



DRILLING COMPLETION REPORT

WELL 6507/5-5

Skarv 4

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Prepared by :

.....
Tor Jan Tjøstheim
Drilling Engineer

Reviewed by

.....
Eamon Condon
Skarv Project Control

Approved by :

.....
Steinar Bryne
Skarv 4 Drilling Project Manager

	SKARV 4 – 6507/5-5 COMPLETION REPORT	Page: 2 of 202
Chapter: 0	TABLE OF CONTENT	Date: 03/05/02 Rev: 0

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	SKARV 4 – 6507/5-5 COMPLETION REPORT	Page: 3 of 202
Chapter: 0	TABLE OF CONTENT	Date: 03/05/02 Rev: 0

TABLE OF CONTENT

1	GENERAL DATA	6
1.1	Well Data.....	6
1.2	Area Location Map.....	8
1.3	Block location map.	9
1.4	Casing and Well head Data.....	10
1.5	Well Data.....	11
1.6	Well Sketch 6507/5-5.....	12
1.7	Well Abandonment Status.....	13
1.8	Primary Cementation	14
1.9	Mud Summary.....	16
1.10	Project organisation	17
1.11	Service Company Listing	19
2	HOLE SECTION SUMMARY	20
2.1	Rig Move	20
2.1.1	Objectives	20
2.1.2	Actual.....	20
2.1.3	Result versus objectives	20
2.1.4	Lessons Learned:	20
2.2	Anchor Handling.....	22
2.2.1	Objectives	22
2.2.2	Actual.....	22
2.2.3	Result versus objectives	22
2.2.4	Lessons Learned	22
2.3	Drilling 36” hole and setting 30” conductor	23
2.3.1	Objectives	23
2.3.2	Actual.....	23
2.3.3	Result versus objectives	24
2.3.4	Lessons Learned	25
2.4	Drilling 26” hole and setting 20” casing. Running BOP.	26
2.4.1	Objectives	26
2.4.2	Actual.....	26
2.4.3	Results versus objectives.....	26
2.4.4	Lessons learned	27
2.5	Drilling 17 ½” hole and setting 13 3/8” casing	28
2.5.1	Objectives	28
2.5.2	Actual.....	28
2.5.3	Results versus objectives.....	29
2.5.4	Lessons learned	29
2.6	Drilling 12 ¼” hole, logging 12 ¼” hole and running 9 5/8” liner	30
2.6.1	Objectives	30
2.6.2	Actual.....	30
2.6.3	Results versus objectives.....	31
2.6.4	Lessons learned	31
2.7	Drilling 8 ½” hole, coring and logging.	34

	SKARV 4 – 6507/5-5 COMPLETION REPORT	Page: 4 of 202
Chapter: 0	TABLE OF CONTENT	Date: 03/05/02 Rev: 0

2.7.1	Objectives	34
2.7.2	Actual.....	34
2.7.3	Results versus objectives.....	35
2.7.4	Lessons learned	35
2.8	Running 7” liner and testing.....	36
2.8.1	Objectives	36
2.8.2	Actual.....	36
2.8.3	Results versus objectives.....	38
2.8.4	Lessons learned	38
2.9	Plugging and Abandoning	39
2.9.1	Objectives	39
2.9.2	Actual.....	39
2.9.3	Results versus objectives.....	40
2.9.4	Lessons learned	40
2.10	Anchor handling and rig move to Haugesund.....	41
2.10.1	Objectives	41
2.10.2	Actual	41
3	LOGISTICS & PROCUREMENT	42
3.1	Introduction	42
3.2	Supply base(s)	42
3.3	Helicopter.....	42
3.4	Charter / Fixed wing.....	42
3.5	Supply Vessel / Stand-by Vessel / Anchor Handling Vessel	43
3.6	Broker.....	43
3.7	Group Loadings	43
3.8	Scheduler	43
3.9	Contract strategy	44
3.10	Procurement.....	44
4	SAFETY AND ENVIRONMENT.....	45
4.1	HSE.....	45
4.2	HSE Action List:	46
5	PERFORMANCE REVIEW.....	48
5.1	Time Depth Graph.....	48
5.2	Daily Drilling Summary	49
5.3	Execution Plans	53
5.4	Time breakdown	64
5.5	Non-Productive Time	65
5.6	Cost Estimating.....	67
5.7	Drilling operations Cost vs Plan.....	67
5.8	Tabulation, AFE versus Actual Cost.....	68
5.9	Actual spend breakdown.....	69
6	LESSONS LEARNT	73
7	DRILLING DATA.....	102
7.1	DIMS operation summary.....	102

	SKARV 4 – 6507/5-5 COMPLETION REPORT	Page: 5 of 202
Chapter: 0	TABLE OF CONTENT	Date: 03/05/02 Rev: 0

7.2	Bit record.....	161
7.3	BHA Record.....	162
7.4	Drilling Fluids Report	169
7.5	Directional Surveys	172
7.6	LOT/FIT Data	175
8	FORMATION EVALUATION	177
8.1	Pore Pressure and Fracture Gradient.....	177
8.1.1	Overburden Gradient.....	178
8.1.2	Pore Pressure.....	178
8.1.3	Fracture Gradient	178
8.1.4	Conclusions	178
8.2	MDT pressure test data.....	180
8.3	Lithology	181
8.4	Marker Horizon.....	183
8.5	Formation pressure plot	184
8.6	Temperature plot.....	185
8.7	DST test.....	186
8.7.1	Deck Layout	186
8.7.2	Surface Equipment.....	187
8.7.3	Landing String.....	188
8.7.4	DST String.....	189
8.7.5	Test Results Summary.....	190
9	APPENDIX	191

☐ END OF WELL REVIEW RECORD

☐ SLIDE PRESENTATION

☐ BAROID MUD SUMMARY

☐ SMITH BIT SUMMARY

☐ NODECO FAILURE REPORT

☐ DRIL-QUIP FAILURE REPORT

	SKARV 4 – 6507/5-5 COMPLETION REPORT	Page: 6 of 202
Chapter: 1	GENERAL DATA	Date: 03/05/02 Rev: 0

1 GENERAL DATA

1.1 Well Data

Well No.:	6507/5-5
Prospect:	Skarv B Segment
Licence:	PL 212
Well Classification:	Appraisal
Rig:	West Alpha Moored Semi Submersible Drill rig
Center Derrick co-ordinates:	65 deg, 42 min, 8,010 sec N
Int. Spheroid ED50, Norway:	07 deg, 35 min, 45,360 sec E
Surface UTM Zone 32:	7 287623,70 mN, 435533,04 mE
Target	
Primary Target Type :	Skarv B Segment 3-way dip closure bounded to NW by normal fault Lower and Middle Jurassic reservoir (Garn, Ilje and Tilje Formations)
Secondary Target Type:	Cretaceous (Lange Formation sandstone) Combined Stratigraphic and structural traps of marine gravity sandstones
Target Locations Co-ordinates:	65 deg, 42 min, 8.341 sec N 07 deg, 35 min, 45.104 sec E
Target UTM :	7,287,634.0 mN 435,530.05 mE
Seismic Lines:	The reprocessed final cube bpn00m1 PL2112 seisworks project. Xline 1765, Inline 1203
TD	3950 m MD BRT, 3948 m TVD BRT
Target (6507/5-5):	Garn JS14 3648,2 m MD BRT, 3647,5 TVD BRT
RTE Elevation (West Alpha):	18.0 m AMSL
Water Depth:	375 m (MSL)
RTE to Sea Bed:	393 m
Licence Interest	:
	: BP Amoco 30% (Operator)
	: Enterprise 25%
	: Exxon Mobil 15%
	: Statoil 30%

	SKARV 4 – 6507/5-5 COMPLETION REPORT		Page: 7 of 202
Chapter: 1	GENERAL DATA	Date: 03/05/02	Rev: 0

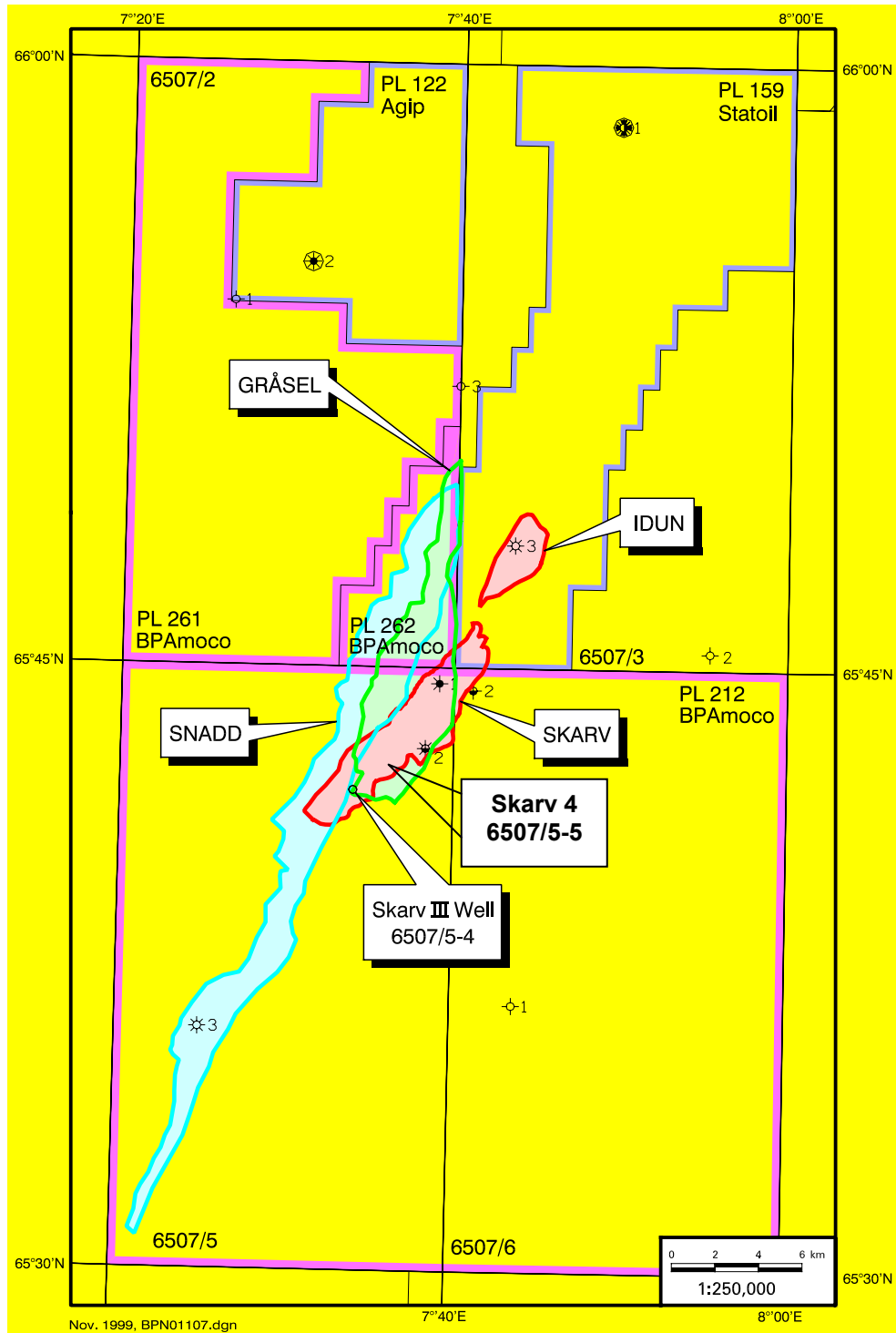
Vertical Well Drilling Time:

Rig on Contract:	04:00 hrs on 20.11.01
On location:	10:00 hrs on 24.11.01
Spud of 36" hole:	01:15 hrs on 28.11.01
Drilling Ended at TD 3950m:	19:00 hrs. on 05.01.02
End of TD logging:	14:30 hrs. on 09.01.02
7" Liner Installed:	07:00 hrs. on 14.01.02
End of Remedial Work:	15:30 hrs. on 23.01.02
End of Testing	11:00 hrs. on 02.02.02
End of well (rig release)	12:00 hrs. on 14.02.02
Total rig days:	86,3 days

AFE Vertical Well	198 million NOK
Actual Vertical Well	234 million NOK
AFE Remedial Work	33 million NOK
Actual Remedial Wel	35 million NOK
AFE Well Test	41 million NOK
Actual Well Test	38 million NOK
Total AFE Well Cost:	272 million NOK
Estimated Final Well Cost:	307 million NOK

	SKARV 4 – 6507/5-5 COMPLETION REPORT	Page: 9 of 202	
Chapter: 1	GENERAL DATA	Date: 03/05/02	Rev: 0

1.3 Block location map.



	SKARV 4 – 6507/5-5 COMPLETION REPORT	Page: 10 of 202
Chapter: 1	GENERAL DATA	Date: 03/05/02
		Rev: 0

1.4 Casing and Well head Data

6507/5-5

Casing OD (inches)	Weight (lb/ft)	Grade	Connection	Depth mBRT
30"	456	X52	SL-60	405
30"	311	X52	SL-60	466.5
20"	133	X56	E-60 MT	1051,3
13 3/8"	72	P-110	New VAM	2100,4
9 5/8" *(Liner)	53,5	P-110	New VAM	2044,5- 3642
7" Liner	29	L-80	New VAM	3531,5- 3938,8
7" Scab Liner	32	P-110	New VAM	2028- 3531,5
Wellhead Datum				391,3

* The 9 5/8" liner top at 2044,5m

The well-head used was a Dril-Quip SS15 Standard wellhead .The wellhead was fitted with a Vetco H-4 profile.

The 30" well-head housing extension had a wall thickness of 1.5", whereas all other conductor joints had a 1" wall thickness.

	SKARV 4 – 6507/5-5 COMPLETION REPORT		Page: 11 of 202
Chapter: 1	GENERAL DATA	Date: 03/05/02	Rev: 0

1.5 Well Data

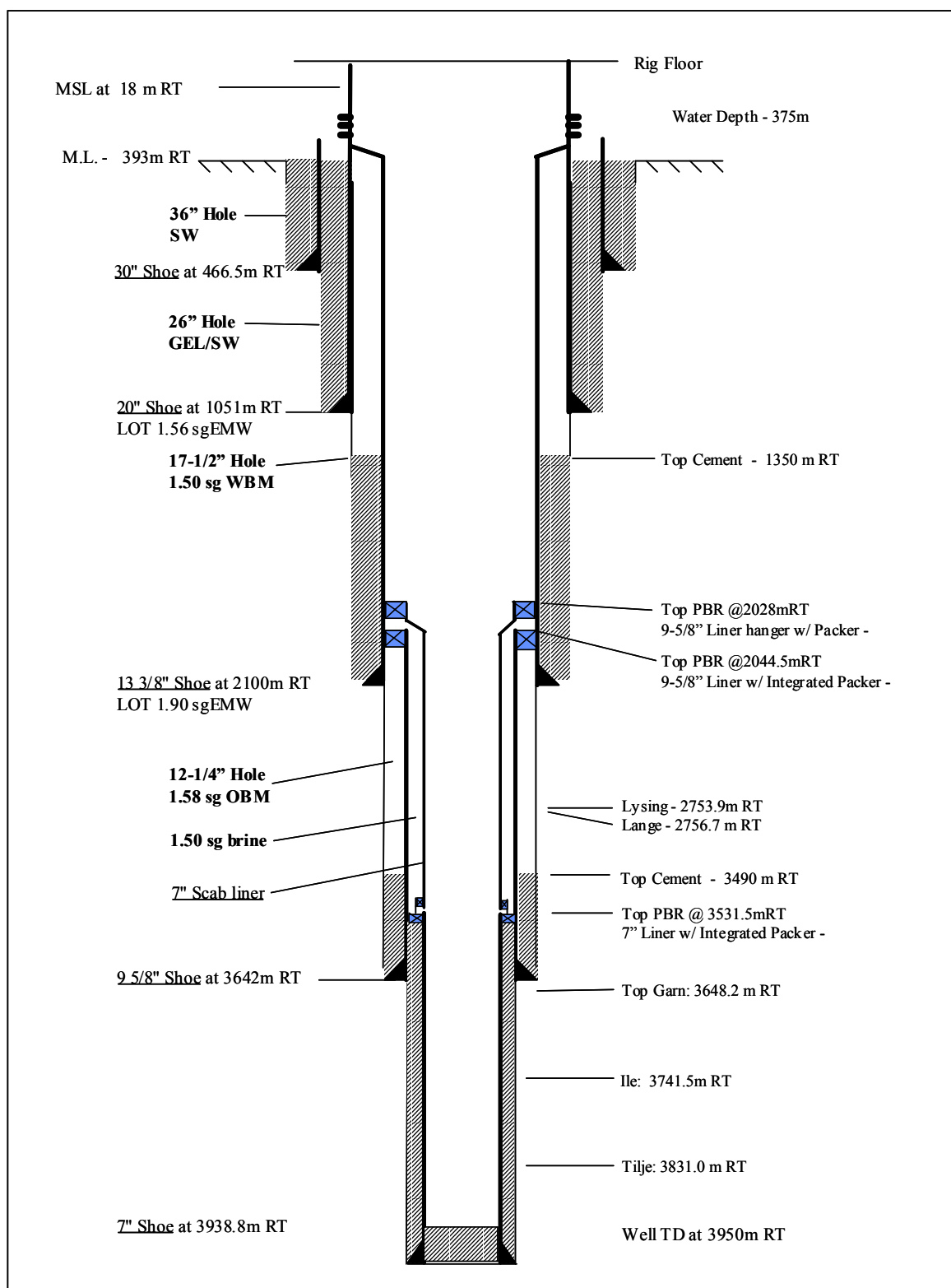
6507/5-5

Hole Section	Depth (m MD BRT)	Fluid	Casing Size	Casing Depth (m BRT)
36"	471	Riser less SW& Spud Mud Sweeps	30"	466,5
26"	1060	Riser less SW & Spud Mud Sweeps	20"	1051,3
17½"	2106	WBM KCl Polymer Glycol	13 3/8"	2100,4
12¼"	3643	OBM Enviromul	9 5/8"	3642
8 ½"	3950	WBM KCL Polymer	7"	3938,8

	SKARV 4 – 6507/5-5 COMPLETION REPORT		Page: 12 of 202
Chapter: 1	GENERAL DATA	Date: 03/05/02	Rev: 0

1.6 Well Sketch 6507/5-5

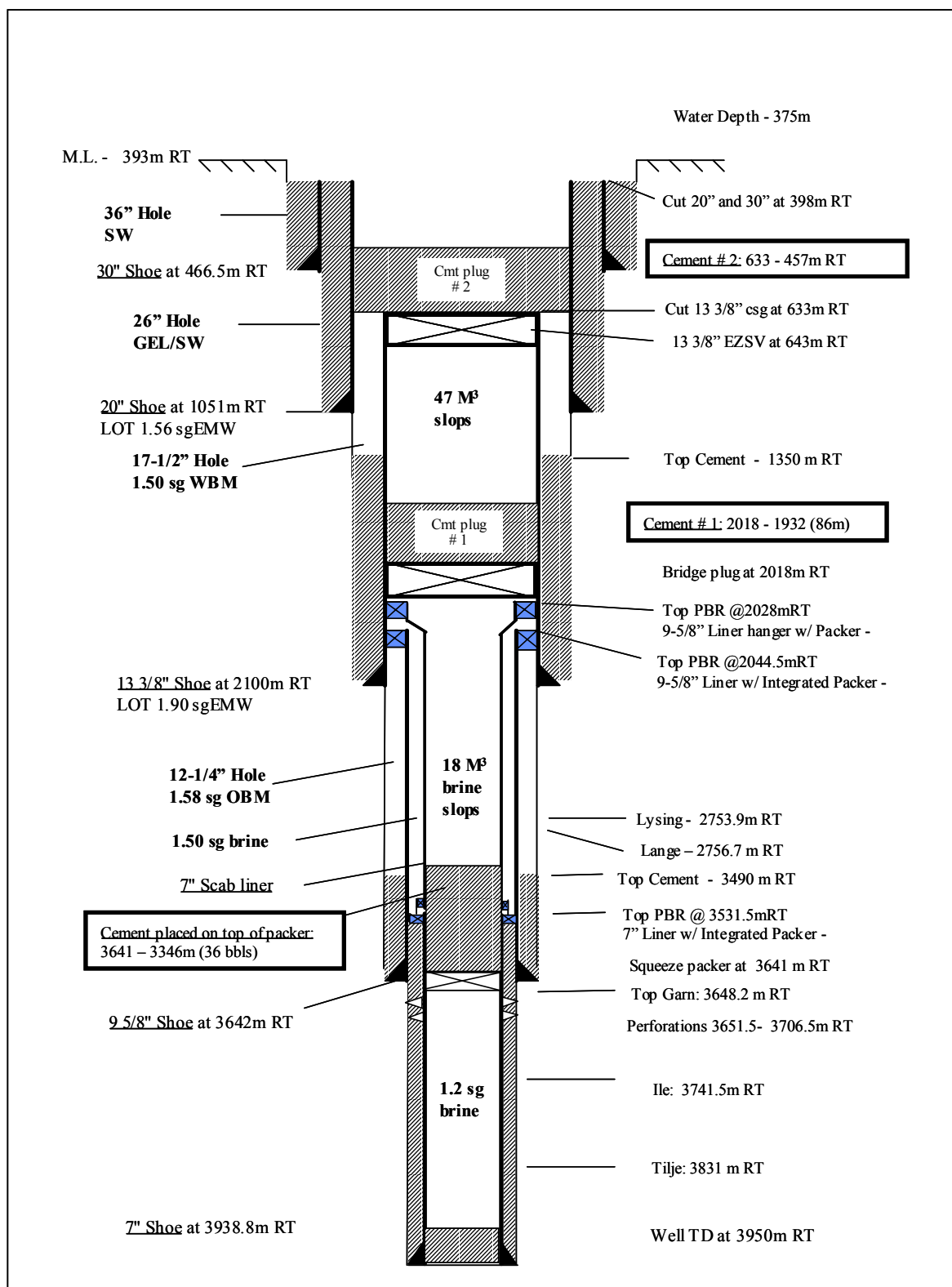
Skarv Well 6507/5-5 Well Schematic



	SKARV 4 – 6507/5-5 COMPLETION REPORT	Page: 13 of 202
Chapter: 1	GENERAL DATA	Date: 03/05/02 Rev: 0

Well Abandonment Status

Skarv Well 6507/5-5 Abandonment Well Schematic



	SKARV 4 – 6507/5-5 COMPLETION REPORT	Page: 14 of 202
Chapter: 1	GENERAL DATA	Date: 03/05/02 Rev: 0

1.8 Primary Cementation

Casing size : 30" Conductor
Type and density : Class G, 1.92 SG
Top of cement : Sea Bed
Casing shoe : 466.5 m MDBRT
Volume & Excess : 310 bbls (200%)
Top-up cementing : none

Casing size : 20" Surface Casing
Type and density :
Lead : Class G, 1.50 SG
Tail : Class G, 1.92 SG
Top of cement : Sea Bed
Casing shoe : 1051 m MDBRT
Lead Vol & Excess: 873 bbls (100 %)
Tail Vol & Excess : 294 bbls (100%)

Casing size : 13 3/8" Casing
Type and density :
Lead : Class G, 1.62 SG
Tail : Class G, 1.92 SG
Top of cement : 1350 (estimated based on volume pumped)
Casing shoe : 2100 m MDBRT
Lead Vol & Excess: 203 bbls (0 %)
Tail Vol & Excess : 120 bbls (0%)

Casing size : 9 5/8" liner primary job
The job failed. (All cement had to be circulated out of well)

Casing size : 9 5/8" liner (squeeze repair job)
Type and density : Class G + 35% SSA-1, 1.98 SG Gas Tight Slurry
Top of cement : 3490 m (estimated based on volume squeezed)
Casing shoe : 3642 m MDBRT
Volume & Excess : 63 bbls (Squeezed around shoe)

Casing size : 7" liner
Type and density : Class G + 35% SSA-1, 1.92 SG Gas Tight Slurry
Top of cement : 3531 m
Casing shoe : 3939 m MDBRT
Volume & Excess : 50 bbls (caliper volume + 10% + 100m annulus volume)

Cement plugs used for Well Abandonment

	SKARV 4 – 6507/5-5 COMPLETION REPORT		Page: 15 of 202
Chapter: 1	GENERAL DATA	Date: 03/05/02	Rev: 0

Plug at top of perforations

Hole size : 7” liner inside volume
Type and density : Class G + 35% SSA, 1.92 SG Plug
Plug depth : 3641-3346 m
Plug Vol & Excess: 31.3 bbls (Obtained no injection, cement volume placed on top of squeeze packer)

Plug at top of 7” scab liner

Hole size : 13 3/8” casing inside volume
Type and density : Class G + 35% SSA, 1.95 SG Plug
Plug depth : 2018-1932 m
Plug Vol : 40 bbls

Surface cement plug

Hole size : 20” casing inside volume
Type and density : Class G, 1.95 SG Plug
Plug depth : 633-457 m
Plug Vol : 220 bbls (lost 22 bbls return during cement job.)

	SKARV 4 – 6507/5-5 COMPLETION REPORT	Page: 16 of 202
Chapter: 1	GENERAL DATA	Date: 03/05/02 Rev: 0

1.9 Mud Summary

Well 6507/5-5

36" conductor hole

Gel/Seawater (1,20 SG)

Interval 393 – 471 m

Total cost 52 184 \$

26" surface hole

Gel/Seawater (1,20 SG)

Interval 471 – 1051 m

Total Cost 35 350 \$

17 ½" intermediate hole

KCl/Polymer/Glycol (1.50 SG)

Interval 1051 – 2100 m

Total Cost 179 199 \$

12 ¼" intermediate hole

OBM/ENVIROMUL NAP(1.58 SG)

Interval 2100 - 3642

Total Cost 186 601 \$

8 ½" reservoir section

KCl/Polymer (1.20 SG)

Interval 3642 - 3950 m

Total Cost 75 352 \$

8 ½" well control incident & testing

Brine sodium bromide (1.50 SG for well control)

Brine NaCl (1.20 SG for testing)

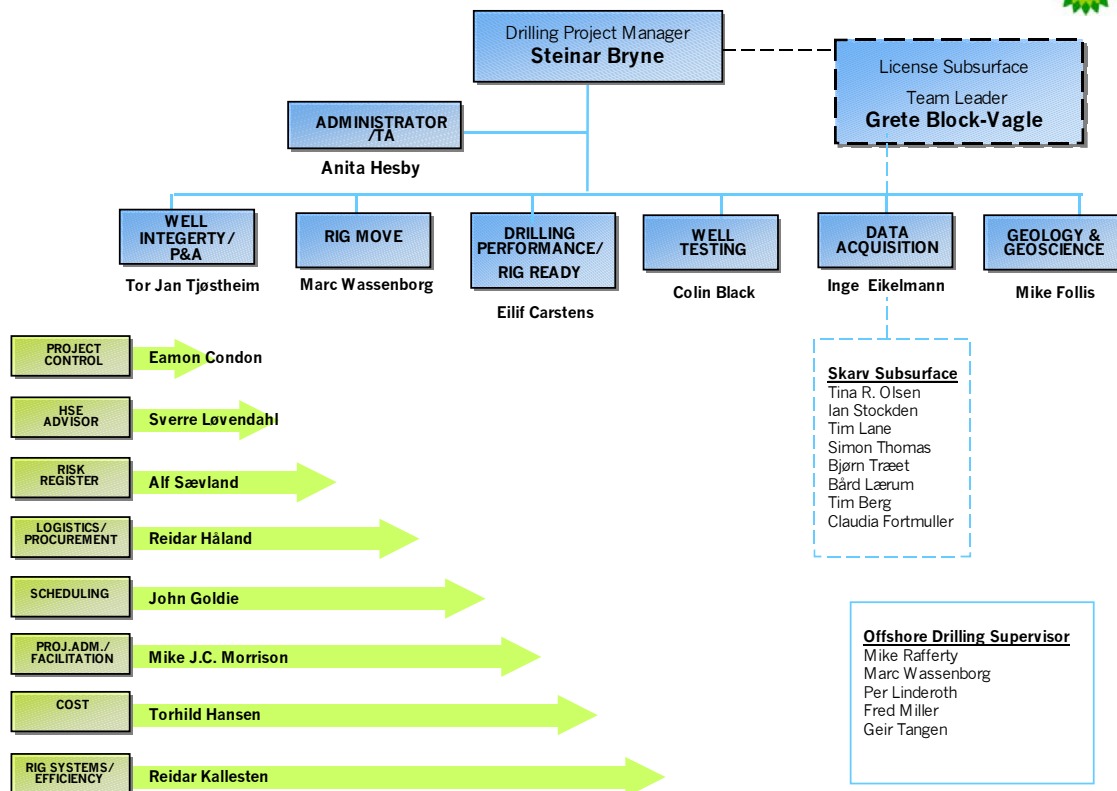
Interval 3950 - 3950 m

Total Cost 637 036 \$

	SKARV 4 – 6507/5-5	COMPLETION REPORT	Page: 17 of 202
Chapter: 1	GENERAL DATA	Date: 03/05/02	Rev: 0

1.10 Project organisation

Skarv 4 Project – Organisation Chart



13/09-01 Skarv 4 ahe

A World Class Drilling Planning Process was used on this well with the objective of delivering World Class Drilling Performance. The Team built an Organisational Structure that focused on the delivery of the well objectives with accountability assigned to the key Process owners. The process ensured that the project had the appropriate competent resources in the planning phase that were 100 % committed to ensure delivery of the well objectives. The team members build the structure in accordance with the well specific objectives. The key Process owners were nominated as the most suitable candidates with the relevant competence and experience necessary to assume the position.

Assurance and verification was conducted throughout the process by consultation to technical centers and independent peer reviews.

	SKARV 4 – 6507/5-5 COMPLETION REPORT	Page: 18 of 202
Chapter: 1	GENERAL DATA	Date: 03/05/02
		Rev: 0

Key events:

Project start	07.09.01
Submit Application for Consent	17.09.01
Project initiation meeting	19.09.01
Submit Well Program	24.09.01
Technical limit meeting	02.10.01
Design Phase Peer review	16.10.01
Planning phase 1 finished (plans shelved)	19.10.01
Planning re-start meeting	07.11.01
Risk register close out	07.11.01
Drilling Operation Procedures (DOP)	08.11.01
Prespud Meeting no. 1	15.11.01
Rig take-over	20.11.01
* Sidetrack kick-off meeting	27.11.01
* Sidetrack Drilling Program	07.12.01
* Sidetrack Drilling Operation Procedures (DOP)	14.12.01
End of well (rig release)	14.02.02
Post well review meeting (Contractors)	25.02.02
Post well review meeting (Core Team)	26.02.02

* The sidetrack was planned, but never performed. The decisions point whether to sidetrack or not was after final logging of the main bore. Based on the results from the logs it was decided not to perform a sidetrack.

	SKARV 4 – 6507/5-5 COMPLETION REPORT	Page: 19 of 202
Chapter: 1	GENERAL DATA	Date: 03/05/02 Rev: 0

1.11 Service Company Listing

Service	Company
Drilling/Rig Contractor	Smedvig
Mud Logging	Baker Hughes Inteq (BHI)
Directional/MWD	Baker Hughes Inteq (BHI)
Coring	Baker Hughes Inteq (BHI)
Directional Tools	Baker Hughes Inteq (BHI)
Directional Surveying	Baker Hughes Inteq (BHI)
Mud/Mud Engineering	Baroid
Wellhead Equipment, 30” Conductor and 20” Casing	Dril-Quip
Tubular Management	ITM
Casing Running	Weatherford
Cementing	Halliburton
Liner Hangers	Weatherford (Nodeco)
Bits	BHI /Smith / DBS
Drill Rental Equipment	OR Rentals
Electric Logging	Schlumberger
Surface Testing	Schlumberger
Downhole Testing	Schlumberger
Well site fluid analysis	Oilphase
Well site geologist	Quad consulting / Cambrian Consultants
Plug and Abandonment / Fishing services	Weatherford
Hole Opening	Smith Red Baron
ROV	Halliburton SubSea
Weather	Norsk Metereologisk Inst.
Telecom	Norse Electronic
Rig Positioning	Furgo Geoteam

	SKARV 4 – 6507/5-5 COMPLETION REPORT		Page: 20 of 202
Chapter: 2	HOLE SECTION SUMMARY	Date: 03/05/02	Rev: 0

2 HOLE SECTION SUMMARY

2.1 Rig Move

2.1.1 Objectives

Utilize two big anchor handling vessels on each anchor chain 1 and 8 and tow ca. 408 nautical miles from the Exxon Mobil location to the Skarv 4 location with average speed 4 knots/hr.

2.1.2 Actual

The rig was officially taken on contract to BP @ 04:00 Tuesday 20th November 2001, when the rig was on tight tow to the Skarv location. The rig was towed by anchor handling vessel Torm Heron on anchor chain no. 8 and by Tor Viking on anchor chain no. 1. Safety talks were performed with the captains on the tugboats. Ongoing activities during the tow were:

Changing Bondura bolts on Crown Compensator
Cleaning pits
Changing rams in BOP
Changing disc module no.2 on Mud Pump no. 2
General rig maintenance

Due to bad weather, the rig had to change heading to upwind and ballast to survival draft and wait on weather 21.11.01 at 21:20 hrs. The tow continued after waiting on weather 22.11.01 at 22:00 hrs. The rig arrived at the Skarv 4 location 24.11.01 at 10:00 hrs.

2.1.3 Result versus objectives

Activity	Technical limit time (hrs)	Budget time (hrs)	Actual time (hrs)	Difference (T. Limit – Actual)
Rig move	96,00	138	102,00	-6,00

Tow took 102 hours with an average speed of 4 knts/hr of the entire journey. This was 6 hrs longer than technical limit time. However, 24:40 hrs was spent waiting on weather.

2.1.4 Lessons Learned:

Description: Use of two AHV during long tow is recommended especially in bad weather.

	SKARV 4 – 6507/5-5 COMPLETION REPORT		Page: 21 of 202
Chapter: 2	HOLE SECTION SUMMARY	Date: 03/05/02	Rev: 0

Learning: Rig was taken over from Esso with only the Torm Heron on the #8 chain plus the Thrusters and a speed of 5-5.5 knots was achieved. The Tor Viking arrived later and was connected to the #1 anchor and the speed went up to 7-7.5 knots in similar weather conditions.

The Weather slowly deteriorated and winds up to 40-50 knots were recorded with 4-5 meters significant waves. The advantage of towing on the chain versus the bridle then is that more chain can be slacked off which will act as a “dampener” between the AHV and the rig and therefore allowing a smoother tow and delaying the ballasting down operations. Furthermore, it also gives a full set of redundancy in case one chain or AHV fails.

Action: If possible with the fairleader configuration, two AHV on each of the anchor chain is recommended to both increase operational safety as well as increase operational efficiency.

Additional lessons learnt are included in the “Lessons Learnt Log” chapter 6.

	SKARV 4 – 6507/5-5 COMPLETION REPORT		Page: 22 of 202
Chapter: 2	HOLE SECTION SUMMARY	Date: 03/05/02	Rev: 0

2.2 Anchor Handling

2.2.1 Objectives

Ballast rig.
Set and test anchors to 180 tones for 15 minutes.
Minimize damage to corals

2.2.2 Actual

After arriving at the Skarv 4 location @ 24.11.01 at 10:00 hrs, the rig had to wait on weather until 26.11.01 at 19:30.

Anchor No. 5 and anchor No. 1 were run out first. All 8 anchors were run and tested to 180 tons by 27.11.01 at 08:00. The rig was ballasted.

To minimize damage on corals the planned anchor pattern was adjusted to best positions. Rig heading was planned to 295 degrees and normal anchor pattern with 45 degrees spread and anchor no 2 adjusted with 2 degrees, to minimize damage to the corals.

2.2.3 Result versus objectives

Activity	Technical limit time (hrs)	Budget time (hrs)	Actual time (hrs)	Difference (T. Limit – Actual)
Anchor handling	24,25	35	70,00	-45,75

The anchor handling operations took 45,75 hours more time than technical limit time. However, the rig had to wait on weather for 57.5 hrs.

2.2.4 Lessons Learned

Lessons learnt are included in the “Lessons Learnt Log” chapter 6.

	SKARV 4 – 6507/5-5 COMPLETION REPORT		Page: 23 of 202
Chapter: 2	HOLE SECTION SUMMARY	Date: 03/05/02	Rev: 0

2.3 Drilling 36" hole and setting 30" conductor

2.3.1 Objectives

Drill from 393 m to 489 m in one run.
Maintain inclination at less than 1.5 degrees.
Run & Cement 30" Conductor.

2.3.2 Actual

The Skarv 4 well (6507/5-5) was spudded at 01:15 hrs on 28.11.01. The 17 ½" x 36" hole was drilled from 393 m to 471 m (36" hole opener TD at 468m)
Drilled with 1230 lpm and 45 rpm till hole opener was buried. Continued to drill section with 3900- 5000lpm and 62- 80 RPM. Pumped hi-vis sweeps every 15 m drilled. Increased WOB from 2- 4 metric ton to 7-15 metric ton. Did not encounter evidence of boulders in the section. Took Anderdrift inclination surveys while drilling. Maximum inclination was 1 degree. At TD the Anderdrift inclination survey showed one degree. After reaching TD, circulated the hole clean and displaced to 1.2 SG mud. Pulled out of hole with the 36" BHA to the mudline and found the hole to be in good condition. Allowed the hole to rest for ½ hour while the Top drive was serviced and top drive and derrick checked for loose items. Ran in hole to TD again and found 2 m of fill on bottom. Washed away soft fill and re-displaced well to 1,2 SG Bentonite mud. No drag was observed on the trip out of the hole.

The conductor was run to 6m above sea level before operations was suspended for 6.5 hrs waiting on weather. Continued to run 30" casing to 462m where the conductor stood up. Had 6m fill on bottom of hole causing guidebase to stand 6m above sea-bed. Attempted to wash fill with 4900 lpm and 5- 27 metric ton weight without success.

Pulled out of the hole with the casing and hung it off with the PGB placed and secured on the moon pool trolley. The 36" hole was deepened to 471 (bit depth 474m). Then the well was displaced to 1.6 SG mud. Two meter fill was observed on the wipertrip before pulling out of hole, however 1 m of free hole remained so reaming actions were not required.

When the 30" running tool was made ready for re-running, the 30" PGB housing dogs failed due to wear from wave motion in the hang-off period, and the 30" conductor string fell to the sea bottom. The conductor penetrated 19m into the seabed and stood without breaking at an angle of 15-20 degrees. The casing was successfully fished from the seabed and laid down. The casing had been hung off for a time period of approx. 10 hrs. The wind speed over this period was 8 knots increasing to 50 knots.

A wiper trip was made before running the back-up conductor. The 36" hole was located using the ROV sonar, marker buoys and cutting mound. The hole condition was good. Fresh 1.6 SG mud was displaced in the hole.

	SKARV 4 – 6507/5-5 COMPLETION REPORT		Page: 24 of 202
Chapter: 2	HOLE SECTION SUMMARY	Date: 03/05/02	Rev: 0

The back up 30” conductor string and PGB were run to the seabed. However, the cuttings mound could not be identified on the ROV sonar. Clouds of sediments obscured visibility on the seabed. A rigorous search to locate the well was conducted using the ROV sonar, the 2 marker buoys and the crater from the previous dropped casing as reference points. After 12 hrs of repositioning the rig and probing the seabed the original Skarv 4 well was assumed lost.

