&A	SBO		Landed no go in wellhead. Set down 5 MT, took 20 MT overpull & slacked off 10 MT. Started cutting the 20" extension joint & 30" wellhead housing with 2,000 lpm, 33 bar SPP. Increased flowrate in steps to 2,520 lpm. 06:00 hrs update: Continued cutting the 20" extension joint & 30" conductor housing as per Smith Red Baron procedure. HSE: Conducted a weekly inspection with day shift, focused on main deck & cellar deck. Number of Stop-cards received: 8; 1 safe, 8 unsafe Number of RUHs raised: 12; 9 green, 3 red Incidents: 0 Near-misses: 0
25/04/2004	00:00 - 06:30	6.50	P&A	SBO		Cut 20" extension joint & 30" conductor housing with Red Baron pipe cutting assembly @ 2,500 lpm, 50 bar SPP.
	06:30 - 07:00	0.50	P&A	SBO		Attempted to pull wellhead free with maximum 160 MT overpull - no go.
	07:00 - 08:30	1.50	NPO	11a		POOH Red Baron cutting assembly. Inspected knives - no major wear. Redressed cutter & RIH assembly through splash zone. Shallow tested assembly - cutters opened @ 2,300 lpm, 30 bar SPP.
	08:30 - 09:00	0.50	NPO	11a		RIH Red Baron cutting assembly.
	09:00 - 15:30	6.50	NPO	10a		Landed no go in wellhead & performed a 20 MT overpull test. Continued cutting 20" extension joint & 30" conductor housing with 2,800 lpm, 59 bar SPP. Increased flowrate in stages to 4,000 lpm, 121 bar SPP. Made 5 attempts at pulling free with overpulls ranging 200 - 260 MT - no go. Condtinued cutting; WH & RGB came free @ 15:15 hrs. Flushed drill pipe & inspected top drive for loose parts prior to POOH.
	15:30 - 16:30	1.00	P&A	SBO		POOH WH & RGB. Landed & secured assembly on work skid.
	16:30 - 18:00	1.50	P&A	SBO		L/D Red Baron cutter assembly. M/U 18 3/4" WH running tool.
	18:00 - 19:00	1.00	P&A	SBO		M/U running tool to 18 3/4" WH & released 30" conductor housing x 20" extension joint from RGB.
	19:00 - 19:30	0.50	P&A	SBO		L/D 18 3/4" WH & WH running tool. Cleared rig floor.
	19:30 - 20:30	1.00	DRI	5c		L/D 6 x 8" DCs & 12 jts 5" HWDP.
	20:30 - 21:30	1.00	NPW	NWB		Suspended L/O pipe - waiting on crane. Crane working on priority backload.
	21:30 - 22:15	0.75	DRI	5c		L/D 12 jts 5" HWDP.

A/S Norske Shell

Operations Summary Report

Legal Well Name: 26/4-2 Beluga
Common Well Name: Beluga
Event Name: ORIG DRILLING
Contractor Name: Odfjell
Rig Name: Deep Sea Delta
Start: 11/04/2004
Rig Release: 27/04/2004
Rig Number:
Spud Date: 13/04/2004
End:

Date	From - To	Hours	Code	Sub Code	Phase	Description of Operations
25/04/2004	22:15 - 00:00	1.75	MOV	2a		Commenced anchor handling. Passed pennant wires #7, 6, 1 & 12. Anchors #1 & #6 secured on deck. Meanwhile, commenced deballasting @ 23:10 hrs. 06:00 hrs update: Anchor #12 secured on deck @ 02:45 hrs. Suspended anchor handling operations whilst deballasting rig. HSE: Conducted weekly safety meeting with night shift. Number of Stop-cards received: 3, all unsafe Number of RUHs raised: 7, all green Incidents: 0 Near-misses: 0
26/04/2004	00:00 - 00:00	24.00	MOV	2a		Anchor handling operations. Anchor # 12 on bolster @ 09:10 hrs. Anchor # 6 on bolster @ 10:02 hrs. Anchor # 7 on bolster @ 12:06 hrs. Anchor # 2 on bolster @ 12:15 hrs. Anchor # 11 on bolster @ 14:23 hrs. Anchor # 5 on bolster @ 15:14 hrs. Anchor # 8 on bolster @ 16:50 hrs. Anchor # 3 on bolster @ 18:24 hrs. Anchor # 4 on bolster @ 23:30 hrs. Anchor # 10 on bolster @ 23:36 hrs 06:00 hrs update: Continued anchor handling. Anchor # 9 on bolster @ 00:30 hrs. Deep Sea Delta off contract @ 00:40 hrs.
27/04/2004	00:00 - 00:40	0.67	MOV	2a		Anchor handling operations. Anchor # 9 on bolster @ 00:30 hrs. Deep Sea Delta off Shell contract @ 00:40 hrs.