The well was re-spudded at 04:00 hrs on 03.12.01. The 17 ½” x 36” hole was drilled from 393 m to 474 m (36” hole opener TD at 471m). The hole was drilled with 1200 lpm and 50 rpm until the hole opener was buried. The rest of the hole was drilled with 3000- 5000lpm and 70-80 RPM. Pumped hi-vis sweeps every 15 m drilled. Increased WOB from 0.5- 1 metric ton to 2-5 metric ton. Did not encounter evidence of boulders in the section. Took Anderdrift inclination surveys while drilling. Maximum inclination was 2.25 degree. At TD the Anderdrift inclination survey showed one degree. After reaching TD, the hole was circulated clean and displaced to 1.4 SG mud. Pulled out of hole with the 36” BHA to the mudline and found the hole to be in good condition. Allowed the hole to rest for ½ hour while the top drive was serviced and the top drive and derrick checked for loose items after top hole drilling. Ran in hole to TD again and found 2 m of fill on bottom. Displaced well to 1,4 SG bentonite mud. No drag was observed on the trip out of hole.

The conductor was run to 466m. Guidebase stick-up was 1.5m. The casing was cemented pumping 310 bbls 1.92 sg cement slurry mixed with Dyckerhoff Class G cement. Observed cement returns at seabed approx. 5M³ before full displacement. Waited on cement for 6.25 hrs. Observed bullseyes with ROV (0.75 and 1.5 degrees). The running tool was pulled out of hole and the bullseyes checked. Bullseyes readings remained the same.

A TITUS top up jub was not done because the TITUS system was not installed on the back-up 30” housing.

2.3.3 Result versus objectives

Activity	Technical limit time (hrs)	Budget time (hrs)	Actual time (hrs)	Difference (T. Limit – Actual)
Drilling 36” hole from 393-489 m	26,5	38	87*	-60,5
Running 6 joints 30” conductor	12,5	18	77,5□	-65
Cementing 30” conductor	13,00	18,5	15,5	-2,5

- * Includes drilling of first 36” hole, check trip after successful fishing of dropped conductor and drilling of second 36” hole.
- Includes unsuccessful running of conductor in original hole, fishing dropped conductor, unsuccessful attempt to stab in hole with new conductor after fishing job and finally successful run of conductor in the second 36” hole.

	SKARV 4 – 6507/5-5 COMPLETION REPORT		Page: 25 of 202
Chapter: 2	HOLE SECTION SUMMARY	Date: 03/05/02	Rev: 0

2.3.4 Lessons Learned

No. 1

Description: PGB dogs wore out after suspending the 30” csg for 10 hrs. When dogs failed the 30” conductor string was dropped to the sea.

Learning: The risk of this happening was not identified by anybody nor considered at any stage. Drill Quip no longer runs a sleeve below the dogs to shoulder the load of the 30” csg.

Conclusions from the investigation report: The 30” conductor parted from the PGB as a result of dynamic bending loads being transmitted through the conductor/guidebase interface. These dynamic loads were produced by the poor weather and sea conditions acting on the conductor string

Recommendations:

- Perform a risk assessment before it is decided to hang off. This needs to include type of conductor connectors, the type of wellhead to conductor interface, the suitability of BOP cart or spider beams and environmental conditions and length of hang-off period.
- If it is decided to hang off, support the guidebase as close as possible around the conductor to minimize the loading
- Service personnel to visually inspect the guidebase/conductor periodically during poor weather and sea conditions for any signs of deterioration or relative movement of the conductor.

No. 2

Description: The 36” hole could not be located after check trip. The marker buoys were of inadequate wt, had poor labels and were deployed in close proximity to one another.

Learning: Deploy 3 buoys, spaced as outlined in the Halliburton ROV buoy procedure, labeled with legible and adequately weighted to prevent movement.

Action: Drill reps to enforce 3 Buoy Skarv policy and application of Halliburton buoy-spotting procedure. DOP to be updated to state the requirement for 3 buoys on bottom until PGB is landed.

No. 3

Description: After first attempt to run 30” csg, it stood up on 6 m fill. This led to a chain of unscheduled events occurring over 4.9 days. The ultimate result being the collapse of the 36” hole.

Learning: Future teams must re-evaluate need for rathole based on total area experience.

Action: Best practices for the area needs to be investigated and a conclusion on this made and implemented in future DOP.

Additional lessons learnt are included in the “Lessons Learnt Log” chapter 6.

	SKARV 4 – 6507/5-5 COMPLETION REPORT		Page: 26 of 202
Chapter: 2	HOLE SECTION SUMMARY	Date: 03/05/02	Rev: 0

2.4 Drilling 26" hole and setting 20" casing. Running BOP.

2.4.1 Objectives

Drill the section in one bit run from 466 to 1050 m.

Maintain inclination as close to vertical as possible.

Set the 20" casing sufficiently deep to obtain the kick tolerance necessary to drill to +/_ 2050 meters in the next hole section. This requires a LOT of minimum 1.45sg.

2.4.2 Actual

Ran in hole with the 26" BHA and drilled soft cement from 461- 465m. Drilled the 30" casing shoe and rathole (hard cement) with 3- 5 metric ton weight on bit and 50 RPM. Continued to drill to the section TD (1060m) with 3-11 metric ton weight on bit, 4000- 4500 lpm flow rate and 50- 120 RPM. Pumped high viscosity pills every 15m drilled. Reamed the hole on every stand to reduce any build tendency. At section TD, circulated hole clean and displaced to 1.20 sg mud. Pulled out of hole. The hole was in good condition.

Ran the 20" 133 ppf, X-56 casing with Dril-Quip E-60 MT connections using 2 anti rotation keys per connection. Attached double guide ropes to the shoe joint. Checked floats and found them to be in good condition. Continued to run the 20" casing to the mud line. Re-positioned the rig and stabbed the 20" casing into the 30" housing. Two of the four guide ropes were broken off before stabbing the casing. Continued to run the 20" casing to 470 m where the string took up to 30 klbs weight. Pulled the casing string back into the 30" shoe and installed circulating swedge. Worked and circulated the casing down from 470- 544m (The bottom 5 joints had centralizers installed, and these seemed to hang up in the rathole). Continued to run in hole with the 20" casing from 544- 652m. Observed no excessive weight. Changed handling equipment and ran the 20" casing on drillpipe to 1051 m. Circulated the hole clean with 2100 litre/min before the cement job. Pumping 139 m³ of 1.50 SG lead slurry (100% excess) and 46.7 m³ of 1.92 SG tail slurry (100% excess). Observed good cement returns to mudline. The plug bumped and the casing was pressure tested to 1600 psi for 10 min.

Laid down 26" BHA and made up 17 ½" BHA while waiting on good weather forecast. Ran BOP and Marine Riser. Pressure tested kill and choke lines to 5500 psi. Installed the diverter. Pressure tested the wellhead connector to 5200 psi.

2.4.3 Results versus objectives

Activity	Technical limit time (hrs)	Budget time (hrs)	Actual time (hrs)	Difference (T. Limit – Actual)
Drilling 26" hole from 466-1060m	41	60	50.5	-9,5
Running 20"	15,5			

	SKARV 4 – 6507/5-5 COMPLETION REPORT		Page: 27 of 202
Chapter: 2	HOLE SECTION SUMMARY	Date: 03/05/02	Rev: 0

casing string		22	18	-2,5
Cementing 20” casing string	10,5	15	11,5	-1,0
Running and testing BOP & Riser	59,50	85,5	69,50	-10,00

2.4.4 Lessons learned

Lessons learnt are included in the “Lessons Learnt Log” chapter 6.

	SKARV 4 – 6507/5-5 COMPLETION REPORT		Page: 28 of 202
Chapter: 2	HOLE SECTION SUMMARY	Date: 03/05/02	Rev: 0

2.5 Drilling 17 1/2” hole and setting 13 3/8” casing

2.5.1 Objectives

Drill the 17 1/2” hole section in one bit run from 1050 to 2100m

Effective ROP 40 m/h or higher.

No hole problems allowing the casing to be run and cemented as efficiently as possible.

Obtain sufficient high LOT at 13 3/8” casing shoe to drill the 12 1/4” hole section to the top of the reservoir.

2.5.2 Actual

Performed a leak-off test after drilling out the 20” casing shoe and 3 m of new formation. In preparation to the LOT the 1,20 SG mud was circulated and conditioned for 1,2 hours. The leak off pressure was 538 psi over 1,20 SG mud giving an equivalent mud weight at 1,56 SG. After the LOT, the 17 1/2” hole was drilled down to 1313m with 10-12 MT weight on bit, 130-135 RPM and 4350 litre pr minute flow rate. From 1313m and down to 1590m up to 40% drill gas was observed, but no connection gas indicating that the well was drilled overbalanced. An electrical fault occurred when drilling at 1590m causing insufficient power to draw works and mud pumps. Repair time was 12.5 hrs. After the repair, continued drilling on from 1590 m to total depth for section at 2106m with 7-20 MT weight on bit, 80- 135 RPM, 4100 litre pr minute and 300 bar pump pressure. Hard stringers were encountered over the intervals 1866-1889m, 1894- 1898m and 2027- 2029m. The mud weight over the 17 1/2” section was increased as planned from 1.20sg in the beginning to 1.50sg at the end.

The well was circulated clean with 4100 litre pr minute and 305 bar pump pressure. Two times bottoms up were required before the shakers cleaned up. Pulled out of hole from 2106- 1599m. Encountered several tight spots. Went back on bottom and circulated hole clean before pulling out of hole. Flow checks were performed inside the 20” casing shoe, and prior to the BHA entering the BOP stack. Then the 17 1/2” BHA was pulled to surface and racked back. Some small pieces of clay were sticking to the stabilizers and drill collars. Bit was in gauge.

Rigged up 13 3/8” casing handling equipment and made up the 13 3/8” shoe track. Checked float valves and ran in hole installing centralizers on the first 4 joints. The initial running speed was extremely slow due to problems making up the New VAM threads. Average running speed was 5 joints/hour from 34 to 314m. The make up torque setting for the JAM unit was increased and the running speed was slowly increased to 8- 9 joints / hour. Filled casing every joint with the rig hose. Ran the casing on the landing string and landed off the hanger in the wellhead. Observed no hole related problems while running the casing.

Casing shoe depth was 2100,4m. Staged up the flowrate to 3600 litre/minute. Started to loose mud and reduced flowrate to 1620 litre/minute and 75 bars with no losses. Lost a total of 30 M³ mud. Circulated bottoms up.

	SKARV 4 – 6507/5-5 COMPLETION REPORT		Page: 29 of 202
Chapter: 2	HOLE SECTION SUMMARY	Date: 03/05/02	Rev: 0

Rigged up and tested cement lines. Pumped 13 M³ sg spacer before releasing ball. Pumped 203 bbls of 1.62 sg lead slurry followed by 120 bbls of 1.92 sg tail slurry. Released top plug with 179 bars. Displaced cement with rig pumps and bumped plug (96% pump efficiency). No losses were observed while pumping or displacing the cement. Pressure tested casing to 5000psi. Set and pressure tested seal assembly to 5200 psi. When attempting to pull casing running tool, it hung up in the lower annular. Had to reposition rig and pump to come free.

Ran in hole with the combined cup tester and 12 ¼” wear bushing running tool. Tested the casing to 5200 psi and afterwards pressure tested the BOP and surface system to 5200 psi.

2.5.3 Results versus objectives

Activity	Technical limit time (hrs)	Budget time (hrs)	Actual time (hrs)	Difference (T. Limit – Actual)
M/U BHA & Clean out 20” casing shoe	7,50	11	19,25	-11,75
LOT below 20” casing shoe	3,5	5	4,50	-1
Drilling 17 ½” hole from 1051-2006 m	63	90,5	84,25	-21,00
Running and cementing 13 3/8” casing	29	41,5	37,5	-8,5
Testing BOP and surface equipment	12,75	18,25	16,5	-3,75

The time spent making up the BHA and clean-out the casing shoe was 11,75 hrs more than planned mainly because of problems with the MWD tool and slower tripping speed. The time spent drilling this section was 21 hours more then planned mainly because of electrical fault in the rig power system and one unplanned wiper trip.

2.5.4 Lessons learned

Lessons learnt are included in the “Lessons Learnt Log” chapter 6.

	SKARV 4 – 6507/5-5 COMPLETION REPORT		Page: 30 of 202
Chapter: 2	HOLE SECTION SUMMARY	Date: 03/05/02	Rev: 0

2.6 Drilling 12 ¼” hole, logging 12 ¼” hole and running 9 5/8” liner

2.6.1 Objectives

Drill to the 9 5/8” Liner Point in one bit run with effective ROP of 60 m/hr in the Shetland and 35m/hr in the Cromer Knoll and the Viking.

Drill 12 ¼” section to 5m above the Top Garn.

No OBM spills.

A secondary objective was to evaluate the secondary target (Cretaceous sands).

2.6.2 Actual

The 12 ¼” BHA was ran in hole to 2045m. Washed down from 2045-2075m, tagged TOC and performed a JSA before displacing hole to 1.58 sg oil based mud. Spent 8.5 hrs drilling the float collar even if the plug was of the antirotation type. Drilled firm cement from 2077- 2102m and soft cement from 2102- 2106m. Drilled 3m of new formation and performed a leak-off test to 1.90 sg. Continued to drill and survey 12 ¼” hole from 2109m to TD of section at 3643m. Drilling parameters for the upper part of section was 0- 5 MT weight on bit and 180 RPM. For the lower part of the hole section the parameters were 2-16 MT weight on bit, 80- 180 RPM and 3500 litre pr minute flow rate. Hard stringers in the lower part of the section slowed down the penetration rate. The mud weight was kept at 1.58sg throughout the section. TD was picked based on markers on the MWD log. The markers came in high compared to the prognosis.

The hole was circulated clean before the string was pulled out from 3643- 3200m. Some tight spots were encountered taking up to 20 ton overpull. Continued pumping and reaming out from 3200- 2788m. Maximum overpull was 20 ton. Ran string back to bottom and circulated bottoms up before pulling out of hole without problems. The hole was in good conditions. The overpull noticed on the first trip out to 2788m was probably due to hole geometry and hard stringers rather than hole instability.

Logging 12 ¼” hole.

Rigged up wire line logging tools and ran in hole with DSI/IPLT/GR/AMS log to 3644.5m. Logged the open hole section without problems.

Setting 9 5/8” Liner

Rigged up 9 5/8” casing running equipment and made up 9 5/8” shoe track. Installed piptag on the shoe joint. Checked float valves and ran in hole with 9 5/8”, 53,5 ppf, P-110 casing with New-VAM connections to 610m. Had to change Weatherford tong due to failure. Continued to run 9 5/8” liner to 1585m and installed liner hanger. Continued to run in hole on 4 stands of 5 ½” HWDP and then 5 ½” DP to surface. Picked up and made up Nodeco cement head. Washed the last stand to 1m above bottom. Made an unsuccessful attempt to set hanger. Pulled up 2m and set hanger successfully. 9 5/8” shoe depth was 3642m and top of 9 5/8” hanger PBR was at 2044.5m. Released the running tool and attempted to shear out the ball seat. The seat seemed to shear out at 210 bar, about 10 bars lower than it was pinned to. Circulated and conditioned the mud. Circulation pressure was higher than expected, but showed a dropping

	SKARV 4 – 6507/5-5 COMPLETION REPORT	Page: 31 of 202
Chapter: 2	HOLE SECTION SUMMARY	Date: 03/05/02 Rev: 0

tendency. Prepared and pumped a carbide tracer to check if flow was following the correct path around the liner shoe or it was pumped across a failed liner running tool. However, no gas tracer was detected in return. The cement job was initiated. The cement job gave good indications of progressing properly except for no bump on the plugs after maximum allowable displacement. Set the liner packer and started to circulate out from top of liner PBR. Got all the cement that was pumped into well in return. An investigation after the job was finished showed that not sufficient weight had been set down on liner hanger when applying pressure for shearing out the ball seat. This caused a wash-out in the FJB Pressure Equalizations Sleeve, and all the cement was actually circulated through the washout at the top of the liner leaving no cement behind the liner. Pulled out of hole with the liner running tools and tested the BOP. Then run in hole with an 8 1/2" BHA and drilled plugs and shoe. Ran in hole with cement stinger and set a 10 M³ balanced 1.98 sg cement plug at bottom of well. Squeeze cemented 4.8 M³ around the shoe. Top of cement outside of 9 5/8" liner was calculated to 3490m assuming the formation weak point that broke down during the squeeze was above this depth. Pulled out of hole with the cement stinger. Successfully pressure tested the 9 5/8" liner to 5200 psi over 1.58 sg OBM.

2.6.3 Results versus objectives

Activity	Technical limit time (hrs)	Budget time (hrs)	Actual time (hrs)	Difference (T. Limit – Actual)
Drilling 12 1/4" hole from 2106 – 3643 m	106,75	153	184,50	-77,75
Logging 12 1/4" hole with wire line	14,75	21	16,00	-1,25
Running and cementing 9 5/8" liner	40,25	57,75	124,00	-83,75
BOP testing including surface equipment	11	15,75	17,50	-6,50

Drilling the 12 1/4" hole took 3.2 days longer than planned. Main problems were drilling of shoe track (8.5 hrs), slower drilling than planned and an unplanned wipertrip. Running and cementing of 9 5/8" liner took 3.5 days longer than planned. The main problem was incorrect Nodeco liner running procedure causing wash-out in the liner top and unsuccessful primary cement job. The liner shoe had to be squeeze cemented in order to be able to continue.

2.6.4 Lessons learned

No. 1

	SKARV 4 – 6507/5-5 COMPLETION REPORT		Page: 32 of 202
Chapter: 2	HOLE SECTION SUMMARY	Date: 03/05/02	Rev: 0

Description: Cuttings skips used worked very well. The bins were rented from Aberdeen and was of the Bairoid Drill Cutting Bins “DCB” type.

Learning: The skips could be stacked two high without people needing to climb on them. Furthermore they were lower which resulted in a steeper fall from the last auger into the skip, which resulted in no plugging off. The skips were smaller which meant they were easier to lift as well.

Action: Those type of skips are highly recommended to be used on the West Alpha for future total containment. They should also be considered on other projects where total containment is planned to be used.

No. 2

Description: Slow drilling with aggressive PDC bit through top Melke sequence.

Learning: The Instantaneous ROP's through the Lysing / Lange sequence was slower than anticipated. The entire sequence was hard to drill with high torque and stick slip values. The top Melke was penetrated at 3372m MD and instantaneous ROP slowly dropped from 20-30 m/hr to just 0-5 m/hr range circa 20m below top Melke. ROP would then pick up once again to upto 40 m/hr for a 20 meter interval before it would die down slowly to almost 0 m/hr over the next 30 meters drilled. This 30 meters of real slow drilling could be interpreted as the bit being worn as in reality the sonic indicates that this section is a little harder to drill than expected. After this 30m, the ROP slowly picked up again and the bit continued to TD.

The bit drilled the entire section in one bit run from the 13 3/8” shoe to 9 5/8” casing point and was graded 2-5-BT-S-X-I-LT-TD

Action: Future drilling programs should highlight the slow drilling through this section. This would minimize the chance of pulling the bit green at the top Melke. On Skarv 4 we observed a ROP increase at 3451m, which was right at the base of the carbonate section approximately 80m below the top of the Melke.

No. 3

Description: The 9 5/8” liner running tool washed out during the liner setting operation. The cement was circulated thru the washout causing the contamination of ca. 150 M³ OBM and 36 hr lost time to re-cement the liner.

Lesson Learned: The Nodeco running procedure was wrong. It did not specify sufficient weight down when applying pressure to shear out the ball seat. The major difference in this job compared to all of the previous jobs in the North Sea was that this job was performed with an improved new type of running tool (BA Tool) designed to have a larger ID for reduced ECD's and higher tensile rating. The standard tools have a 2-13/16” ID with a 100 mm OD Slick Joint. The BA tools has a 4.125” ID with a 141mm OD Slick Joint.

The Running Tool sees a net upward force (piston force) from pressure applied to the ball seat. For the new bigger tool, the upward force is larger than for the old tool. Insufficient weight to compensate for the piston effect caused the string to move upwards when the pressure was

	SKARV 4 – 6507/5-5 COMPLETION REPORT		Page: 33 of 202
Chapter: 2	HOLE SECTION SUMMARY	Date: 03/05/02	Rev: 0

applied. The movement most likely caused the Floating Junk Bonnet shifting the Pressure Equalization Sleeve. The circulation fluid was then diverted from downwards through the liner to the ports in the FJB and up in the 13 3/8" annulus.

Shifting of the Sleeve at a 3000 psi pressure-load probably ruined the seals, destroying the pressure integrity for the Pressure Equalization Sleeve for the rest of the job.

Action: Make sure the Nodeco procedures are updated to take into account the correct up-force when pressure is applied. If new tools are used, make sure proper design review and HAZOP study have been performed by the tool supplier.

Additional lessons learnt are included in the "Lessons Learnt Log" chapter 6.

	SKARV 4 – 6507/5-5 COMPLETION REPORT		Page: 34 of 202
Chapter: 2	HOLE SECTION SUMMARY	Date: 03/05/02	Rev: 0

2.7 Drilling 8 ½” hole, coring and logging.

2.7.1 Objectives

Drill and core from the 9 5/8” liner shoe to TD as fast as possible.

Identify the fluid type in the Garn formation.

Provide a wellbore that enables all Data Acquisition objectives to be fulfilled.

Provide a wellbore to run 7” liner with no problems.

2.7.2 Actual

Drill to core point

Made up and ran in hole with 8 ½” BHA and tagged top of cement at 3490 m. Drilled firm cement from 3490- 3500m. Displaced well to 1.2 sg WBM. Drilled firm cement from 3500- 3643m with 2500 lpm, 210 bar, 4- 10 MT weight on bit, 100 RPM and 5000- 6000 ftlbs torque. Drilled formation from 3643- 3655m. Top Garn was encountered at 3648.2m. Circulated bottoms up for sample, flow checked well, slugged pipe and pulled out of hole.

Core run no. 1

Ran in hole with 83m core barrel assembly to 3616m and circulated one string volume. Tagged bottom at 3655m and cut core to 3736m with 1000 lpm circulation rate, 70- 100 RPM and 3- 9 MT weight on bit. Max gas was 5.44% from 3665m. Broke core off bottom with 7 MT, flow checked and pulled out of hole with core. Recovered 81m (100 %). When sub on top of inner barrel was unscrewed, a gas energized column of core gel surged from the inner barrel. The surging gel had enough energy to unload approximately 12.5m core. The core pieces unloaded varied in length from 10- 30 cm.

Drill to TD

Made up 8 ½” drilling BHA and ran in hole to 3640 m. Logged and reamed from 3640- 3736m with 2000 lpm, 160 bar, 50 RPM and 25- 30 m/hr ROP. Drilled 8 ½” hole from 3736 m to well TD at 3950 m. The drilling parameters were 2- 5MT WOB, 5-17 kft-lbs torque, 2500 lpm and 210 bar. Circulated hole clean, flow checked well and pulled drill string out of hole.

Logging 8 ½” hole

Rigged up the logging equipment and ran the logging tool string number 1 (HRLA-DSI-SP-GR-EMS) without any problems. Logged from 3946.5m- 3440m. Went ahead and ran the logging tool string number 2 (IPLT-GR) and logged from TD to 3596m without experiencing any difficulties. Rigged up toolstring no. 3 (MDT-GR) and logged for pressure points. Performed a total of 44 pressure points, but only 12 ended up being good tests. No drag observed during pressure testing. Pulled out of hole with the MDT logging tool due to tool failure. Repaired and re-run the MDT tool. Took a sample at 3668m with a sampling period of 5 hrs and 10 minutes. No overpull observed when pulling the tool free. Additional samples were taken at 3653.5m and 3701.8m. Ran in hole with tool string no. 4 (ZO-VSP/GR). Had to re-run this log due to communication problems with tool on first attempt. Replaced all

	SKARV 4 – 6507/5-5 COMPLETION REPORT	Page: 35 of 202
Chapter: 2	HOLE SECTION SUMMARY	Date: 03/05/02 Rev: 0

connections on cable head before successfully rerunning the log. Rigged down the logging tool and the wireline equipment.

2.7.3 Results versus objectives

Activity	Technical limit time (hrs)	Budget time (hrs)	Actual time (hrs)	Difference (T. Limit – Actual)
Drill 8 ½” hole to core point (3655m)	30,75	44	38,50	- 7,75
Core reservoir (core interval 83m)	34,25	49	35,50	-1,25
Drill 8 ½” hole to well TD (3950 m)	45,50	65,25	38,50	7,00
Log 8 ½” hole section	62,5	89,5	81,00	-18,50

Logging reservoir took about 0.8 days more time than planned. Main problems were MDT tool failure and communication failure with ZO-VSP/GR tool

2.7.4 Lessons learned

Description: The gel in the inner core bbl became energized with formation gas. When the top sub was backed off the rig rolled leaving the core an open path of escape. The energized gel immediately ejected 12.5 m of core on to the drill floor.

Solution: The BHI core hands recommend using their inner core bbl aliening guide to keep the top sub connection aliened over the inner core bbl. Also clamp the lower pipe racking arm on the top sub to stabilize it from vessel motion.

Additional lessons learnt are included in the “Lessons Learnt Log” chapter 6.

	SKARV 4 – 6507/5-5 COMPLETION REPORT		Page: 36 of 202
Chapter: 2	HOLE SECTION SUMMARY	Date: 03/05/02	Rev: 0

2.8 Running 7” liner and testing.

2.8.1 Objectives

Isolate the formations Garn, Tilje and Ile with 7” liner in such a way that it will give zonal isolation for a DST.

Acquire flow potential data to investigate the potential of high flow performance wells.

Additional objectives were:

- No HSE incidents
- Test within budget
- Acquire quality PVT and large volume fluid samples.

2.8.2 Actual

Setting 7” Liner

Changed handling equipment and rigged up for running the 7” liner. Performed a pre job SJA meeting prior to running the liner. Picked up the 7” liner shoe joint, float joint, intermediate joint and landing collar joint, Baker Locked the shoe track and ran 7” liner (29 lbs/ft, L-80, New Vam). Total length of 7” liner was 407.34m. Circulated the liner volume after having installed the liner hanger. Continued to run the liner in hole with 4 stands 5 ½” HWDP and 5 ½” DP. The weather came up and it was decided to hang off the string. WOW 40 hrs with shoe at 1975m. Continued to run the liner to 3940m where top of fill was encountered. No obstructions were encountered in open hole. Washed the liner down to bottom, pulled 4m up and set liner hanger.

Cemented the liner by pumping 8 M³ 1.59 sg spacer, 8 M³ 1.92 sg cement slurry and displaced cement by using rig pumps. Displaced with 1500 lpm and bumped plug (97.5% pump efficiency). Rotated liner with 20 RPM during cementing operations. No losses. Successfully pressure tested the liner to 345 bars, set the liner packer and reverse circulated out excess cement. Dumped spacer and 1 M³ cement. Pulled out of hole with the landing string.

A clean out string consisting of a 6” bit, 7” casing scraper, PBR mill and top dress mill was RIH. Washed the BOP area on the way in. Washed and scraped the DST packer setting area from 3605- 3624m. The top of the PBR was tagged at 3531.5 m and dressed off with 800 lpm 20 RPM

The well was then displaced to 1.20 SG NaCl brine by pumping 15 M³ seawater and 15 M³ high viscosity brine spacer ahead of the brine. The well was displaced by pumping 2500 lpm and rotating string 10 RPM. Pulled out of hole with the clean-out string and laid down top dress mill and tie back mill, scraper and bit.

The liner lap was attempted pressure tested to 5200 psi over 1.20 sg brine. The test was not successful as pressure dropped by 360 psi in 15 minutes.

Well control incident

	SKARV 4 – 6507/5-5 COMPLETION REPORT		Page: 37 of 202
Chapter: 2	HOLE SECTION SUMMARY	Date: 03/05/02	Rev: 0

Ran in hole with the BOP test tool to test the BOP. At first test, observed brine in return up the drill pipe. However, the pressure test was OK, so the flow had to come from the well. Pulled the test tool above the BOP and closed the shear ram. The pressure below the shear ram build up to 53 bars. Total influx was 800 litres. The well was pressured up to 172 bars several times to check the well response. Pressure dropped off to 165 bar over 15 minutes confirming communication to formation. Pressure was bleed back to +/-56 bars between each test, and there were no indication of oil or gas in return. It was also confirmed that the flow capability of the leak was low, and based on this information it was decided to open up the well and trip in to the top of the 7" liner instead of stripping in. The gain was 2.2 M³ while tripping in to 2088m. From this depth, circulated bottoms up over the choke with backpressure. No gas, oil or oil-based mud was observed in return. Opened well again and tripped further in to top of the 7" liner hanger at 3515m. Gained another 3.1 M³ while tripping. Circulated bottoms up over the choke and had some strung out OBM in returns. Killed the well by pumping 1.5 sg brine. Pulled out of hole with the DP and RIH with a 9 5/8" RTTS packer to find the hole in the casing. The leak was located to be in the 9 5/8" liner somewhere between 2054- and 2682m

A 7" scab liner was run from the 7" PBR at 3531m to 2028m to seal off the leak. Tested the BOPs to 5200 psi after installation of the scab liner. Ran in hole with drillpipe to TD of the well and displaced well from 1.5sg kill brine to 1.20 sg brine. Performed a successful pressure test and inflow test of well.

Run and pressure test DST string (ref. section 8.7 for drawings)

Picked up and ran in hole with TCP guns, DST tools and 3 1/2" PH6 tubing. Pressure tested the string to 6000 psi. Made up dummy hanger and ran in hole on 5 1/2" DP and 4 1/2" tubing as landing string. Landed off on wear bushing, and operated rams to mark the pipe. Rigged up Schlumberger wireline and performed a depth correlation for correct placement of TCP guns and packer. Pulled dummy hanger and included 2 pup joints (3.66m) in the 3 1/2" string for correct space out. A locking wedge on the dummy hanger was lost in hole, but the junk did not cause any problems. Ran the landing string and installed the flowhead. Pressure tested the landing string and flowhead to 6000 psi. Set the DST packer at 3613.5m and circulated diesel cushion into the test string.

Perforate and flow well.

Activated the TCP guns by pressuring up string to 5468 psi. Performed clean-up flow for 4 hrs and 15 minutes with a flowrate of approx. 6000 bbls/day on 52/64" choke. Closed the well in for a period of 11.5 hrs. Took bottom hole samples while well was shut in. Opened for the main flow and flowed the well for about 14 hours with a flowrate of approx. 6000 bbls/day. Shut the well in for main build-up (approx. 30 hrs)

Kill well and pull DST string.

Bled down string contents to burners. Reverse circulated 1.2 sg brine into test tubing. Bullheaded well and squeezed a kill pill to the perforations. Flowchecked the well and released the packer. Circulated 2 times bottom up, flowchecked, broke off flowhead and pulled out of hole with DST string.

	SKARV 4 – 6507/5-5 COMPLETION REPORT	Page: 38 of 202
Chapter: 2	HOLE SECTION SUMMARY	Date: 03/05/02 Rev: 0

2.8.3 Results versus objectives

Activity	Technical limit time (hrs)	Budget time (hrs)	Actual time (hrs)	Difference (T. Limit – Actual)
Run 7” liner & clean out	55,75	80	112,50	-56,75
Well control incident	N/A	N/A	213,75	-213,75
Run and pressure test DST string	78.25	112,25	115	- 36.75
Perforate and flow well	72.75	104,25	63,5	9.25
Kill well and pull DST string	40	57,5	57,5	-17.50

Running and clean-out of liner took about 2.4 days longer than planned. Most of the extra time (1.9 days) was due to WOW. About 9 days were lost due to the well control incident. Testing operations were performed without any large incidents. The time to perforate, flow well and pressure build-up was shorter than technical limit time because the formation had better characteristics and cleaned up faster than expected.

2.8.4 Lessons learned

Description: The kill pill performed its task well. It sealed off the pore throats and provided a stable well for killing operations. It also proved to be an excellent scouring agent in removing traces of hydrocarbon from the well bore while circulating the well.

The pill consisted of:

BARACARB 50	Ground calcium carbonate, 95% particles size under 50 microns	50 ppb
BARACARB 150	Ground calcium carbonate, 95% particles size under 150 microns	50 ppb
BARACARB 600	Ground calcium carbonate, 95% particles size under 600 microns	25 ppb
HEC	Cellulose fluid loss additive	3 ½” lb /gal
BARZAN	Suspension agent, stops settling.	

100 bbls made up in 1.2sg. brine

Learning: This type of pill can be used to successfully block the pore throats of the Garn formation. This type of fluid should be considered when drilling future Garn reservoirs to minimize formation damage.

Additional lessons learnt are included in the “Lessons Learnt Log” chapter 6.

	SKARV 4 – 6507/5-5 COMPLETION REPORT		Page: 39 of 202
Chapter: 2	HOLE SECTION SUMMARY	Date: 03/05/02	Rev: 0

2.9 Plugging and Abandoning

2.9.1 Objectives

Any zones with a flow potential shall be located and secured to prevent formation fluid or gas from flowing between formation layers or up to the surface.

Optimize P&A operation without jeopardizing BPA policy and NPD regulations.

Pull BOP

Cut 20" and 30" casings 5m below seabed and Pull wellhead and PGB.

2.9.2 Actual

Squeeze of perforations

Rigged up wireline, ran EZSV packer to 3641m and successfully set packer. The packer was run on wireline due to severe weather condition and possible problem setting packer due to rig motion if set on pipe. Laid down excess DP from derrick when waiting on weather. Ran in hole with the EZSV stinger on 3 1/2" tubing and 5 1/2" DP and sting into the packer. Attempted to establish injection rate pressuring up to 3100 psi and then 4500 psi. Did not obtain a squeeze break down, but pressure leaked off for both pressures. Set a 295m long balanced cement plug on top of the packer. Successfully pressure tested well to 3100 psi Disposed 18 M³ oil contaminated brine slops in the well while pulling out of the hole with the stinger.

Plug above 7" scab liner

Run in hole with 13 3/8" ESZV bridge plug on drill pipe to 2018m and set plug. Set a cement plug on top of it (40 bbls cement). Pressure tested bridge plug to 3150 psi (1000 psi above 13 3/8" shoe leak-off pressure). Disposed 45 bbls slops in well before pulling out. Spotted a high viscosity pill at 790- 700m.

Bridge plug at 639m, cut and retrieval of 13 3/8" casing and surface cement plug

Rigged up wireline to run the 13 3/8" EZSV bridge plug. Had a miss run, not able to set plug due to a short circuit in the cable head. Changed out the cable head and RIH and set the plug at 639m. Successfully pressure tested bridge plug to 3160 psi. Ran in hole with casing cutter and wear bushing retrieving tool. Cut casing at 626.6m and pulled out of hole with the cutting assembly and wear bushing.

Run in hole with the diverter tool and drillpipe and set a balanced plug from 639m- 457m. Pumped 35 bbls 1.58 sg spacer and 220 bbls 1.95 sg cement. Lost 22 bbls return during cement job. Laid down drillpipe while waiting on cement. Ran in hole and tagged top of cement at 457m with 12 metric ton. Attempted to pressure test cement plug, but pressure bleed back to 145 psi. Successfully Re-tested the plug to 1450 psi over 1.5 sg brine after additional 6 hrs waiting on cement time.

	SKARV 4 – 6507/5-5 COMPLETION REPORT	Page: 40 of 202
Chapter: 2	HOLE SECTION SUMMARY	Date: 03/05/02 Rev: 0

Pulling BOP, cutting and retrieving wellhead and PGB

Pulled the BOP and riser according to plan. Picked up 20" x 30" cutter assembly, ran in hole and cut 20" and 30" casings at 398mRT, 5m below seabed. Engaged the MOST tool and pulled free with 22 metric ton overpull. Pulled out of hole with the wellhead housings and the 30" and 20" casing stumps. Anchor handling commenced as a simultaneous operation with recovering the wellhead housings.

2.9.3 Results versus objectives

Activity	Technical limit time (hrs)	Budget time (hrs)	Actual time (hrs)	Difference (T. Limit – Actual)
Squeeze of perforations	19,50	28	68,5	-49
Plug above 7" scab liner	23,25	33,25	26,50	-3
Bridge plug at 639m, cut and retrieval of 13 3/8" casing and surface cement plug	30,25	43,5	47,00	-16,75
Pull BOP	46,25	66,25	40,00	6,25
Cut 20" and 30" & Retrieve PGB	8,5	12,25	5,00	-3,5

Squeeze of perforations took about 49 hours more time than planned, most due to waiting on weather.

Bridge plug at 639m, cut and retrieval of 13 3/8" casing and surface cement plug took 16.75 hours more time than planned. Most lost time was due to rerun of bridge plug (5 hrs) and longer WOC time (4.5 hrs).

Pulling BOP and retrieving the PGB went better than planned.

2.9.4 Lessons learned

Lessons learned are included in the "Lessons Learnt Log" chapter 6.

	SKARV 4 – 6507/5-5 COMPLETION REPORT		Page: 41 of 202
Chapter: 2	HOLE SECTION SUMMARY	Date: 03/05/02	Rev: 0

2.10 Anchor handling and rig move to Haugesund

2.10.1 Objectives

Deballast Rig to transit draft.

ROV to perform seabed survey. Start anchor-handling procedures while deballasting rig.

Recover anchors.

Move rig to the ABB yard in Haugesund

2.10.2 Actual

The ROV did the final seabed survey. Anchor handling operations started the 10th of February at 06:30 while de-ballasting to transit draft. Two vessels were used when picking up the anchors. The boats in attendance were "Tor Viking" and "Balder Viking". Anchor handling operations ran efficient without any problems. West Alpha was on tight tow to Haugesund 10.02.2002 at 18:00 hrs. Both anchor-handling boats were used on tow. Rig arrived the ABB yard in Haugesund, and the Skarv 4 operations ended 14.02.2002 at 12:00 hrs.

Results versus objectives

Activity	Technical limit time (hrs)	Budget time (hrs)	Actual time (hrs)	Difference (T. Limit – Actual)
Recover Anchors	26,00	37,25	11,00	15,00
Rig Move	NN	NN	90,00	NN

Anchor handling went better than planned.

	SKARV 4 – 6507/5-5 COMPLETION REPORT		Page: 42 of 202
Chapter: 3	LOGISTICS & PROCUREMENT	Date: 03/05/02	Rev: 0

3 LOGISTICS & PROCUREMENT

3.1 Introduction

The over all Logistics and Procurement process was managed from the BP offices as part of the Skarv 4 Project Team, where Logistics and Procurement was included as an element of the World Class Drilling Process.

Contract Strategy, Commitment , Equipment list / Group Loadings and Personnel Forecast was completed in good time in advance to the commencement of the well.

Key players, Asco Supply base, Helgelandsbase, Helicopterservices A/S where brought up to speed with respect to the planned logistics of the well.

By involving the key players, drilling contractor representative and representatives from the service companies on the Equipment list and personnel movement plans, a common understanding of the execution of the logistics for the well was reached.

3.2 Supply base(s)

The Skarv 4 location is about 130 nm west of Sandnessjøen. Helgelandsbase at Sandnessjøen was therefore used as forward supply base to ship materials and equipment to the offshore location.

The service and support executed by Helgelandsbase personnel have once again been on the upper class level. This understanding is well supported by BP, both onshore and offshore.

3.3 Helicopter

Personnel movements were done from Brønnøysund heliport.

Four flights a week were scheduled.

The flying operation from Brønnøysund was just to a minor extent affected by the helicopter-pilot strike; and therefore did not have any impact on the operation.

Once again, very good support from the Helicopterservice personnel in Brønnøysund.

3.4 Charter / Fixed wing

A scheduled fixed wing was not planned for this well. However, due to the winter season and a few unplanned events; a charter plane had to be mobilized.

It was a known fact that we would make use of a charter to bring people from south to the north (Brønnøysund) on an ad-hoc basis. This was mainly done during Christmas time, New Year, during the test phase and during the demobilizing phase. It is proven

	SKARV 4 – 6507/5-5 COMPLETION REPORT		Page: 43 of 202
Chapter: 3	LOGISTICS & PROCUREMENT	Date: 03/05/02	Rev: 0

that making use of charter plane, fully booked and avoid overnight stay, is commercially beneficial.

3.5 Supply Vessel / Stand-by Vessel / Anchor Handling Vessel

Scandi Stolmen, supported the West Alpha operation as supply vessel; plus initially one additional operation, Norne skipet. This sharing agreement with Statoil has been regarded as a great success, especially from a commercial point of view, and was very well managed by the Helgelands base representative in Sandnessjøen.

However, and based on previous operation on Skarv, an additional supply vessel was hired in to support the start-up phase of the well. This worked fine; however, there is a tendency to keep the vessel on contract longer than originally planned. The main reason for keeping this vessel longer on contract was due to winter time drilling (bad weather; ensure to make use of weather window).

Stril Herkules was selected to support the operation as stand-by vessel.

Two Anchor Handling Vessels (AHV), were hired for anchoring up and picking up anchors. Good vessels and well done job.

3.6 Broker

Seabrokers were used as Broker in connection with providing supply vessel, stand-by vessel and one AHV for the Skarv 4 Project.

3.7 Group Loadings

Group Loadings were generated based on inputs from the Master Equipment List (MEL). Service companies were required to ensure that equipment, materials and bulk requirements were addressed on the MEL.

Worthwhile to mention is that the normal 7 days lead-time was reduced to 6 days, with respect to material deliveries to the Supply Base. High value rental items were monitored very closely, with a lead-time of approximately 4 days.

3.8 Scheduler

The scheduler has been a good support to the logistics operation, and 'The Schedule' proved again to be a very good tool for planning the logistics.

	SKARV 4 – 6507/5-5 COMPLETION REPORT		Page: 44 of 202
Chapter: 3	LOGISTICS & PROCUREMENT	Date: 03/05/02	Rev: 0

3.9 Contract strategy

Contract Strategy document was issued and agreed at an early stage of the project. Most services, have been provided from existing contracts within BP.

3.10 Procurement

Services have been provided from existing contracts. For all commitments made under the Skarv 4 Project, Orders have been issued.

For cost control purposes, separate orders were issued to cover for planning cost.

Commitments orders were issued to all service companies (incl. rig contractor) for the execution of the well.

	SKARV 4 – 6507/5-5 COMPLETION REPORT		Page: 45 of 202
Chapter: 4	SAFETY AND ENVIRONMENT	Date: 03/05/02	Rev: 0

4 SAFETY AND ENVIRONMENT

4.1 HSE

Application for Consent (AFC) preparation work and the Rig Intake process was carried out without any significant problems. Due to the fact that the rig was applying for SUT, we refer to the non-con. list in the Smedvig SUT application in our application for consent. This was not accepted by NPD and a separate non-con. list was submitted.

Training was carried out for BP and Smedvig supervisors, in the content of the Bridging Document and the ASA-audit technique.

The Project HSE Targets were;

1. Zero Personal Injuries (DAFWC-RWI-MTI)
2. Zero Spills
3. Zero Serious Incidents (High potential incidents)
4. Zero Dropped Objects

In order to achieve the above targets, the following activities were agreed to be focus areas;

- Perform SJA before each and every critical job
- Take Time-out-for-Safety as and when needed
- Active use of the “Fair Play Campaign”
- Ensure full induction of everybody arriving the rig
- Perform Advanced Safety Audits (ASA) Target: 7 pr. Week
- Run Joint “Dropped Object Program”

All targets were meet, much due to the close cooperation between BP and Smedvig management which put much emphasize on “walk the talk. Smedvig safety officers onboard the rig contributed very positively to the high level of safety performance. A more detailed list of responsibility for the various safety actions can be seen in section 4.2.

	SKARV 4 – 6507/5-5 COMPLETION REPORT	Page: 46 of 202
Chapter: 4	SAFETY AND ENVIRONMENT	Date: 03/05/02 Rev: 0

Learning:

Separate non-con. list must be submitted together with the Application for consent.

BP procedure “HSE management in drilling operation involving mobile drilling units” needs reviewing.

When WA came on contract BP had a poor HSE statistics. The WA crew felt that there were too much focus on the poor BP statistics rather than on WA`s very good Statistic.

West Alpha`s HSE performance has been very good over a long period of time. The Skarv 4 well was the 3`rd BP well drilled under the present contract. The statistics for all the 3 wells were as follows: 0 LTA's, 0 Medical Treatments and 0 Spills.

ENVIRONMENT:

The drilling operation was completed without any spills or other environmentally unacceptable events. The Environmental Emission Report came in from the rig on request and contained all data required.

4.2 HSE Action List:

Item	Action	Responsible	Deadline
1	Review status of safety training (ASA, TBRA, Incident Investigation, STOP) for all BP supervisors	PL	ASAP
2	Arrange ASA refresher for leaders down to driller / crane operator level	SL/KEJ	ASAP
3	Hold Management Meeting with BP, Smedvig and 3. party contractors. The aim is to clarify BP`s expectations to HSE and agree how we all can contribute. A Smedvig safety delegate from West Alpha to be present.	SB	15.11.
4	All BP drilling supervisors and BP representatives shall have their Personal Safety Performance Contract (PSPC) in place prior to operation start up.	SB	Before Operation Start.
5	All helicopter flights will have a HSE briefing upon arrival at the rig. Focus on stating BP`s safety expectations (zero tolerance) and standards (the 8 Golden Rules of Safety).	BP drilling Supervisor	During operation
6	Anchor handling meeting between BP,	SB	Before

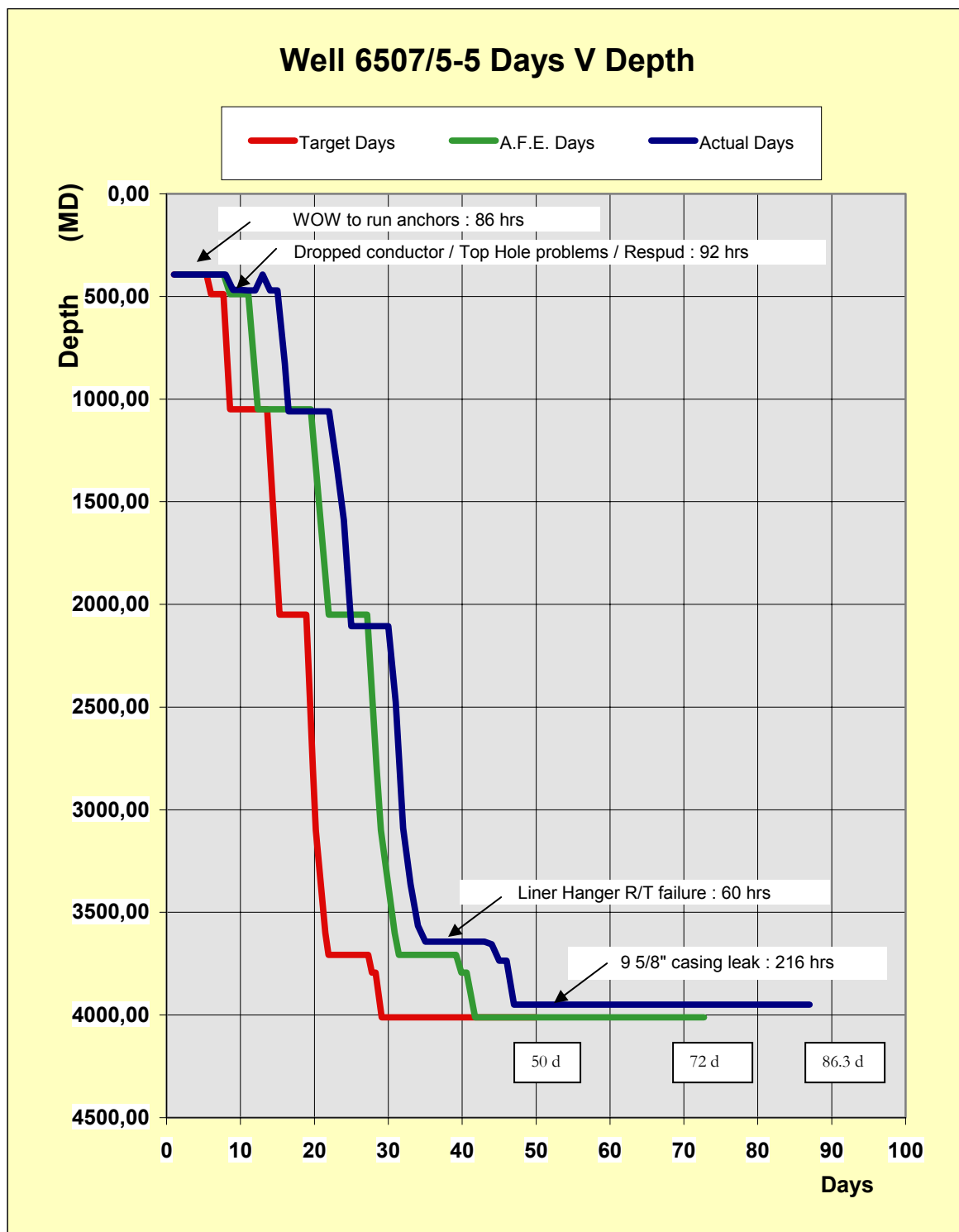


Item	Action	Responsible	Deadline
	Smedvig and boat crews		anchor-handling
7	Establish weekly onshore HSE meeting with BP and Smedvig	SB	Before operation starts
8	Ensure effective process for Dropped Object System is implemented.	KEJ	Before operation starts
9	All supervisors and reps. to present their PSPC to crews in safety meetings	BP supervisors	1. offshore tour
10	W.A. safety engineer to meet with BP supervisors to explain safety systems in use onboard and agree how BP can contribute to make systems work even better.	Smedvig safety engineers / BP supervisors	1. offshore tour
11	Management rig visit.	SB	Shortly after spud
12	Drilling Supervisors shall hold a meeting with all new personnel onboard (ref. item 5).	BP supervisors	Duration of operation
13	Weekly safety theme with R&R. Spill protection and lifting operations to be focused prior to starting to use OBM. 8 Golden Rules of Safety to be integrated into this process.	Drilling supervisors	During operation
14	Time Out For Safety (TOFS) / Toolbox talk to be documented in the DDR.	BP drilling Supervisors	During operation

	SKARV 4 – 6507/5-5 COMPLETION REPORT	Page: 48 of 202
Chapter: 5	PERFORMANCE REVIEW	Date: 03/05/02 Rev: 0

5 PERFORMANCE REVIEW

5.1 Time Depth Graph



	SKARV 4 – 6507/5-5 COMPLETION REPORT	Page: 49 of 202
Chapter: 5	PERFORMANCE REVIEW	Date: 03/05/02 Rev: 0

5.2 Daily Drilling Summary

DAILY DRILLING SUMMARY LOG

- Skarv 4

DATE	OPERATION	DEPTH	PHASE	TIME BREAKDOWN (hrs)			TOTAL
				Productive	NPT		
20.Nov.01	West Alpha on contract at 04:00 hours when rig on tight tow to Skarv 4 location (6507/5-5)	0	Tow Rig	20	0		20,00
21.Nov.01	Rig on tow to Skarv 4 location (6507/5-5) Norway, @ 24:00 hr, distance gone 238 NM.	0	Tow Rig	24	0		24,00
22.Nov.01	Rig on tow to Skarv 4 location (6507/5-5) Norway, WOW, @ 24:00 hr, distance gone 270 NM.	0	Tow Rig	2	22		24,00
23.Nov.01	Rig on tow to Skarv 4 location (6507/5-5) Norway, @ 24:00 hr, distance gone 374 NM.	0	Tow Rig	24	0		24,00
24.Nov.01	Rig on tow to Skarv 4 location (6507/5-5) Norway, Arrive location at 10:00 hrs. WOW	0	Tow Rig	10	14		24,00
25.Nov.01	WOW prior to anchor handling.	0	Anchor Rig	0	24		24,00
26.Nov.01	WOW. Started anchor handling at 19:30 hrs.	0	Anchor Rig	4,5	19,5		24,00
27.Nov.01	Completed anchor handling. Pre-tension anchors. Mixed spud mud and kill mud.	0	36" Hole	20	4		24,00
28.Nov.01	Drilled 36" hole from 393- 468m	468	36" Hole	24	0		24,00
29.Nov.01	POOH, Waited on weather. Ran 30" conductor.	468	36" Conductor	17,5	6,5		24,00
30.Nov.01	POOH with 30" conductor. Clean-out trip- Drilled 3m new formations. POOH. Dropped 30" conductor.	471	36" Conductor	7	17		24,00
01.Dec.01	Fished 30" casing. POOH and lay down same. Clean-out trip. Ran new 30" conductor	471	36" Conductor	0	24		24,00
02.Dec.01	Attempted to stab in 30 " conductor. No go. POOH with conductor. RIH with 36" hole opener.	393	36" Conductor	0	24		24,00
03.Dec.01	RE-spudded well and drilled 36" hole to 471m. POOH.	471	36" Hole	0	24		24,00
04.Dec.01	Ran 30" conductor and cemented same. Made up 36" BHA.	471	36" Conductor	20,5	3,5		24,00
05.Dec.01	Drilled 26" hole to 828m.	828	26" Hole	23,5	0,5		24,00
06.Dec.01	Drilled 26" hole to 1060m	1060	26" Hole	20,5	3,5		24,00
07.Dec.01	RIH with 20" casing and cemented same.	1060	20" Casing	23,75	0,25		24,00
08.Dec.01	Laid down 26" BHA and made up 17 ½" BHA. WOW.	1060	20" Casing	15,5	8,5		24,00
09.Dec.01	Picked up 5 ½" drill pipe. Moved BOP to moon pool and started to run same	1060	Run BOP	23	1		24,00
10.Dec.01	Ran BOPs and marine riser.	1060	Run BOP	24	0		24,00
11.Dec.01	Landed BOP, pressure tested connector. RIH with 17 ½" BHA	1060	Run BOP	24	0		24,00
12.Dec.01	Performed leak-off test to 1.56 sg. Drilled 17 ½" hole from 1060- 1311m.	1311	17 1/2" Hole	22	2		24,00

	SKARV 4 – 6507/5-5 COMPLETION REPORT	Page: 50 of 202
Chapter: 5	PERFORMANCE REVIEW	Date: 03/05/02 Rev: 0

DATE	OPERATION	DEPTH	PHASE	TIME BREAKDOWN (hrs)			TOTAL
				Productive	NPT		
13.Dec.01	Drilled from 1311m- 1590m. POOH due to electronic failure.	1590	17 1/2" Hole	13,5	10,5		24,00
14.Dec.01	RIH with BHA and drilled 17 1/2" hole from 1590- 2039m	2039	17 1/2" Hole	20	4		24,00
15.Dec.01	Drilling 17 1/2" hole to 2106m. Did wipertrip. POOH to run 13 3/8" casing.	2106	17 1/2" Hole	24	0		24,00
16.Dec.01	POOH, pulled wear bushing. Rigged up and commenced running 13 3/8" casing.	2106	13 3/8" Casing	24	0		24,00
17.Dec.01	Ran and cemented 13 3/8" casing. Set seal assembly and pressure tested casing.	2106	13 3/8" Casing	21	3		24,00
18.Dec.01	Laid down 17 1/2" BHA, Picked up 12 1/4" BHA. Repaired clutch on drawworks.	2106	12 1/4" Hole	19,5	4,5		24,00
19.Dec.01	Picked up 5 1/2" DP. Displaced hole to Oil Based Mud.	2160	12 1/4" Hole	22,5	1,5		24,00
20.Dec.01	Drilled shoe track. Performed leak-off test to 1.90 sg. Drilled new hole to 2476m.	2476	12 1/4" Hole	24	0		24,00
21.Dec.01	Drilled 12 1/4" hole from 2476- 3090m.	3090	12 1/4" Hole	23,5	0,5		24,00
22.Dec.01	Drilled 12 1/4" to 3363m.	3363	12 1/4" Hole	24	0		24,00
23.Dec.01	Drilled 12 1/4" hole from 3363- 3565m.	3563	12 1/4" Hole	24	0		24,00
24.Dec.01	Drilled 12 1/4" to 3643m. Backreamed out of hole to 2702m.	3643	12 1/4" Hole	24	0		24,00
25.Dec.01	Backreamed out of hole to 2788m. RIH and circulated bottoms up.	3643	12 1/4" Hole	24	0		24,00
26.Dec.01	Logged hole. Rigged up 9 5/8" running tools and started to run 9 5/8" liner	3643	12 1/4" Hole	21,5	2,5		24,00
27.Dec.01	Ran 9 5/8" liner.	3643	9 5/8" Liner	22	2		24,00
28.Dec.01	Cemented liner. Set TSP packer. Circulated out cement.	3643	9 5/8" Liner	14	10		24,00
29.Dec.01	POOH with liner running tool. Tested BOP.	3643	9 5/8" Liner	17	7		24,00
30.Dec.01	RIH with 8 1/2" BHA. Drilled out plugs and shoe. POOH.	3643	9 5/8" Liner	1	23		24,00
31.Dec.01	Ran cement stinger and squeeze cemented liner shoe.	3643	9 5/8" Liner	0	24		24,00
01.Jan.02	Laid down 12 1/4" BHA. Tested casing. Made up 8 1/2" BHA and RIH.	3643	9 5/8" Liner	20	4		24,00
02.Jan.02	Displaced well to water based mud. Drilled to core point. POOH.	3655	8 1/2" Hole	23	1		24,00
03.Jan.02	Made up core assembly and RIH. Cut 81m core. POOH.	3736	8 1/2" Hole	24	0		24,00
04.Jan.02	Continued POOH. Laid down core. RIH with 8 1/2" BHA.	3736	8 1/2" Hole	24	0		24,00
05.Jan.02	Drilled 8 1/2" hole to well TD at 3950m.	3950	8 1/2" Hole	24	0		24,00
06.Jan.02	Continued POOH. Rigged up and ran wireline logs.	3950	8 1/2" Hole	24	0		24,00
07.Jan.02	Continued to run wireline logs, MDT/GR.	3950	8 1/2" Hole	17	7		24,00
08.Jan.02	Continued to run wireline logs, MDT/GR and ZO-VSP/GR	3950	8 1/2" Hole	22	2		24,00
09.Jan.02	Continued running ZO-VSP/GR log. Ran 7" liner.	3950	7" Liner	17,5	6,5		24,00
10.Jan.02	Continued running liner. Hung off due to bad weather.	3950	7" Liner	3	21		24,00
11.Jan.02	Waited on weather. Continued to run 7" liner.	3950	7" Liner	0	24		24,00
12.Jan.02	Continued to run 7" liner. Cemented same. POOH with running string.	3950	7" Liner	24	0		24,00
13.Jan.02	Ran liner clean-out string. Displaced to 1.2 sg brine.	3950	7" Liner	22	2		24,00



DATE	OPERATION	DEPTH	PHASE	TIME BREAKDOWN (hrs)			TOTAL
				Productive	NPT		
14.Jan.02	POOH. Failed casing pressure test. Well flowed 0.8 m ³ . Shut in pressure 54 bars.	3950	Well Control	11,25	12,75		24,00
15.Jan.02	Lubricated well. RIH with drillpipe into well. Monitored well.	3950	Well Control	0	24		24,00
16.Jan.02	Commenced killing well with 1.50 sg brine.	3950	Well Control	0	24		24,00
17.Jan.02	Killed well and circulated additional bottoms up.	3950	Well Control	0	24		24,00
18.Jan.02	POOH with 5 ½" DP. Made up and RIH with RTTS packer to locate leak point.	3950	Well Control	0	24		24,00
19.Jan.02	POOH with RTTS and RIH with 13 3/8" casing scraper.	3950	Well Control	0	24		24,00
20.Jan.02	POOH with scraper and RIH with 7" scab liner to seal off leak.	3950	Well Control	0	24		24,00
21.Jan.02	RIH and set 7" scab liner. Pressure tested same. POOH. Tested BOP.	3950	Well Control	7	17		24,00
22.Jan.02	Tested surface equipment and RIH with clean-out string. Displaced well to 1.2 sg brine.	3950	Well Control	3	21		24,00
23.Jan.02	Pulled out of hole with 3 ½" clean-out string.	3950	Well Control	3	21		24,00
24.Jan.02	Start running in DST test string.	3950	DST test	23	1		24,00
25.Jan.02	Continued RIH with DST string.	3950	DST test	21,5	2,5		24,00
26.Jan.02	Correlated depth with wireline. Made up hanger and Sen tree assembly.	3950	DST test	21	3		24,00
27.Jan.02	RIH with 4 ½" landing string. Made up surface tree and set packer.	3950	DST test	19,25	4,75		24,00
28.Jan.02	Tested surface equipment. Perforated and flowed well.	3950	DST test	24	0		24,00
29.Jan.02	Performed first build up and main flow period.	3950	DST test	24	0		24,00
30.Jan.02	Performed main build-up period.	3950	DST test	24	0		24,00
31.Jan.02	Killed well and circulated hole clean.	3950	DST test	18,25	5,75		24,00
01.Feb.02	Pulled out of hole with test string. Function tested BOP.	3950	DST test	24	0		24,00
02.Feb.02	POOH with DST BHA. RIH with cement retainer. Laid down drillpipe.	3950	DST test	24	0		24,00
03.Feb.02	Laid down drillpipe while waiting on weather.	3950	P&A	24	0		24,00
04.Feb.02	Placed cement plug on top of retainer. Pressure tested. POOH and laid down tubing.	3950	P&A	22	2		24,00
05.Feb.02	Set EZSV at 2018m. Set cement plug from 2018- 1932m. Pressure tested. Laid down drillpipe.	3950	P&A	22	2		24,00
06.Feb.02	Pulled out of hole. Set EZSV at 639m. RIH with 13 3/8" casing cutter.	3950	P&A	16,5	7,5		24,00
07.Feb.02	Cut and pulled 13 3/8" casing. Set cement plug from 633- 425m. POOH and laid down pipe.	3950	P&A	21,75	2,25		24,00
08.Feb.02	Tested cement plug. Started to pull BOP.	3950	P&A	23	1		24,00
09.Feb.02	Pulled BOP	3950	P&A	24	0		24,00
10.Feb.02	Cut 20" and 30" casings and pulled wellhead and PGB. Pulled anchors and commenced tow.		P&A	24	0		24,00
11.Feb.02	Under tow from Skarv 4 location to Haugesund.		Move	24	0		24,00
12.Feb.02	Under tow from Skarv 4 location to Haugesund.		Move	24	0		24,00
13.Feb.02	Under tow from Skarv 4 location to Haugesund.		Move	24	0		24,00

	SKARV 4 – 6507/5-5 COMPLETION REPORT		Page: 52 of 202
Chapter: 5	PERFORMANCE REVIEW	Date: 03/05/02	Rev: 0

DATE	OPERATION	DEPTH	PHASE	TIME BREAKDOWN (hrs)			TOTAL
				Productive	NPT		
14.Feb.02	Moved from waiting point outside Haugesund and moored up at ABB yard in Haugesund. End of Skarv 4 operations 14.02.2002 at 12:00 hrs.		Move	12	0		12,00
			SUM (hrs)	1466,25	605,75		2072,00
			SUM (days)	61,09	25,24		86,33

	SKARV 4 – 6507/5-5 COMPLETION REPORT	Page: 53 of 202
Chapter: 5	PERFORMANCE REVIEW	Date: 03/05/02 Rev: 0

5.3 Execution Plans

EXECUTION PLAN									
Skarv 4 (6507/5-5)									
28.02.02 08:28									
Used hrs = Hours used in To /From Calculations and estimates.									
EXE hrs = Execution Plan Hours (Critical path time), final modifications.									
Mod. Plan = Rigsite estimations for Plan Hours (EXE hrs) or modifications to plan									
REF	OPERATION	USED Hrs	EXE Hrs	Mod. Plan	From - To				
1	Mobilise rig				20-nov	04:00	-	20-nov	04:00
2	Tow rig				20-nov	04:00	-	20-nov	04:00
3	Tow Rig				20-nov	04:00	-	20-nov	04:00
4	Rig in transit	159,50	96,00		20-nov	04:00	-	26-nov	19:30
5	Anchor Rig				26-nov	19:30	-	26-nov	19:30
6	Anchor Rig				26-nov	19:30	-	26-nov	19:30
7	Run 1st set of anchors	2,50	4,00		26-nov	19:30	-	26-nov	22:00
8	Run 2nd set of anchors	1,50	4,00		26-nov	22:00	-	26-nov	23:30
9	Run 3rd set of anchors	1,50	4,00		26-nov	23:30	-	27-nov	01:00
10	Run 4th set of anchors	2,00	4,00		27-nov	01:00	-	27-nov	03:00
11	Ballast down and pre-tension	2,00	6,00		27-nov	03:00	-	27-nov	05:00
12	Final tension test of anchors	3,00	2,00		27-nov	05:00	-	27-nov	08:00
13	Verify Rig Position	0,00	0,25		27-nov	08:00	-	27-nov	08:00
14	Install 30" Conductor TD 489 m BRT				27-nov	08:00	-	27-nov	08:00
15	Install 30in Conductor				27-nov	08:00	-	27-nov	08:00
16	Conductor Preparation				27-nov	08:00	-	27-nov	08:00
17	M/U 30" Running tool below stand of 5 1/2" DP, stand back	0,00	0,00		27-nov	08:00	-	27-nov	08:00
18	M/U cementing stand with pump in sub, kelly cock, pup jt, kelly cock	0,00	0,00		27-nov	08:00	-	27-nov	08:00
19	Mix spud mud and kill mud.	11,00	0,00		27-nov	08:00	-	27-nov	19:00
20		0,00	0,00		27-nov	19:00	-	27-nov	19:00
21	Perform ROV survey and bring down 2 marker buoys	0,00	0,00		27-nov	19:00	-	27-nov	19:00
22	Drill 36" hole to 489 m BRT (8 joints conductor)				27-nov	19:00	-	27-nov	19:00
23	BHA #1				27-nov	19:00	-	27-nov	19:00
24	PU 1000m of 5 1/2" DP	0,00	0,00		27-nov	19:00	-	27-nov	19:00
25	PU 9 1/2" DC	0,00	3,00		27-nov	19:00	-	27-nov	19:00
26	M/U 36" BHA #1	0,00	3,00		27-nov	19:00	-	27-nov	19:00
27	RIH to seabed. ROV set # 3 marker buoy.	1,00	1,00		27-nov	19:00	-	27-nov	20:00
28	Tag seabed and re-set marker buoys	0,00	1,75		27-nov	20:00	-	27-nov	20:00
29	Rig repair. Bulk barite tank plugged off.	5,00	0,00		27-nov	20:00	-	28-nov	01:00
30	Drill 36" hole from 393 to 467 m BRT	20,00	13,50		28-nov	01:00	-	28-nov	21:00
31	Displace hole to Hi-Vis mud 1.2 SG	1,00	0,50		28-nov	21:00	-	28-nov	22:00
32	POOH. Do a check trip in 36" hole (top up well as POOH)	4,00	1,50		28-nov	22:00	-	29-nov	02:00
33	Rack back BHA. Load TITUS dart in cmt std.(1/2 hrs)	3,00	2,50		29-nov	02:00	-	29-nov	05:00
34	Make Up and run 30" Conductor				29-nov	05:00	-	29-nov	05:00
35	Hold safety meeting	0,50	0,50		29-nov	05:00	-	29-nov	05:30
36	Skid PGB Under Rotary Table	0,25	0,25		29-nov	05:30	-	29-nov	05:45
37	Attach the guidelines to the guideposts	0,00	0,00		29-nov	05:45	-	29-nov	05:45
38	Install 30" bowl and slips & elevators	0,50	0,50		29-nov	05:45	-	29-nov	06:15
39	Pick up 30" shoe jt, check for debris, circ float shoe.	2,75	0,50		29-nov	06:15	-	29-nov	09:00
40	Fill with seawater and check for flow	0,50	0,50		29-nov	09:00	-	29-nov	09:30
41	WOW. 65 knot winds. 10 m sea ht.	6,50	0,00		29-nov	09:30	-	29-nov	16:00
42	M/U conductor as per pipe tally filling each joint w/seawater to purge air	2,00	2,50		29-nov	16:00	-	29-nov	18:00
43	M/U 30" RT. Lock 30" housing into PGB. B/O and rack back 30" RT.	2,50	0,25		29-nov	18:00	-	29-nov	20:30
44	M/U cement stinger (66.5 m DP), re-run RT, M/U to 30" housing.	1,00	0,75		29-nov	20:30	-	29-nov	21:30
45	Lift PGB off trolley. Install TITUS hose and guidelines.	1,50	0,50		29-nov	21:30	-	29-nov	23:00
46	Run landing string to position shoe above seabed. Use ROV to check bulls eye and close fill up valve on 30" RT.	1,50	0,50		29-nov	23:00	-	30-nov	00:30
47	Reposition rig to ROV sonar. No visibility on sea bed. Stab 30" casing blind.	2,50	1,00		30-nov	00:30	-	30-nov	03:00
48	RIH to 464 m. 6 fill.	2,50	1,00		30-nov	03:00	-	30-nov	05:30
49	Circ csg with 5000 LPM. Slack off 25 MT. Pump hi vis sweeps.	2,00	0,00		30-nov	05:30	-	30-nov	07:30
50	Re-set marker buoys. POOH. Park 30" csg on trolley.	3,50	0,00		30-nov	07:30	-	30-nov	11:00
51	RIH 36" BHA. Stab into seabed. Clean out fill. Drill 36" to 471 m. Pump hi vis. Wiper trip. Disp 1.6 SG mud. POOH.	10,00	0,00		30-nov	11:00	-	30-nov	21:00
52	30" casing dropped out of PGB to sea bed. Fish same.	10,00	0,00		30-nov	21:00	-	01-des	07:00
53	Lay out 30" string	2,00	0,00		01-des	07:00	-	01-des	09:00
54	Perform cleanout trip. Tag fill at 472 m. Disp 1.6 SG. POOH.	6,25	0,00		01-des	09:00	-	01-des	15:15
55	Run new 30" conductor	3,50	0,00		01-des	15:15	-	01-des	18:45
56	Run cmt stinger. MU 30" RT. Latch PGB. Fill 30" csg. RIH. No stab.	16,75	0,00		01-des	18:45	-	02-des	11:30
57	POOH w/csg.	7,50	0,00		02-des	11:30	-	02-des	19:00

Chapter:
5

PERFORMANCE REVIEW

Date:
03/05/02Rev:
0

REF	.OPERATION		USED	EXE	Mod.	From - To			
			Hrs	Hrs	Plan				
58		RIH and drill new 36" hole.	27,50	0,00		02-des	19:00	-	03-des 22:30
59		RIH w/30" csg.	6,00	0,00		03-des	22:30	-	04-des 04:30
60			0,00	0,00		04-des	04:30	-	04-des 04:30
61	Cement conductor					04-des	04:30	-	04-des 04:30
62		Circulate casing contents	0,50	1,00		04-des	04:30	-	04-des 05:00
63		Recheck PGB orientation, elevation and bullseyes	0,00	0,50		04-des	05:00	-	04-des 05:00
64		Pump and displace cmt.	1,50	2,00		04-des	05:00	-	04-des 06:30
65		Activate TITUS system	0,00	1,00		04-des	06:30	-	04-des 06:30
66		WOC in tension	6,25	3,00		04-des	06:30	-	04-des 12:45
67		Perform top up cement job through TITUS (100 bbls)	0,00	1,50		04-des	12:45	-	04-des 12:45
68		Displace cement with seawater.	0,00	0,50		04-des	12:45	-	04-des 12:45
69		Recheck bullseyes. ROV in position to observe release of RT.	0,75	0,75		04-des	12:45	-	04-des 13:30
70		Release R/T	0,50	0,50		04-des	13:30	-	04-des 14:00
71		POOH L/string. L/D RT and cement stinger.	0,75	1,50		04-des	14:00	-	04-des 14:45
72		L/D running tool and cement stinger	0,75	0,75		04-des	14:45	-	04-des 15:30
73	Install 20" casing TD 1050 m BRT					04-des	15:30	-	04-des 15:30
74	Drill 26" hole					04-des	15:30	-	04-des 15:30
75	Preparation for 20" Casing					04-des	15:30	-	04-des 15:30
76		M/U preloaded remote controlled cement stand, and rack in derrick	1,00	1,00		04-des	15:30	-	04-des 16:30
77		Pick up the premade 18 3/4" housing assembly and rack in derrick	1,50	1,00		04-des	16:30	-	04-des 18:00
78	Clean out 30" shoe					04-des	18:00	-	04-des 18:00
79		L/D 36" BHA	2,00	2,00		04-des	18:00	-	04-des 20:00
80		M/U 26" BHA.	2,50	2,00		04-des	20:00	-	04-des 22:30
81		RIH	2,50	2,00		04-des	22:30	-	05-des 01:00
82		Drill out 5m cement and 30" Conductor shoe	3,00	3,00		05-des	01:00	-	05-des 04:00
83	Drill 26" hole					05-des	04:00	-	05-des 04:00
84		Drill 26" hole to 1050 m	31,75	21,00		05-des	04:00	-	06-des 11:45
85		Sweep Hole clean	1,00	1,00		06-des	11:45	-	06-des 12:45
86		Displace 1.20 SG hi-vis mud to 30" Housing	1,25	1,50		06-des	12:45	-	06-des 14:00
87		Torque wrench and stand lift problems	1,00	0,00		06-des	14:00	-	06-des 15:00
88		POOH to 455 m	3,00	0,00		06-des	15:00	-	06-des 18:00
89		L/D torque wrench and break drilling pup	2,50	0,00		06-des	18:00	-	06-des 20:30
90		POOH drillstring	1,00	3,00		06-des	20:30	-	06-des 21:30
91		Rack back BHA. Download MWD memory in rotary.	1,00	2,00		06-des	21:30	-	06-des 22:30
92		Break out bit	0,00	0,25		06-des	22:30	-	06-des 22:30
93	Install 20" casing					06-des	22:30	-	06-des 22:30
94	Run 20" casing					06-des	22:30	-	06-des 22:30
95		Hold Safety and SJA Meeting.	0,50	0,50		06-des	22:30	-	06-des 23:00
96		Install 20" remote controlled slips & BX elevator & Weatherford tong	0,75	1,50		06-des	23:00	-	06-des 23:45
97		M/U shoe track, check float, attach guide ropes.	1,50	1,50		06-des	23:45	-	07-des 01:15
98		RIH 20" casing to 5m above 30" Housing	3,75	4,50		07-des	01:15	-	07-des 05:00
99		Stab 20" csg into 30" Casing Head Housing	0,50	0,50		07-des	05:00	-	07-des 05:30
100		RIH 20" casing from 393m to 645m,	6,75	3,00		07-des	05:30	-	07-des 12:15
101		P/U 18 3/4 wellhead	1,00	1,00		07-des	12:15	-	07-des 13:15
102		R/D casing running equipment & change BX frame III to frame I	1,00	1,00		07-des	13:15	-	07-des 14:15
103		RIH with L/string	1,00	1,00		07-des	14:15	-	07-des 15:15
104		Wash down cement stand to TD	0,50	0,50		07-des	15:15	-	07-des 15:45
105		Land casing - overpull to confirm engaged	0,50	0,50		07-des	15:45	-	07-des 16:15
106		Observe the bulls eye inclination.	0,00	0,00		07-des	16:15	-	07-des 16:15
107	Cement 20" casing					07-des	16:15	-	07-des 16:15
108		Hold Safety Meeting.	0,25	0,25		07-des	16:15	-	07-des 16:30
109		RU and pressure test surface lines	0,75	0,50		07-des	16:30	-	07-des 17:15
110		Circulate casing contents	0,75	0,75		07-des	17:15	-	07-des 18:00
111		Pump SW, lead (xxxxbbls) and tail (xxxxbbls) at 6bpm	4,25	4,00		07-des	18:00	-	07-des 22:15
112		Drop dart, Shear plug, rig Pumps displace slurry, bump plug	1,00	1,00		07-des	22:15	-	07-des 23:15
113		Pressure test casing on bump to 1600 psi	0,50	0,50		07-des	23:15	-	07-des 23:45
114		Release running tool, jet wellhead and clean PGB	0,75	0,50		07-des	23:45	-	08-des 00:30
115		POOH landing string	1,50	1,00		08-des	00:30	-	08-des 02:00
116		L/D 18 3/4" Runningtool	1,00	1,00		08-des	02:00	-	08-des 03:00
117		L/D subsea cement head	1,00	1,00		08-des	03:00	-	08-des 04:00
118	Install BOP					08-des	04:00	-	08-des 04:00
119	Rig up to run riser and BOP					08-des	04:00	-	08-des 04:00
120		L/D 26" BHA, P/U 17 1/2" BHA and P/U DP while WOW.	30,00	0,00		08-des	04:00	-	09-des 10:00
121		Perform SJA. Install 500 T bails and elevator	1,50	1,00		09-des	10:00	-	09-des 11:30
122		L/D mouse hole, master and outdoor bushings, post in V-door	0,50	0,50		09-des	11:30	-	09-des 12:00
123		Install rotary-lifting gear, lay down master and other bushings	1,00	1,00		09-des	12:00	-	09-des 13:00
124		Remove rails for Iron roughneck, disconn rotary-gear and hoses	2,00	2,00		09-des	13:00	-	09-des 15:00
125		Install riser spider, conn hoses, open hydr valves under drill house	0,50	0,50		09-des	15:00	-	09-des 15:30
126		Open rotary lock pins, open Drillfloor hatch and install guide beams	1,00	1,00		09-des	15:30	-	09-des 16:30
127		Disconnect flowline and fill up line	0,00	0,00		09-des	16:30	-	09-des 16:30
128		Retract guideline telescopes, P/U Guideline 1 & 2 into tracks	0,50	0,50		09-des	16:30	-	09-des 17:00
129		Prepare tools and air hoses	0,50	0,50		09-des	17:00	-	09-des 17:30
130		P/U 20" marine riser P/Up jnt and set in riser spider w/K/C -lines	0,50	0,50		09-des	17:30	-	09-des 18:00
131		Open Drill floor in V-Door and set lock pins	0,50	0,50		09-des	18:00	-	09-des 18:30