C: DIMS BIT RECORD

A/S Norske Shell

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Bits Summary Report

Legal Well Name: 26/4-2 Beluga
Common Well Name: Beluga
Event Name: ORIG DRILLING
Contractor Name: Odfjell
Rig Name: Deep Sea Delta
Start: 11/04/2004
Rig Release: 27/04/2004
Rig Number:
Spud Date: 13/04/2004
End:

Bit No/ Run	Size (in.)	Make/ Type	IADC Code	Serial Number	TFA (in²) JETS (/32")	TMD In/ Out (m)	Total Drilled (m)	Cum./ Tot Rot Hours	ROP	WOB Min/Max (kdaN)	RPM	Pump Press (bar)	Pump Output (lpm)	deltaP Bit (psi)	Nozzle Velocity (m/s)	HHP (HHP/in²)	API Cond. I O D L B G O R
1/	17.500	Smith /	111		0.942	160.0/	144.0	4.40	32.73			42,000	4,500				1-1-NO-A
1		DSJ			18.0/18.0/18.0/16.0/	237.0		4.40			94						E-I -NO-TD
					/ / / /												
	Remarks																
2/	26.000	/			1.452	234.0/	3.0	0.18	16.67	/		118	3,907	405	69.5	296.278	1-1-NO-A
2					22.0/22.0/22.0/21.0/	237.0		4.58		5	82						E-I -NO-TD
					/ / / /												
	Remarks																
3/	12.250	Smith /	111		1.065	237.0/	967.0	22.50	42.98	/		155	3,490	602	84.7	1,770.314	2-3-NO-A
3		FGXi			16.0/18.0/22.0/18.0/	1,204.0		27.08		12	200						E-I -NO-TD
					/ / / /												
	Remarks																
4/	8.500	Security /	S424		0.552	1,204.0/	1,098.0	27.90	39.35	/	41	250	2,419	1	113.2	5.675	1-1-NO-A
4		FS2565			12.0/12.0/12.0/12.0/12.0	2,302.0		54.98		11	173						D-I -NO-TD
					/ / / /												
	Remarks																

C: DIMS BHA RECORDS

BHA #1

BHA Name	Bit#	Purpose	Bit to Survey (m)	Min Id (in)	Motor	Pred. Perf. Act. Perf.	Pred. Build/Walk Act. Build/Walk /(m/30m)	I O D L B G O R
Spud assy	1	Spud assy	10.23	69.850	N			1/1/NO/A E/I/NO/TD

Date In: 13/04/2004 Time In: 18:30 TMD In: 160.0 (m) Date Out: 14/04/2004 Time Out: 05:00 TMD Out: 237.0 (m)

BHA Detail Item Description	# Jts	Length (m)	OD (in)	ID (in)	Connection Size	Connection Type	Pin Box	Gauge In	Gauge Out	Serial #	Spiral	Fishing Neck (in)	Blade Width
	1	0.43	17.500		7,625	REG							
	1	0.89	10.750	3.000	7,625	REG							
36" Hole Opener	1	4.33	36.000			7 5/8 R	P						
Cross Over	1	0.63	9.500			7 5/8 R	P						
8" Powerpulse	1	8.80	8.500	5.125		6 5/8 R	P						
NM Stab 12 1/4" FG	1	2.12	12.250			6 5/8 R	P					0.79	
8" NM DC	1	8.93	8.000	2.875		6 5/8"							
Drill Collar	3	27.71	8.000	2.875		6 5/8 R	P						
8" WH Jar	1	9.70	8.000	3.000		6 5/8 R	P						
Drill Collar	3	27.22	8.000	2.813		6 5/8 R	P						
Cross Over	1	1.07	6.500	2.813		2 7/8 R	P					0.59	
Drill Collar	3	28.10	6.500	2.813		4 1/2 I	P						
H.W.D.P.			5.000			NC50	P						
Total Length:		**119.93**											

BHA #2

BHA Name	Bit#	Purpose	Bit to Survey (m)	Min Id (in)	Motor	Pred. Perf. Act. Perf.	Pred. Build/Walk Act. Build/Walk /(m/30m)	I O D L B G O R
Clean out assy	2	Spud assy	10.23	69.850	N			1/1/NO/A E/I/NO/TD

Date In: 14/04/2004 Time In: 21:30 TMD In: 237.0 (m) Date Out: 15/04/2004 Time Out: 00:30 TMD Out: 237.0 (m)

BHA Detail Item Description	# Jts	Length (m)	OD (in)	ID (in)	Connection Size	Connection Type	Pin Box	Gauge In	Gauge Out	Serial #	Spiral	Fishing Neck (in)	Blade Width
	1	0.65	26.000		7,625	REG							
		0.97	9.250										
Cross Over	1	1.09	9.250	3.000		7 5/8 R	P						
Drill Collar	2	18.74	8.000	3.000		6 5/8 R	P						
8" WH Jar	1	9.70	8.000	3.000		6 5/8 R	P						
Drill Collar	3	27.22	8.000	2.750		6 5/8 R	P						
Cross Over	1	1.07	6.500	2.813		2 7/8 R	P					0.59	
Drill Collar	3	28.10	6.500	2.813		4 1/2 I	P						
H.W.D.P.			5.000			NC50	P						
Total Length:		**87.54**											

BHA #3

BHA Name	Bit#	Purpose	Bit to Survey (m)	Min Id (in)	Motor	Pred. Perf. Act. Perf.	Pred. Build/Walk Act. Build/Walk /(m/30m)	I O D L B G O R
12 1/4" Drilling BHA	3		11.25	69.850	N			2/3/NO/A E/I/NO/TD

Date In: 15/04/2004 Time In: 21:30 TMD In: 237.0 (m) Date Out: 16/04/2004 Time Out: 00:00 TMD Out: 1,204.0 (m)

BHA Detail Item Description	# Jts	Length (m)	OD (in)	ID (in)	Connection Size	Connection Type	Pin Box	Gauge In	Gauge Out	Serial #	Spiral	Fishing Neck (in)	Blade Width
	1	0.33	12.250										
Bit sub	1	0.91	8.000			6 5/8	B						
M.W.D.	1	6.02	9.000			6 5/8 R	P						
8" Powerpulse	1	8.32	8.500			6 5/8 R	P						
NM Stab 12 1/4" FG	1	2.12	12.250			6 5/8 R	P					0.79	
8" NM DC	1	8.93	8.000	2.875		6 5/8"							
Drill Collar	3	27.71	8.000	2.875		7 H90	P						
8" WH Jar	1	9.70	8.000	3.000		6 5/8 R	P						
Drill Collar	2	17.79	8.000	2.813		7 H90	P						
Cross Over	1	1.07	7.813	2.813		6 5/8 R	P					0.59	
Drill Collar	3	28.10	6.500	2.813		NC50	P						
H.W.D.P.	25	224.55	5.000			NC50	P						
Total Length:		**335.55**											

BHA #4

BHA Name	Bit#	Purpose	Bit to Survey (m)	Min Id (in)	Motor	Pred. Perf. Act. Perf.	Pred. Build/Walk Act. Build/Walk /(m/30m)	I O D L B G O R
8 1/2" BHA	4	Drill 8 1/2" hole	6.36		N			1/1/NO/A D/I/NO/TD

Date In: 19/04/2004 Time In: 04:30 TMD In: 1,204.0 (m) Date Out: 21/04/2004 Time Out: 20:00 TMD Out: 2,302.0 (m)

BHA Detail Item Description	# Jts	Length (m)	OD (in)	ID (in)	Connection Size	Connection Type	Pin Box	Gauge In	Gauge Out	Serial #	Spiral	Fishing Neck (in)	Blade Width
8.1/2" PDC Bit	1	0.33	8.500			4 1/2 R	P			1042570			
RAB-6 w/ 8 1/4" stab	1	3.68	8.250			5 1/2 F				31375			
6.3/4" Powerpulse	1	9.65	6.750	0.108		5 1/2 F	P			109			
L.W.D.	1	6.64	7.625			4 1/2 I	B			1704			
NMStab (IB) 8.1/4" UG	1	2.26	8.250	0.111		4 1/2 I	P			26882		0.79	
H.W.D.P.	1	9.14	5.000	0.111		NC50	P			25088			
H.W.D.P.	17	159.17	5.000	0.118		NC50	P						
6.1/2" WH Jar	1	9.76	6.375	0.108		4 1/2 I	P			2983			
H.W.D.P.	5	46.70	5.000	0.111		NC50	P						
6.1/2" WH Accelerator	1	9.76	6.500	0.108		4 1/2 I	P			1019			
H.W.D.P.	2	18.78	5.000	0.118		NC50	P						
Total Length:		**275.87**											

BHA #5

BHA Name	Bit#	Purpose	Bit to Survey (m)	Min Id (in)	Motor	Pred. Perf. Act. Perf.	Pred. Build/Walk Act. Build/Walk /(m/30m)	I O D L B G O R
WH cutting assy		WH cutting			Y			

Date In: 24/04/2004 Time In: 20:00 TMD In: 157.7 (m) Date Out: Time Out: : TMD Out: (m)

BHA Detail Item Description	# Jts	Length (m)	OD (in)	ID (in)	Connection Size	Connection Type	Pin Box	Gauge In	Gauge Out	Serial #	Spiral	Fishing Neck (in)	Blade Width
Stab (IB) 8 1/2" FG	1	3.18	6.000	2.813		4 1/2 R	P					2.00	
Cross Over	1		7.500	3.000		6 5/8 R	P					1.50	
8" x 11 3/4" pipe cutter	1	5.58	8.000	3.000	7	6 5/8 R							
Stabiliser	1		6.000	2.000		6 5/8 R						0.85	
Jet sub	1		8.000			6 5/8 R							
Stop sub w/ stop plate	1		8.000	2.813		6 5/8"						0.30	
9 1/2" Drillex motor	1	7.85	9.500			6 5/8"						6.75	
8" Bumper Sub	1		8.000	3.000		6 5/8 R	P						
Drill Collar	6		8.000	2.813		6 5/8 R	P						
Cross Over	1		6.750	2.250		4 1/2 I	P					1.50	
H.W.D.P.	17	150.00	5.000	3.000		NC50	P						
Total Length:		**166.61**											

D: DIMS DRILLING FLUIDS SUMMARY

Mud Summary Report

Legal Well Name: 26/4-2 Beluga
Common Well Name: Beluga
Event Name: ORIG DRILLING
Contractor Name: Odfjell
Rig Name: Deep Sea Delta
Start: 11/04/2004
Rig Release: 27/04/2004
Rig Number:
Spud Date: 13/04/2004
End:

Day	TMD (m)	Hole Sz. (in)	Mud Type	MW (sg)	Visc. (s/qt)	PV (cp)	YP (lb/100ft²)	Gels 10s/10m/30m (lb/100ft²)	API WL (cc/30min)	HTHP WL cc/30min	HTHP T (°C)	pH	Cl- (mg/L)	Sand (%)	TS (%)	LGS (kg/m3)	MBT (sg)	Oil (%)	Tot. Hard. (mg/L)	Tot. Vol. (m³)
5	654.0	12.250	Disp.mud	1.05								9.8								227.0
6	1,204.0	12.250	Glycol mud	1.20	95	13	9	5 / 11 / 0	6.0			9.4			8.0	87.0				246.0
7	1,204.0	12.250	Glycol mud	1.20	95	13	9	5 / 11 / 0	6.0			9.4			8.0	87.0				0.0
8	1,204.0	12.250	Glycol mud	1.31		25	7	2 / 3 / 0	2.8			8.8	78,000		13.0	25.7				379.0
9	1,324.0	8.500	Glycol mud	1.31		23	7	2 / 3 / 0	2.4			8.9	77,000		13.5	70.4				373.0
10	2,020.0	8.500	Glycol mud	1.31		24	8	3 / 4 / 0	2.4			8.2	77,000		16.0	155.3	15.00			363.0
11	2,302.0	8.500	Glycol mud	1.31		24	9	3 / 5 / 0	2.2			8.0	75,000	0.25	14.0	77.8	22.00			365.0
12	2,302.0	8.500	Glycol mud	1.31		25	9	3 / 5 / 0	2.2			8.0	75,000	0.25	14.0	77.8	22.00			256.0
13	2,302.0	8.500	Glycol mud	1.31		25	9	3 / 5 / 0	2.2			8.0	75,000	0.25	14.0	77.8	22.00			198.0

E: DIMS CEMENTING REPORTS
30" CONDUCTOR

Cementing Report

Legal Well Name:	Beluga			Spud Date:	13/04/2004
Common Well Name:	Beluga	Report #:	1	Report Date:	14/04/2004
Event Name:	ORIG DRILLING	Start:	11/04/2004	End:	

Cement Job Type: Primary

Primary	Squeeze Open Hole	Squeeze Casing	Plug
Hole Size: 36.00 ()	Hole Size:	Hole Size:	Hole Size:
TMD Set: 234 (m)	SQ TMD: (m)	TMD Set:	Top Set: (m)
Date Set: 14/04/2004	SQ Date:	Date Set:	BTM set: (m)
Csg Type: 30" Conductor	SQ Type:	Csg Type:	Plug Date:
Csg Size: 30.000 (in.)		SQ TMD:	Plug Type:
		SQ Date:	Drilled Out:
Cmtd. Csg: 30" Conductor	Cmtd. Csg:	Cmtd. Csg:	Cmtd. Csg:

Cement Co: Halliburton Cementer: Skaanes-Larsen Pipe Movement: No movement

Pipe Movement

Rot Time Start: :	Time End: :	RPM:	Init Torque: (ft-lbf)	Avg Torque: (ft-lbf)	Max Torque: (ft-lbf)
Rec Time Start: :	Time End: :	SPM:	Stroke Length: (m)	Drag Up: (lbs)	Drag Down: (lbs)

Stage No: 1 of 1

Type: Lead	Start Mix Cmt: 11:45	Disp Avg Rate: 8.18 (bbl/min)	Returns: To seabed
Volume Excess %: 200.00	Start Slurry Displ: 12:30	Disp Max Rate: 8.18 (bbl/min)	Total Mud Lost: (bbl)
Meas. From: Seabed	Start Displ: 13:45	Bump Plug: N	Cmt Vol to Surf: 26.91 (bbl)
Time Circ Prior	End Pumping: 14:00	Press Prior: (psi)	
To Cementing: 1.50	End Pump Date: 14/04/2004	Press Bumped: (psi)	Ann Flow After: N
Mud Circ Rate: 25.16 (bbl/min)	Top Plug: N	Press Held: (min)	Mixing Method: Rec
Mud Circ Press: 836 (psi)	Bottom Plug: N	Float Held: Y	Density Meas By: Densiomete

Mud Data

Type: Seawater Density: 1,050.00 (sg) Visc: 100 (s/qt) PV/YP: (cp)/ (lb/100ft²) Gels 10 sec: (lb/100ft²) Gels 10 min: (lb/100ft²)
Bottom Hole Circulating Temperature: 7 (°C) Bottom Hole Static Temperature: 7 (°C)
Displacement Fluid Type: Seawater Density: 8.8 (ppg) Volume: 144.35 (bbl)

Stage No: 1 Slurry No: 1 of 1

Slurry Data

Fluid Type: LEAD		Description: LIQUID ADDITIVE EXTENDED		Class: G NEAT	Purpose: CONDUCTOR
Slurry Interval: (m)	To: 234 (m)	Cmt Vol: 57.00 (ton)	Density: 16.28 (ppg)	Yield: 1.13 (ft³/sk)	Mix Water: 169.83 (bbl)
Water Source: Seawater		Slurry Vol:286 (bbl)	Water Vol: 141.8 (bbl)	Other Vol: ()	Foam Job: N

Test Data			**Time**	**Temp**	**Pressure**
Thickening Time: 3.53	Temperature: (°C)	Compressive Strength 1:		7.0 (°C)	400 (psi)
Free Water: (%)	Temperature: (°C)	Compressive Strength 2:		(°C)	(psi)
Fluid Loss: (cc)	Temperature: (°C)				

Stage No: 1 Slurry No: 1 of 1 - Additives

Trade Name	Type	Concentration	Units	Liquid Conc.	Units
CACL2 (LIQUID)	ACCELERATOR	4.35	LITERS	15.60	bbls
NF-6	DEFOAMER	0.10	LITERS	0.36	bbls

DIMS CEMENTING REPORT – 12¼" CASING

Cementing Report

Legal Well Name:	Beluga			Spud Date:	13/04/2004
Common Well Name:	Beluga	Report #:	2	Report Date:	17/04/2004
Event Name:	ORIG DRILLING	Start:	11/04/2004	End:	