REF	.OPERATION	USED	EXE	Mod.	From - To			
		Hrs	Hrs	Plan				
132	Swing out catwalk beams, standlift in transverse position	0,50	0,50		09-des	18:30	-	09-des 19:00
133	Run BOP				09-des	19:00	-	09-des 19:00
134	P/U rotary and riser P/Up to allow BOP to be transported to centre	0,25	0,25		09-des	19:00	-	09-des 19:15
135	Perform TOFS. Move BOP to centre and close Drillfloor	1,25	1,00		09-des	19:15	-	09-des 20:30
136	Secure catwalk beams, install marine riser adapter on catwalk machine	0,00	0,00		09-des	20:30	-	09-des 20:30
137	Install second BOP guide, stab marine riser P/U joint on BOP	1,00	1,00		09-des	20:30	-	09-des 21:30
138	P/U pup joint, rotary and BOP - remove transporter	0,50	1,00		09-des	21:30	-	09-des 22:00
139	Release Guidelines no. 1 & 2 from tracks and land BOP on beams	0,50	0,50		09-des	22:00	-	09-des 22:30
140	Install pod hoses, guidelines etc	1,25	2,50		09-des	22:30	-	09-des 23:45
141	Retract BOP second guide, P/U BOP and retract support beams	0,50	0,50		09-des	23:45	-	10-des 00:15
142	Move BOP guide into position, primary guide	0,00	0,00		10-des	00:15	-	10-des 00:15
143	Land rotary on drillfloor and set lock pins	0,50	0,50		10-des	00:15	-	10-des 00:45
144	Remove lift gir for rotary and guide beams	0,50	1,00		10-des	00:45	-	10-des 01:15
145	Close drillfloor	0,50	0,50		10-des	01:15	-	10-des 01:45
146	Pressure test BOP x 20ft pup joint connection	1,00	1,00		10-des	01:45	-	10-des 02:45
147	Run marine riser as per program, install pod clamps every 25ft.	18,75	14,00		10-des	02:45	-	10-des 21:30
148	Land & Test BOP (part1)				10-des	21:30	-	10-des 21:30
149	P/U slip joint and M/U same to last riser joint	1,00	1,00		10-des	21:30	-	10-des 22:30
150	Land slip joint in spider on flange and disconnect lift sub	0,50	0,50		10-des	22:30	-	10-des 23:00
151	P/U diverter and M/U this on slip joint inner barrel	0,00	1,50		10-des	23:00	-	10-des 23:00
152	P/U and stroke out slip joint, P/U all weight and record same	0,50	1,00		10-des	23:00	-	10-des 23:30
153	Lower down to sufficient height to install HP hoses	0,50	0,50		10-des	23:30	-	11-des 00:00
154	Dress Slip Jnt				11-des	00:00	-	11-des 00:00
155	Hook up the deck tugger as a double line	0,50	0,50		11-des	00:00	-	11-des 00:30
156	Centre manifold using side tuggers on cellar deck	0,50	1,00		11-des	00:30	-	11-des 01:00
157	Pull on all three tuggers to lift manifold into the receptacles	0,50	2,00		11-des	01:00	-	11-des 01:30
158	Latch lock claws and set pressure on K/C line engaging lock	0,50	1,00		11-des	01:30	-	11-des 02:00
159	Connect booster line	0,50	1,00		11-des	02:00	-	11-des 02:30
160	Remove handling equipment and install safety wire.	0,50	1,00		11-des	02:30	-	11-des 03:00
161	Land and Test BOP (part 2)				11-des	03:00	-	11-des 03:00
162	Lower down ca. 2m and install marine riser tension lines	0,50	2,00		11-des	03:00	-	11-des 03:30
163	Pressure up marine riser tensions and DSC to precalculated press	0,00	0,00		11-des	03:30	-	11-des 03:30
164	Connect Guidelines Pressure up Guideline tensioners to 6 -8 klbs.	0,50	1,00		11-des	03:30	-	11-des 04:00
165	Land BOP on wellhead and observe with ROV	1,50	1,50		11-des	04:00	-	11-des 05:30
166	Operate connector to 'close ' position on drum	0,25	0,25		11-des	05:30	-	11-des 05:45
167	Overpull test to 50klbs with DSC	0,25	0,25		11-des	05:45	-	11-des 06:00
168	Slack off podhoses and conn junction boxes	1,25	3,00		11-des	06:00	-	11-des 07:15
169	Bleed off guidelines to 2 -3 klbs	0,00	0,00		11-des	07:15	-	11-des 07:15
170	Adjust pressure on marine riser tensioners and close DSC	0,00	0,00		11-des	07:15	-	11-des 07:15
171	Land diverter in diverter housing	0,25	0,25		11-des	07:15	-	11-des 07:30
172	Connect diverter hose, lock down dogs, flowline seal and slip joint	1,00	1,00		11-des	07:30	-	11-des 08:30
173	Hook up Flowline	2,00	2,00		11-des	08:30	-	11-des 10:30
174	Rig down handling equipment	2,00	2,00		11-des	10:30	-	11-des 12:30
175	Install test plug	1,00	1,00		11-des	12:30	-	11-des 13:30
176	Test BOP connector	1,00	1,00		11-des	13:30	-	11-des 14:30
177	POOH with test plug	2,00	1,00		11-des	14:30	-	11-des 16:30
178	Re-install eagle light, flow line, trip tank line etc.	6,50	0,00		11-des	16:30	-	11-des 23:00
179	Install 13 3/8" casing c. 2050m BRT				11-des	23:00	-	11-des 23:00
180	Drill 17 1/2" hole				11-des	23:00	-	11-des 23:00
181	Preparation for 13 3/8" Casing				11-des	23:00	-	11-des 23:00
182	M/U cement stand, and rack in derrick	0,00	1,50		11-des	23:00	-	11-des 23:00
183	Pick up pre made up casing hanger and rack in derrick.	0,00	1,50		11-des	23:00	-	11-des 23:00
184	Emergency hang off tool will be picked up and racked in derrick	0,00	0,00		11-des	23:00	-	11-des 23:00
185	17 1/2" BHA - cleanout casing				11-des	23:00	-	11-des 23:00
186	L/D 26" BHA	0,00	2,00		11-des	23:00	-	11-des 23:00
187	PU 1500m of DP	0,00	8,50		11-des	23:00	-	11-des 23:00
188	Pressure Test Surface Equipment	0,00	2,00		11-des	23:00	-	11-des 23:00
189	M/U 17 1/2" BHA	2,50	3,00		11-des	23:00	-	12-des 01:30
190	RIH to c. 1000 m BRT (P/U 6 stands with 5 1/2" DP from deck)	3,00	1,50		12-des	01:30	-	12-des 04:30
191	Hold kick drill.	1,50	1,00		12-des	04:30	-	12-des 06:00
192	Drill cmt/20" shoe track	3,75	2,00		12-des	06:00	-	12-des 09:45
193	Drill 3m of new formation	0,50	0,50		12-des	09:45	-	12-des 10:15
194	Circulate bottoms up	1,50	1,50		12-des	10:15	-	12-des 11:45
195	LOT				12-des	11:45	-	12-des 11:45
196	Rig up surface lines	0,50	0,50		12-des	11:45	-	12-des 12:15
197	Pressure test lines	0,25	0,25		12-des	12:15	-	12-des 12:30
198	Perform LOT	2,00	0,75		12-des	12:30	-	12-des 14:30
199	Take SCR's	0,25	0,25		12-des	14:30	-	12-des 14:45
200	17 1/2" BHA - Drill to c. 2050m (1000m Open Hole)				12-des	14:45	-	12-des 14:45
201	Drill 17 1/2" hole from 1050 m to 1591 m	22,75	42,00		12-des	14:45	-	13-des 13:30
202	Electrical Failure, Pull back to Shoe fix problem and RIH	14,50	0,00		13-des	13:30	-	14-des 04:00
203	Drill 17 1/2" hole from 1591 to 2106m	23,50	0,00		14-des	04:00	-	15-des 03:30
204	Circ Hole Clean	3,00	2,00		15-des	03:30	-	15-des 06:30
205	Flowcheck	0,25	0,50		15-des	06:30	-	15-des 06:45

	SKARV 4 – 6507/5-5 COMPLETION REPORT	Page: 56 of 202
Chapter: 5	PERFORMANCE REVIEW	Date: 03/05/02 Rev: 0

REF	.OPERATION	USED	EXE	Mod.	From - To			
		Hrs	Hrs	Plan				
206	Pull out of the hole to 20" shoe	7,25	5,00		15-des	06:45	-	15-des 14:00
207	RIH to TD	2,00	2,00		15-des	14:00	-	15-des 16:00
208	Circ condition mud	1,50	2,00		15-des	16:00	-	15-des 17:30
209	Flowcheck	0,25	0,50		15-des	17:30	-	15-des 17:45
210	POOH 5 stands wet	0,00	0,75		15-des	17:45	-	15-des 17:45
211	Pump slug	0,00	0,50		15-des	17:45	-	15-des 17:45
212	Pump out of the hole to 20" shoe	4,00	2,00		15-des	17:45	-	15-des 21:45
213	Circulated BU from 20" Shoe	1,00	0,00		15-des	21:45	-	15-des 22:45
214	POOH drillstring	2,25	3,50		15-des	22:45	-	16-des 01:00
215	Rack back BHA. Download MWD memory in rotary.	1,50	2,00		16-des	01:00	-	16-des 02:30
216	Break out bit	0,00	0,25		16-des	02:30	-	16-des 02:30
217	Install 13 3/8" casing				16-des	02:30	-	16-des 02:30
218	Run 13 3/8" casing				16-des	02:30	-	16-des 02:30
219	Hold Safety Meeting.	0,50	1,00		16-des	02:30	-	16-des 03:00
220	P/U bore protector running tool and RIH, engage, POOH	3,25	2,00		16-des	03:00	-	16-des 06:15
221	Jet wellhead while pulling bore protector	0,25	0,25		16-des	06:15	-	16-des 06:30
222	Install flush mounted spider, BX elevator, Lafleur, bails, Weatherford tong & Jam	1,50	1,50		16-des	06:30	-	16-des 08:00
223	M/U shoe track, bakerlocking joints	2,25	1,25		16-des	08:00	-	16-des 10:15
224	Test float	0,25	0,25		16-des	10:15	-	16-des 10:30
225	RIH 13 3/8" casing according to tally	17,50	12,00		16-des	10:30	-	17-des 04:00
226	P/U 13 3/8" casing hanger and make up to landing string and change out handling equipment	0,75	1,00		17-des	04:00	-	17-des 04:45
227	RD casing running equipment	0,50	1,00		17-des	04:45	-	17-des 05:15
228	RIH L.String to TD	2,00	2,00		17-des	05:15	-	17-des 07:15
229	Wash down last stand to TD	0,75	0,50		17-des	07:15	-	17-des 08:00
230	P/U cement head and land casing	0,50	0,50		17-des	08:00	-	17-des 08:30
231	Cement 13 3/8" casing				17-des	08:30	-	17-des 08:30
232	Hold Safety Meeting.	0,00	0,00		17-des	08:30	-	17-des 08:30
233	Rig up and press test surface lines	0,50	0,00		17-des	08:30	-	17-des 09:00
234	Circulate and condition mud	1,50	2,00		17-des	09:00	-	17-des 10:30
235	Pump spacer	0,25	0,25		17-des	10:30	-	17-des 10:45
236	Drop ball for bottom plug	0,25	0,25		17-des	10:45	-	17-des 11:00
237	Mix and pump lead and tail slurry	1,00	1,50		17-des	11:00	-	17-des 12:00
238	Drop dart, shear plug, rig pumps displace slurry, bump plug	2,00	1,00		17-des	12:00	-	17-des 14:00
239	Pressure test casing on bump to 5200 psi	0,50	0,50		17-des	14:00	-	17-des 14:30
240	Test well control system				17-des	14:30	-	17-des 14:30
241	BOP Test				17-des	14:30	-	17-des 14:30
242	Set and test seal assembly	0,50	1,50		17-des	14:30	-	17-des 15:00
243	Perform full BOP test against running tool	1,00	4,00		17-des	15:00	-	17-des 16:00
244	Function test BOP's	0,00	0,50		17-des	16:00	-	17-des 16:00
245	Release running tool. Jet wellhead. Stand back cmt head.	4,50	1,00		17-des	16:00	-	17-des 20:30
246	L/D subsea cement head.	0,00	1,00		17-des	20:30	-	17-des 20:30
247	POOH landing / test string	1,25	1,00		17-des	20:30	-	17-des 21:45
248	RIH with Multi Purpose tool and wear bushing	2,00	1,00		17-des	21:45	-	17-des 23:45
249	Install wearbushing	0,25	0,25		17-des	23:45	-	18-des 00:00
250	Pressure test and Function Test BOP to 500/5200 Psi	2,25	0,00		18-des	00:00	-	18-des 02:15
251	POOH Multi Purpose tool	1,25	1,00		18-des	02:15	-	18-des 03:30
252	L/D cement stand and PU single, rack back stand	1,00	0,00		18-des	03:30	-	18-des 04:30
253	Surface Equipment Pressure Tests				18-des	04:30	-	18-des 04:30
254	Test top drive valves, Choke & Kill manifold	3,50	1,50		18-des	04:30	-	18-des 08:00
255	Install 9 5/8" liner TD 3707 m BRT				18-des	08:00	-	18-des 08:00
256	Drill 12 1/4in hole from 2050 to 3707 m BRT				18-des	08:00	-	18-des 08:00
257	M/U 9 5/8" cementing stand, and rack back in derrick	0,00	1,50		18-des	08:00	-	18-des 08:00
258	Cleanout 13 3/8" casing				18-des	08:00	-	18-des 08:00
259	L/D 17 1/2" BHA	3,50	3,00		18-des	08:00	-	18-des 11:30
260	M/U 12 1/4" BHA & Shallow test MWD	5,50	3,00		18-des	11:30	-	18-des 17:00
261	Fixed drawwork clutch	4,50	0,00		18-des	17:00	-	18-des 21:30
262	Continued to MU 12 1/4" BHA	2,50	0,00		18-des	21:30	-	19-des 00:00
263	PU 1200m of 5,5" DP	9,50	7,00		19-des	00:00	-	19-des 09:30
264	Close shear rams	0,00	0,00		19-des	09:30	-	19-des 09:30
265	Pressure test 13 3/8" casing to 3,500 psi against shear rams	0,00	0,00		19-des	09:30	-	19-des 09:30
266	L/D 2 jnts of DP, Cut and slip drill line, changed kelly cock on drl pup	5,00	0,00		19-des	09:30	-	19-des 14:30
267	RIH to above top of cement	2,50	2,50		19-des	14:30	-	19-des 17:00
268	Repaired hose on DDM	1,00	0,00		19-des	17:00	-	19-des 18:00
269	Hold kick drill	1,50	1,00		19-des	18:00	-	19-des 19:30
270	Problems with suction on mud pumps	0,50	0,00		19-des	19:30	-	19-des 20:00
271	Displace hole to OBM	4,00	0,00		19-des	20:00	-	20-des 00:00
272	Drill Plug Float Collar	8,50	0,00		20-des	00:00	-	20-des 08:30
273	Drill shoetrack	2,50	3,00		20-des	08:30	-	20-des 11:00
274	Drill 3m of new formation	0,25	0,25		20-des	11:00	-	20-des 11:15
275	POOH from 2109 to 2073 m	0,25	0,00		20-des	11:15	-	20-des 11:30
276	Circulate 1,5 x bottoms up and even	1,00	1,50		20-des	11:30	-	20-des 12:30
277	LOT				20-des	12:30	-	20-des 12:30
278	Rig up surface lines	0,00	0,50		20-des	12:30	-	20-des 12:30
279	Pressure test lines	0,00	0,25		20-des	12:30	-	20-des 12:30



REF	.OPERATION	USED	EXE	Mod.	From - To			
		Hrs	Hrs	Plan				
280	Perform LOT	1,00	0,75		20-des	12:30	-	20-des 13:30
281	Take slow circulating rates and choke line friction	0,50	0,25		20-des	13:30	-	20-des 14:00
282	Pick up drilling stand RIH from 2073 m to 2109 m	0,50	0,00		20-des	14:00	-	20-des 14:30
283	Drill 12 1/4" hole - same BHA				20-des	14:30	-	20-des 14:30
284	Drill 12 1/4" hole from 2050m - 2800m.	19,50	20,00		20-des	14:30	-	21-des 10:00
285	Drill 12 1/4" hole from 2800m - 3100m	15,00	11,00		21-des	10:00	-	22-des 01:00
286	Drill 12 1/4" hole from 3100 m to 3600m	50,50	30,00		22-des	01:00	-	24-des 03:30
287	Drill to 3638 m at 10mph	5,50	10,00		24-des	03:30	-	24-des 09:00
288	Circulate hole clean.	2,00	2,00		24-des	09:00	-	24-des 11:00
289	Drill an additional 5 m	1,00	0,00		24-des	11:00	-	24-des 12:00
290	Circulated BU	2,00	0,00		24-des	12:00	-	24-des 14:00
291	Flow check	0,50	0,50		24-des	14:00	-	24-des 14:30
292	POOH 5 stands wet	0,50	0,50		24-des	14:30	-	24-des 15:00
293	Pump slug	0,25	0,25		24-des	15:00	-	24-des 15:15
294	POOH drillstring to 2640 m	9,75	4,00		24-des	15:15	-	25-des 01:00
295	RIH to 3643 m	2,50	0,00		25-des	01:00	-	25-des 03:30
296	Circ bottom up	2,00	0,00		25-des	03:30	-	25-des 05:30
297	Flow check	0,50	0,50		25-des	05:30	-	25-des 06:00
298	POOH drillstring	11,50	3,00		25-des	06:00	-	25-des 17:30
299	POOH BHA	2,50	1,25		25-des	17:30	-	25-des 20:00
300	Download MWD	0,00	0,50		25-des	20:00	-	25-des 20:00
301	Break out bit	0,00	0,25		25-des	20:00	-	25-des 20:00
302	Log 12-1/4" Open Hole				25-des	20:00	-	25-des 20:00
303	Log Run - 1: DSI-IPLT-GR				25-des	20:00	-	25-des 20:00
304	Time out for Safety. Remove ice from derrick	3,50	0,00		25-des	20:00	-	25-des 23:30
305	Hold safety meeting. Prior to rig up logging equipment	0,50	0,25		25-des	23:30	-	25-des 00:00
306	Rig up sheaves	1,50	0,75		25-des	00:00	-	26-des 01:30
307	RU logging tools for logging suit 1: DSI-IPLT-GR	1,50	1,00		26-des	01:30	-	26-des 03:00
308	Check Tools and install radioactive sources	0,50	0,50		26-des	03:00	-	26-des 03:30
309	RIH to 2200 m	0,75	0,75		26-des	03:30	-	26-des 04:15
310	Log hole, logging suit 1	7,75	8,50		26-des	04:15	-	26-des 12:00
311	POOH while logging GR to surface.	1,50	1,50		26-des	12:00	-	26-des 13:30
312	Remove radioactive source and perform after calibration.	1,50	1,00		26-des	13:30	-	26-des 15:00
313	R/D logging tools, suit 1	0,50	0,50		26-des	15:00	-	26-des 15:30
314	Install 9 5/8" Liner				26-des	15:30	-	26-des 15:30
315	Run Liner 9 5/8"				26-des	15:30	-	26-des 15:30
316	Changed out saver sub	1,00	0,00		26-des	15:30	-	26-des 16:30
317	MU Nodeco Cement head	2,50	0,00		26-des	16:30	-	26-des 19:00
318	Perform Wiper Trip to TD, Circ, POOH	0,00	0,00		26-des	19:00	-	26-des 19:00
319	Hold safety meeting with both crews	0,50	0,50		26-des	19:00	-	26-des 19:30
320	Install flush mounted spider, BX elevator, Weatherford tong & Jam	1,50	1,00		26-des	19:30	-	26-des 21:00
321	M/U 9 5/8" shoe track, check same	2,00	2,00		26-des	21:00	-	26-des 23:00
322	Run 9 5/8" liner as per tally (Approx 1800 meter)	16,50	10,00		26-des	23:00	-	27-des 15:30
323	Change handling equipment	0,50	0,50		27-des	15:30	-	27-des 16:00
324	P/U Nodeco Liner Hanger assembly Install Wiper Plug and M/U to Liner	1,00	1,00		27-des	16:00	-	27-des 17:00
325	Fill PBR with drill Water Circulate liner volume	0,50	0,50		27-des	17:00	-	27-des 17:30
326	Run in hole on DP to 13 3/8" shoe, break circulation, take torque readings with shoe just inside 13 3/8 Shoe	3,50	2,00		27-des	17:30	-	27-des 21:00
327	Continue to RIH to TD on DP	4,50	5,50		27-des	21:00	-	28-des 01:30
328	M/U cement stand and wash last stand to Bottom	1,00	1,00		28-des	01:30	-	28-des 02:30
329	Circulate & condition hole as required	1,50	2,00		28-des	02:30	-	28-des 04:00
330	Hold safety meeting	0,00	0,00		28-des	04:00	-	28-des 04:00
331	M/u and pressure test surface lines	0,00	0,00		28-des	04:00	-	28-des 04:00
332	Drop Liner hanger setting ball displ ball to ball seat	0,75	0,75		28-des	04:00	-	28-des 04:45
333	Set liner hanger release running tool and shear out ball seat	1,75	0,50		28-des	04:45	-	28-des 06:30
334	Circ and cond. Pump carbide tracer.	8,00	0,25		28-des	06:30	-	28-des 14:30
335	Pump spacer as per program	0,50	0,50		28-des	14:30	-	28-des 15:00
336	Mix & pump lead and tail cement as per program	1,75	1,50		28-des	15:00	-	28-des 16:45
337	Drop drill pipe dart from cement head	0,25	0,25		28-des	16:45	-	28-des 17:00
338	Displace Dart/Cement to bump the plug	1,00	2,00		28-des	17:00	-	28-des 18:00
339	Bleed of and confirm floats are holding.	0,00	0,50		28-des	18:00	-	28-des 18:00
340	Pressure test Liner to 5200 PSI for 10 minutes	0,00	0,25		28-des	18:00	-	28-des 18:00
341	Pick up to bring the packer actuator above PBR, slack off weight and set packer	1,00	0,50		28-des	18:00	-	28-des 19:00
342	Circ out all cmt slurry. Treat w/sugar and retarder. Cond mud.	6,00	2,00		28-des	19:00	-	29-des 01:00
343	Rack back cement stand	1,50	0,25		29-des	01:00	-	29-des 02:30
344	Pooh with running tool	4,50	3,00		29-des	02:30	-	29-des 07:00
345	L/D Liner running tool and ensure clean of cement	0,50	1,00		29-des	07:00	-	29-des 07:30
346	R/D Cement head	0,00	1,00		29-des	07:30	-	29-des 07:30
347	Test well to 5200 Psi	0,00	0,00		29-des	07:30	-	29-des 07:30
348	Test well control system				29-des	07:30	-	29-des 07:30
349	BOP Test #2				29-des	07:30	-	29-des 07:30
350	M/U and RIH with BOP test tool	10,00	2,50		29-des	07:30	-	29-des 17:30
351	Perform full BOP test against running tool	3,50	4,00		29-des	17:30	-	29-des 21:00
352	Function test BOP's + acoustics	1,00	1,00		29-des	21:00	-	29-des 22:00

Chapter:
5

PERFORMANCE REVIEW

Date:
03/05/02Rev:
0

REF	.OPERATION	USED	EXE	Mod.	From - To			
		Hrs	Hrs	Plan				
353	POOH with BOP test tool.	2,00	1,00		29-des	22:00	-	29-des 00:00
354	Surface Equipment Pressure Tests				29-des	00:00	-	29-des 00:00
355	Test top drive valves, Choke & Kill manifold	0,00	2,50		29-des	00:00	-	29-des 00:00
356	Re-cement 9 5/8" Liner				29-des	00:00	-	29-des 00:00
357	MU 8 1/2" Bit & HWDP. RIH. Clean cmt to T.O. Wiper plug.	6,00	0,00		29-des	00:00	-	30-des 06:00
358	Push wiper plug into landing collar with bit.	3,00	0,00		30-des	06:00	-	30-des 09:00
359	Pressure test Liner to 5200 PSI for 10 minutes	1,00	0,00		30-des	09:00	-	30-des 10:00
360	Drill out wiper plug and shoe track. Perf injection test. POOH.	17,50	0,00		30-des	10:00	-	31-des 03:30
361	PU & RIH 3 1/2" Cmt stinger.	9,50	0,00		31-des	03:30	-	31-des 13:00
362	Cmt squeeze liner shoe. POOH.	5,50	0,00		31-des	13:00	-	31-des 18:30
363	POOH cmt stinger. Rack in derrick.	9,00	0,00		31-des	18:30	-	01-jan 03:30
364	Drill / Core 81/2" Section from 3707 to 4011 m BRT and perform TD logs				01-jan	03:30	-	01-jan 03:30
365	Drill 8 1/2" Section to 3715m BRT				01-jan	03:30	-	01-jan 03:30
366	Cleanout 9 5/8" Liner				01-jan	03:30	-	01-jan 03:30
367	PU 300m of 5" DP	0,00	2,00		01-jan	03:30	-	01-jan 03:30
368	LD 12 1/4" BHA. Slip and cut. Rig repair 0.5 hour.	8,00	3,00		01-jan	03:30	-	01-jan 11:30
369	M/U 8 1/2" BHA	6,00	4,00		01-jan	11:30	-	01-jan 17:30
370	Test MWD	0,00	0,00		01-jan	17:30	-	01-jan 17:30
371	Close shear rams	0,00	0,00		01-jan	17:30	-	01-jan 17:30
372	Pressure test 9 5/8" casing to 5,200 psi against shear rams	1,50	0,00		01-jan	17:30	-	01-jan 19:00
373	RIH to 1000m BRT, Test MWD	2,50	1,50		01-jan	19:00	-	01-jan 21:30
374	RIH to top of cement. Wash to firm cmt. Displ. To WBM.	12,50	3,00		01-jan	21:30	-	02-jan 10:00
375	Hold kick drill. Take SCR. Riser and choke line.	1,00	1,00		02-jan	10:00	-	02-jan 11:00
376	Drill cement, cond mud and add Tritium to mud system	3,00	6,00		02-jan	11:00	-	02-jan 14:00
377	Circulate hole clean	0,00	1,00		02-jan	14:00	-	02-jan 14:00
378	Take slow circulating rates and choke line friction	0,00	0,25		02-jan	14:00	-	02-jan 14:00
379	Drill to Top Garn	2,00	1,00		02-jan	14:00	-	02-jan 16:00
380	Circulate Clean and POOH. Rack back MWD	11,25	8,00		02-jan	16:00	-	03-jan 03:15
381	Core Garn & Not - Core run 1 (81 m core from 3712 to 3793m)				03-jan	03:15	-	03-jan 03:15
382	PU and RIH with Core Assembly No.1	13,75	12,00		03-jan	03:15	-	03-jan 17:00
383	Circulate, space out, take SCR, Cut 81 m Core	5,50	7,50		03-jan	17:00	-	03-jan 22:30
384	POOH with core barrel, hold safety meeting prior to laying down core	11,00	9,25		03-jan	22:30	-	04-jan 09:30
385	Lay down core and coring equipment, rack back BHA	5,50	5,50		04-jan	09:30	-	04-jan 15:00
386	Core Tilje Sands - Core run (Contingency)				04-jan	15:00	-	04-jan 15:00
387	PU CB/ MWD and RIH with Core Assembly	0,00	0,00		04-jan	15:00	-	04-jan 15:00
388	Circulate, Cut Core	0,00	0,00		04-jan	15:00	-	04-jan 15:00
389	TOH with core barrel	0,00	0,00		04-jan	15:00	-	04-jan 15:00
390	Lay down core and coring equipment	0,00	0,00		04-jan	15:00	-	04-jan 15:00
391	Drill down to Well TD (216m from 3793m to 4011m)				04-jan	15:00	-	04-jan 15:00
392	PU 8 1/2" BHA	3,00	3,00		04-jan	15:00	-	04-jan 18:00
393	RIH to 1000m BRT, Test MWD	1,50	1,50		04-jan	18:00	-	04-jan 19:30
394	RIH to casing shoe	5,00	3,00		04-jan	19:30	-	05-jan 00:30
395	Ream down to 3793m	4,50	2,00		05-jan	00:30	-	05-jan 05:00
396	Drill 8 1/2" hole from 3795 to TD	14,00	20,00		05-jan	05:00	-	05-jan 19:00
397	Circulate and condition mud	2,00	2,00		05-jan	19:00	-	05-jan 21:00
398	Circulate hole clean	0,00	3,00		05-jan	21:00	-	05-jan 21:00
399	POOH WET as required by hole conditions	1,00	0,50		05-jan	21:00	-	05-jan 22:00
400	Pump slug	0,50	0,50		05-jan	22:00	-	05-jan 22:30
401	POOH drillstring to shoe	0,00	4,50		05-jan	22:30	-	05-jan 22:30
402	Flow check	0,00	0,25		05-jan	22:30	-	05-jan 22:30
403	POOH drillstring	3,00	3,00		05-jan	22:30	-	06-jan 01:30
404	POOH BHA	2,00	2,00		06-jan	01:30	-	06-jan 03:30
405	Download MWD	0,00	0,00		06-jan	03:30	-	06-jan 03:30
406	Break out bit, L/D MWD. L/D 2 stds core barrel.	2,00	0,25		06-jan	03:30	-	06-jan 05:30
407	Log OH reservoir				06-jan	05:30	-	06-jan 05:30
408	Log Run - 1: DSI-HRLA-GR-EMS-SP				06-jan	05:30	-	06-jan 05:30
409	Hold safety meeting	0,50	0,25		06-jan	05:30	-	06-jan 06:00
410	Rig up Sheaves	1,00	0,75		06-jan	06:00	-	06-jan 07:00
411	RU logging tools for logging suit 1: DSI-HRLA-GR-EMS-SP	0,5	1,00		06-jan	07:00	-	06-jan 07:00
412	Check Tools	0,50	0,50		06-jan	07:00	-	06-jan 07:30
413	RIH	1,50	1,50		06-jan	07:30	-	06-jan 09:00
414	Log hole, logging suit 1	2,75	4,50		06-jan	09:00	-	06-jan 11:45
415	POOH	1,25	1,25		06-jan	11:45	-	06-jan 13:00
416	R/D logging tools, suit 1	1,25	1,00		06-jan	13:00	-	06-jan 14:15
417	Log Run - 2: IPLT				06-jan	14:15	-	06-jan 14:15
418	RU logging tools for logging suit 2: IPLT	1,00	1,00		06-jan	14:15	-	06-jan 15:15
419	Check Tools and install sources	0,50	0,50		06-jan	15:15	-	06-jan 15:45
420	RIH	1,50	1,50		06-jan	15:45	-	06-jan 17:15
421	Log hole, logging suit 2	1,50	1,50		06-jan	17:15	-	06-jan 18:45
422	POOH	1,25	1,25		06-jan	18:45	-	06-jan 20:00
423	Remove Sources & perform after calibrations	0,50	0,50		06-jan	20:00	-	06-jan 20:30
424	R/D logging tools, suit 2	0,50	0,75		06-jan	20:30	-	06-jan 21:00
425	Log Run - 3: MDT / GR				06-jan	21:00	-	06-jan 21:00
426	RU logging tools for logging suit 3: MDT / GR	1,00	1,00		06-jan	21:00	-	06-jan 22:00

Chapter:
5

PERFORMANCE REVIEW

Date:
03/05/02Rev:
0

REF	.OPERATION	USED	EXE	Mod.	From - To			
		Hrs	Hrs	Plan				
427	Check Tools	0,50	0,50		06-jan	22:00	-	06-jan 22:30
428	RIH	1,75	1,75		06-jan	22:30	-	07-jan 00:15
429	Log hole, logging suit 3	34,75	24,00		07-jan	00:15	-	08-jan 11:00
430	POOH	2,00	1,50		08-jan	11:00	-	08-jan 13:00
431	R/D logging tools, suit 3	1,75	2,00		08-jan	13:00	-	08-jan 14:45
432	Sample validation	0,00	0,00		08-jan	14:45	-	08-jan 14:45
433	Log Run - 4 : ZO-VSP / GR				08-jan	14:45	-	08-jan 14:45
434	Deploy and test seismic source	0,00	0,00		08-jan	14:45	-	08-jan 14:45
435	RU logging tools for logging suit 4: ZO-VSP / GR	2,25	0,50		08-jan	14:45	-	08-jan 17:00
436	Check Tools	0,25	0,25		08-jan	17:00	-	08-jan 17:15
437	RIH, communication problem. POOH. Take out bottoms sonde. RIH.	13,50	1,75		08-jan	17:15	-	09-jan 06:45
438	Log hole, logging suit 4	5,75	10,00		09-jan	06:45	-	09-jan 12:30
439	POOH	0,75	1,25		09-jan	12:30	-	09-jan 13:15
440	R/D logging tools, suit 4	1,25	0,50		09-jan	13:15	-	09-jan 14:30
441	Log Run - 5 : FMI / GR (Contingency)				09-jan	14:30	-	09-jan 14:30
442	RU logging tools for logging suit 5: FMI / GR	0,00	0,00		09-jan	14:30	-	09-jan 14:30
443	Check Tools	0,00	0,00		09-jan	14:30	-	09-jan 14:30
444	RIH	0,00	0,00		09-jan	14:30	-	09-jan 14:30
445	Log hole, logging suit 5	0,00	0,00		09-jan	14:30	-	09-jan 14:30
446	POOH	0,00	0,00		09-jan	14:30	-	09-jan 14:30
447	R/D logging tools, suit 5	0,00	0,00		09-jan	14:30	-	09-jan 14:30
448	Log Run - 6 : MSCT / GR (Contingency)				09-jan	14:30	-	09-jan 14:30
449	RU logging tools for logging suit 6: MSCT / GR	0,00	0,00		09-jan	14:30	-	09-jan 14:30
450	Check Tools	0,00	0,00		09-jan	14:30	-	09-jan 14:30
451	RIH	0,00	0,00		09-jan	14:30	-	09-jan 14:30
452	Log hole, logging suit 6	0,00	0,00		09-jan	14:30	-	09-jan 14:30
453		0,00	0,00		09-jan	14:30	-	09-jan 14:30
454	R/D logging tools, suit 6	0,00	0,00		09-jan	14:30	-	09-jan 14:30
455	Run 7" Liner, cleanout liner and Test Well				09-jan	14:30	-	09-jan 14:30
456					09-jan	14:30	-	09-jan 14:30
457	Install 7" Liner				09-jan	14:30	-	09-jan 14:30
458	Run 7" Liner				09-jan	14:30	-	09-jan 14:30
459	M/U cement stand and press. Tested to 5000 psi.	1,50	0,00		09-jan	14:30	-	09-jan 16:00
460	Hold Safety Meeting	0,50	0,50		09-jan	16:00	-	09-jan 16:30
461	Install 7" bowl, slips and elevators	1,50	1,00		09-jan	16:30	-	09-jan 18:00
462	M/U 7" shoe track	1,00	2,00		09-jan	18:00	-	09-jan 19:00
463	Run 7" liner as per tally (Approx 400m)	4,00	2,50		09-jan	19:00	-	09-jan 23:00
464	MU Hanger assembly and install Liner wiper plug	1,00	1,50		09-jan	23:00	-	09-jan 00:00
465	Fill PBR with water and circulate liner volume	0,50	0,50		09-jan	00:00	-	10-jan 00:30
466	LD 7" Handling equipment	0,00	0,50		10-jan	00:30	-	10-jan 00:30
467	RIH on Drillpipe to 1550m. Hung off string w/shoe at 1975m.	4,50	6,00		10-jan	00:30	-	10-jan 05:00
468	WOW. Retrieve hang off tool. RIH to csg shoe.	43,50			10-jan	05:00	-	12-jan 00:30
469	RIH with liner to csg shoe. Circulate and take Torque & drag readings	8,75	0,50		12-jan	00:30	-	12-jan 09:15
470	RIH liner on Drillpipe in open hole 3641 - 3950 m	2,25	2,00		12-jan	09:15	-	12-jan 11:30
471	M/U Cement Stand and wash last stand to bottom	1,25	1,00		12-jan	11:30	-	12-jan 12:45
472	Circulate and Condition Hole	2,25	2,00		12-jan	12:45	-	12-jan 15:00
473	P Test surface Lines	0,25	0,50		12-jan	15:00	-	12-jan 15:15
474	Drop setting ball	0,25	0,25		12-jan	15:15	-	12-jan 15:30
475	Chase ball	0,25	0,50		12-jan	15:30	-	12-jan 15:45
476	Set Liner Hanger, release running tool and shear out ball seat.	0,25	0,50		12-jan	15:45	-	12-jan 16:00
477	Confirm Running tool free	0,25	0,25		12-jan	16:00	-	12-jan 16:15
478	Circulate	0,00	1,00		12-jan	16:15	-	12-jan 16:15
479	Pump Spacer	0,25	0,50		12-jan	16:15	-	12-jan 16:30
480	Mix and pump cement	0,50	1,50		12-jan	16:30	-	12-jan 17:00
481	Drop Liner wiper plug launching dart	0,25	0,25		12-jan	17:00	-	12-jan 17:15
482	Displace cement down Drillpipe	0,25	0,50		12-jan	17:15	-	12-jan 17:30
483	Slow down displacement to watch dart engage	0,25	0,25		12-jan	17:30	-	12-jan 17:45
484	Displace cement to bump plug	0,00	0,25		12-jan	17:45	-	12-jan 17:45
485	Bleed off and confirm floats holding	0,00	0,25		12-jan	17:45	-	12-jan 17:45
486	Pressure test liner to 5200 psi	0,25	0,50		12-jan	17:45	-	12-jan 18:00
487	Back out liner running tool	0,25	0,25		12-jan	18:00	-	12-jan 18:15
488	Set Liner Tie back packer	0,50	0,50		12-jan	18:15	-	12-jan 18:45
489	Circulate out excess cement	1,00	1,25		12-jan	18:45	-	12-jan 19:45
490	Wash and jet PBR	0,00	0,00		12-jan	19:45	-	12-jan 19:45
491	Rig Down Cement stand	0,25	0,00		12-jan	19:45	-	12-jan 20:00
492	POOH with running tool	5,00	6,00		12-jan	20:00	-	13-jan 01:00
493	Function Test BOPs Flush C&K lines and ensure all BOP cavities are cleared of cement	0,00	0,00		13-jan	01:00	-	13-jan 01:00
494	L/D liner running tool and ensure clean of cement	1,00	1,00		13-jan	01:00	-	13-jan 02:00
495	R/D cement head	0,50	1,50		13-jan	02:00	-	13-jan 02:30
496	Re-arranged tubulars from derrick	1,00	0,00		13-jan	02:30	-	13-jan 03:30
497	Perform Liner Clean out run and displace to Brine				13-jan	03:30	-	13-jan 03:30
498	Make up 6" bit /scraper/4 3/4" dc/ 3 1/2" drillpipe, PBR tie back mill, PBR top Dressing mill x-over. Ensure space out to bottom out Tie back mill before landing 6" bit. Slip and cut drlg. Line.	4,75	4,00		13-jan	03:30	-	13-jan 08:15



REF	.OPERATION	USED	EXE	Mod.	From - To			
		Hrs	Hrs	Plan				
499	RIH on Drillpipe to TOC at 3860 m. Rig repair 2 hours.	10,25	6,00		13-jan	08:15	-	13-jan 18:30
500	Work scraper / brush over packer setting depth	0,25	1,00		13-jan	18:30	-	13-jan 18:45
501	RIH and dress off top PBR	2,75	1,00		13-jan	18:45	-	13-jan 21:30
502	Displace well from 1.20 sg mud to Brine at 1.2 sg.	2,50	3,00		13-jan	21:30	-	13-jan 00:00
503	POOH with Liner Clean out assembly	7,00	6,00		13-jan	00:00	-	14-jan 07:00
504	Failed to test csg. Well kicked. Killing operation.	97,00			14-jan	07:00	-	18-jan 08:00
505	POOH with 5 1/2" DP from 3515m	8,25			18-jan	08:00	-	18-jan 16:15
506	MU and RIH with RTTS packer to 2054m	5,00			18-jan	16:15	-	18-jan 21:15
507	Set RTTS and test below and above to determine leak	14,00			18-jan	21:15	-	19-jan 11:15
508	Flowcheck and POOH with RTTS packer	5,75			19-jan	11:15	-	19-jan 17:00
509	Run 7" Scab liner				19-jan	17:00	-	19-jan 17:00
510	Perform 13 3/8" scraper run	12,25	0,00		19-jan	17:00	-	20-jan 05:15
511	B/O Crossover from hang off tool	1,00			20-jan	05:15	-	20-jan 06:15
512	Hold Safety Meeting	0,50			20-jan	06:15	-	20-jan 06:45
513	Install flush mounted spider, BX elevator, Weatherford tong & Jam	0,75	0,00		20-jan	06:45	-	20-jan 07:30
514	Pick up seal stem and RIH with casing joints	14,50	0,00		20-jan	07:30	-	20-jan 22:00
515	Pick up hanger assembly and make up to liner	1,00	0,00		20-jan	22:00	-	20-jan 23:00
516	Change handling equipment	0,50	0,00		20-jan	23:00	-	20-jan 23:30
517	Fill PBR with drill Water Circulate liner volume	0,50	0,00		20-jan	23:30	-	20-jan 00:00
518	Run in hole on DP to top of 7" PBR. Break circulation.	4,50	0,00		20-jan	00:00	-	21-jan 04:30
519	Open compensator, break circulation and lower sealstem into PBR	0,50	0,00		21-jan	04:30	-	21-jan 05:00
520	Bleed off pressure and lower sealstem fully into the PBR until positive weight loss observed.	0,50	0,00		21-jan	05:00	-	21-jan 05:30
521	Pull back 0,5- 1m	0,50	0,50		21-jan	05:30	-	21-jan 06:00
522	Pressure up in steps to set liner hanger. Compensate with weight according to Weatherford procedure to avoid pumping sealstem out of PBR.	0,50	0,00		21-jan	06:00	-	21-jan 06:30
523	Set down weight to verify that hanger is set (20 ton)	0,50	0,00		21-jan	06:30	-	21-jan 07:00
524	Release running tool according to procedure	0,50	0,00		21-jan	07:00	-	21-jan 07:30
525	Pick up to bring the packer actuator above PBR, slack off weight and set packer	0,50	0,00		21-jan	07:30	-	21-jan 08:00
526	Test packer down annulus to 3600 psi	0,50	0,00		21-jan	08:00	-	21-jan 08:30
527	Pick up running tool to release RSM pack-off	0,50	0,00		21-jan	08:30	-	21-jan 09:00
528	Test well and scab liner to 2835 Psi	0,75	0,00		21-jan	09:00	-	21-jan 09:45
529	Flow check well	0,50			21-jan	09:45	-	21-jan 10:15
530	Pooh with running tool	4,75	0,00		21-jan	10:15	-	21-jan 15:00
531	L/D Liner running tool	0,50	0,00		21-jan	15:00	-	21-jan 15:30
532	MU hang off tool again an rack back in derrick	1,25			21-jan	15:30	-	21-jan 16:45
533	Re arrange derrick for access of 6" DC	0,75			21-jan	16:45	-	21-jan 17:30
534	RIH with BOP test tool	2,75	2,50		21-jan	17:30	-	21-jan 20:15
535	Perform full BOP test	3,25	4,00		21-jan	20:15	-	21-jan 23:30
536	Function BOP and acoustic	0,50	1,00		21-jan	23:30	-	21-jan 00:00
537	POOH with BOP test tool	1,25	1,00		21-jan	00:00	-	22-jan 01:15
538	Test IBOP and kelly hose	1,50	2,50		22-jan	01:15	-	22-jan 02:45
539	PU 1700m of 3 1/2" Tubing	15,75			22-jan	02:45	-	22-jan 18:30
540	Slip and cut drill line	1,50			22-jan	18:30	-	22-jan 20:00
541	RIH with 3 1/2" x 5 1/2" string	3,75			22-jan	20:00	-	22-jan 23:45
542	Reverse Displace well to 1.2 brine	5,25			22-jan	23:45	-	23-jan 05:00
543	POOH with string and rack back 3 1/2" tubing	19,00			23-jan	05:00	-	23-jan 00:00
544	Well Test				23-jan	00:00	-	23-jan 00:00
545	Schlumberger Correlation run				23-jan	00:00	-	23-jan 00:00
546	Rig Up Schlumberger Wireline	0,00	1,00		23-jan	00:00	-	23-jan 00:00
547	RIH and correlate	0,00	5,00		23-jan	00:00	-	23-jan 00:00
548	POOH	0,00	2,00		23-jan	00:00	-	23-jan 00:00
549	Run the TCP Guns and DST Test Tools				23-jan	00:00	-	23-jan 00:00
550	PU Flowhead, MU single and RU lines	4,75			23-jan	00:00	-	24-jan 04:45
551	Break back up equipment due to not testing on deck	1,00			24-jan	04:45	-	24-jan 05:45
552	Make up TCP Gun Assembly	4,00	4,00		24-jan	05:45	-	24-jan 09:45
553	Make up DST Tool String	4,00	4,00		24-jan	09:45	-	24-jan 13:45
554	Pick up Remaining Drill Collars.	3,75	1,00		24-jan	13:45	-	24-jan 17:30
555	Pressure Test Bottom Hole Assembly	2,00	2,00		24-jan	17:30	-	24-jan 19:30
556	Run and Pressure Test Main String				24-jan	19:30	-	24-jan 19:30
557	RIH 1500 m 3 1/2" Hydril PH-6 Tubing	10,50	10,00		24-jan	19:30	-	25-jan 06:00
558	RIH 1500 m (the rest) of the Test Tubing	9,50	10,00		25-jan	06:00	-	25-jan 15:30
559	Pressure Test String prior to Dummy Run SSTT Test	1,00	2,00		25-jan	15:30	-	25-jan 16:30
560	Calibrate Drill String Compensator	0,25	0,25		25-jan	16:30	-	25-jan 16:45
561	Correlate TCP Guns and Perforation Depth, Space out DST String				25-jan	16:45	-	25-jan 16:45
562	Pick up Dummy Fluted Hanger and Install	1,25	1,00		25-jan	16:45	-	25-jan 18:00
563	RIH Dummy Fluted Hanger	5,50	3,50		25-jan	18:00	-	25-jan 23:30
564	Changed out slips to and lip guide on Wheatherford elevator to 4 1/2".	2,50	0,00		25-jan	23:30	-	26-jan 02:00
565	Mark Pipe	0,00	0,25		26-jan	02:00	-	26-jan 02:00
566	Rig Up Schlumberger Wireline	1,50	0,50		26-jan	02:00	-	26-jan 03:30
567	RIH with two more jnts to land off	1,50			26-jan	03:30	-	26-jan 05:00
568	RIH Schlumberger Wireline	3,00	2,00		26-jan	05:00	-	26-jan 08:00
569	Depth Correlation of TCP/Packer	0,50	0,50		26-jan	08:00	-	26-jan 08:30
570	Pull Out of Hole, Rig down Schlumberger	1,50	2,00		26-jan	08:30	-	26-jan 10:00

	SKARV 4 – 6507/5-5 COMPLETION REPORT			Page: 61 of 202
Chapter: 5	PERFORMANCE REVIEW			Date: 03/05/02 Rev: 0

REF	.OPERATION	USED	EXE	Mod.	From - To			
		Hrs	Hrs	Plan				
571	Pull out of hole dummy fluted hanger.	2,00	2,50		26-jan	10:00	-	26-jan 12:00
572	B/O Fluted hanger to be used on EZ tree	1,50			26-jan	12:00	-	26-jan 13:30
573	Adjust string with pup joints as required	1,00	1,00		26-jan	13:30	-	26-jan 14:30
574	Prepared for welltest while evaluate missing collet from Eztree	3,00	0,00		26-jan	14:30	-	26-jan 17:30
575	Run Landing string and flow head	0,00	1,00		26-jan	17:30	-	26-jan 17:30
576	Preparations	0,00	0,00		26-jan	17:30	-	26-jan 17:30
577	Confirm Space-Out	0,00	0,00		26-jan	17:30	-	26-jan 17:30
578	Pick up SenTree and install on Major String	3,25	0,50		26-jan	17:30	-	26-jan 20:45
579	Function test SenTree Assembly	2,00	2,00		26-jan	20:45	-	26-jan 22:45
580	P test string to 6000 psi	3,00	1,00		26-jan	22:45	-	27-jan 01:45
581	Control hose unit star leaking. Changed out same	3,75	0,00		27-jan	01:45	-	27-jan 05:30
582	Run in Hole with 4 1/2" PH6 Tubing	3,50	1,00		27-jan	05:30	-	27-jan 09:00
583	Install Lubricator Valves	2,50	0,50		27-jan	09:00	-	27-jan 11:30
584	Test control hoses and function test lubricator valves	2,00	1,00		27-jan	11:30	-	27-jan 13:30
585	Pressure test String to 5,000 psi	1,00	0,50		27-jan	13:30	-	27-jan 14:30
586	Inflow Test Lower Lubricator Valve	1,00	1,00		27-jan	14:30	-	27-jan 15:30
587	Space-Out of Flow Head (Surface Tree)	0,00	0,00		27-jan	15:30	-	27-jan 15:30
588	Install Flow Head and Change to Long Bails	5,00	5,00		27-jan	15:30	-	27-jan 20:30
589	Land Test String in Well Head	1,00	1,00		27-jan	20:30	-	27-jan 21:30
590	Test connections from lower lubricator to choke manifold	3,50	3,00		27-jan	21:30	-	28-jan 01:00
591	Set the 7" Retrieval Packer	2,50	0,50		28-jan	01:00	-	28-jan 03:30
592	Close 5 1/2" Fixed (middle) rams on SenTree Slick Joint	0,00	0,00		28-jan	03:30	-	28-jan 03:30
593	Lock Open TFFIV and check Packer Integrity	1,00	1,00		28-jan	03:30	-	28-jan 04:30
594	Circulate Cushion into test string.				28-jan	04:30	-	28-jan 04:30
595	Put IRDV Tester Valve in Sequential Mode	0,50	0,50		28-jan	04:30	-	28-jan 05:00
596	Open reverse circulation ports	0,25	0,25		28-jan	05:00	-	28-jan 05:15
597	Pump Diesel Cushion	1,50	1,50		28-jan	05:15	-	28-jan 06:45
598	Close the IRDV Circulation Valve	1,00	0,50		28-jan	06:45	-	28-jan 07:45
599	Perforate the well				28-jan	07:45	-	28-jan 07:45
600	Perforate the well				28-jan	07:45	-	28-jan 07:45
601	Weather Check				28-jan	07:45	-	28-jan 07:45
602	Notifications				28-jan	07:45	-	28-jan 07:45
603	ESD Function Check	0,25	0,25		28-jan	07:45	-	28-jan 08:00
604	Safety Meeting	0,50	0,50		28-jan	08:00	-	28-jan 08:30
605	Systems Preparation				28-jan	08:30	-	28-jan 08:30
606	Walk the Lines & Tool Box Talk	2,00	0,50		28-jan	08:30	-	28-jan 10:30
607	Open the Downhole Tester Valve (IRDV)	0,25	0,25		28-jan	10:30	-	28-jan 10:45
608	Fire TCP Guns	1,00	1,00		28-jan	10:45	-	28-jan 11:45
609	Post perforation build up				28-jan	11:45	-	28-jan 11:45
610	Observe well for confirmation of Gun fire & BU	0,25	0,25		28-jan	11:45	-	28-jan 12:00
611	Well Clean up and Initial flow	6,00	6,00		28-jan	12:00	-	28-jan 18:00
612	Open Well on 16/64" Fixed Choke				28-jan	18:00	-	28-jan 18:00
613	Unload Cushion				28-jan	18:00	-	28-jan 18:00
614	Unload Interface and Rat Hole Mud				28-jan	18:00	-	28-jan 18:00
615	Clean up the Well				28-jan	18:00	-	28-jan 18:00
616	Switch Flow to fixed Choke				28-jan	18:00	-	28-jan 18:00
617	Commence Readings at Separator				28-jan	18:00	-	28-jan 18:00
618	Stop Methanol and Glycol Injection				28-jan	18:00	-	28-jan 18:00
619	Commence collecting PVT Separator samples.				28-jan	18:00	-	28-jan 18:00
620	Flow Well Until Sampling Completed				28-jan	18:00	-	28-jan 18:00
621	Preparations for Shut-in Period				28-jan	18:00	-	28-jan 18:00
622	Shut in well at down hole Tester Valve IRDV				28-jan	18:00	-	28-jan 18:00
623	11Initial Shut in	11,00	10,00		28-jan	18:00	-	29-jan 05:00
624	Shut in well at IRDV down hole Tester Valve				29-jan	05:00	-	29-jan 05:00
625	Activation of Metrol /Schlumberger Samplers (set Delay)				29-jan	05:00	-	29-jan 05:00
626	12Main Flow Period	14,00	14,00		29-jan	05:00	-	29-jan 19:00
627	Open Tester Valve IRDV				29-jan	19:00	-	29-jan 19:00
628	Open the Well at Surface, Flow the Well				29-jan	19:00	-	29-jan 19:00
629	Prepare for main build up.				29-jan	19:00	-	29-jan 19:00
630	13Main Build Up	30,00	40,00		29-jan	19:00	-	31-jan 01:00
631	Main Build up				31-jan	01:00	-	31-jan 01:00
632	14Well Kill				31-jan	01:00	-	31-jan 01:00
633	Bleed down tubing pressure prior to bullheading tubing contents.	2,00	1,00		31-jan	01:00	-	31-jan 03:00
634	IRDV to Reverse Circulate position and Reverse Circulate	3,00	2,00		31-jan	03:00	-	31-jan 06:00
635	Spot spacer and kill pill in tubing	2,00	2,00		31-jan	06:00	-	31-jan 08:00
636	Bull head formation below tester valve into formation	3,00	1,00		31-jan	08:00	-	31-jan 11:00
637	Circulate test tubing	8,00	2,00		31-jan	11:00	-	31-jan 19:00
638	Unseat Packer and Direct Circulate	4,00	4,00		31-jan	19:00	-	31-jan 23:00
639	15Pull DST String				31-jan	23:00	-	31-jan 23:00
640	Pull Landing String	8,00	8,00		31-jan	23:00	-	01-feb 07:00
641	Pull out of hole	15,00	15,00		01-feb	07:00	-	01-feb 22:00
642	Function test BOP	1,00	0,00		01-feb	22:00	-	01-feb 23:00
643	Flow Check	1,00	1,00		01-feb	23:00	-	01-feb 00:00
644	Pull DST tools	8,00	4,00		01-feb	00:00	-	02-feb 08:00

	SKARV 4 – 6507/5-5 COMPLETION REPORT	Page: 62 of 202	
Chapter: 5	PERFORMANCE REVIEW	Date: 03/05/02	Rev: 0

REF	.OPERATION	USED	EXE	Mod.	From - To			
		Hrs	Hrs	Plan				
645	Rig down Coflexip kill and choke lines from derrick	3,00	0,00		02-feb	08:00	-	02-feb 11:00
646	P&A				02-feb	11:00	-	02-feb 11:00
647	Abandon (Permanent abandonment)				02-feb	11:00	-	02-feb 11:00
648	Set EZSV squeeze packer and squeeze cement perforations				02-feb	11:00	-	02-feb 11:00
649	Hold safety meeting	0,50	0,50		02-feb	11:00	-	02-feb 11:30
650	Make up 7" EZSV squeeze packer. Ran same on wire line	7,00	0,50		02-feb	11:30	-	02-feb 18:30
651	Wow Heave 5 to 7.5 m Pitch 5 deg roll 4.5 deg	20,50	0,00		02-feb	18:30	-	03-feb 15:00
652	RIH on 3 1/2" PH6 tubing to 1640m	7,00	0,50		03-feb	15:00	-	03-feb 22:00
653	Change out handling equipment	0,50	0,50		03-feb	22:00	-	03-feb 22:30
654	RIH with squeeze packer on 5 1/2" drillstring	5,00	2,50		03-feb	22:30	-	04-feb 03:30
655	Set packer	0,00	0,50		04-feb	03:30	-	04-feb 03:30
656	Perform injectivity test	3,00	0,50		04-feb	03:30	-	04-feb 06:30
657	Release of packer	0,50	0,50		04-feb	06:30	-	04-feb 07:00
658	Pump spacer ahead. Mix, pump & displace cement	3,00	1,00		04-feb	07:00	-	04-feb 10:00
659	String backs into packer and squeeze cement. Drop min 10 bbls on top of packer.	1,00	1,00		04-feb	10:00	-	04-feb 11:00
660	Drop drillpipe wash ball and circulate string content	1,00	1,50		04-feb	11:00	-	04-feb 12:00
661	Pressure test to 1000 psi above injection pressure	1,00	0,50		04-feb	12:00	-	04-feb 13:00
662	Black out on rig power	1,50	0,50		04-feb	13:00	-	04-feb 14:30
663	POOH to 1640m	1,50	0,50		04-feb	14:30	-	04-feb 16:00
664	Change out handling equipment	0,50	0,50		04-feb	16:00	-	04-feb 16:30
665	POOH and L/D PH6 tubing	13,50	8,00		04-feb	16:30	-	05-feb 06:00
666	Changed Weatherford tong	1,50	0,00		05-feb	06:00	-	05-feb 07:30
667	Set EZSV bridge plug at +/- 2018m & spot cement plug no. 1		0,00		05-feb	07:30	-	05-feb 07:30
668	P/U and M/U 13 3/8" EZSV	0,50	0,50		05-feb	07:30	-	05-feb 08:00
669	RIH with EZSV to 2018m	5,00	2,00		05-feb	08:00	-	05-feb 13:00
670	Set EZSV bridge plug	1,00	0,50		05-feb	13:00	-	05-feb 14:00
671	Pressure test surface lines	0,50	0,25		05-feb	14:00	-	05-feb 14:30
672	Pump spacer and cement as pr. the cement recipe and displace to set a balanced plug.	2,00	2,00		05-feb	14:30	-	05-feb 16:30
673	Pull back 3 stands above theoretical TOC	0,50	0,50		05-feb	16:30	-	05-feb 17:00
674	Pressure test to 3100 psi over 1.2 sg brine	0,50	0,50		05-feb	17:00	-	05-feb 17:30
675	Drop drillpipe wash ball and circulate string content	0,50	1,00		05-feb	17:30	-	05-feb 18:00
676	POOH 5 1/2" drillstring & L/D excess pipe while POOH	16,00	16,00		05-feb	18:00	-	06-feb 10:00
677	Run 13 3/8 Bridge Plug				06-feb	10:00	-	06-feb 10:00
678	Rig up wireline	0,50	0,50		06-feb	10:00	-	06-feb 10:30
679	Miss run due to short circuit in cable	5,00	0,00		06-feb	10:30	-	06-feb 15:30
680	RIH and set bridge plug at 641m	0,50	0,50		06-feb	15:30	-	06-feb 16:00
681	POOH w/ wireline	1,50	0,50		06-feb	16:00	-	06-feb 17:30
682	Test Plug	0,00	0,00		06-feb	17:30	-	06-feb 17:30
683	Rig down wireline	1,00	1,00		06-feb	17:30	-	06-feb 18:30
684	Cut 13 3/8" csg at 641 m and recover wear bushing				06-feb	18:30	-	06-feb 18:30
685	M/U casing cutting string with 13 3/8" cutting tools	1,50	1,50		06-feb	18:30	-	06-feb 20:00
686	RIH with 200m 5 1/2" DP	0,50	0,50		06-feb	20:00	-	06-feb 20:30
687	Pick up MPIT from Derrick	0,50	0,50		06-feb	20:30	-	06-feb 21:00
688	Continue RIH to approx 630m w/ 5 1/2" DP	1,00	1,00		06-feb	21:00	-	06-feb 22:00
689	Establish P/U and S/O weight while compensated	0,25	0,25		06-feb	22:00	-	06-feb 22:15
690	RIH BHA to 641 m and Engage MPIT into wear bushing then close annular around DP	0,50	0,50		06-feb	22:15	-	06-feb 22:45
691	Pump did not get suction. Treated mud	2,50	0,00		06-feb	22:45	-	07-feb 01:15
692	Circulate and cut 13 3/8" casing.	0,50	0,50		07-feb	01:15	-	07-feb 01:45
693	Flow check	0,50	0,50		07-feb	01:45	-	07-feb 02:15
694	Release wear bushing from wellhead, POOH to MPIT and release wearbushing then rack back	1,00	1,00		07-feb	02:15	-	07-feb 03:15
695	Problem getting through flex joint. Pos rig	0,75	1,00		07-feb	03:15	-	07-feb 04:00
696	Continue POOH and lay down cutter	2,50	1,00		07-feb	04:00	-	07-feb 06:30
697	P/U premade spear assembly	1,00	1,00		07-feb	06:30	-	07-feb 07:30
698	M/U to MPIT and add 6 1/2" Bumper Sub above MPIT	1,00	1,00		07-feb	07:30	-	07-feb 08:30
699	RIH to 630m and establish P/U and S/O weight	1,00	1,00		07-feb	08:30	-	07-feb 09:30
700	Engage MPIT and release Pack-off	0,25	0,25		07-feb	09:30	-	07-feb 09:45
701	Flow check	0,25	0,25		07-feb	09:45	-	07-feb 10:00
702	Engage Spear	0,25	0,25		07-feb	10:00	-	07-feb 10:15
703	POOH w/ 5 1/2" DP	1,00	1,00		07-feb	10:15	-	07-feb 11:15
704	Secure casing at rotary and rig up casing handling equipment	0,75	0,75		07-feb	11:15	-	07-feb 12:00
705	Release spear and rack back to be laid down later	0,50	0,50		07-feb	12:00	-	07-feb 12:30
706	Pull & layout 13 3/8" casing	2,50	2,50		07-feb	12:30	-	07-feb 15:00
707	Lay out casing handling equipment	1,00	1,00		07-feb	15:00	-	07-feb 16:00
708	Surface cement plug				07-feb	16:00	-	07-feb 16:00
709	RIH w/ 5 1/2" DP	1,00	1,00		07-feb	16:00	-	07-feb 17:00
710	Pump spacer. Mix & pump cement	1,50	1,50		07-feb	17:00	-	07-feb 18:30
711	Displace slurry	0,50	0,50		07-feb	18:30	-	07-feb 19:00
712	Pull back to 431 and circulate clean	0,50	0,50		07-feb	19:00	-	07-feb 19:30
713	Circulate clear cement from DP, work across BOPs to clear of any cement	1,00	1,00		07-feb	19:30	-	07-feb 20:30
714	WOC while laying down pipe and jet BOP	9,50	5,00		07-feb	20:30	-	08-feb 06:00
715	Close BOP	0,00	0,00		08-feb	06:00	-	08-feb 06:00
716	Pressure test cement plug	0,50	0,50		08-feb	06:00	-	08-feb 06:30
717	Ran in and pulled out. Broke down pipe	2,50			08-feb	06:30	-	08-feb 09:00
718	Prepare to pull BOP				08-feb	09:00	-	08-feb 09:00

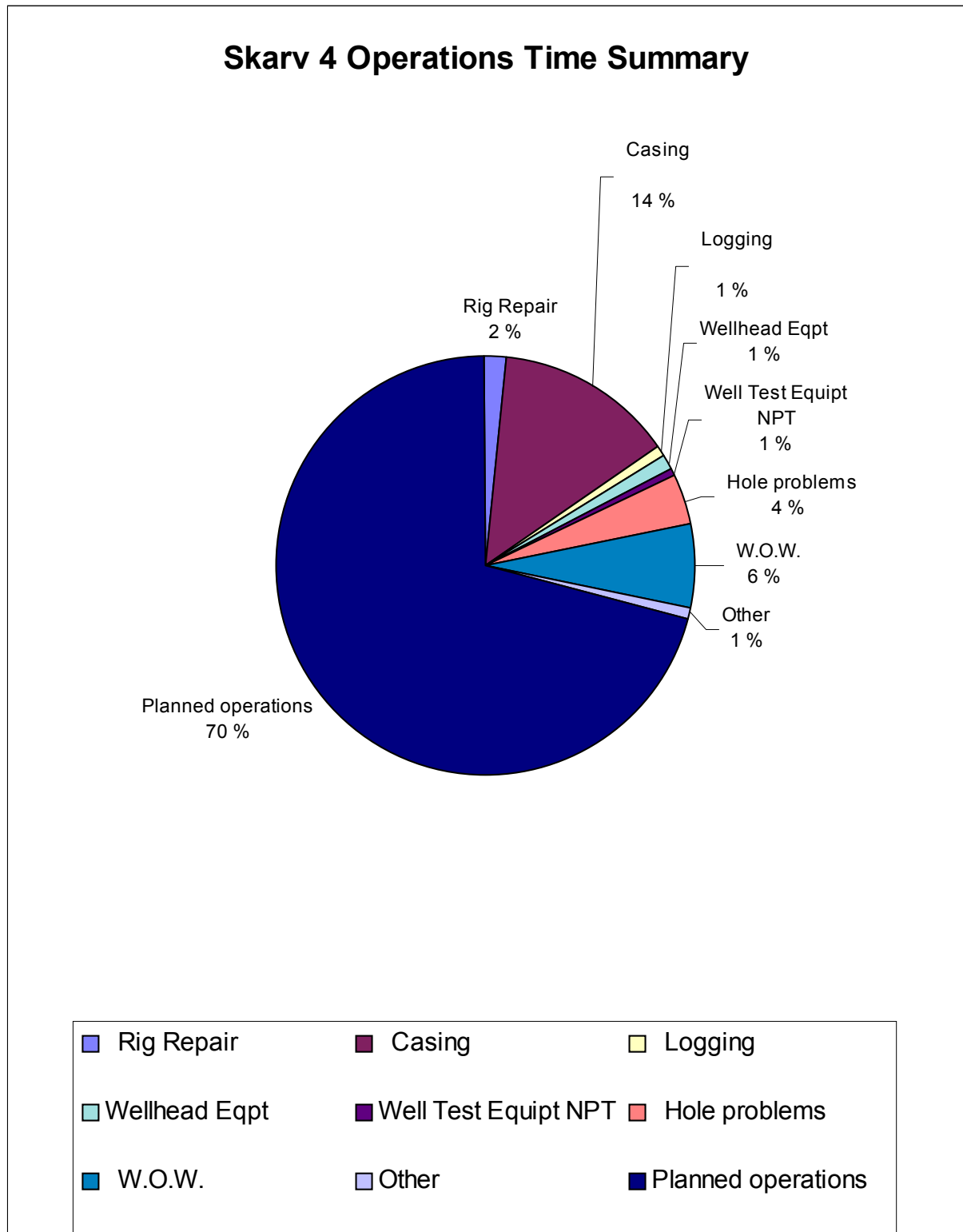
	SKARV 4 – 6507/5-5 COMPLETION REPORT	Page: 63 of 202	
Chapter: 5	PERFORMANCE REVIEW	Date: 03/05/02	Rev: 0

REF	.OPERATION	USED	EXE	Mod.	From - To			
		Hrs	Hrs	Plan				
719	Displ riser, flush BOP, K/C-lines and boosterlines	1,50	0,50		08-feb	09:00	-	08-feb 10:30
720	MU 500T bails, manual elevator	0,50	0,50		08-feb	10:30	-	08-feb 11:00
721	L/D mouse/rathole, master and outer bushings	0,50	0,50		08-feb	11:00	-	08-feb 11:30
722	Inst diverter RTool, bleed of slip jnt seal and disconn hose	1,00	1,00		08-feb	11:30	-	08-feb 12:30
723	Bleed off diverter seal, retract lock down dogs and check free	0,25	0,25		08-feb	12:30	-	08-feb 12:45
724	Bleed off Payne unit, hydraulic box diverter	0,25	0,25		08-feb	12:45	-	08-feb 13:00
725	Disconnect hoses for diverter insert packer	0,75	0,50		08-feb	13:00	-	08-feb 13:45
726	Remove rails for Iron roughneck, disconnect rotary-gir and hoses	1,00	1,00		08-feb	13:45	-	08-feb 14:45
727	Install spider, connect hoses. Open hydraulic valves under drillhouse	0,50	0,50		08-feb	14:45	-	08-feb 15:15
728	Open drill floor and unlock rotary lock pins	0,25	0,25		08-feb	15:15	-	08-feb 15:30
729	Disconnect flowline and fill up line	1,00	1,00		08-feb	15:30	-	08-feb 16:30
730	Prepare riser running tool and protectors	0,00	0,00		08-feb	16:30	-	08-feb 16:30
731	Install adapter on catwalk machine, position standlift	1,00	1,00		08-feb	16:30	-	08-feb 17:30
732	Remove posts in v door and eagle light rails	3,00	3,00		08-feb	17:30	-	08-feb 20:30
733	BOP Disconnect				08-feb	20:30	-	08-feb 20:30
734	Open DSC, PU diverter and inner barrel	0,50	0,50		08-feb	20:30	-	08-feb 21:00
735	Disconn BOP, inspect with TV or ROV	0,50	0,50		08-feb	21:00	-	08-feb 21:30
736	Pull BOP, remove HP hoses, Move Rig 10 m Off Location	4,00	4,00		08-feb	21:30	-	09-feb 01:30
737	Lock DSC	0,00	0,00		09-feb	01:30	-	09-feb 01:30
738	Un-dress slip joint				09-feb	01:30	-	09-feb 01:30
739	Vent the kill and choke line to atmosphere	0,00	0,00		09-feb	01:30	-	09-feb 01:30
740	Hook up deck tugger, centre the manifold	0,00	0,50		09-feb	01:30	-	09-feb 01:30
741	Lift manifold on the receptacles. Disconnect booster line	0,00	1,50		09-feb	01:30	-	09-feb 01:30
742	Unlatch and secure in open position	0,00	0,75		09-feb	01:30	-	09-feb 01:30
743	Slack off tuggers and release manifold from slip joint	0,00	0,25		09-feb	01:30	-	09-feb 01:30
744	Secure manifold on spider beams	0,00	0,50		09-feb	01:30	-	09-feb 01:30
745	Land outer barrel in spider, collapse slip joint and M/U lock bolts	0,00	1,00		09-feb	01:30	-	09-feb 01:30
746	L/D diverter and slip joint and pull out	0,00	3,00		09-feb	01:30	-	09-feb 01:30
747	BOP at surface				09-feb	01:30	-	09-feb 01:30
748	Pull Riser until last marine riser joint before pup jnt	12,00	12,00		09-feb	01:30	-	09-feb 13:30
749	Lower primary BOP guide and lower travel block, R/U rotary lifting	1,00	1,00		09-feb	13:30	-	09-feb 14:30
750	Install guide beams, open drill floor hatches and P/U travel block	2,00	2,00		09-feb	14:30	-	09-feb 16:30
751	P/U and land BOP on support beams,	0,50	0,50		09-feb	16:30	-	09-feb 17:00
752	Remove guidelines and retract, also telescopes remove pod hoses	2,50	2,50		09-feb	17:00	-	09-feb 19:30
753	Open drillfloor in V-door, land rotary and pup joint	0,25	0,25		09-feb	19:30	-	09-feb 19:45
754	Land BOP on transporter and secure same	3,00	3,00		09-feb	19:45	-	09-feb 22:45
755	Close hatches on drillfloor, land rotary and pup joint	0,25	0,25		09-feb	22:45	-	09-feb 23:00
756	Skid BOP to parking area	0,00	0,00		09-feb	23:00	-	09-feb 23:00
757	Remove lifting gear, guide beams etc	2,00	2,00		09-feb	23:00	-	10-feb 01:00
758	Cut & Retrieve 20 " & 30" casing				10-feb	01:00	-	10-feb 01:00
759	M/U BHA to cut and retrieve wellhead	1,00	1,00		10-feb	01:00	-	10-feb 02:00
760	RIH BHA to wellhead	2,00	2,00		10-feb	02:00	-	10-feb 04:00
761	Stab into WH, land MOST tool	0,50	0,50		10-feb	04:00	-	10-feb 04:30
762	Cut 20" and 36" at 396m BRT	1,00	4,00		10-feb	04:30	-	10-feb 05:30
763	Activate Lockdown	0,50	1,00		10-feb	05:30	-	10-feb 06:00
764	POOH BHA with wellhead and casing stumps	0,00	0,00		10-feb	06:00	-	10-feb 06:00
765	POOH BHA, guidebase in moonpool	0,00	0,00		10-feb	06:00	-	10-feb 06:00
766	Secure guidebase. Rack back MOST tool & L/D wellhead	0,00	0,00		10-feb	06:00	-	10-feb 06:00
767	L/D Most tool and cutting tools	0,00	0,00		10-feb	06:00	-	10-feb 06:00
768	Demob rig				10-feb	06:00	-	10-feb 06:00
769	Recover Anchors				10-feb	06:00	-	10-feb 06:00
770	Pull Anchors				10-feb	06:00	-	10-feb 06:00
771	Seabed survey - SIMOPS	0,00	1,00		10-feb	06:00	-	10-feb 06:00
772	De-ballast rig to transit draft - SIMOPS	1,00	5,00		10-feb	06:00	-	10-feb 07:00
773	Recover anchor no 3 and 7	3,00	5,50		10-feb	07:00	-	10-feb 10:00
774	Recover anchor no 2 and 6	3,00	5,00		10-feb	10:00	-	10-feb 13:00
775	Recover anchor no 4 and 8	3,00	5,00		10-feb	13:00	-	10-feb 16:00
776	Recover no 1	0,50	2,50		10-feb	16:00	-	10-feb 16:30
777	Rig moves AFT to pick up anchor no 5 & prepare for towing	1,50	2,00		10-feb	16:30	-	10-feb 18:00
778	Rig move to Haugesund and Rig hand over to Smedvig	90,00	0,00		10-feb	18:00	-	14-feb 12:00
779	Release Rig	2072	1186		14-feb	12:00		
		Time in days	86,3	49,4				

Actual 86.3 days
Technical Limit 49.4 days

	SKARV 4 – 6507/5-5 COMPLETION REPORT	Page: 64 of 202
Chapter: 5	PERFORMANCE REVIEW	Date: 03/05/02 Rev: 0

5.4 Time breakdown



	SKARV 4 – 6507/5-5 COMPLETION REPORT	Page: 65 of 202
Chapter: 5	PERFORMANCE REVIEW	Date: 03/05/02 Rev: 0

5.5 Non-Productive Time

Non-Productive Time Break-down Skarv 4

DATE	PHASE	EVENT	DRILLING OPERATIONS NON-PRODUCTIVE TIME (hrs)															
			Wireline	Rig Repair	Directional Equip	Mud	Cement	Coring	Casing	Logging	MWD / LWD	Bit Failure	Logistics	Wellhead Eqpt	Well Test Equip NPT	Hole problems	W.O.W.	General Delays
22.nov.01	Rig Move	WOW during rig move														22,00		
24.nov.01	Rig Move	WOW on location prior to running anchors														14,00		
25.nov.01	Rig Move	WOW on location prior to running anchors														24,00		
26.nov.01	Rig Move	WOW on location prior to running anchors														19,50		
27.nov.01	36" Section	Problems with Barite delivery system, unable to mix mud		4,00														
29.nov.01	36" Section	WOW to run 30" conductor														6,50		
30.nov.01	36" Section	Hydraulic leakage on 5 1/2" elevator		0,50														
30.nov.01	36" Section	Unable to get 30" conductor to bottom. Performed 36" cleanout run													13,50			
30.nov.01	36" Section	Dropped 30" conductor into sea. PGB locking mechanism failed.											3,00					
01.des.01	36" Section	Fished out 30" conductor, performed cleanout run and re-ran backup 30" conductor.											9,00		15,00			
02.des.01	36" Section	Unable to find 36" hole. POOH with conductor. M/U 36" holeopener.		0,50											23,50			
03.des.01	36" Section	Re-spudded 36" hole and drilled to 36" TD. Ran conductor.													24,00			
04.des.01	36" Section	Re-ran conductor into re-spudded hole.													3,50			
05.des.01	26" Section	Cross-threaded saver sub and damaged threads on 5 1/2" DP stand.		0,50														
06.des.01	26" Section	Problems with top drive torque wrench. L/D same.		0,50													3,00	
07.des.01	26" Section	Safe load indicator on gantry crane malfunctioned.		0,25														
08.des.01	26" Section	Repaired fault on draw works clutch.		3,00														
08.des.01	26" Section	MWD MPR Sub failed								5,50								
09.des.01	26" Section	IBOP failed to test. Changed out.		1,00														
12.des.01	17 1/2" Section	Problems getting LOT															2,00	
13.des.01	17 1/2" Section	Electrical Distribution Problems on rig, POOH to shoe while repaired		10,50														
14.des.01	17 1/2" Section	Fixed Electrical problems, RIH, circulated well prior to drilling ahead		4,00														
17.des.01	17 1/2" Section	Unable to pull 13 3/8" casing hanger running tool through BOP annular.											3,00					
18.des.01	12 1/4" Section	Problems with Drawworks clutch		4,50														
19.des.01	12 1/4" Section	Broken Hydraulic hose on DDM (1 hr.) Fault find on Mud pumps (1/2hr).		1,50														
21.des.01	12 1/4" Section	Electrical problem on Drawworks and Mud Pumps		0,50														
26.des.01	12 1/4" Section	Problems with racking back cement head.															2,50	
27.des.01	12 1/4" Section	Weatherford Tong Failure							2,00									
28.des.01	12 1/4" Section	Liner hanger problems							10,00									
29.des.01	12 1/4"	Problems getting BOP test tool through the Lower											7,00					

Chapter:
5

PERFORMANCE REVIEW

Date:
03/05/02Rev:
0

DATE	PHASE	EVENT	DRILLING OPERATIONS NON-PRODUCTIVE TIME (hrs)															
			Wireline	Rig Repair	Directional Equip	Mud	Cement	Coring	Casing	Logging	MWD / LWD	Bit Failure	Logistics	Wellhead Eqpt	Well Test Equip NPT	Hole problems	W.O.W.	General Delays
	Section	Annular.																
30.des.01	12 1/4" Section	Liner cleanout operations as a result of failed cement job.							23,00									
31.des.01	12 1/4" Section	Liner cement squeeze on shoe							24,00									
01.jan.02	12 1/4" Section	Liner cement squeeze on shoe (3.5 hrs) Repaired brake rim (0.5 hr)		0,50					3,50									
03.jan.02	8 1/2" Section	Crack in threads on inner barrel. Changed out same.						1,00										
07.jan.02	8 1/2" Section	Problems with MDT tool (OFA Errors)								7,00								
08.jan.02	8 1/2" Section	VSP tool failure								2,00								
09.jan.02	8 1/2" Section	VSP tool failure								6,50								
10.jan.02	7" liner Section	WOW while running 7" liner														21,00		
11.jan.02	7" liner Section	WOW while running 7" liner														24,00		
13.jan.02	7" liner Section	Emergency Generator Shut Down		2,00														
14.jan.02	Well Test	Well Influx through casing leak							12,75									
15.jan.02	Well Test	Well Influx through casing leak							24,00									
16.jan.02	Well Test	Well Influx through casing leak							24,00									
17.jan.02	Well Test	Well Influx through casing leak							24,00									
18.jan.02	Well Test	Well Influx through casing leak							24,00									
19.jan.02	Well Test	Well Influx through casing leak							24,00									
20.jan.02	Well Test	Well Influx through casing leak							24,00									
21.jan.02	Well Test	Well Influx through casing leak. Did BOP test also.							17,00									
22.jan.02	Well Test	Well Influx through casing leak							21,00									
23.jan.02	Well Test	Well Influx through casing leak. P/U Well Test Flowhead also							21,00									
24.jan.02	Well Test	Well Test Equipment failure.											1,00					
25.jan.02	Well Test	Casing tong elevator segments (Lip guide on elevator wrong size)							2,50									
26.jan.02	Well Test	Fish (collet and securing pin) from donut left in hole											3,00					
27.jan.02	Well Test	Hydraulic control unit hose leak (3,75 hrs) Dropped stand in derrick 1hrs)												3,75			1,00	
31.jan.02	Well Test	Unable to close circulation port on IRDV (0.75hr). Unable to circulate past packer (5hrs)												5,75				
04.02.02	P/A	Black out on rig (1.5hrs) Weatherford tong failure (0,5 hr)		1,50					0,50									
05.02002	P/A	Weatherford Tong Failure (1,5 hrs) Repaired broken hose on catwalk machine (0,5 hr)		0,50					1,50									
06.02.02	P/A	Draw works SCR problems (1,5hrs) Wireline short in cable head (5hrs) Mud problems (1hr)		1,50		1,00				5,00								
07.02.02	P/A	Mud problems (1,5hrs) P/A tool hanging up in flex joint (0.75hr)				1,50							0,75					
08.02.02	P/A	Unable to pressure test surface cement plug					1,00											
SUM (hrs)			0,00	37,25	0,00	2,50	1,00	1,00	282,75	20,50	5,50	0,00	0,00	22,75	13,50	79,50	131,00	8,50

Total NPT hrs: 605.75

	SKARV 4 – 6507/5-5 COMPLETION REPORT		Page: 67 of 202
Chapter: 5	PERFORMANCE REVIEW	Date: 03/05/02	Rev: 0

5.6 Cost Estimating

We have a process that we use for estimating and tracking costs of the Exploration “Common Process” wells.