Cement Job Type: Primary

Primary	Squeeze Open Hole	Squeeze Casing	Plug
Hole Size: 12.25 ()	Hole Size:	Hole Size:	Hole Size:
TMD Set: 1,200 (m)	SQ TMD: (m)	TMD Set:	Top Set: (m)
Date Set: 17/04/2004	SQ Date:	Date Set:	BTM set: (m)
Csg Type: Surface Casing	SQ Type:	Csg Type:	Plug Date:
Csg Size: 9.625 (in.)		SQ TMD:	Plug Type:
		SQ Date:	Drilled Out:
Cmtd. Csg: Surface Casing	Cmtd. Csg:	Cmtd. Csg:	Cmtd. Csg:

Cement Co: Halliburton Cementer: Danvik/Skaanes Pipe Movement: No movement

Pipe Movement

Rot Time Start: :	Time End: :	RPM:	Init Torque:	(ft-lbf)	Avg Torque: (ft-lbf)	Max Torque: (ft-lbf)	
Rec Time Start: :	Time End: :	SPM:	Stroke Length:	(m)	Drag Up: (lbs)	Drag Down: (lbs)	

Stage No: 1 of 1

Type:	Primary job	Start Mix Cmt:	15:40	Disp Avg Rate:	14.80 (bbl/min)	Returns:	To seabed
Volume Excess %:	75.00	Start Slurry Displ:	15:45	Disp Max Rate:	15.54 (bbl/min)	Total Mud Lost:	(bbl)
Meas. From:	Open hole	Start Displ:	17:45	Bump Plug:	Y	Cmt Vol to Surf:	(bbl)
Time Circ Prior		End Pumping:	18:30	Press Prior:	1,194 (psi)		
To Cementing:	2.00	End Pump Date:	17/04/2004	Press Bumped:	3,002 (psi)	Ann Flow After:	N
Mud Circ Rate:	6.29 (bbl/min)	Top Plug:	Y	Press Held:	10 (min)	Mixing Method:	Recirculat
Mud Circ Press:	478 (psi)	Bottom Plug:	Y	Float Held:	Y	Density Meas By:	Densiomete

Mud Data

Type: SW/Bentonite Density: 1.20 (sg) Visc: 95 (s/qt) PV/YP: 13 (cp)/18 (lb/100ft²) Gels 10 sec: 9 (lb/100ft²) Gels 10 min: 22 (lb/100ft²)
Bottom Hole Circulating Temperature: 42 (°C) Bottom Hole Static Temperature: 23 (°C)
Displacement Fluid Type: Mud Density: 10.0 (ppg) Volume: 331.48 (bbl)

Stage No: 1 Slurry No: 1 of 2

Slurry Data

Fluid Type:	LEAD		Description: LIQUID ADDITIVE EXTENDED		Class: G NEAT	Purpose: ZONAL ISOLA	
Slurry Interval: (m)	To: 857 (m)	Cmt Vol: 53.20 (ton)	Density: 13.02 (ppg)	Yield: 1.95 (ft³/sk)	Mix Water: 329.92 (bbl)		
Water Source: Seawater		Slurry Vol:421 (bbl)	Water Vol: 316.2 (bbl)	Other Vol: ()	Foam Job: N		

Test Data			**Time**	**Temp**	**Pressure**
Thickening Time: 8.29	Temperature: 23 (°C)	Compressive Strength 1:	4.50	23.0 (°C)	(psi)
Free Water: (%)	Temperature: (°C)	Compressive Strength 2:	8.29	23 (°C)	(psi)

Stage No: 1 Slurry No: 1 of 2 - Additives

Trade Name	Type	Concentration	Units	Liquid Conc.	Units
ECONOLITE	EXTENDER	3.20	LITERS	11.00	bbls
HR-4L	RETARDER	0.80	LITERS	4.40	bbls
NF-6	DEFOAMER	0.10	LITERS	0.19	bbls

Stage No: 1 Slurry No: 2 of 2

Slurry Data

Fluid Type:	TAIL		Description: LIQUID ADDITIVE EXTENDED		Class: G NEAT		Purpose: SHOE INTEG
Slurry Interval:	857 (m)	To: 1,200 (m)	Cmt Vol: 13.80 (ton)	Density: 16.03 (ppg)	Yield: 1.13 (ft³/sk)		Mix Water: 38.10 (bbl)
Water Source:	Fresh water		Slurry Vol:63 (bbl)	Water Vol: 38.0 (bbl)	Other Vol: ()		Foam Job: N

Test Data			**Time**	**Temp**	**Pressure**
Thickening Time: 5.23	Temperature: 23 (°C)	Compressive Strength 1:	4.23	23.0 (°C)	(psi)
Free Water: (%)	Temperature: (°C)	Compressive Strength 2:	5.23	23 (°C)	(psi)
Fluid Loss: (cc)	Temperature: (°C)				
Fluid Loss Pressure: (°C)					

Stage No: 1 Slurry No: 2 of 2 - Additives

Trade Name	Type	Concentration	Units	Liquid Conc.	Units
NF-6	DEFOAMER	0.10	LITERS	0.07	bbls

Casing Test	Shoe Test	Liner Top Test
Test Press: 3,002 (psi)	Pressure: 13.77 (ppge)	Liner Lap:
For: 10 (min)	Tool: N	Pos Test: (ppge) Tool: N
Cement Found between	Open Hole: (m)	Neg Test: (ppge) Tool: N
Shoe and Collar: Y	Hrs Before Test:	Hrs Before Test:
		Cement Found on Tool: N

DIMS CEMENTING REPORT – ABANDONMENT PLUG #1

Cementing Report

Legal Well Name:	Beluga			Spud Date:	13/04/2004
Common Well Name:	Beluga	Report #:	3	Report Date:	23/04/2004
Event Name:	ORIG DRILLING	Start:	11/04/2004	End:	

Cement Job Type: Plug

Primary	Squeeze Open Hole	Squeeze Casing	Plug
Hole Size:	Hole Size:	Hole Size:	Hole Size: 8.50 ()
TMD Set: (m)	SQ TMD: (m)	TMD Set:	Top Set: 992.0 (m)
Date Set:	SQ Date:	Date Set:	BTM set: 2,302.0 (m)
Csg Type:	SQ Type:	Csg Type:	Plug Date: 23/04/2004
Csg Size:		SQ TMD:	Plug Type: plug type 1
		SQ Date:	Drilled Out: N
Cmtd. Csg:	Cmtd. Csg:	Cmtd. Csg:	Cmtd. Csg: OPEN HOLE

Cement Co: Halliburton Cementer: Haaland/Lodden Pipe Movement: No movement

Pipe Movement

Rot Time Start: :	Time End: :	RPM:	Init Torque: (ft-lbf)	Avg Torque: (ft-lbf)	Max Torque: (ft-lbf)
Rec Time Start: :	Time End: :	SPM:	Stroke Length: (m)	Drag Up: (lbs)	Drag Down: (lbs)

Stage No: 1 of 3

Type: Plug #1	Start Mix Cmt: 01:35	Disp Avg Rate: 12.58 (bbl/min)	Returns: Trace cement
Volume Excess %: 10.00	Start Slurry Displ: 01:38	Disp Max Rate: 12.58 (bbl/min)	Total Mud Lost: (bbl)
Meas. From: Open hole	Start Displ: 01:58	Bump Plug: N	Cmt Vol to Surf: (bbl)
Time Circ Prior	End Pumping: 02:05	Press Prior: (psi)	
To Cementing: 0.50	End Pump Date: 23/04/2004	Press Bumped: (psi)	Ann Flow After:
Mud Circ Rate: 12.58 (bbl/min)	Top Plug: N	Press Held: (min)	Mixing Method: Reciprocat
Mud Circ Press: 1,552 (psi)	Bottom Plug: N	Float Held:	Density Meas By: Densiomete

Mud Data

Type: Glycol mud Density: 1.31 (sg) Visc: (s/qt) PV/YP: 25 (cp)/9 (lb/100ft²) Gels 10 sec: 3 (lb/100ft²) Gels 10 min: 5 (lb/100ft²)
Bottom Hole Circulating Temperature: 55 (°C) Bottom Hole Static Temperature: 80 (°C)
Displacement Fluid Type: Mud Density: 10.9 (ppg) Volume: 100.64 (bbl)

Stage No: 1 Slurry No: 1 of 1

Slurry Data

Fluid Type: TAIL	Description: LIQUID ADDITIVE EXTENDED		Class: G NEAT	Purpose: ZONAL ISOLA
Slurry Interval: 2,302 (m) To: 2,102 (m)	Cmt Vol: 10.36 (ton)	Density: 15.86 (ppg)	Yield: 1.17 (ft³/sk)	Mix Water: 39.94 (bbl)
Water Source: Fresh water	Slurry Vol:51 (bbl)	Water Vol: 20.3 (bbl)	Other Vol: ()	Foam Job: N

Stage No: 1 Slurry No: 1 of 1 - Additives

Trade Name	Type	Concentration	Units	Liquid Conc.	Units
GASCON 469	GAS MIGRATION	3.50	LITERS	2.44	bbls
HR-5L	RETARDER	0.40	LITERS	0.55	bbls
HALAD-613L	FLUID LOSS	9.00	LITERS	6.10	bbls
CFR-5LE+	THINNER	2.50	LITERS	1.73	bbls
NF-6	DEFOAMER	0.10	LITERS	0.10	bbls

DIMS CEMENTING REPORT – ABANDONMENT PLUG #2

Stage No: 2 of 3

Type: Plug #2	Start Mix Cmt: 04:25	Disp Avg Rate: 12.58 (bbl/min)	Returns: Trace
Volume Excess %: 10.00	Start Slurry Displ: 04:27	Disp Max Rate: 14.15 (bbl/min)	Total Mud Lost: (bbl)
Meas. From: Open hole	Start Displ: 04:41	Bump Plug: N	Cmt Vol to Surf: (bbl)
Time Circ Prior	End Pumping: 04:48	Press Prior: (psi)	
To Cementing: 1.00	End Pump Date: 23/04/2004	Press Bumped: (psi)	Ann Flow After:
Mud Circ Rate: 15.73 (bbl/min)	Top Plug: N	Press Held: (min)	Mixing Method: Reciprocat
Mud Circ Press: 2,320 (psi)	Bottom Plug: N	Float Held:	Density Meas By: Densiomete