This includes that the Lead Drilling Engineer is making the AFE with input from Vendors cost persons and engineers working on the well. We also use the Crystal Ball analysis. The vendors are themselves responsible for mobilizing equipment and personnel and also to estimate their budget and follow up the cost of the well.

During the Execution of the well Weekly Cost reports are submitted by the vendors. This includes all the cost for one week; personnel, equipment, onshore planning, mobilization cost, etc.

Within two weeks after the well is finished the Final Cost Reports needs to be done. Included here is a summary of actual versus budgeted cost and a list of sent and outstanding invoices.

The AFE cost vs. the Actual cost can be seen on attached Pie charts and excel spreadsheet.

5.7 Drilling operations Cost vs Plan

Skarv 4 – Vertical Well

The Vertical well was initial budgeted for NOK 198,3 mill. A Supplemental AFE was issued to cover for the overrun of the cost. The amount was NOK 44.1 mill. The total estimated cost for the Vertical well is NOK 235 mill. , 18.5% over the original AFE. The main reasons for the overrun are 5.5 days waiting on weather, 2.5 for Respod of the well, and 2.5 days when we had to run the 9 5/8” liner job twice.

Skarv 4 – Remedial Phase

The Remedial phase (repair of leak in 9 5/8” liner) was budgeted to NOK 33 mill. The Final Estimated Cost is NOK 35.1 or 6.6% over the AFE cost. This is due to the fact that we charged the testing cost equipment onboard, waiting for the test to commence, to the Remedial phase.

Skarv 4 – Testing Cost

The Testing program was done in less day and under budget. The budget cost was 40.6 mill. NOK. The final estimated cost is 37.9 mill NOK.

	SKARV 4 – 6507/5-5 COMPLETION REPORT	Page: 68 of 202
Chapter: 5	PERFORMANCE REVIEW	Date: 03/05/02 Rev: 0

5.8 Tabulation, AFE versus Actual Cost

SKARV 4		VERTICAL		REMEDIAL		TEST		TOTAL	
		AFE	Est. Final Costs	AFE	Est. Final Costs	AFE	Est. Final Costs	AFE	Est. Final Costs
	DAYS	56	62	10	9,33	11	9,83	77	81,16
Rig Cost	Hire of West Alpha	99 690 560	117 419 616		16 897 319	14 775 750	14 118 284	114 466 310	148 435 219
	Rig Site / Positioning	12 150 000	14 903 603		0	-	0	12 150 000	14 903 603
								-	
Consumables	Wellhead, casings, bits	10 451 824	9 456 042		1 600 000	217 198	0	10 669 022	11 056 042
	Mud chemicals and OBM Disposal	5 962 081	7 039 963		4 849 752	310 000	819 862	6 272 081	12 709 577
	Cement and additives	2 246 913	3 287 795		0	-	0	2 246 913	3 287 795
	Fuel Oil	2 862 500	3 041 402		476 966	550 000	502 470	3 412 500	4 020 839
Services	Mud Engineering	711 750	832 496		167 250	194 040	142 900	905 790	1 142 646
	Casing Running	2 588 705	1 898 853		335 895	250 000	354 314	2 838 705	2 589 062
	Cement services	2 130 361	2 112 098		151 641	197 966	189 231	2 328 327	2 452 970
	Mud and Drilling Data Log	1 766 880	1 383 706		0	237 831	379 505	2 004 711	1 763 211
	Directional Drilling & Survey	607 510	2 043 416		0	-	0	607 510	2 043 416
	MWD/LWD Services	1 964 648	3 153 405		0	-	0	1 964 648	3 153 405
	Fishing and Wellhead Recovery	340 588	440 406		122 895	144 782	164 451	485 370	727 752
	ROV Services	2 272 977	2 729 269		348 467	426 411	367 141	2 699 388	3 444 877
	Wireline logging	7 127 888	7 712 215		414 702	-	187 000	7 127 888	8 313 917
	Core Barrel Rental / Operator	707 575	906 788		0	-	0	707 575	906 788
	Core Analysis	725 000	821 404		0	-	0	725 000	821 404
	Fluid Sampling and Analysis	0	0		0	250 000	250 000	250 000	250 000
	Log Processing	236 250	0		0	-	0	236 250	0
	DST Planning & Equipment Installation	0	0		3 568 150	14 146 041	13 744 101	14 146 041	17 312 251
	Rig Communication / Telecom	472 000	501 525		41 985	49 500	44 235	521 500	587 745
	Drilling Fluid Equipment Hire	647 200	124 058		0	-	0	647 200	124 058
	Drill String Tool Rental	1 861 000	1 861 000		0	134 211	134 211	1 995 211	1 995 211
	Abandonment / Suspension	780 329	780 329		0	-	0	780 329	780 329
Transport and Supply	Air Craft (Helicopters and Planes)	3 410 000	3 323 133		568 132	1 364 286	598 577	4 774 286	4 489 842
	Road Transport	880 000	934 983		146 612	-	154 469	880 000	1 236 063
	Supply Vessel (includes dedicated OBM)	8 750 000	20 996 500		1 772 700	2 380 000	1 867 700	11 130 000	24 636 900
	Standby Vessel	3 600 000	2 836 000		541 140	660 000	570 140	4 260 000	3 947 280
Indirect Cost	Supply Base Operations	3 080 000	4 399 436		553 269	682 000	582 919	3 762 000	5 535 624
	Wellsite Supervision	2 609 792	3 434 322		675 492	796 800	711 692	3 406 592	4 821 506
	Engineering Studies	679 100	679 100		0	-	0	679 100	679 100
	Contractors / Consultants Costs	3 300 000	2 559 731		0	510 000	0	3 810 000	2 559 731
	BPA Manpower / Charges	13 703 196	12 410 648		1 951 314	2 301 600	2 055 885	16 004 796	16 417 847
TOTAL		198 316 627	234 023 242	33 000 000	35 183 680	40 578 416	37 939 086	271 895 043	307 146 008

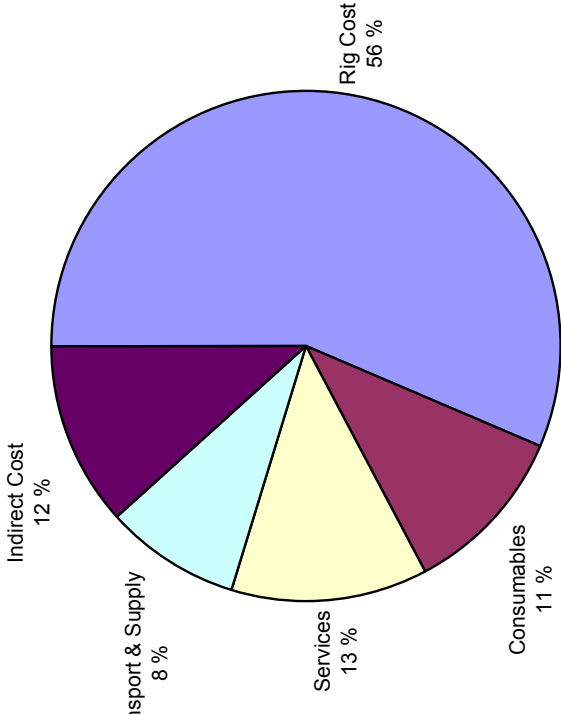
Sequential timing of operations

	Start	Finish	Days	Cumulative
Vertical Well	11.20.01 4:00	1.9.02 14:30	50,44	50,44
7" liner	1.9.02 14:30	1.14.02 7:00	4,69	55,13
Remedial	1.14.02 7:00	1.23.02 15:30	9,35	64,48
Test	1.23.02 15:30	2.2.02 11:00	9,81	74,29
P&A/Demob (Vertical AFE)	2.2.02 11:00	2.14.02 12:00	12,04	86,33

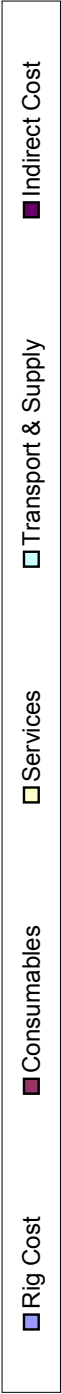
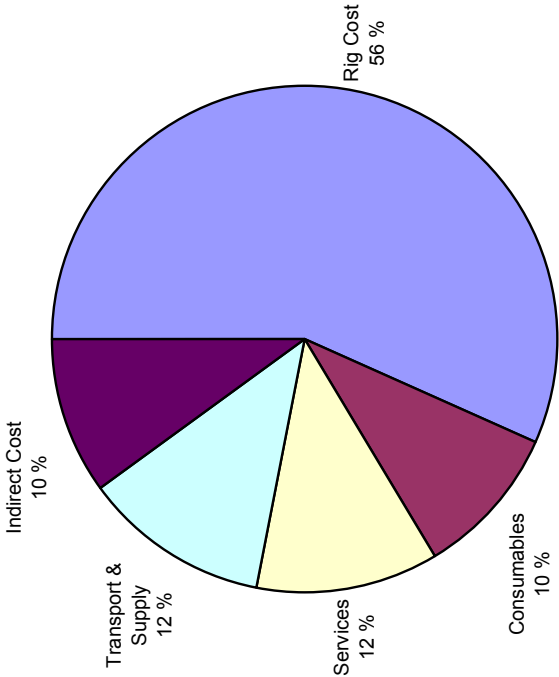
	SKARV 4 – 6507/5-5 COMPLETION REPORT	Page: 69 of 202
Chapter: 5	PERFORMANCE REVIEW	Date: 03/05/02 Rev: 0

5.9 Actual spend breakdown

Skarv 4 Vertical Well AFE cost

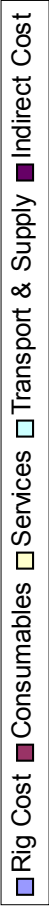
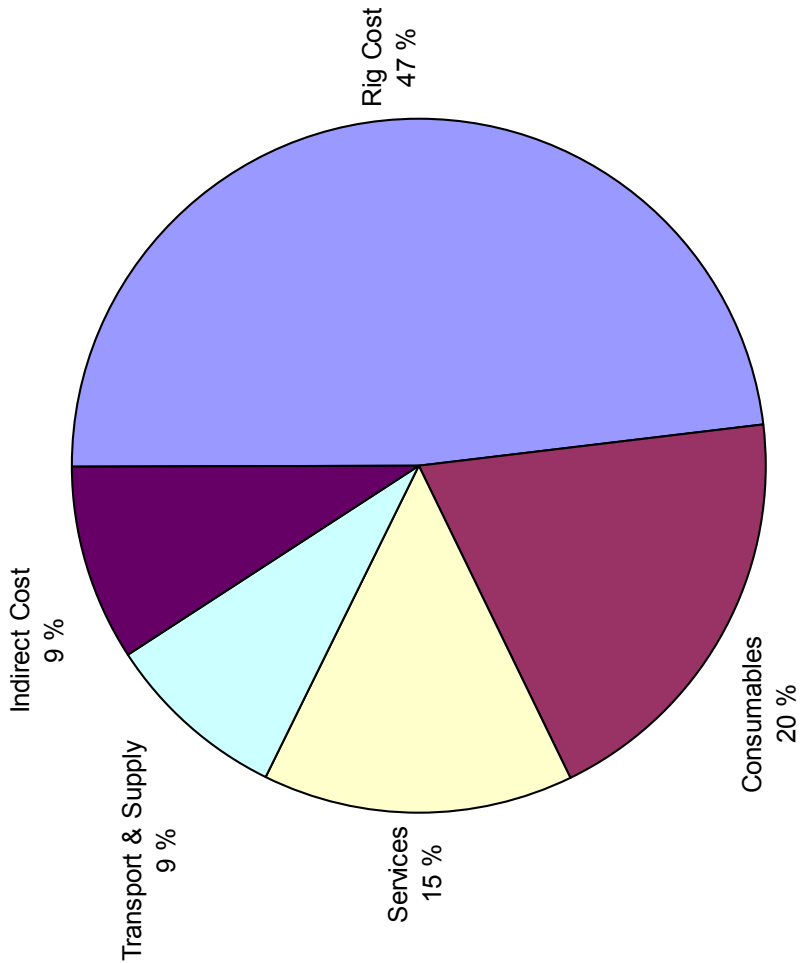


Skarv 4 Vertical Well Final Estimated Cost



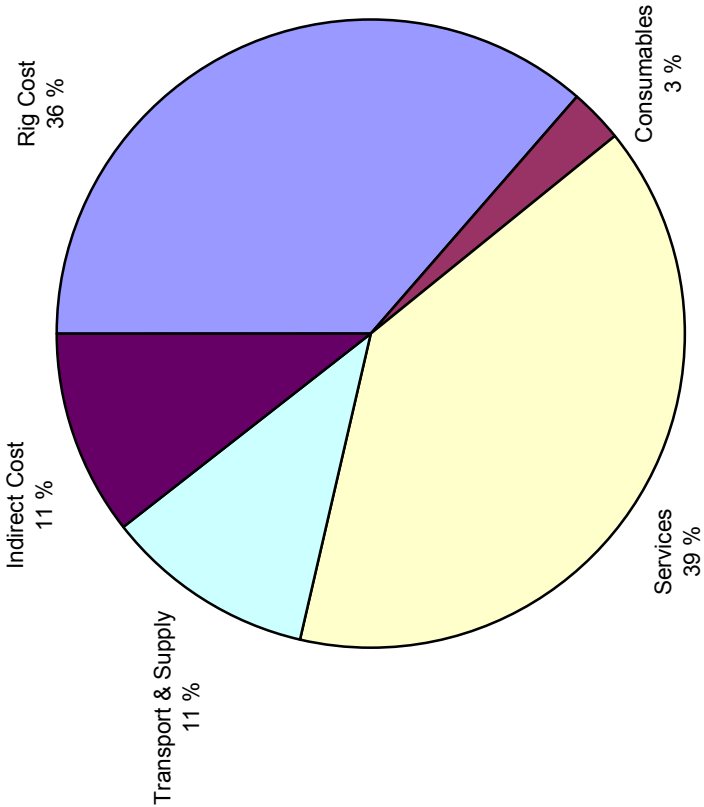
	SKARV 4 – 6507/5-5 COMPLETION REPORT	Page: 70 of 202
Chapter: 5	PERFORMANCE REVIEW Date: 03/05/02	Rev: 0

Skarv 4 Remedial Final Est. Cost

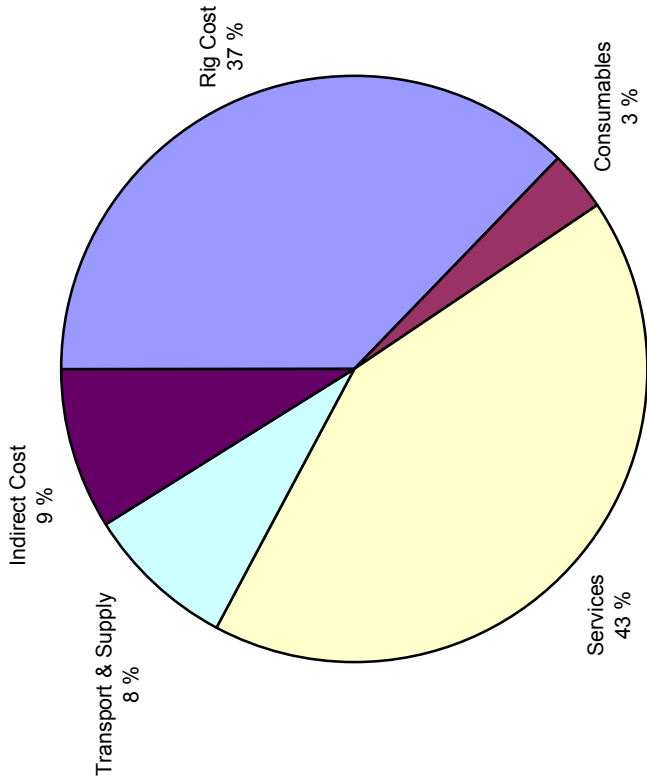


	SKARV 4 – 6507/5-5 COMPLETION REPORT		Page: 71 of 202
Chapter: 5	PERFORMANCE REVIEW	Date: 03/05/02	Rev: 0

Skarv 4 Testing AFE Cost



Skarv 4 Testing Final Est. Cost



■ Rig Cost

■ Consumables

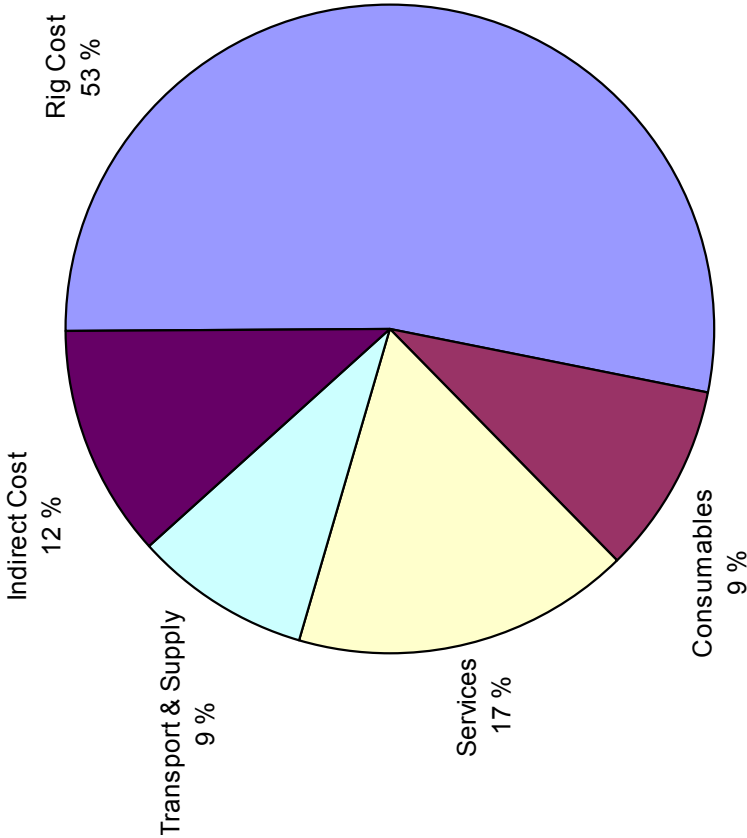
■ Services

■ Transport & Supply

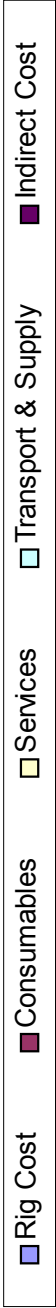
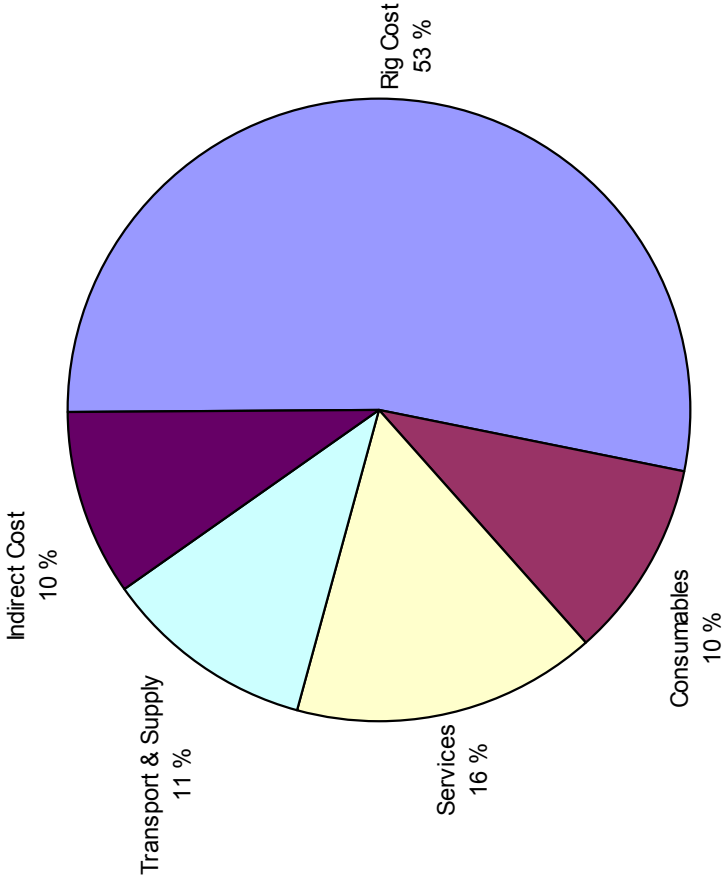
■ Indirect Cost

	SKARV 4 – 6507/5-5		COMPLETION REPORT		Page: 72 of 202	
	Chapter: 5	PERFORMANCE REVIEW		Date: 03/05/02	Rev: 0	

Skarv 4 Total AFE Cost



Skarv 4 Total Estimated Cost



	SKARV 4 – 6507/5-5	COMPLETION REPORT	Page: 73 of 202
Chapter: 6	LESSONS LEARNT	Date: 03/05/02	Rev: 0

6 LESSONS LEARNT

The objective of this section of the lessons learnt is to capture the significant events that were encountered during the planning and execution phase of the Skarv 4 well. The lessons that will have bp global impact will be extracted and distributed via Link and those that are area/ well specific for the PL 212 Licence will be available for future considerations when planning wells in the area.

No	Owner	Subject / Section	Description & Learning
1.		HSE	Description: Excellent HSE performance throughout well. No LTA, no spills, no high potential incidents. Learning: Commitment of whole team to deliver safe operation. Built a well specific action plan. Focused attention of the well itself. A known safe rig was used. Rig contractor had good reputation. Input into LINK: No
2.		Planning time	Description: The planning time ahead of spud was short. The short planning time was offset by using competent and experienced personnel and copy of previous proven well design. Learning: Do not shorten down the front end planning time unless you have to. It only worked this time because of having known rig, known well design and continuous and committed team. Input into LINK: No
3.		Low WOW	Description: Taking the weather conditions into account, the WOW time was low. The rig was very stable. Learning: Must consider rig stability for winter operations. Input into LINK: No
4.		Rig operations performance	Description: Excellent performance achieved from drilling contractor. Limited wasted time. Learning: Continuity pays off (3 years contract) Rig superintendent was used as the technical limit coach, which made it possible to pre-plan all jobs in an optimum manner and fitting in necessary maintenance jobs off the critical path. Input into LINK: No
5.	MJW	Move	Description: The 30" PGB came out with gimbal installed. The gimbal, a funnel mounted below the PGB to guide it into a TGB was too big in diameter to fit into the circular moonpool trolley. This resulted in the PGB sticking up approximately 2 feet and not being level with the moonpool trolley. After consulting with drill-quip the decision was made to remove the gimbal. On Skarv 2 the gimbal was never mounted under the PGB Learning: The moonpool trolley on the West Alpha has a circular opening and is not big enough to feed through the Drill-Quip gimbal. Action: Removed gimbal of primary PGB offshore and drill-quip will sent out backup PGB without gimbal installed. Need Feedback to Drill –Quip to sharpen up on what's being sent to rig – Action Tor Jan. Input into LINK: No rig specific learning – will depend on moonpool trolley
6.		Move	Description: Use of two AHV during long tow is recommended especially in bad weather. Learning: Rig was taken over from Esso with only the Torm Heron on the #8 chain plus the Thrusters and a speed of 5-5.5 knots was achieved. The Tor Viking arrived later and was connected to the #1 anchor and the speed



No	Owner	Subject / Section	Description & Learning
			went up to 7-7.5 knots in similar weather conditions. The Weather slowly deteriorated and winds up to 40-50 knots were recorded with 4-5 meters significant waves. The advantage of towing on the chain versus the bridle then is that more chain can be slacked off which will act as a "dampener" between the AHV and the rig and therefore allowing a smoother tow and delaying the ballasting down operations. Furthermore, it also gives a full set of redundancy in case one chain or AHV fails. Action: If possible with the fairleader configuration, two AHV one on each anchor chain is recommended to both increase operational safety as well as increase operational efficiency. Eamon's Comment: The practice is to be insisted on for future rig moves unless Drilling Contactor can justify reason not to. Input into LINK: No
7.	FM	Pre Spud	Description: No bulk mud materials on top-hole boat. Learning: Top-hole boat arrived without bulk materials: DW, Bentonite, and barite. Action: Ideally the rig should have all bulks and equipment for top hole drilling onboard prior to sailing. This needs to be evaluated against efficiency of rig move times. However the first boat to meet the rig on location must have bulks and equipment for top hole if not already onboard .Put in DOP. (Comments from lessons learned review meeting) Input into LINK: No
8.	FM	All sections	Description: Load all Cement heads offshore. Learning: The 30" and 20" DP darts were preloaded onshore in remote operated cement heads. This is not the best practise for the following reasons: 1. The cement heads cannot be function tested offshore without unloading and re-loading the dart. 2. This preload method requires 2 remote operated heads complete with air manifold and hoses since no 2 remote operated cmt heads are alike. 3. The man who loaded the head is not the man running the job. 4. The cement heads could be mixed up and the wrong dart dropped botching a 30" or 20" casing primary cement job. Action: Put in DOP. Use 1 cement head. Load on rig. Input into LINK: No
9.	FM	Logistics	Description: No cargo manifests sent ahead of equipment coming to the rig. Learning: The supply vessel faxed a copy of the cargo manifest to the rig when he arrived. Action: Shore base logistics co-ordinator fax out cargo manifest prior to vessel departure. This system needs to be for both equipment leaving Tananger to go to Sandnesjøen as well as equipment leaving Sandnesjøen going on boat to rig. Action Reidar Håland. Input into LINK: No
10.	Logistic	Helicopters.	Description: Maximum amount of people on a flight in the winter should be based on 14 persons. The Friday flight should have been for third party people or other small parties but not for the drilling crews as they already had 14 people and therefore we could not use this flight to put additional service personnel on it.



No	Owner	Subject / Section	Description & Learning
			Service personnel who have regular scheduled crew changes on to the West Alpha should use this facility and not expect to be able to arrange to crew change as and when it suits them. Only personnel that provide services at irregular intervals (Weatherfords, DrilQuip) should expect to be accommodated as and when they are needed. Learning: The BP Drilling Supervisor is not and never has been a logistics coordinator for our main 3rd party service providers. Baroid, BHI, Halliburton etc need to realise that they provide BP with services and not that BP provide them with the services of a Travel Agent. Action: Reiterate to the 3rd party Service Providers coordinators in the BP office that helicopter services to the West Alpha are set up for the convenience of everyone on the rig, and that seats may not be available to them on alternative days that are scheduled for Smedvig personnel. Input into Link: Not necessary.
11.	FM	Pre-spud	Description: Bariod had no MSDS documents on West Alpha Learning: Cementer had the latest CD-rom with all the MSDS data. All service hands should carry their companies safety directives, job procedures and MSDS on CD roms. Action: Take this up with all suppliers and consider to put in service contracts. Reidar Haaland Input into LINK: No.
12.	FM	Pre-spud	Description: Have supply vessels in the field carry Bulk materials. Learning: The Statoil boats were sailing hi and dry while West Alpha mixing pre-spud mud. Action: Standing instruction was issued to shared boat to top up on bulks on all sailings. Put in DOP for future projects. Action: Eamon Input into LINK: No.
13.	FM	30" hole section	Description: The 30" spud mud requirement was based on the 20" kill mud requirement. 11 hours + 4 hrs NPT was used mixing mud prior to spud. Learning: Offshore team did not understand the critical mud requirements have in place prior to spudding. Have a specific spud and kill mud requirement for 30" hole section, so that this mud can be mixed off critical path. Having the 30 and 20" top-hole mud in 1 batch presents a much larger volume to be pre-mixed. This causes a delay to spudding the well. This was a communication failure. Dialogue on this should have taken place earlier. (Lesson Learned review comments) Action: Amend DOP to reflect minimum quantities required to spud well. Drilling Supervisors to review and actively challenge DOP contents prior to operations. Input into LINK: No.
14.	FM	30" hole section	Description: Miniize/optimize conductor setting depth. Learning: The 30" hole section was shortened by 2 jts when slow ROP's were encountered and it appeared the bit/hole opener might not make TD. A better plan would have been to drill a shorter 30" section in the first place. Plan the 30 " section on a range of depths to allow the offshore team flexibility where to set the csg. Action: This need to be reviewed on a well by well basis depending on the results of the Shallow Hazard assessment, however any flexibility on decision making needs to be outlined in the DOP. Action – Tor Jan



No	Owner	Subject / Section	Description & Learning
			Input into LINK: No.
15.	FM	Communication inadequate.	Description: No e-mail. Super slow access to onshore files. No internet access. Learning: Same poor data link that was used on Skarv 3. Very frustrating cannot e-mail DDR's. Updating 'the execution plan' and POB take hours. Action: Future rigs working in this area need to had more efficient communication links. Budget the data link upgrade in the well budget. Needs to be addressed on rig spec for the next rig working in this area. Input into LINK: No.
16.	FM	TITUS hose HSE risk	Description: The TITUS cmt hose must be made up under the PGB in the moonpool. This is a very hazardous operation over rough seas when the standby cannot come in for over the side operations. Learning: Dril Quip should re-design the hose system so that it is pre installed and disposable to eliminate over the side work and increase efficiency. Action: Tor Jan to follow up with Dril Quip. Input into LINK: No
17.	FM	PGB 30" Housing dogs.	Description: PGB dogs wore out after suspending the 30" csg for 10 hrs. When dogs failed the 30" conductor string was dropped to the sea. Learning: The risk of this happening was not identified by anybody nor considered at any stage. Dril Quip no longer runs a sleeve below the dogs to shoulder the load of the 30" csg. This can happen again. Conclusions from the investigation report: The 30" conductor parted from the PGB as a result of dynamic bending loads being transmitted through the conductor/guidebase interface. These dynamic loads were produced by the poor weather and sea conditions acting on the conductor string. Recommendations: –Perform a risk assessment before it is decided to hang off. This needs to include type of conductor connectors, the type of wellhead to conductor interface, the suitability of BOP cart or spider beams and environmental conditions and length of hang-off period. –If decided to hang off, support the guidebase as close as possible around the conductor to minimize the loading –Service personnel to visually inspect the guidebase/conductor periodically during poor weather and sea conditions for any signs of deterioration or relative movement of the conductor. Action: Rig Procedures for hanging off to be updated Input into LINK: Yes
18.	FM	36" Hole displacement mud wt.	Description: The 36" hole was planned to be displaced to 1.2 SG mud after the wiper trip. After hard fill stood up the 30" csg the mud wt was increased to 1.6 SG. The Skarv 3 DOP specified 100 bbls of 1.4 SG 36" hole mud. Learning: The 1.4 or 1.6 SG mud wt may have prevented the original 36" hole from caving in with 6 m fill on bottom. Therefore the 30 csg could have been landed and cemented the first go. Action: Use 1.4 SG disp mud on 36" hole in future DOPs. Input into LINK: No

	SKARV 4 – 6507/5-5	Page: 77 of 202
Chapter: 6	LESSONS LEARNT	Date: 03/05/02 Rev: 0

No	Owner	Subject / Section	Description & Learning
19.	FM	ROV marker buoys	Description: The 36" hole could not be located. The marker buoys were of inadequate wt, had poor labels and were deployed in close proximity to one another. Learning: Deploy 3 buoys, spaced as outlined in the Halliburton ROV buoy procedure, labelled with legible and adequately wt'd to prevent movement. Action: Halliburton wrote buoy-spotting procedure. Drill reps enforce 3 Buoy Skarv policy. DOP to be updated to state the requirement for 3 buoys on bottom until PGB landed. Input into LINK: No
20.	FM	All Sections	Description: Rental HWDP, DC's and Lift subs are of sub standard quality. Learning: The HWDP arrived with mismatched Tool Joints, which could lead to several fishing runs to determine which overshot grapple might catch a broken connection. The 9 ½" lift sub and DC have been re-cut beyond standard practise. The lift sub tong area is shorter than the tong die contact area making it impossible to breakout with an iron roughneck and difficult to break out with rig tongs. The lift sub was laid down frozen into the top of the DC, rather than risk an incident with rig tongs pulling maximum torque on the small contact area. The DC pin end had been re-cut into the spiral-grooved area making the use of the pipe spinner wrench to back it out ineffective. The 9 ½" DC was backed out manually with a chain tong. Action: This equipment is Smedvig supplied. Smedvig to follow up and provide feed back on appropriate quality control actions. Input into LINK: No
21.	FM	36" hole section	Description: ROV transponder mapped by West Alpha bridge. Learning: As a back up to marker buoys marking the position of the 36" hole on the seabed, the ROV was parked at the intersection of the 36" hole and drill string. The West Alpha bridge used their transponder locator to mark the position of the ROV. This position could be used as a back up if all of the marker buoys became lost. Action: Put in DOP. This is one of a number of lessons learned areas of potential improvement during open water work. This needs to be verified as an acceptable practice. Eamon taking up with ROV company. All feedbacks to be out in DOP. Input into LINK: No.
22.	FM	36"	Description: Taking PGB heading without ROV gyro error. Learning: When the ROV is used to check the PGB heading after being parked several hrs in close proximity to the steel field of the PBG/30" housing remember the run the flux gate gyro in the free position. Other wise the gyro will give a false reading due to steel interference. Action: Put in DOP. Not normally necessary to have ROV parked for hours to check PGB heading. Requirement is to line PGB up with rig heading. (Lessons Learned review meeting comments) Input into LINK: No.
23.	GT/FM	36"	Description: 30" csg stood up on 6 m fill. This led to a chain of unscheduled events occurring over 4.9 days. The ultimate result being the collapse of the 36" hole. Learning: Future teams must re-evaluate need for rathole based on total

	SKARV 4 – 6507/5-5	Page: 78 of 202
Chapter: 6	LESSONS LEARNT	Date: 03/05/02 Rev: 0

No	Owner	Subject / Section	Description & Learning
			area experience. Action: Best practices for the area needs to be investigated and a conclusion on this made and implemented in future DOP. Input into LINK: No.
24.	Team	Prespud	Description: West Alpha took 15 hrs to spud in after anchor handling. Required service hands (i.e. mud engineer, ROV etc were not on board in time) Learning: In this case have all service hands on the rig prior to spud. Action: DOP – Logistics – service hands on MEL in time for operation needed Input into LINK: No
25.	MR	20"	Description: "20" casing stood up immediately below the "30" casing shoe. Learning: Even though the trip out of the hole to run the "20" casing had been uneventful, and the "26" hole had caused no problems while drilling or tripping, it is prudent to expect to experience problems when the "20" casing enters the "36" rat hole below the "30" casing. At one point it took 50 tons overpull to be able to pull the "20" casing string free. This is particularly true when the rat hole is long and the "20" casing is centralized. In the event, it was necessary to work the "20" shoe joint and the following 4 joints of "20" casing (all of which were centralized) through the rat hole with good circulation and 1 Hi-vis sweep. This was probably caused by cement blocks dislodged by the centralizers. This is one of the possible disadvantages of drilling a rat hole for the "30" casing. Action: To be noted in future DOP hole sections. Input into LINK: No
26.	MR	20" casing.	Description: Had to wash the "20" casing to bottom for the last 100 metres. Learning: Prudent to expect to need to wash down to bottom if you have experienced problems higher up the hole while running casing. Any thing at all that was previously dislodged from the wall of the well bore must eventually prove to be problematical. Action: To be noted in future DOP hole sections. Input into LINK: No
27.	GT	20" casing	Description: Had to re-position rig prior to pull 20" running tool out of 30" housing. Learning: The 20" casing was cemented, plug bumped and casing pressure tested to 1600 psi. The pressure was bled off and the bleed off valve on the 20" running tool was opened by the ROV. The string was turned 5,5 turns to the right with 2 MT overpull on the string. The tool started to move upwards about 15-20 cm, and then locked up in the housing. ROV inspected the lock ring to have been retracted OK. A slight angle was observed and the rig was moved 4-6 m to port side. With 2 MT overpull the 20" running tool came free from the housing. The running tool was inspected at surface and small marks showed that the tool have been hanging on the edge above the o-rings. Action: To be noted that the string must be straight over the wellhead. 20" running tool configuration is such that no angle is tolerated. Input into LINK: No



No	Owner	Subject / Section	Description & Learning
28.	MR	13 3/8"	Description: Lost time racking the 13 3/8" casing hanger in the derrick because the 5 1/2" drill pipe handling pup was too short. Learning: Need to use a 5 1/2" handling pup of at least 2.5 - 3.5 metres in length above the 13 3/8" casing hanger so that there is enough room to install the bushings and the slips in the Rotary table. It is difficult to install a second handling sub because of the possibility of backing the string out from the casing hanger itself. (Left Hand Thread). Action: Continue to stress the need for understanding of these issues with Service companies that provide "Made up assemblies" at future safety meetings. Input into LINK: Not necessary.
29.	TEAM	BOP Handling.	Description: Lost time in not having the correct threaded cross over sub beneath the Torque Wrench on the Top Drive. Learning: A 5 1/2 FH Box x 4 1/2 IF Pin (Especially made – very short) cross over sub from the Torque Wrench on the Top Drive to the lifting gear for the Rotary Table when preparing to run the BOP's would have prevented having to remove the Saver sub/Cross over and replacing it with a sub with the correct threads for the lifting apparatus. At the end of the running of the BOP's this process has to be reversed. This would result in a time saving of at least 1 hour. Action: This is a Smedvig rental item. If the necessary cross over was specified it should be possible to rent it under the present agreement. Input to LINK: Not necessary.
30.	Dril-quip	BOP test tool	Description: The Dril-Quip BOP testing tool for the 18 3/4" Wellhead was supplied with 4 1/2" IF threads above and below the test plug. Learning: If any rig is using 5 1/2" drill pipe and Heavy weight drill pipe, Dril Quip should supply the BOP test tool with the correct threads (5 1/2" FH) above and below the test plug. It is extremely difficult to install cross over subs because of the necessity to use ordinary rig tongs due to the inability to use the Iron Roughneck around the test tool. This is equally true of the "Jet Sub". Action: Dril-Quip should try ensure that they supply BOP test tools to the rig that are compatible with the drill string in use. Input into LINK: Not necessary.
31.	Team	Drilling 17 1/2" hole.	Description: The cuttings were soft, mushy and had been amalgamated together. Lots of "Fines" tended to blind shaker screens. Learning: There is an equation between running enough inhibitor in the mud and bearing the additional mud costs involved. and the amount of rig time eaten up by having to curtail drilling during additional circulating time to clean up the well bore and work on the shakers. Use of the coarsest screens possible did not prevent blinding of the screens. This may have been due to the shape of the grains in the fines rather than the size and volume of the cuttings coming over the shakers. Reducing the flow rate is most definitely NOT THE ANSWER. Action: More emphasis on the economics of drilling this hole section must be made. Careful evaluation of the benefits and consequences of using a "cheap and cheerful" dump and dilute Water based mud system as opposed to using a more expensive Water based mud that will facilitate better hole cleaning should be made. Rig time was lost in this hole section trying to keep the shale shakers in serviceable condition. The Wiper trips were essential. It must be possible to have a fuller selection and variety of shaker screens available at the rig site. These should include "Square" mesh screens and

	SKARV 4 – 6507/5-5	Page: 80 of 202
Chapter: 6	LESSONS LEARNT	Date: 03/05/02 Rev: 0