Mud Data

Type: Glycol mud Density: 1.31 (sg) Visc: (s/qt) PV/YP: 25 (cp)/9 (lb/100ft²) Gels 10 sec: 3 (lb/100ft²) Gels 10 min: 5 (lb/100ft²)
Bottom Hole Circulating Temperature: 55 (°C) Bottom Hole Static Temperature: 80 (°C)
Displacement Fluid Type: Mud Density: 10.9 (ppg) Volume: 89.95 (bbl)

Stage No: 2 Slurry No: 1 of 1

Slurry Data

Fluid Type: TAIL Description: LIQUID ADDITIVE EXTENDED Class: G NEAT Purpose: ZONAL ISOLA
Slurry Interval: 2,102 (m) To: 1,881 (m) Cmt Vol: 10.36 (ton) Density: 15.86 (ppg) Yield: 1.17 (ft³/sk) Mix Water: 39.94 (bbl)
Water Source: Fresh water Slurry Vol:51 (bbl) Water Vol: 20.3 (bbl) Other Vol: () Foam Job: N

Test Data		**Time**	**Temp**	**Pressure**
Thickening Time:	Temperature: (°C)	Compressive Strength 1:	(°C)	(psi)
Free Water: (%)	Temperature: (°C)	Compressive Strength 2:	(°C)	(psi)
Fluid Loss: (cc)	Temperature: (°C)			
Fluid Loss Pressure: (°C)				

Stage No: 2 Slurry No: 1 of 1 - Additives

Trade Name	Type	Concentration	Units	Liquid Conc.	Units
GASCON 469	GAS MIGRATION	3.50	LITERS	2.44	bbls
HR-5L	RETARDER	0.40	LITERS	0.55	bbls
HALAD-613L	FLUID LOSS	9.00	LITERS	6.01	bbls
CFR-5LE+	THINNER	2.50	LITERS	1.73	bbls
NF-6	DEFOAMER	0.10	LITERS	0.10	bbls

DIMS CEMENTING REPORT – ABANDONMENT PLUG #3

Stage No: 3 of 3

Type: Plug #3	Start Mix Cmt: 18:00	Disp Avg Rate: 9.04 (bbl/min)	Returns: None
Volume Excess %:	Start Slurry Displ: 18:06	Disp Max Rate: 9.44 (bbl/min)	Total Mud Lost: (bbl)
Meas. From:	Start Displ: 18:26	Bump Plug: N	Cmt Vol to Surf: (bbl)
Time Circ Prior	End Pumping: 18:32	Press Prior: (psi)	
To Cementing: 1.00	End Pump Date: 26/04/2004	Press Bumped: (psi)	Ann Flow After:
Mud Circ Rate: 15.73 (bbl/min)	Top Plug: N	Press Held: (min)	Mixing Method: Reciproca
Mud Circ Press: 2,103 (psi)	Bottom Plug: N	Float Held:	Density Meas By: Densiomete

Mud Data

Type: Glycol mud Density: 1.31 (sg) Visc: (s/qt) PV/YP: 25 (cp)/9 (lb/100ft²) Gels 10 sec: 3 (lb/100ft²) Gels 10 min: 5 (lb/100ft²)
Bottom Hole Circulating Temperature: 55 (°C) Bottom Hole Static Temperature: 80 (°C)
Displacement Fluid Type: Seawater Density: 8.8 (ppg) Volume: 604.47 (bbl)

Stage No: 3 Slurry No: 1 of 1

Slurry Data

Fluid Type: TAIL Description: LIQUID ADDITIVE EXTENDED Class: G NEAT Purpose: ZONAL ISOLA
Slurry Interval: 1,192 (m) To: 992 (m) Cmt Vol: 9.66 (ton) Density: 15.86 (ppg) Yield: 1.15 (ft³/sk) Mix Water: 27.67 (bbl)
Water Source: Fresh water Slurry Vol:47 (bbl) Water Vol: 27.6 (bbl) Other Vol: () Foam Job: N

Test Data		**Time**	**Temp**	**Pressure**
Thickening Time:	Temperature: (°C)	Compressive Strength 1:	(°C)	(psi)
Free Water: (%)	Temperature: (°C)	Compressive Strength 2:	(°C)	(psi)
Fluid Loss: (cc)	Temperature: (°C)			
Fluid Loss Pressure: (°C)				

Stage No: 3 Slurry No: 1 of 1 - Additives

Trade Name	Type	Concentration	Units	Liquid Conc.	Units
NF-6	DEFOAMER	0.10	LITERS	0.06	bbls

F: SURVEY LISTING

Depth MD m	Incl deg	Azim deg	Depth TVD m	N/S m	E/W m	Northing m	Easting m	Latitude Deg	Min	Sec		Longitude Deg	Min	Sec	
697.38	0.32	285.02	697.34	3.16	-4.84	6622557.4	505675.68	59	44	22.146	N	3	6	3.448	E
726.36	0.47	305.53	726.32	3.25	-5.01	6622557.49	505675.51	59	44	22.149	N	3	6	3.436	E
754.99	0.67	216.21	754.95	3.18	-5.21	6622557.42	505675.31	59	44	22.147	N	3	6	3.424	E
785.08	0.31	195.9	785.04	2.96	-5.33	6622557.2	505675.19	59	44	22.14	N	3	6	3.416	E
812.46	0.35	183.24	812.42	2.81	-5.36	6622557.05	505675.16	59	44	22.135	N	3	6	3.414	E
871.49	0.41	92.61	871.45	2.62	-5.16	6622556.86	505675.36	59	44	22.128	N	3	6	3.427	E
898.82	0.41	146.17	898.77	2.53	-5.01	6622556.77	505675.51	59	44	22.126	N	3	6	3.437	E
927.76	0.58	233	927.71	2.36	-5.07	6622556.6	505675.45	59	44	22.12	N	3	6	3.433	E
956.6	0.53	216.32	956.55	2.16	-5.26	6622556.4	505675.26	59	44	22.114	N	3	6	3.42	E
985.06	0.35	264.16	985.01	2.05	-5.43	6622556.29	505675.09	59	44	22.11	N	3	6	3.41	E
1013.88	0.26	265.64	1013.83	2.03	-5.58	6622556.27	505674.94	59	44	22.11	N	3	6	3.4	E
1042.79	0.97	70.82	1042.74	2.11	-5.41	6622556.35	505675.11	59	44	22.112	N	3	6	3.411	E
1072.76	1.19	59.16	1072.71	2.35	-4.91	6622556.59	505675.61	59	44	22.12	N	3	6	3.443	E
1102.11	1.14	67.09	1102.05	2.62	-4.38	6622556.86	505676.14	59	44	22.129	N	3	6	3.477	E
1131.33	1.16	68.79	1131.26	2.84	-3.83	6622557.08	505676.69	59	44	22.136	N	3	6	3.512	E
1158.85	0.75	63.56	1158.78	3.02	-3.41	6622557.26	505677.11	59	44	22.142	N	3	6	3.539	E
1187.18	0.57	48.66	1187.11	3.2	-3.14	6622557.44	505677.38	59	44	22.147	N	3	6	3.556	E
1192.05	0.41	53.01	1191.98	3.22	-3.11	6622557.46	505677.41	59	44	22.148	N	3	6	3.559	E
1252.4	0.51	47.18	1252.33	3.54	-2.74	6622557.78	505677.78	59	44	22.158	N	3	6	3.582	E
1281.36	0.41	36.92	1281.28	3.71	-2.58	6622557.95	505677.94	59	44	22.164	N	3	6	3.592	E
1313.45	0.37	48.14	1313.37	3.87	-2.43	6622558.11	505678.09	59	44	22.169	N	3	6	3.602	E
1342.3	0.41	37.87	1342.22	4.01	-2.3	6622558.25	505678.22	59	44	22.173	N	3	6	3.61	E
1397.37	0.7	118.84	1397.29	4	-1.89	6622558.24	505678.63	59	44	22.173	N	3	6	3.637	E
1425.89	0.7	135.45	1425.81	3.8	-1.61	6622558.04	505678.91	59	44	22.166	N	3	6	3.654	E
1484.55	1.1	134.47	1484.46	3.15	-0.96	6622557.39	505679.56	59	44	22.145	N	3	6	3.696	E
1511.76	1.33	132.7	1511.67	2.75	-0.54	6622556.99	505679.98	59	44	22.133	N	3	6	3.723	E
1540.42	1.51	135.64	1540.32	2.25	-0.03	6622556.49	505680.49	59	44	22.117	N	3	6	3.755	E
1570.27	1.37	139.13	1570.16	1.7	0.48	6622555.94	505681	59	44	22.099	N	3	6	3.788	E
1626.67	1.49	141.88	1626.54	0.62	1.37	6622554.86	505681.89	59	44	22.064	N	3	6	3.845	E
1657.04	1.54	147.21	1656.9	-0.04	1.84	6622554.2	505682.36	59	44	22.042	N	3	6	3.875	E
1684.43	1.43	143.02	1684.28	-0.62	2.24	6622553.62	505682.76	59	44	22.024	N	3	6	3.901	E
1713.07	1.56	143.45	1712.91	-1.22	2.69	6622553.02	505683.21	59	44	22.004	N	3	6	3.929	E
1742.9	1.52	139.04	1742.73	-1.84	3.19	6622552.4	505683.71	59	44	21.984	N	3	6	3.961	E
1772.46	1.57	146.92	1772.28	-2.48	3.67	6622551.76	505684.19	59	44	21.963	N	3	6	3.992	E
1800.46	1.4	147.07	1800.27	-3.09	4.06	6622551.15	505684.58	59	44	21.944	N	3	6	4.017	E
1828.67	1.58	151.76	1828.47	-3.72	4.43	6622550.52	505684.95	59	44	21.923	N	3	6	4.041	E
1857.91	1.68	156.35	1857.7	-4.47	4.8	6622549.77	505685.32	59	44	21.899	N	3	6	4.064	E
1915.42	1.86	155.27	1915.18	-6.09	5.52	6622548.15	505686.04	59	44	21.847	N	3	6	4.11	E
1944.8	2.12	155.29	1944.54	-7.01	5.95	6622547.23	505686.47	59	44	21.817	N	3	6	4.138	E
1972.87	2.09	163.67	1972.59	-7.98	6.31	6622546.26	505686.83	59	44	21.786	N	3	6	4.161	E
2002.08	2.05	159.93	2001.78	-8.98	6.64	6622545.26	505687.16	59	44	21.753	N	3	6	4.182	E
2202.85	1.73	162.62	2202.45	-15.24	8.78	6622539	505689.3	59	44	21.55	N	3	6	4.318	E
2230.78	1.58	164.47	2230.36	-16.02	9.01	6622538.22	505689.53	59	44	21.525	N	3	6	4.332	E
2292.46	1.53	160	2292.02	-17.61	9.52	6622536.63	505690.04	59	44	21.474	N	3	6	4.365	E