No	Owner	Subject / Section	Description & Learning
			“Oblong” mesh screens. Mud companies should be encouraged to share their best practices with BP and to become more pro-active in seeking solutions to this well documented problem. Input into LINK: Not necessary.
32.	Team.	Wiper Trip. 17 ½”	Description: Due to circumstances beyond our control, (Electrical power distribution failure) it was necessary to perform a wiper trip from 1600m +/- to the 20” casing shoe at 1050m. This trip was TIGHT. The drillstring had to be pumped out of the hole with up to 20 tons overpull and fluctuations of 5 Bar (70 psi) in pump pressure. At section TD similar tripping conditions were experienced. Learning: When a driller has experienced the type of hole cleaning problems that occurred while drilling this 17 ½” hole section with Water based mud, a wiper trip can be expected to become a necessity. Because of the widespread use of OBM, Wiper trips have almost become deemed to be unnecessary. This has never been the case when Water based mud has been used. The DOP should reflect the probability that a Wiper trip will be necessary. Action: Improve the DOP. Ensure that the drilling team understand that a Wiper trip will be more than likely if this section is drilled with water based mud. Input into LINK: Not necessary.
33.	Team.	Running 13 3/8” casing.	Description: The 13 3/8” NEW VAM casing was run using a Weatherford Jam Unit. This proved to be very problematical at the start of the job, because use of the automated casing handling system (Eagle light and BX elevators) meant that any rig movement was reflected in the friction created by the BX elevators which resulted in erroneous torque readings at the jam unit. This problem is not unique to the West Alpha and Maersk Guardian and the Transocean Nordic (which is a Jack up rig and has no rig movement) have also experienced severe problems running VAM connections on casing and production tubing. MORE EXPERIENCE AND ADVICE CAN BE OBTAINED FROM WEATHERFORDS: Learning: Expect erroneous torque readings when the casing is stabbed using automated handling equipment, or, use a cheaper, less demanding thread than NEW VAM. Any suitable connection that does not require the use of a Jam Unit. If 13 3/8” New VAM casing has to be used again, perform high standard QA/QC checks on threads before casing is sent to rig. Spot oval casing in good time and replace by round. Input into LINK: No.
34.	Team	Roles and responsibilities.	Description: Service personnel are coming to the rig that are ignorant of what their roles and responsibilities are. This is the exact opposite of “Teamwork”. Instead, Service companies appear to come to the rig having received no briefings as to what is required of them by BP or of any of BP’s newly implemented safety policies. Some are not aware of the BP “No Jewellery” policy. Some are not aware of a basic item called the DOP. This is almost unbelievable. Some appear to believe that they operate in “Isolation” and that so long as their function on the rig is fulfilled, they will have no impact on any of the other operations that are ongoing on the rig. EG. Baroid and Halliburton both needing pit space to enable Halliburton to mix Spacers and cement mix water, and Baroid need pit space to affect a change out of mud systems. (Example only – Not literal). Learning: Service providers in town are very, very poor at communicating BP’s requirements and expectations to their personnel before they leave town to go offshore. Even though Service companies are fully engaged in the planning and Pre-spud meetings that precede the spudding of a well, they fail to embrace the idea that we are a “Team” and continue to behave as though they see their function on the rig in isolation from everyone else and consequently they have little or no consideration for the requirements of

	SKARV 4 – 6507/5-5	Page: 81 of 202
Chapter: 6	LESSONS LEARNT	Date: 03/05/02 Rev: 0

No	Owner	Subject / Section	Description & Learning
			personnel from other companies. Input into LINK: Not necessary.
35.	Halliburton	Cement hose etc	Description: The control hoses on the cement head used on the landing string for the 13 3/8" casing were considerably shorter than the cement hose itself. This resulted in halting with the landing string at the rotary table for 5 – 10 minutes to hook up these control hoses to the Remote control unit, when only about 5 metres from landing the casing. This is the worst possible point at which to get stuck with the casing if the casing hanger is across the BOP's and the rams cannot be used if the well should start to flow. It is also poor oilfield drilling practice to halt the landing operation at any time when close to the landing point. The cement hose (Smedvig property) is only rated to 5,000 psi and the DOP called for the casing to be tested to 5,200 psi. Learning: The cement hose and Remote control hoses should be of the same length and of such length that they can be hooked up and the well circulated immediately after the cement head stand has been made up. This will help to alleviate potential stuck pipe problems because the casing string will be stationary and without circulation for the minimum possible time. Input into LINK: Not necessary.
36.	DrilQuip	Casing hanger seal assembly running tool. (CHSART):	Description: After the 13 3/8" casing had been cemented and the seal assembly set and tested against the annular preventers to 5200 psi, it proved to be very difficult to recover the DrilQuip CHSART because it was hanging up in the lower annular preventer. 3 ½ hours rig time was used attempting to recover the CHSART and it was finally recovered by taking 15 tons overpull on the tool and using the thrusters to "Walk" the landing string around the top of the well bore. Numerous attempts were made to position the rig exactly over the well bore and the ROV was used to assist by checking the BOP and Riser Bullseyes. None of the bullseyes indicated that the rig was more than 6-8 metres off of the wellbore, which should have made no difference at all in the recovery operation. (Water depth 375 metres). Whilst attempting to pull the CHSART tool and lubricate the annular preventer by circulating at 100 spm and 40 Bar, the pump pressure suddenly went up to 250 Bar and then dropped back down just as rapidly. On previous attempts this had not happened. Almost immediately after this occurrence, the CHSART came free with 15 tons over pull and was recovered to the rig floor. There was no significant damage to the CHSART and apart from a few minor marks on the top of the tool, there was nothing to suggest why the tool had been stuck in the annular. No debris of any kind was observed at the surface after the pressure spike had occurred whilst circulating. Learning: It is difficult to attribute any "single" cause to this occurrence. It is more likely that a combination of circumstances caused this problem and that these should be given due consideration as follows:- (1) The annulars had recently been closed and 5200 psi had been applied to the preventer from below. This pressure normally helps the preventer to seal off the well bore. The preventer had been opened only minutes before and the rubber sealing element of the preventer may not have been fully "Relaxed" when the recovery operation started. (2) The rig was a few metres off of location. This most definitely did not help matters. (2) The pressure spike while circulating does indicate that some sort of obstruction (junk or cuttings) was in the wellbore. (4) The CHSART is quite short and does not have a large bevel type guide on its top surface. The bevel is small and in my opinion, inadequate to be a usable "guide" to centre the tool in the BOP's. Action: Talk to DrilQuip to establish if there is any sort of history of this occurrence on other rigs using this type of tool. Try to encourage DrilQuip to re-establish a more substantial "Bevel guide" on this tool. Jump ROV sooner and utilize Marine department earlier so that all of the skills on the rig are involved in trying to solve this type of problem. Input into Link: No.
37.	MJW	12 ¼" Section	Description: Lost 8.5 hours drilling the Plugs above the float collar while

	SKARV 4 – 6507/5-5	Page: 82 of 202
Chapter: 6	LESSONS LEARNT	Date: 03/05/02 Rev: 0

No	Owner	Subject / Section	Description & Learning
			drilling out the 13 3/8" casing. Learning: A smith S987BHPX PDC bit was used to drill out the 13 3/8" shoe track. This is a very aggressive 5 bladed PDC bit with 22mm PDC cutters. The 13 3/8" cement job was executed according to plan and the cement plug bumped. Initially, the recommended parameters as supplied by Smith were used to attempt to drill through the plug without success. The parameters were then varied to see if any torque could be obtained. Staged up WOB while running with low rpm to eventually get some torque response. Difficult to say which combination of parameters resulted in finally drilling the plugs. Action: ASCI data was sent back to Smith to further evaluate the drill out parameters. Smith to go through data base and see if similar problems have occurred with 5 bladed aggressive PDC bits drilling plugs. Furthermore, we should re-evaluate the use of Franks Shark bite system. Input to link: No
38.	MJW	12 1/4" Section	Description: 4 hours were spent displacing from WBM to OBM. Learning: The execution planned called for displacing on the fly when the shoetrack was drilled. However, a combination of losing suction and the difficulty to drill the plug without backing off on the flowrate made us decide to perform the displacement itself independent from drilling the shoetrack. Getting a good displacement was paramount as volume control was extra difficult due to the pumps losing suction and jacking off. Could evaluate to drill the plug and float collar prior to commencing the displacement to OBM at least at that point drilling parameters should be steady which make it easier to perform this task simultaneously. Consideration could be given to either bumping the plug using seawater or drilling the float collar just with seawater as this then allows all the pits to be dumped after landing the casing and doing the cement job and prior to sealing off the entire rig for OBM. Note: Obviously, the casing collapse pressure needs to be checked prior to designed the cement job to be displaced with seawater. This time the last pit was used to perform the displacement with which meant that it had to be circulated through the string and over the shakers to be dumped as otherwise the rig had to be re-sealed again (pit dump valves). By drilling it with seawater the advantage would have been that this last pit could have been cleaned prior to sealing the rig and the waterbased mud would have been easy to displace out of the well with the heavy OBM. Input into Link: No
39.	MJW	12 1/4" Section	Description: Cuttings skips used worked very well. The bins were rented from Aberdeen and was of the Bairoid Drill Cutting Bins "DCB" type. Learning: This time smaller cutting skips were used. The skips could be stacked two high without people needing to climb on them. Furthermore they were lower which resulted in a steeper fall from the last auger into the skip, which resulted in no plugging off. The skips, where smaller which meant they were easier to lift as well. Action: Those types of skips are highly recommended to be used on the West Alpha for future total containment. They should also be considered on other projects where total containment is planned to be used. Input to link: No
40.	MJW	12 1/4" Section	Description: High Stick-Slip levels while drilling the Lysing and Lange interbedded formations. Learning: Drilling this section with an aggressive 5 bladed PDC bit results in high stick slip numbers. It remains a challenge to get a compromise between the LWD guy and the driller. More focus during the planning could be spent on optimizing the bit to minimize stick slip and to prepare an offset

	SKARV 4 – 6507/5-5	Page: 83 of 202
Chapter: 6	LESSONS LEARNT	Date: 03/05/02 Rev: 0

No	Owner	Subject / Section	Description & Learning
			log with stick slips numbers. In our case if we would have stuck to the recommended parameters we would not have been able to finish this section in one run. Action: When planning the next well in the area, download LWDdata and obtain a stick slip plot per meter drilled. This should be fed back to the bit suppliers to optimize bit design and drilling parameters to drill this hole section. Input to link: No
41.	MJW	12 ¼" Section	Description: Continued drilling with aggressive PDC bit through top Melke sequence despite low instantaneous ROP's Learning: The Instantaneous ROP's through the Lysing / Lange sequence was slower than anticipated. The entire sequence was hard to drill with high torque and stick slip values. The top Melke was penetrated at 3372m MD and instantaneous ROP slowly dropped from 20-30 m/hr to just 0-5 m/hr range circa 20m below top Melke. ROP would then Pick up once again to up to 40 m/hr for a 20-meter interval before it would die down slowly to almost 0 m/hr over the next 30 meters drilled. These 30 meters of real slow drilling could be interpreted as the bit being worn as in reality the sonic indicates that this section is a little harder to drill. After this 30m, the ROP slowly picked up again and the bit continued to TD. The bit drilled the entire section in one bit run from the 13 3/8" shoe to 9 5/8" casing point and was graded 2-5-BT-S-X-I-LT-TD Action: Future drilling programs should highlight the slow drilling through this section. This would minimize the change of pulling the bit green at the top Melke. On Skarv 4 we observed a ROP increase at 3451m, which was right at the base of the carbonate section approximately 80m below the top of the Melke. Input to link: No
42.	MJW	12 ¼" Section	Description: 9 5/8" Landing Collar was made up to the box end of a joint. Learning: Float collars and landing collars should never be made up at the box end of a joint. Instead they should be either made up at the pin end or made up in between a joint of casing. The downside of making the landing collar up at the box end is the difficulty to fish same in case the casing string is dropped Action: In future make up landing collars etc at either pin end of joints or in between a casing joint Input to link: No
43.	MJW	All Sections	Description: Working at heights Learning: Walking around the rig there are quite a few items, which are sent to the rig from offshore, which look like they are properly designed to work on but in fact are just over two meters in height. Some good examples of those are helifuel tanks (2.10m), cement liquid additive containers (2.05m), oil and glycol storage containers (2.05m). The only containers you are "allowed" to stand without safety harness is the Swaco vacuum container as this container is 1.95m high. Action: More focus is required to not sent equipment to the rig which looks like it is designed to work on, with a perfect work platform etc but in reality is higher then 2.0m and therefore requires special precautions to work on them. Effort should be focused on re-designing those type of containers below the industry standard of 2.0 m Input to link: No
44.	MJW	All Sections	Description: More data in DOP with regards to operational parameters Learning: Both the 12 ¼" and 8 ½" section did not have much detail about

	SKARV 4 – 6507/5-5	Page: 84 of 202
Chapter: 6	LESSONS LEARNT	Date: 03/05/02 Rev: 0

No	Owner	Subject / Section	Description & Learning
			the recommended flowrate and other operational parameters in the main body of the DOP. Action: Future DOP should include at least the recommended flowrate and operational parameters in the main DOP. This to ensure that lessons learnt from offset wells are captured and executed. In the 12 1/4" section we should come up with some recommended parameters to drill the different formations etc based on this latest run. Input to link: No
45.	Team Nodeco	Liner Running	Problem: the 9 5/8" liner was set without tagging bottom. Lesson learned: It is a best practice to tag bottom with liners run in vertical wells to verify the depth landed and pipe tally is correct. Action: Nodeco need to ensure their offshore service tech's understand bp's world class process in which they are fully responsible for the liner running operation. The liner tech must insist on executing best practices thru out the liner job. Input to link: No
46.	Nodeco	Liner running.	Description: The 9 5/8" liner running tool washed out during the liner setting operation. The liner cement circulated thru the washout causing the contamination of ca. 150 m3 OBM with cement and 36 hr delay to re-cmt the liner. Lesson Learned: The Nodeco running procedure was wrong. It did not specify sufficient weight down when applying pressure to shear out the ball seat. The major difference in this job compared to all of the previous jobs in the North Sea was that this job was performed with an improved new type of running tool (BA Tool) designed to have a larger ID for reduced ECD's and higher tensile rating. The standard tools have a 2-13/16" ID with a 100 mm OD Slick Joint. The BA tools have a 4.125" ID with a 141mm OD Slick Joint. The Running Tool sees a net upward force (piston force) from pressure applied to the ball seat. For the new bigger tool, the upward force is larger than for the old tool. Insufficient weight to compensate for the piston effect caused the string to move upwards when the pressure was applied. The movement most likely caused the Floating Junk Bonnet shifting the Pressure Equalization Sleeve. The circulation fluid was then diverted from downwards through the liner to the ports in the FJB and up in the 13 3/8" annulus. Shifting of the Sleeve at a 3000 psi pressure-load probably ruined the seals, destroying the pressure integrity for the Pressure Equalization Sleeve for the rest of the job. Action: Make sure the Nodeco procedures are updated to take into account the correct up-force when pressure is applied. If new tools are used, make sure proper design review and HAZOP study have been performed by the tool supplier. Input to link: yes
47.	BHI	Tracers in OBM	Problem: Carbide tracer could not be identified in OBM. Lesson Learnt: If the tracer had identified the liner running tool washout many hrs of liner cementing grief would have been spared. Action: Provide a dependable OBM tracer material or procedure. Input to link: No
48.	Bariod	Wet Big Bags	Problem: The KCL has been delivered in wet big bags. This has solidified the KLC material into hopper clogging lumps, which cause mixing inefficiency. It is not practical to be struggling with big bags of KCL on an expensive floating drilling operation. Action: Deliver KCL as a saturated salt fluid than can be diluted for use offshore and eliminate use of the labour intensive, contaminated, big bag materials. Input to link: No
49.	Dril Quip	18 3/4" well head	Problem: There is no drawing left on the rig to indicate the distance from the

	SKARV 4 – 6507/5-5 COMPLETION REPORT	Page: 85 of 202
Chapter: 6	LESSONS LEARNT	Date: 03/05/02 Rev: 0

No	Owner	Subject / Section	Description & Learning
	BP Smedvig	drawing.	TO the 18 ¾" wellhead to the TO of the 13 3/8" bore protector. There was no reference in DIMS to the TO the 13 3/8" bore protector from BRT. Lesson Learnt: These reference pts would be nice to know when spacing out the test plug to the pipe rams. If cross over subs proved to be too long the middle fixed pipe rams could not be pressure tested in the same run, need to fly cross over sub, or pressure test with RTTS packer. Action: Drill Quip leave accurate SS wellhead drawing on rig. Input to link: No
50.	BHI coring	8 ½"	Problem: The gel in the inner core bbl became energized with fm gas. When the top sub was backed off the rig rolled leaving the core an open path of escape. The energized gel immediately ejected 12.5 m of core on to the drill floor. Solution: The BHI core hands recommend using their inner core bbl aliening guide to keep the top sub connection aliened over the inner core bbl. Also clamp the lower pipe-racking arm on the top sub to stabilize it from vessel motion. Input to link: No
51.	Logistics	All sections.	Problem: The West Alpha deck plan has always been to minimize unnecessary cargo handling to reduce risks associated with the deck management. During the course of drilling to T.D. there was a change to the execution plan changed to sidetrack, test or abandon the well. The logistics plan escalated to include sidetrack and test equipment mobilization. The dedicated boat was put into service to ferry sidetrack and testing equipment up the coast from Tananger. During this period the drilling of the 8 ½" section commenced leaving only the shared Statoil boat to service the West Alpha and 2 Statoil operations. This situation in addition to winter weather patterns presented great logistics liabilities. Lesson learned: 1) Have a dedicated boat in the Skarv field during winter operations. 2) When plans change expedite equipment deliveries to the base without taking the dedicated boat out of the field. Input to link: No
52.	Dril-Quip	Emergency Hang Off Tool.	Problem: The West Alpha rig was running a 7" Liner inside 13 3/8" casing when the weather deteriorated and the decision was taken to hang off the 7" Liner and the landing string in the wellhead using the Emergency Hang off Tool. The hang off operation went well but when the weather improved and an attempt was made to retrieve the 7" Liner and the landing string, the 4 ½" threads on the recovery sub could not be engaged with the threads below the ACME thread in the Hang off Tool. The recovery sub was landed out properly but no torque was generated when the recovery string was rotated. The DrilQuip manual was referred to but instead of a schematic of the recovery tool in the manual, all that could be found was a "Blue" sheet of paper with the words " Drawings and Attachments to follow". The shore based on duty DrilQuip engineer was contacted and the Serial No of the hang off tool was relayed to him. His subsequent enquiries revealed that the threads on the pin of the recovery sub should have been 5 ½" FH instead of 4 ½" IF. Lesson Learnt: Insist on accurate Manuals from Service companies. Ensure that the threads on the Emergency Hang off Tool are checked and "known" to the rig personnel when the Hang off stand is assembled and racked back in the derrick. Action: Take up this issue with DrilQuip at EOWR meeting. Insist on full and complete manuals before spudding of well. Input to link: No
53.	Team	Recovering well integrity.	Problem: It was very difficult to pin point the problem with the casing or liner when the initial influx was taken in to the well bore. This proved to be very frustrating both to the shore based staff and the men on the rig. For a time the "Team" fragmented and was in danger of coming apart at the



No	Owner	Subject / Section	Description & Learning
			seams, but eventually good order was restored and "Team spirit" restored to some extent. Lesson Learnt: It must be possible to restrict the "Morning Meeting" to general well issues and to then take up any issues brought up in a meeting restricted to BP personnel and involved 3rd parties after the "Morning Meeting" has been concluded. Input to link: No
54.	MJW	Recovering well integrity after leak in 9 5/8" liner.	Description: Leak was determined to be between 2054m and 2682m and was in the 9 5/8" liner Learning: The leak was isolated by using RTTS packer to be between 2682m and 2054m, this is somewhere inside the 9 5/8" liner. This liner was never cemented all the way due to problems initially. A remedial cement job was performed with the Top of cement roughly 150m above the shoe (circa 3492m). The top packer had previously been set and was successfully tested to 5200 Psi for 10 minutes with 1.58 sg OBM in the well (11:30-13:00 hrs on 1 January 2002). The well was displaced to 1.2 SG WBM and the 8 1/2" hole section drilled and the 7" liner run and cemented. The 6" cleanout run was performed and the well displaced from 1.2 SG WBM to 1.2 SG brine. An attempt was made to pressure test the top of the 7" liner lap 5200 Psi with 1.2 SG brine in the hole and was unsuccessful (05:30-06:30 hrs 14 January 2002) The well subsequently started to flow and 56 bars was recorded on the choke. The root cause of the failure is still unknown. The only thing we established is that the leak is below the 9 5/8" tieback packer and somewhere in the 9 5/8" liner above 2682m. Pressure testing the casing to find the leak could suggest that the leak is small. The following has been checked in order to try to find the cause of the failure: –Casing wear –Partly unscrewing of liner joint when drilling out 9 5/8" shoe track –Excessive forces (temperature related) on casing when testing after circulating in cold brine –Poorly made up casing connection or poor connection The results of the above investigations were inconclusive. A detailed report can be found in the Skarv 4 electronic well file under the folder "Review → Major Incident Follow Up. Input to link: No
55.	MJW	Liner running	Description: Nodeco liner running tool had a 6 5/8" box connection at the top versus 5 1/2" FH. Learning: The hanger running tool did not have the correct DP connection to make up straight to the 5 1/2" FH connections used. The connection on top of the running tool was 6 5/8" FH instead. There wasn't a separate 6 5/8" x 5 1/2" XO supplied with the liner hanger and as such the Emergency hang off tool needed to be broken apart to get this XO. This resulted in the inability to use the hang off tool and also resulted in 1 hour to break out the XO and an additional 1,25 hrs to make up the hang off tool again. Total time lost was 2 1/4 hrs of rig time Action: The running tool should have come out with the correct XO and should have had 5 1/2" FH box. If this could not be organized in time then two separate 6 5/8" x 5 1/2" FH XO should have been supplied by Nodeco as part of the package. Input to link: No
56.		DST	Description: The DST test was completed safely within budget. Learning: The DST was planned to a comprehensive detail with service sector. The same people that planned the test also went to the rig and executed it.



No	Owner	Subject / Section	Description & Learning
			Input to link: No
57.		Run test tubing	Description: Weatherford 3 ½" elevator did not latch satisfactory Learning: While picking up 3 ½" Test tubing it was found difficult to properly latch the Weatherford supplied 3 ½" air operated elevator. This elevator needed to be changed out for the backup elevator and resulted in ¼ hours lost time. Action: Check QA on elevators with Weatherford. Input to link: No
56	Baroid Mud	Kill brine.	Problem: Poor estimation of the quantities of kill weight brine that would be needed to regain well control was made initially and insufficient brine was requested. This condition would have been compounded if it had been left to Baroid to coordinate the logistical supply from Kristiansund. Learning: Baroid did not appear to see rations. The World Class Drilling Process seems to have become diluted to the point where Baroid mud engineers do not appear to believe that they are accountable for their actions and are loath to resume that accountability and responsibility. Alternative Action: Dispense with the services of Baroid as the preferred supplier of mud engineering services.
58.		Run test tubing	Description: Weatherford did not supply special cut out slips to run control hoses for EZ tree. Learning: No cut out 4 ½" slips were provided by Weatherford for accommodating the control hoses for the EZ tree while running the 4 ½" landing string. Action: A set of slips was modified on the rig to accommodate the control hoses. BP should not pay for those slips, as they should have been supplied as part of the package. Input to link: No
59.		Run test tubing	Description: 3 ½" PH6 tubing was made up without JAM unit Learning: The 3 ½" tubing was made up and used as a cleanout string to displace the well back from 1.5 SG kill weight brine back to a 1.2 SG brine after running the 7" scab liner. Weatherford was used to make up the 3 ½" PH6 tubulars and the string was racked back in the derrick after the well was displaced to 1.2 SG brine. The TCP guns were run when it was discovered that the previously run 3 ½" tubing had not been made up using the JAM unit. This despite the fact that the DST program clearly stated that the Jam unit should have been used. Furthermore, the BP DST supervisor had a discussion with Weatherford prior to his departure and clearly stated that the JAM unit should be used. That person however had crew changed and was no longer onboard. Action: It is embarrassing to see that we spent all this time and money planning the DST come to find out that this is not transferred to the people working offshore. Weatherford needs to come up with a proposal of how to assure that those kind of incidents will not happen in the future as the communication between the onshore support and offshore is clearly lacking. A proposal might be to make a well specific binder, which will stay offshore for each company, as this communication problem is not isolated to Weatherford only. This binder could include: 1. Accountability sheet of the onshore co-ordinator. 2. Brief explanation of the WCDP and what we expect from the offshore crew leaders. This quite often is more than just one particular service. 3. Copy of the MEL specific for Weatherford, so the crew leaders can check if we have got everything not only according to the manifest but also according to the MEL.



No	Owner	Subject / Section	Description & Learning
			4. Specific objective for each casing run with all specifications. This should list what services Weatherford supplies during each casing string. Furthermore it should have details of connection type, MU torques etc and state if torque turn would be required Input to link: No
60.		Run test tubing	Description: 3 ½" PH6 was made up to higher than recommended make up torque Learning: Some of the previous well test had incurred high cost for re-cutting the entire test string as the connections were damaged. Therefore, on Skarv 4, Hydrill was contracted to provide the assurance that the connections would be made up and broken out correctly. The 3 ½" PH6 tubing was made up to be used as a clean out string prior to doing the DST. The Hydrill thread inspector provided Weatherford with the make up torque value of 8500 ft-lbs whereas the optimum make up torque was 6200 ft-lbs as listed in the Skarv 4 welltest program. The Hydrill thread inspector had looked up the recommended make up torque in his own book and moved his finger down one line which resulted in the higher than recommended make up torque being applied to the 3 ½" tubing. Hydril was contacted and confirmed that the tubing was still in good condition as the maximum make up torque is 11,300 ft-lbs. The real learning is that nobody had looked into the DST test program as the operation was to RIH and displace the well back to 1.2 SG brine prior to commencing the DST program. By providing the Hydrill inspector it almost seems that we have taken some of the responsibilities away from Weatherford as well as I would have expected them to be intimate with the required MU values for the 3 ½" PH6 as well, especially as it was supplied by them. Action: There is no doubt that the Hydril inspector should have known better. However, I expect Weatherford to know those values as well and at least challenge the values as provided by Hydril Input to link: No
61.		DST	Description: Primary EZ tree was damaged while performing surface function testing in sub zero weather conditions. Learning: In this case the most likely cause for the damage on the EZ tree was testing the EZ tree at sub zero weather conditions. The tree was tested without heating up and some of the internals might have been frozen. The applied pressure might have actually caused some of the internals to break. Sub zero weather conditions should be applied whenever temperature is below zero. Action: Sent in EZ tree and examine same to identify most likely cause of the incident. Input to link: No
62.		Run test tubing	Description: Needed to change Weatherford elevators from 3 ½" inserts to 4 ½" inserts which was very time consuming. Learning: Took 2 ½" hours of rig time to change the Weatherford elevators from 3 ½" inserts to 4 ½" inserts. The program was as follows: 1. RIH with 3 ½" 2. Do dummy tree and land same on 4 ½" tubing 3. POOH with EZ Tree 4. Rack back one stand of 3 ½" tubing to insert space out pups below. 5. RIH with EZ tree and land same off on 4 ½" tubing This involved 3 changes of inserts. Both the elevators were dressed for 3 ½". One elevator was changed to 4 ½" inserts and the backup one was used



No	Owner	Subject / Section	Description & Learning
			for the 3 ½" tubing (This backup one was previously laid out due to difficulties latching). In the future at least one elevator should have come out dressed for 4 ½" and the other should have come out dressed for 3 ½". This together with spare slips would have been sufficient as the change out of the elevators takes less than ½" hour. Action: Should have at least one elevator already dressed for the tubing sizes used. The other one can then be used as backup. Input to link: No
63.		DST	Description: Lot of backflow of brine through tubing while running in with DST test string Learning: The downhole TFTV acted as a "downhole pump". The rig heave would cause the flapper to close and the brine to be pushed out over the top. Luckily, this was ordinary brine and not the bromide brine as it would have been impossible to trip. Even when POOH after the dummy run, the brine would be pushed out of the tubing with the stand all the way in the derrick. The trip tank was used but the well did not give back the correct volume, actually showed a loss when RIH with the tubing. This because the majority of the brine would be sprayed all over the rigfloor This is something to be aware off as in this case a heavy slug would not make any difference as it is not caused by an imbalance in hydrostatic head but purely due to the TFTV. Action: Be aware of this problem especially when heavier brines are used as completion fluid. Input to link: No
64.		DST	Description: Flow simulations conducted out on the rig showed that the maximum flowrate which was achievable using the 3 ½" x 4 ½" DST test string was circa 5000 bbls/Day versus the 9000 bbls/day as in the planned Learning: This simulation should have really been conducted in the planning stage and be part of the tubing selection criteria. Action: Future test programs should have a copy of the tubing performance curve included. Input to link: No
65.		Fishing tools	Description: 3 ½" and 4 ¾" Fishing tools were accidentally backloaded Learning: The slimhole fishing tools were accidentally backloaded with the 9 5/8" Nodeco liner hanger equipment as they were in the same container. Weatherford had both Nodeco people and casing running people on board but nobody seems to take ownership of the Weatherford fishing tools. Action: Weatherford needs to develop a system, which ensures that their crew leaders are exactly familiar with all the services Weatherford supplies on the well and that they are familiar with their roles and responsibilities. On Skarv 4 the welltest tubing is rented from Weatherford and so are the fishing services. We need to make sure that the crew leaders take full accountability for all the services and not only the individual product lines (See previous learning with regards to 3 ½" tubing not made up with Jam unit) Input to link: No
66.		DST	Description: Only one full spare joint of 4 ½" tubing was sent out to the rig Learning: The water depth on Skarv 4 was 393m. We just had 1 spare 4 ½" tubing joint plus some pups available to land the EZ tree in the wellhead.

	SKARV 4 – 6507/5-5	Page: 90 of 202
Chapter: 6	LESSONS LEARNT	Date: 03/05/02 Rev: 0

No	Owner	Subject / Section	Description & Learning
			Action: Future load out list should have approximately 6 spare joints. Input to link: No
67.		DST	Description: Lost collet and nut in well after retrieving the dummy tree. Learning: The dummy test string was run with the donut screwed all the way to the top on the adjustable spindle. Therefore, the two collets or retaining pins were installed at the bottom of the donut. Those collets prevent the donut from accidentally backing off and are held in place by a small retaining screw. After retrieving the dummy tree and moving it to the pipe deck it was found that one of the collet and screws was missing from the dummy tree assembly. A deck search was conducted but the collet was not found and assumed to be left in the hole. The other retaining nut on the other collet was found to be loose. Action: It is better to install the collets at the top of the donut as this will at least prevent them from dropping after the retaining nut has been backed off. Furthermore, the retaining nut has only a few threads which hold it in place and a better solution need to be re-engineered. Need Schlumberger to do failure report and come up with recommendation, which should include a modification to the retaining nut mechanism. Input to link: No.
73		DST planning	Learning: Get the whole team involved early, wide range of experience present and interconnecting problems are easily identified. Keep the team together keeps plan consistent. When people change then many of the reasons behind the decisions made are lost. When a section of the plan is changed it is not always obvious how it effects all other actions. By keeping the same people the Team memory is enhanced. Input to link: No.
68.		DST planning	Description: During the planning the planned flow rates moved from 5,000 bbls a day to 9,000 bbls a day without a proper review of the knock on effects of the change. While on the rig a Prosper simulation of the flow was run and it was found that the 3 ½" tubing was far from optimal for the test should the permeability of the reservoir have been in the Darcy range. As it turned out the permeability was lower than estimated and the choice of tubing did not adversely affect the test. This was good fortune rather than good planning. Learning: Set clear objectives early in a Statement of Requirements document. Change of objectives need to be documented with a Management of Change document and the whole team informed of the change. Input to link: No.
69.		DST planning	Description: It was seen that in several areas of the well test were we had problems of communication the root cause could be traced back to a lack of continuity in the planning. One person would start, another add a section and a third went offshore to execute the plan. This frequently led to miss-communication of the objectives or the reasons behind the planned events. Learning: Whoever writes the plan executes the plan! BP has to ensure that there is management commitment within the service community to the planning process, that managers provide adequate personnel for planning. If a person is going to be changed out during that planning of the well test then a formal change will have to take place. Old member, New Member and Team Leader to ensure a concentrated effort is made to keep continuity.



No	Owner	Subject / Section	Description & Learning
			Input to link: No.
70.		DST logistic	Description: Smedvig have recently changed their inspection procedures to take responsibility for the inspection of all equipment going to the their offshore locations. The change has been prompted by a recognition by Smedvig that the responsibility for equipment on their rigs ultimately Smedvig's. In order to control equipment and documentation Smedvig now inspect all equipment going to their rigs. The plan for the load out of Well Testing Equipment included provision for this inspection to take place however in the event it could have been handled much better. A combination of poor communication, a much moved expected load out date and the Christmas holidays contributed to a less that satisfactory control of both equipment and certification documentation. Learning: On future well tests the following recommendations should be considered: • Global changes to requirement for equipment specifications and documentation should be given a much higher visibility. • Requirements should be documented and signed off by all contractors. I.e. that they have received the procedures required and that they agree to comply. • The MEL (Master equipment list) should have a column for compliance check with shipping requirements to give all personnel involved a simple visual reminder of what has yet to be done. • Schlumberger have committed to having a complete equipment specification list of all their Norwegian equipment on CD on the rig while operations are being carried out. Input to link: No.
71.		DST logistic	Description: Originally the load out of the well test was planned with one dedicated supply boat from Stavanger direct to the West Alpha. The advantage of the plan was that the mobilization of the Well test could be deferred until the MWD logs had been obtained across the reservoir and a hydrocarbon presence confirmed. As we got closer to this decision point it became advantageous to the whole Well Team to use the dedicated WT boat to take equipment to the rig for the other options, i.e. Side Track or Plug and Abandon. As a result not all of the WT equipment could be accommodated on the boat and a split had to be made at Asco base, on the Quay side, as to what equipment was really necessary to start the WT operation and what could be sent by truck to Sandnessjøen. Learning: The split worked quite well even though it was done on the fly as both the Well Test Team Leader and the Schlumberger Supervisor were at Asco, however should future well tests be faced with the same scenario then this split should be planned for in advance. Input to link: No.
72.		DST Deck Plan	Description: With the three options of Well Test, Side track and Plug and abandon being run at the same time, combined with very bad weather the rig was quite full of equipment when the well test was being rigged up. There was a Deck Plan previously prepared for the location of the equipment on the rig. This plan created a nucleus for the planning operation of equipment location. Many changes were made but with good co-operation between the Contractors personnel, Senior Tool pusher and Pushers and crane operators a revised plan was made and implemented. The time available for preparation was very short, the half of the equipment was on the dedicated supply boat, the other half onshore awaiting a boat and deck space. Learning: • You can't buy enough time for preparation, its vital. • Up front deck planning pays • The load out plan was too tight and with delays because of Weather not enough contingency time was planned for.

	SKARV 4 – 6507/5-5	Page: 92 of 202
Chapter: 6	LESSONS LEARNT	Date: 03/05/02 Rev: 0

No	Owner	Subject / Section	Description & Learning
			Cost of rig delay “critical time” while waiting for the WT and possible failures caused by not having enough time to prepare should be weighed carefully against the cost of early WT mobilization. Input to link: No.
73.		DST, pre-job planning	Description: Pre job planning ensured that the personnel on the rig were familiar with test objectives before going offshore. The program had been written with the involvement of the Well Test crew and Smedvig. On the rig such things as equipment lay out, utilities supply, BOP configuration were all pre arranged and presented little problem. Learning: The positive feed back from the crew reinforced the value of pre planning.
74.		DST, documentation & Inspection	Description: The job was over the Christmas period and then delayed. The system for documentation and inspection had to be re-run for the second mobilization. In the intervening time some of the equipment was changed out, however the correct documentation was not updated. In addition the original plan was to have a dedicated “testing” boat. In the event the boat was used to load both testing, sidetrack and P&A equipment. A considerable amount of the well testing equipment had to be transported by road to Sandnessjøen. Learning: - Bring in actual Smedvig inspector into loop. - Do not remove documentation from offshore units. - Manifest: if all equipment does not go on the same boat then two separate manifests have to be made. Input to link: No.
75.		DST, job Preparation on rig	Description: Time allocated 2 days Time achieved 7 (Leak in 9 5/8” liner) Having people on the earlier was a great advantage in preparation. The time was used to thoroughly prepare all of the welltest equipment. This additional time contributed to the smooth running of the well test. New regulations require scaffolding or other safety device for work over 2m above deck. Fortunately there was enough scaffolding on the rig. Learning: Plan for scaffolding next time. More time for preparation pays dividends during the job. Schlumberger Testing having been on the West Alpha for around seven years have, an excellent acquaintance with both the Smedvig personnel and their operating procedures. This was shown by the amount of help given by the Smedvig crew during the whole job. Input to link: No.
76.		DST, Failures	Description: Subsurface Test Tree (SenTree) When working in sub zero conditions free water can freeze inside tools. Cold working conditions procedures should apply from zero deg C. as there is little ambient heat retention on offshore facilities. Mobilization of back up tree went well with good follow up from the onshore base to logistics within BP and with the Supply boat terminal at Sandnessjøen. Refer to Schlumberger Failure report. Learning: Apply cold working procedures when the air temperature is around zero deg C. There is little heat retention on an offshore facility and, surprisingly, water freezes at zero! Input to link: No.
77.		DST, Junk In hole	Description: The WT program was changed to use the back up dummy

	SKARV 4 – 6507/5-5 COMPLETION REPORT	Page: 93 of 202
Chapter: 6	LESSONS LEARNT	Date: 03/05/02 Rev: 0

No	Owner	Subject / Section	Description & Learning
			fluted hanger for both the space out run and the SenTree run in hole for the main flow. This was due to the failure of the primary SenTree during equipment preparations. There were limited x-overs available to make up the dummy run. In order to close the rams on the 5 ½" drill pipe the hanger had to be moved to the top of the adjustable mandrel. Located at the top it was not possible to run the anti rotation collets on top of the fluted hanger. The collets, located with a 1 ½" bolt, were run under the fluted hanger. During the dummy run the bolt backed out and both the bolt and the locating collet dropped down the well. The program was changed and the secondary risk not identified. Refer to Schlumberger Failure report Change of procedure. Learning: A thorough investigation will be performed by Schlumberger to design a suitable locking device for future use of the collets. The design for this will be conveyed to BP and internal modification documentation circulated with Schlumberger. Input to link: No.
78.		DST, Space out & Landing string	Description: Excellent subsea BOP space out. 9mm difference between calculated lengths and actual. Painting of pipe worked well, good indication of ram position achieved. (One dried coat, one wet prior to running, "go faster stripes" of a different colour when running in hole. Clamps on the landing string: Worked really well. Consideration should be given to running a junk basket on top of the Sentree in case of clamp drop. Learning: Recommendation to use on all jobs in the future. Only comment is that more should be available in future. Input to link: No.
79.		DST, Rig up flow head	Description: Job had SJA and Tool Box talk prior to operation. Good co-ordination between rig crew and Schlumberger WT. Stand pipe x-over was put on Co-flex without tightening prior to installation. Made connection much easier. Good operation, pre planning paid off. Learning: Mobilize Coflexips two weeks before the job so the operation can be done as a Simop. This will have to be coordinated with the rig as having the coflexip on the floor too early may cause movement restrictions on the rig floor Input to link: No.
80.		DST, Flow the well	Description: Good co-ordination and communication was achieved by all involved personnel during the flow periods. It was an advantage to have Schlumberger supplied radios run on a separate channel from rig operations. "Lucky we had experienced personnel" 2 x Schlumberger experienced personnel + One junior person + 1 Air man + 1 Slick line. General comment: Supervisor did not supervise job but "did" the job. Glycol & Methanol injection was adequate during the well test. However some parts had to be changed out. Ref Schlumberger Failure report... Minor spill in WT area Tank Learning: With bed space a premium during well testing operations it is an

	SKARV 4 – 6507/5-5	Page: 94 of 202
Chapter: 6	LESSONS LEARNT	Date: 03/05/02 Rev: 0

No	Owner	Subject / Section	Description & Learning
			obvious advantage to have operators who can fulfil dual roles. This not only reduces the head count but also reduces the cost. There is however a cost. The Air compressor operator or Slick line operator who double as a well test operator during flow periods normally have little practical experience on Well Test crews. This means that they either have to be closely supervised or given very simple responsibilities. The demands on the "Actual" Well Testers are then increased. When offered this dual function "deal" as a cost saving measure it should be considered that it introduces more "Risk" into the well testing operation. Input to link: No.
81.	Scan-teck	DST, Air Supply	Description: There were a total of five air compressors on the rig, 2 x 50 cub/min and 3 x 27 cubs/min. The air is supplied by 2" lines to a 4" manifold. The manifold supplies the rig 4" fixed rig lines. During the flow all compressors were on and the supply pressure to the manifold was 10 bars. At this rate the compressors were not laboured, had there been a bigger line then the compressors could have been. When we changed from Starboard to Port burner it was noticed that the flame was cleaner. The reason for this, we suspect is that the air line is shorter and straighter to the burner on the Port side. Learning: On the next job bring instrumentation to the rig so that the manifold pressure and the boom foot pressure can be recorded. Once a pipe friction loss can be determined it may be shown that larger air lines are required. Scan Tech to co-ordinate the measurements with Schlumberger. Too much time taken filling air compressors with diesel. Evaluate bringing a diesel tank specifically for filling the compressors. An alternative may be to ask the rig crew for assistance during flow periods to free the Air Compressor man to work more with the well test crew. Input to link: No.
82.	Oilphase	DST, Load Out	Description: Late changes to sampling program did not cover additional sampling requirements. A liner for filling the 20-barrel samples was sent to rig after the initial loading. Rough sea conditions caused flooding in lab container. Manuals and instrumentation were wet and damaged. Replacements were hand carried to the rig. Once onboard the Oilphase equipment was spotted in various locations around the rig. The operation went very well thanks mainly to a helpful and constructive Smedvig Deck crew. Job planning in conjunction with Metrol went well. Metrol personnel were helpful and the two companies worked as a team to plan and instigate the job. Learning: During the sampling flow all 4 Oilphase personnel were necessary to fulfil the sampling program. Four is a minimum, covered only because of the short flow period. Longer flow period would mean lower sampling rate. 1 x PVT sampler 6 sets + GSB's 1 x Separator barrel sampling 2 x Sampling & analysis of: Radon, Mercury, H2S, CO2 and Water content. Learning: Have additional surface sampling personnel (2) here at least one day before they are required. In the initial flow the sample were taken without shutting off the Methanol injection at the Choke manifold. The program was changed during the initial flow period so that the samples were taken prior to meter factor. The plan had been, meter factor then sampling. Flowing conditions prompted a change to the schedule and the samples were taken first. The Oilphase crew should check with the Schlumberger Crew that the Methanol injection was off, however the late change in program removed focus from the plan and



No	Owner	Subject / Section	Description & Learning
			the procedure was overlooked. Learning: While situation changes are frequent during a well test it is important to realize that seemingly simple changes may have further reaching consequences. Learning: BP will demand the presence Oilphase during the final stages of the planning process Input to link: No.
83.		DST, Main Flow period Sampling	Description: The flow period was only of 14 hours duration and a significant number of sampling operations were required. In summary: 6 x PVT sets, (2gas + 1oil per set) 20 bbls refinery samples 6 x Oil sampling into sample bottles GSB 3 H2S by UOP 212 & Analysis 3 Radon Sampling & Analysis 1 Mercury sampling & Analysis H2S & CO2 by tubes Water sampling & Analysis Water content by Karl Fischer All of the above were achieved except 4 of the GSB samples. Learning: Good planning and preparation allowed all of this to be accomplished during a short flow period. No HSE incidents occurred and the main objectives achieved. The missed 4 GSB samples. Late changes to the well test program meant that although the main sampling requirement list had been updated to reflect the changes the text of the operational plan had been overlooked. The Oilphase operator on the rig had only received the program on the rig and had remembered the "wrong data" in the main flow objectives of 2 GSB samples. Hence in Oilphase' plan the object only called for 2 samples. Learning: Change Management. Late changes to the programs have to be communicated to all participants in the sampling program. However the route cause lies deeper in the planning phase. During the planning of the sampling program both managers and operators changed. One of the objectives of the extensive planning process is to ensure that the offshore personnel have an intimate knowledge of not only the requirements but also the reasons behind the requirements of the sampling program. Cold weather work: In future cold working conditions an insulated container should be sent to the rig for analysis. Check prior to load out. Bottom Hole samples: Four bottom hole samples were taken. Opening pressure: Two matched, one high, one low Report to follow. To be sent to Torgeir Norstad 5201 3210 Input to link: No.
84.	Metrol	DST, Load out and set up	Description: The equipment arrived on location on time. Taken off the boat and spotted correctly. It was difficult to find space to build the below packer carrier. It took almost a day to shuffle the decks to find the space.

	SKARV 4 – 6507/5-5 COMPLETION REPORT	Page: 96 of 202
Chapter: 6	LESSONS LEARNT	Date: 03/05/02 Rev: 0

No	Owner	Subject / Section	Description & Learning
			The Baker mud logs were very accommodating which was very important for the set up of the Metrol equipment. Oilphase offered the facilities of their container on the pipe deck. There was good communication between Oilphase and Metrol during the preparation phase of the job. Learning: In the deck lay out plan meeting the space for all companies equipment is discussed and problems identified. Metrol Personnel will attend this meeting in the future. Pre planning pays dividends on the rig. Input to link: No.
85.	Schlumb . DST & TCP	DST, Load out	Description: Well prepared from town no great problems. DST supervisor was in the Base prior to load out to ensure equipment was ready. 60 meters of gun were pre loaded. On the rig the exact measurements were taken and one gun was partially unloaded. Learning: It would be an advantage if one partly loaded gun were sent to the rig so that the exact length is easier to obtain. The weather on the way to the rig was very rough. The tools had moved in the basket and some were difficult to remove. Better strapping of tools would be advantageous in winter. The area for DST preparation was cleared early so that work could begin. It took some time to get power to the containers as the rig electrician was working on the Well Test Lab cabin. Better co-ordination of the electrician's schedule would have been advantageous. Perhaps an additional electrician for the hook up of all WT equipment should be considered in future. Time. Should we not have had a problem with the well then the rig would probably have had wait for the DST equipment. Check lists: The checks lists were not extensive enough. Pressure test values should have been included. The operator offshore should make his own checklist. In this case the person who made the list was not the same as the person who preformed the operation. To be added to check list review: Handling equipment list versus actually on rig Clarify who is responsible for handling equipment. (Weatherford ? Weatherford personnel on the rig did not have this opinion) "Normally AD's job to get handling equipment to the rig floor." Learning: Deliver handling equipment to Schlumberger's base before the job so that Schlumberger is responsible for the handling equipment they require. Program should include handling equipment required for each operation at the time of the operation so that the equipment can be prepared on the floor. Rig floor crews have difficulty now using rig tongs as most operations are automated. New Schlumberger tools should designed for use on automated rigs or tools should be tested with tongs so that they can be certified with new systems. ACTION: To be followed by C. Black BP and Schlumberger. A lot of the equipment pre made up, easier to get to the rig floor, quicker to make up. More could have been made up: Metrol carrier Metrol Initiator Schlumberger DGA The SHORT and RA collar were put on the bottom of one of the drill collars, which saved some time on the rig floor.

	SKARV 4 – 6507/5-5 COMPLETION REPORT	Page: 97 of 202
Chapter: 6	LESSONS LEARNT	Date: 03/05/02 Rev: 0

No	Owner	Subject / Section	Description & Learning
			Zip elevators hanging in the 3 ½" drill pipe elevators worked well while rigging up the TCP guns. Should be included in the handling equipment requirements for the next job Input to link: No.
86.		DST, Pressure testing and operation of the tools:	Learning: Closer co-ordination will be kept between the DST /TCP requirements and that of the BP Casing Integrity team. Pressures could have been reduced if all parties knew the others concerns. The diesel cushion also affects the firing pressure of the guns, therefore the reservoir should also be in this loop. The values have to be rigorously challenged and alternatives found where appropriate. Input to link: No.
87.		DST, TFTV valve	Learning: While this valve facilitated the easy pressure testing of the string it acted as a down hole pump throughout the time the packer was in the 7" liner. On this job it was especially noticeable as we had a very long 7" scab liner. This tool is NOT SUITABLE FOR OIL BASED MUD or more caustic brine operations. Alternative solutions should be sought for future jobs. Input to link: No.
88.		DST, Packer setting and Space out	Description: The method of calculation of space out for the Guns depth was agreed before the Schlumberger Correlation run took place. The calculations were simple and agreed by all parties. The setting of the packer was well coordinated and went very smoothly. Learning: Practice makes perfect. Setting packer, displacement to diesel and shooting the guns went very smoothly. Initial shut, clean up, main flow & main build up all went well. Input to link: No.
89.		DST, Well Kill	Description: Opening the reverse circulation ports in the IRDV At the start of the shut in period the annulus level, and hence pressure dropped 200 psi because of cooling of the test string. The IRDV went out of "Sequential" (PCT) mode. When we tried to send the open Reverse Circulation ports the IRDV did not recognize the command and hence did not react. The immediate solution was to re activate the "sequential mode" by applying a high-pressure enable command, 1,000 psi held for 1 min. This re activated the "Sequential mode" and the next time the " open reverse circulation ports" command was sent to the IRDV the tool responded correctly. Closing the circulation port on the IRDV The IRDV did not respond to the shut reverse circulation ports command. As the annulus is now in communication with the tubing the volume is larger. The IRDV is "Looking" for a change of pressure rate of 96 per 18sec. With the increased volume to pressure up this was not achieved by using the same pump rate. In addition the tubing hydrostatic was higher than the annulus 1.25sg versus 1.2 as a kill pill was about to be pumped. When the command was sent the pump had to first stop the u-tubing before the pressure increase at the tool hence the tool did not see the required 96psi per 18sec. An attempt to activate the tool was made to increase the rate of pressure increase seen at the tool by starting the sequence with 300 psi on the annulus (to balance the pressures at the tool). This did not work most likely because we had a pressure fluctuation when the pump was shut down. At this stage it was decided to go for the relatively straight forward operation of shearing the disk on the IRDV to turn it into a "piece of pipe" i.e. Tester valve open and reverse circulation ports closed. Learning: While the normal operation of the IRDV valve is straight forward, pressure on annulus to open, bleed to close, the more complex operations require a detailed knowledge of the tool and its operating environment. It is essential the IRDV specialist is on the floor while these operations are taking place Future operations should include a Tool Box Talk prior to the operation to ensure that all the factors affecting the normal operation of the tool can be

	SKARV 4 – 6507/5-5	Page: 98 of 202
Chapter: 6	LESSONS LEARNT	Date: 03/05/02 Rev: 0

No	Owner	Subject / Section	Description & Learning
			discussed. Input to link: No.
90.		DST, Pulling the packer.	Description: The space out of the well head equipment, Long bails, Flowhead, Stick-up, is such that should a retrievable packer fail to unset the blocks becomes too high and can very quickly reach the top of their travel. This is known as "walking the packer" To avoid this situation the plan was not to attempt to set the DST hanger down in the wear bushing after unseating the pack and risk the walk but to close the upper pipe rams on the tubing joint under the SSTT and circulate while holding the string with the compensator. Un fortunately after having pulled 8m to unset the packer the string was set down 25cms to get the mark just right. This was not noticed at the time however the movement was enough to re-set the packer. After some fault finding it was identified that the packer had re-set. The string was pulled up a little further, 2 turns of anticlockwise torque applied to the string and the packer unset and went back down the hole. Learning: When pulling the packer try as soon as possible to go back down. Even if the packer resets the problem will have been identified early and several chances of unsetting the packer will be available. It is possible to set the packer with only 25cms travel, close to the theoretical limit. The IRDV held pressure throughout the well testing operations. Although the tool is complicated to operate it still saves considerable time compared to conventional annulus operated down hole tools. Run the IRDV again. Input to link: No.
91.	Schlumb . Data Acquisition	DST, Load out	Description: Load was complete no further equipment was required from town, except memory extensions for the gauges. It was thought by BP Test Supervisor that the decision to run extension memory cards on the gauges had been communicated to the Head of the Gauge section in Schlumberger testing. This had not happened and hence the gauges arrived on the rig without memory extensions. The memory extensions arrived in time for the job. Learning: Clear Rolls and responsibilities were defined early in the project. People changed position and new personnel were not fully aware of their responsibilities. Either the FSM in charge of the Data acquisition hold accountability for ensuring the personnel he selects to interface with the client are responsible operational planning of the job. It is the BP's test supervisor's responsibility to ensure that these systems are in place. Input to link: No.
92.		DST, The Gauge carriers	Description: The gauge carriers arrived without clear makings as to whether or not they had been pre-torqued at the base. They arrive offshore in the same basket as the DST tools, which are pre-torqued and clearly marked. Learning: Gauge carriers should follow the same procedure on shore as the DST tools. I.e. If they are torqued the same inspection and labelling process should take place. At a minimum labels should be applied to indicate that they have NOT been torqued. Input to link: No.
93.		DST, Downhole Gauges	Description: The down hole gauge set up was changed several times before a final decision was made. The process was time consuming and a little frustrating, however the end set up satisfied everyone. Learning: A dry run gauge set up should be done onshore before the job to give adequate time to review and select the best option offshore attended by the reservoir engineer and the gauge engineer. Gauges summary Four above packer 2 x 1 sec + 2 x 3 sec sampling rate, 28 hr. delay Four below packer 2 x 1 sec + 2 x 3 sec sampling rate, 28 hr. delay All gauges recorded data as required. An excellent performance.

	SKARV 4 – 6507/5-5	Page: 99 of 202
Chapter: 6	LESSONS LEARNT	Date: 03/05/02 Rev: 0

No	Owner	Subject / Section	Description & Learning															
			The consistency of the data will be checked and included in the final report form Schlumberger. The gauges will also go through a post job calibration report. Learning: Future jobs should question the number of gauges required. Note: On this job there was a perceived risk of losing the DST string below the Packer. Additional gauges (2) where therefore run above the packer to ensure full pressure data was obtained should the below packer string have been lost Input to link: No.															
94.	Hallib. Baroid	DST, Brine usage	Description: When running in the hole with the test string the TFTV acted as a down hole pump in the long section of the 7" scab liner. Not all of the flow back to surface was returned to the pits via bell nipple in the flow line because of the windy conditions on the drill floor. At one stage a heavy bucket was placed over the end of the stick up pipe to divert the flow downwards and back to the bell nipple. Never the less we consumed a large volume of brine and eventually had to top the riser up with seawater. Prior to commencement of well kill the riser was displaced back to 1.2 sg sodium chloride brine. Twenty cubes (130 bbls) were required for this displacement. Note: See DST section Brine was also consumed • During the trip • Building of cushion kill pills • Unrecoverable flow to Schlumberger WT surface kit • Displacement of hydrocarbons from tubing • Bull Heading • Isolation of returned kill pill • Hydrocarbon contamination • Riser displacement due to weather conditions (Riser 80 cubes) Through out the entire test program the pH of the brine was maintained above 9.5 by the addition of lime to scavenge any residual H2S. Learning: Have a minimum of 200 cubes of surface brine should be available on surface prior to commencement of a DST run. (Rule of thumb, twice the hole volume) Input to link: No.															
95.		DST, Kill Pill	Description: The kill pill performed its task well. It sealed of the pore throats and provided a stable well for killing operations. It also proved to be an excellent scouring agent in removing traces of hydrocarbon from the well bore while circulation the well. The pill consisted of: <table><tr><td>BARACARB 50</td><td>Ground calcium carbonate, 95% particles size under 50 microns</td><td>50 ppb</td></tr><tr><td>BARACARB 150</td><td>Ground calcium carbonate, 95% particles size under 150 microns</td><td>50 ppb</td></tr><tr><td>BARACARB 600</td><td>Ground calcium carbonate, 95% particles size under 600 microns</td><td>25 ppb</td></tr><tr><td>HEC</td><td>Cellulose fluid loss additive</td><td>3 ½" lb /gal</td></tr><tr><td>BARZAN</td><td>Suspension agent, stops settling.</td><td></td></tr></table> 100 bbls made up in 1.2sg. brine Learning: This type of pill can be used to successfully block the pore throats of the Garn formation. This type of fluid should be considered when drilling future Garn reservoirs to minimize formation damage. Input to link: No.	BARACARB 50	Ground calcium carbonate, 95% particles size under 50 microns	50 ppb	BARACARB 150	Ground calcium carbonate, 95% particles size under 150 microns	50 ppb	BARACARB 600	Ground calcium carbonate, 95% particles size under 600 microns	25 ppb	HEC	Cellulose fluid loss additive	3 ½" lb /gal	BARZAN	Suspension agent, stops settling.	
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No	Owner	Subject / Section	Description & Learning
96.	Hydril	DST, Elevators	Description: Elevators on the rig: 2 sets manual 3 ½" 2 sets of Air Operated dressed for 3 ½" tubing Should have had in addition 2 sets manual 4 ½" 2 sets of Air Operated dressed for 4 ½" tubing But what we had was 4 ½" segments for changing on the rig. Problems Changing segments is time consuming Rig Time! (2 ½" hours) No one in the Weatherford crew was trained in how to change the inserts / Segments Not a good safety policy to do this on the rig, heavy equipment, Confined space, awkward shape. Should not be done on the rig. Learning: Have correct equipment on board for the job. Input to link: No.
97.		DST tools	Description: Objective: • Have all DST tools, Sample carriers made up on shore with string pups top and bottom. • Sub assemblies should be a minimum of 2m long • Put a pup joint on the bottom of the flow head instead of a single The Hydril crew on the rig were there to ensure that the tubing was handled well. In the event the Hydril personnel became responsible for: Tubing Tally Collars Tally Pup Joint tally Tong Jaw selection Operation procedures on the rig floor for the Jam unit Torque values Learning: On the rig this was a very useful job. On future tests these roles should be formalized and the Hydril representative should be invited to the pre test meeting to ensure that all tubing and pipe handling operations are well co-ordinated on the job Input to link: No.
98.	West Alpha	Rig needs polymer shearing mixer	Rig needs Polymer shearing mixer to prevent XC polymer from forming fish eyes when mixed. Input to link: No.
99.	Bariod	PXA cutting mud	Problem: An adhoc cutting fluid was mixed on the rig to create a fluid of sufficient density to match the 1.50 SG WBM behind the 13 3/8" csg. This was also the hole section had drilled gasses of 40%. Learning: The testing brine was viscosified with polymer and wt'd up with barite. However this adhoc fluid was easily aireated causing 3 hrs mud conditioning time before the 13 3/8" csg could be cut with a mud motor. Action: Baroid or future mud service providers should design and provide a purpose built fluid for PXA requirements. Input to link: No.
100.	Drilquip W'ford	Retrieve wearbushing/ Cut and retrieve 13 3/8" casing.	Learning: Running the Dril Quip MPT in combination with the Weatherford Csg cutter eliminates 1 trip in the hole to retrieve the wear bushing and running Drilquip tool in combination with Weatherford spear assembly eliminated 1 trip in hole to retrieve 13 3/8" casing hanger seal assembly. Input to link: No.

	SKARV 4 – 6507/5-5 COMPLETION REPORT	Page: 101 of 202
Chapter: 6	LESSONS LEARNT	Date: 03/05/02 Rev: 0

No	Owner	Subject / Section	Description & Learning
101.	BP	8 pt csg cutter	Learning: Insist on Weatherford 4 blade X 2 pt/ blade csg cutters. They cut csg extremely fast. Cut off Skarv 4 - 13 3/8" csg in 14 mins. Also optimized cutter/mud motor flow rate to flow 2200-2300 LPM. Programmed flow rate was 2800-3200 LPM? Input to link: No.

	SKARV 4 – 6507/5-5	Page: 102 of 202
Chapter: 7	DRILLING DATA	Date: 03/05/02 Rev: 0

7 DRILLING DATA

7.1 DIMS operation summary

BP Amoco Dims Daily Operation Summary

Legal well name: 6507/5-5 Start: 20.11.2001
Common well name: SKARV 4 Spud date: 28.11.2001
Event name: Original drilling. Rig release: 14.02.2002
Contractor name: SMEDVIG
Rig name: WEST ALPHA

Date	Time From	Time To	Time (hr)	Activity	Code	Phase	Description of Currently Highlighted Operation
20.11.2001	04:00	00:00	20	RUNC	P	PRSPU D	(2) Rig take over from Esso on tight tow 04:00 to skarv. Pos N 59 deg 22,1 E 002 deg 24,1 Rig status @ 04:00 hours. Fuel 715 m3 Lube Oil: 12130 Ltrs Potwater 467 m3 Drillwater 368 m3 Dyckerhoff G cmt: 65 mT Bartie: 152 mT Bentonite: 38 mT Torm Heron on anchor # 8 (@ 23:20.19.11) Fuel 666 m3. Lube Oil 14800 Ltrs. PW 500 m3. Note: assed down Drome and move instruction package to Torm Heron prior to retrieve anchor # 8. 10:10 Hrs Stopped and conn anchor chain # 1 to Tor Viking. Fuel 477 m3. Lub Oil 18641 l. PW 68 m3. Passed down Drome and rig move package to Tor Viking. @ 11:50 Safety Talk with Captains on tug boats. @ 14:00 Commenced tow with both AHV's. Torm Hernon Lead Tug. Stril Borg Stand - by vessel. Tor Viking 400 m Chain 570 m wire. Torm Heron 400m Chain 570 m wire.. Distance sailed since 04:00 hrs 116 nM. Remaining distance 306 nM Ongoing activities during tow: Changing Bondura bolts on Crown Compensator Cleaning Pits Changing Rams on BOP Change disc module # 2 on MP 2. 06:00 Update: 00:00 - 06:00 Rig on tow to Skarv. Pos N 61 deg 48,5. E 003 15,3. Distance sailed: 143 nM. Distance remaining 277 nM. Safety meeting with crew.
21.11.2001	00:00	00:00	24	RUNC	P	PRSPU D	(2) Rig on tight tow to Skarv. @ 21:20 hrs change heading upwind and start de-ballast rig to survival draft. Max wind: 50-60 knots. Max wave: 7-8 m @ 23:10 rig @ survival draft (18,5 m). Heading upwind 1-2 knots. Pos : N 63 deg.24 min E 004 deg 45,8 min. Distance sailed 238 nM. Dist to go 168 nM 06:00 Update : 00:00 - 06:00. Heading upwind. WOW Pos N 63 deg 31 min E 004 deg 33,5 min Distance sailed 242 nM. Distance to go 164 nM Ongoing activities during tow. Changing rams in BOP Change disc. module #2 on mp 2 Changed 4 pigtails on Rucker tensioners Gen. rig maintenance Cleaning pump room. ASA : 2
22.11.2001	00:00	22:00	22	WAIT	P	PRSPU D	(2) Heading upwind. WOW Pos N 63 deg 50,8 min E 004 deg 18,6 min Distanse sailed 265 nM. Distance to go 146 nM
22.11.2001	22:00	00:00	2	RUNC	P	PRSPU	(2) Cont. tight tow to Skarv Pos: N 63 50,8 min E 004 18,6 min

	SKARV 4 – 6507/5-5 COMPLETION REPORT	Page: 103 of 202
Chapter: 7	DRILLING DATA	Date: 03/05/02 Rev: 0

Date	Time From	Time To	Time (hr)	Activity	Code	Phase	Description of Currently Highlighted Operation
						D	Dist sailed 270 nM. Distance to go 141 nM 06:00 Update: Cont. tight tow to Skarv. Pos: N 64 deg 08' E 004deg 35,5 ' Dist sailed 271 nM Distance to go 135 nM ETA : 36,4 Hrs Ongoing activities : Cleaning Pump Room Changing module #2 on pump 2 General PM check and maintenance.
23.11.2001	00:00	00:00	24	RUNC	P	PRSPU D	(4) Cont. tight tow to Skarv. Pos: N 65 deg 16' E 006 deg 17,5 ' Sailed total distance of 274 nM. Distance to go 47 nM ETA: 24.11.2001 08:30 Hrs 06:00 Update: Pos: N 65 ° 31.4' E 007° 12.4' Distance to go 14 nM. On going activities: Work on starboard compensator bolt. Test Standpipe Change MP relief valve Change BOP rams and PT X 5200 psi. Function test AVCC R/U Eagle Light.
24.11.2001	00:00	10:00	10	RUNC	P	PRSPU D	(4) On tight tow to Skarv N 65 deg 41,4' E 007 27'
24.11.2001	10:00	00:00	14	WAIT	P	PRSPU D	(4) Arrive location Skarv 6507/5-5 @ 10:00 hrs. Wave height 6-8 mtrs. WOW. @ 10:45 Balder Viking arrives. 06:00 Update: 00:00 06:00 (4) WOW. (Weather picking up to 45 knts Wave heights 5-8 mtrs) Ongoing activities: Changing bolt on stb Compensator. Port Compensator put back in service. Change liners on Pump 1-2-3 to 6 1/2". Change valves on MP # 2 Check all suction filters and strainers on Mud Pumps. R/U Eagle Light to handle tubular and prepare to change load cell. General Rig Maintenance and cleaning. HSE: Daily Safety Inspection: Port Pontoon forward to aft. ASA: 2 Today's topic: Remember somebody is home waiting for you. Note: Stril Hercules (stb.boat) had to return to base to make loose piggyback anchors proper seafastend
25.11.2001	00:00	00:00	24	WAIT	P	PRSPU D	(4) Cont. wait on weather prior to anchor handling. (56 knts 9-11 mtrs waves) @ 02:00 Stril Hercules arrived, without any Piggyback anchors. 06:00 Update: (4) Cont wait on weather. (35-40 knts) Ongoing activities: Slip and cut 108 ' Drlg line. L/d 6 ea sgl 5" HWDP. Change out one manrider winch on cellar deck prior to service. Change out agitator bushings. Daily HSE: Daily safety inspection: Cellar deck ASA: 2 Today's topic: Be aware on the pitch and roll. WEEK 47 HSE: Serious incidents: 0 RUH: 25 ASA: 7
26.11.2001	00:00	19:30	19,5	WAIT	P	PRSPU D	(4) Cont wait on weather. (35-40 knts) @ 17:00 Hrs Start deball.rig from 18,5 m to 14,5 m @19:30. While wait on weather tow rig back to location.
26.11.2001	19:30	00:00	4,5	ANCH	P	PRSPU D	(6) @ 19:45 hrs . Prepare to drop anchor # 5. Anchor # 5 on btm @ 20:17 (7) @ 21:20 Tor Viking pulling out anchor # 1 On btm @ 22:00. (8)@ 22:40 Give pendant # 4 to Tor Viking. On btm @ 23:32. @ 22:42 Torm Heron running out anchor # 8. On btm @ 23:27. 06:00 Update: (9) @ 00:04 Give pendant # 7 to Torm Heron. On btm 01:05 @ 00:12 Give pendant # 3 to Tor Viking. On btm 00:59. (10) @ 01:40 Give pendant # 2 to Tor Viking. On btm 02.35 @ 01:58 Give pendant # 6 to Torm Hernon @ 04:17 hrs. Release Torm Hernon from contract. Fuel: 499 m3. DW: 415 m3. Lub Oil :14350 l. (11) Start pre-tensioning anchor chains. Ongoing: Activities Bondura bolt changed. Compensator back in service. Perform Pre-Spud meeting with night crew. Picked up 141 jnts 5 1/2 " drill pipe rack back in drk. Mixing Pre-Spud Mud. (Still a lot of pitch and roll on the rig) Jump ROV for sea-bed survey. HSE: West

	SKARV 4 – 6507/5-5	COMPLETION REPORT	Page: 104 of 202
Chapter: 7	DRILLING DATA	Date: 03/05/02	Rev: 0

Date	Time From	Time To	Time (hr)	Activity	Code	Phase	Description of Currently Highlighted Operation
							Alpha Weekly safety meeting Topic: Heavy equipment handling, keep your back free. Execution Plan: 5 hrs ahead EST: Spud @ 27. nov. 24:00 hrs.
27.11.2001	00:00	08:00	8	ANCH	P	PRSPUD	(9) @ 00:04 Give pendant # 7 to Torm Heron. On btm 01:05 @ 00:12 Give pendant # 3 to Tor Viking. On btm 00:59. (10) @ 01:40 Give pendant # 2 to Tor Viking. On btm 02:35 @ 01:58 Give pendant # 6 to Torm Hernon on btm 02:56 hrs @ 04:17 hrs. Release Torm Hernon from contract. Fuel: 499 m3. DW: 415 m3. Lub Oil :14350 l. (11) Start pre-tensioning anchor chains. All anchor done @ 08:00 hrs
27.11.2001	08:00	19:00	11	FLD	P	PRSPUD	(25) Start mixing Kill mud. P/U 36 " BHA and 2 ea jnts 9 1/2" DC. Rack back in derrick. @ 09:20 Nav equipment delivered back to rig from Tor Viking Released from contract. Fuel: 283 m3 Lub oil: 17896 l. FW: 47 m3.
27.11.2001	19:00	20:00	1	TRIP	P	PRSPUD	(26) Run in to sea bed: Tag same @ 393 m. Held pre-job safety meeting with crew prior to spud.
27.11.2001	20:00	23:00	3	RIGR	C	PRSPUD	(NPT) Unable to transfer barite from Colum Bulk tank # 2. Fault finding on the transfer system. Cont working on bulk bartie tank
27.11.2001	23:00	00:00	1	RIGR	C	PRSPUD	(NPT). Continue work on bulk barite tank. Review 36" hole section mud volumes required with onshore team. Agreed to spud well with the following mud volumes 345 bbls @1,69 sg. 94 bbls @ 1,50 sg, and 1040 bbls @ 1,06 sg. The rig has ability to mix unweighted mud slurry. Refer to Skarv 4 Change Doc #5. 06:00 Update: 00:00 - 01:00 Re-positioning rig over spud point. Perform pre-job safety meeting with crew 01:00 - 06:00 Run in tag btm @ 393 m. Spud WELL 6507/5-5 Skarv 4 @ 01:15 hrs. Parameters: WOB. 0,1 - 0,4 mT. RPM: 45. Torque :2 -7 klbf. SPM 65 . Press 10 - 12 bars. Up weight 75 mT @ 405 m WOB. 1- 3 mT. RPM: 53. Torque: 3 - 11 klbf. SPM 76. Press 12 - 15 bars. Survey crew to perform final Drilling position today. HSE: Weekly safety focus: Lifting operations. Posted Skarv 4 Safety Target Posters. RUH: 4
28.11.2001	00:00	01:00	1	SKID	P	PRSPUD	(26) Re-positioned rig over spud location. Performed pre-job safety meeting with crew.
28.11.2001	01:00	21:00	20	DRL	P	COND1	(28) Tagged sea bed at 393 m. Spudded well at 01:15 hrs with WOB 0,1 - 0,4 MT, RPM 45, Torque 2 - 7 kftlbs, Pump rate 1230 lpm, Pump pressure 10-12 bars. Drilled 36" from 393 m to 468 m (17 1/2" hole to 471 m). Pumped Hi-Vis pills every 15 m. Drilled with following parameters: At 410 m WOB 2-4 MT, RPM 62, Torque 5 - 20 kftlbs, Pump rate 3900 lpm, Pump pressure 84 bars. At 445 m WOB 7 - 11 MT, RPM 80, Torque 7 - 34 kftlbs, Pump rate 5000 lpm, Pump pressure 169 bars. Survey 1 deg inclination. At 468 m WOB 7 -15 MT, RPM 80, Torque 6 - 30 kftlbs, Pump rate 5000 lpm, Pump pressure 140 bars.
28.11.2001	21:00	22:00	1	CIRC	P	COND1	(29) Circulated hole clean. Took survey, 1 deg inclination. Displaced well to 1,20 SG mud.
28.11.2001	22:00	22:30	0,5	TRIP	P	COND1	(30) POOH to 405 m. No drag.
28.11.2001	22:30	23:00	0,5	RIGS	P	COND1	(30) Performed derrick and top drive inspection. OK.
28.11.2001	23:00	23:30	0,5	TRIP	P	COND1	(30) RIH from 405 m to 466 m. No obstruction observed. Had 2 m fill.
28.11.2001	23:30	00:00	0,5	CIRC	P	COND1	(30) Washed fill from 466 m to 468 m without rotation. OK. Activity 00:00 - 06:00: 00:00 - 00:30 Pumped 20 m3 Hi-Vis pill and circulated out. Pulled 1 stand and re-checked for fill. No fill. 00:30 - 01:00 Displaced hole to 1,20 Sg mud. 01:00 - 02:00 POOH from 468 m to 400 m. No drag. Topped up hole with

	SKARV 4 – 6507/5-5	Page: 105 of 202
Chapter: 7	DRILLING DATA	Date: 03/05/02 Rev: 0

Date	Time From	Time To	Time (hr)	Activity	Code	Phase	Description of Currently Highlighted Operation
							1,20 Sg mud. 02:00 - 04:30 Continued POOH from 400 m. Racked back 36" BHA. 04:30 - 05:00 P/U cement stand and installed TITUS dart. Racked back same. 05:00 - 06:00 Prepare for running 30" casing. Performed pre-job safety meeting. HSE: RUH 4 ASA 1
29.11.2001	00:00	00:30	0,5	TRIP	P	COND1	(30) Pumped 20 m3 Hi-Vis pill and circulated out. Pulled 1 stand and re-checked for fill. No fill.
29.11.2001	00:30	01:00	0,5	DSPL	P	COND1	(30) Displaced hole to 1,20 SG mud.
29.11.2001	01:00	02:00	1	TRIP	P	COND1	(30) POOH from 468 m to 400 m. No drag. Topped up hole with 1,20 SG mud.
29.11.2001	02:00	03:00	1	TRIP	P	COND1	(30) Continued to POOH from 400 m to 167 m.
29.11.2001	03:00	04:30	1,5	TRIP	P	COND1	(31) Continued to POOH with 36" BHA and racked back same.
29.11.2001	04:30	05:00	0,5	MISC	P	COND1	(31) P/U cement stand and installed TITUS dart. Racked back same.
29.11.2001	05:00	05:30	0,5	SAFE	P	COND1	(33) Cleaned rig floor. Performed pre-job safety meeting prior to rig up for running 30" casing.
29.11.2001	05:30	08:30	3	CSG	P	COND1	(34,35) Prepared and R/U 30" casing equipment.
29.11.2001	08:30	09:30	1	CSG	P	COND1	(36) P/U 30" casing shoe and stabbed in guide base. Ran casing to 12 m (6 m above the sea). Suspended operation due to bad weather.
29.11.2001	09:30	16:00	6,5	WAIT	P	COND1	(37) Waited on weather.
29.11.2001	16:00	17:30	1,5	CSG	P	COND1	(38) Continued to run 30" casing from 12 m to 74,93 m
29.11.2001	17:30	18:00	0,5	CSG	P	COND1	(39) Changed to 5 1/2" handling equipment.
29.11.2001	18:00	20:30	2,5	CSG	P	COND1	(40,41) P/U 30" casing running tool and engaged same to 30" housing. Run and landed/locked housing in guide base. Released and racked back running tool in derrick.
29.11.2001	20:30	21:30	1	CSG	P	COND1	(42) Ran cement stinger (2 stand and 1 single DP), attached 30" running tool and made up to 30" housing.
29.11.2001	21:30	23:00	1,5	CSG	P	COND1	(43) Lifted casing string with guide base. Removed trolley. Connected guide lines and TITUS cement hose on 30" housing. Ran 30" casing to 175 m.
29.11.2001	23:00	00:00	1	CSG	P	COND1	(43) Filled string and closed ball valve on casing running tool with ROV. 00:00 - 06:00 Activity: 00:00 - 00:30 Continued to run 30" casing to 383 m (10 m above sea bed) 00:30 - 02:30 Re-positioned rig according to ROV sonar and pre-installed marker boys. Not possible to see 36" hole due to high currents and sea bed clouds. 02:30 - 03:00 Stabbed 30" casing in blind OK and ran same from sea bed to 432 m. 03:00 - 04:00 Observed guide base had turned 180 deg. 04:00 - 04:30 Continued RIH from 432 m to 460 m. 04:30 - 05:00 Had hydraulic leakage on 5 1/2" DP elevator. LD same. 05:00 - 05:30 P/U cement stand and RIH to 462 m. Had 6 m fill. Guide base 6 m off the sea bed. 05:30 - 06:00 Started washing fill with sea water. HSE: RUH 5 ASA 1 Balder Viking arrived rig at 01:30 hrs 30.11.01. Taking on bulks.
30.11.2001	00:00	00:30	0,5	CSG	P	COND1	(41) Continued to run 30" casing to 383 m (10 m above sea bed).
30.11.2001	00:30	02:30	2	CSG	P	COND1	(42) Re-positioned rig according to ROV sonar and pre-installed marker boys. Not possible to see 36" hole due to high currents and sea bed clouds.
30.11.2001	02:30	03:00	0,5	CSG	P	COND1	(43) Stabbed 30" casing in blind OK and ran same from sea bed to 432 m.
30.11.2001	03:00	04:00	1	CSG	P	COND1	(43) Observed with ROV that guide base had turned 180 deg.
30.11.2001	04:00	04:30	0,5	CSG	P	COND1	(43) Continued to RIH with 30" casing from 432 m to 460 m.

	SKARV 4 – 6507/5-5	Page: 106 of 202
Chapter: 7	DRILLING DATA	Date: 03/05/02 Rev: 0

Date	Time From	Time To	Time (hr)	Activity	Code	Phase	Description of Currently Highlighted Operation
30.11.2001	04:30	05:00	0,5	RIGR	P	COND1	(NPT) Had hydraulic leakage on 5 1/2" elevator. LD same.
30.11.2001	05:00	05:30	0,5	CSG	P	COND1	(43) P/U cement stand and RIH to 462 m. Had 6 m fill. Guide base 6 m off sea bed.
30.11.2001	05:30	07:30	2	MISC	P	COND1	(NPT) Attempted to wash fill from 462 m with 4900 lpm and 5-27 MT WOB. Swept Hi-Vis pills. No go.
30.11.2001	07:30	08:00	0,5	MISC	P	COND1	(NPT) POOH with 30" casing from 462 m to 403 m.
30.11.2001	08:00	09:00	1	MISC	P	COND1	(NPT) ROV re-positioned marker boys.
30.11.2001	09:00	10:00	1	MISC	P	COND1	(NPT) Continued POOH with 30" casing from 403 m to 74 m.
30.11.2001	10:00	11:00	1	MISC	P	COND1	(NPT) Landed guide base on skid trolley and secured same. Disconnected pup joint from 30" running tool. Skidded trolley with guide base, 30" casing and running tool hanging in the moon pool.
30.11.2001	11:00	12:00	1	MISC	P	COND1	(NPT) P/U 36" hole opener from derrick. RIH with 36" BHA to 167 m.
30.11.2001	12:00	13:00	1	MISC	P	COND1	(NPT) Continued to RIH with 5 1/2" DP from 167 m to 393 m.
30.11.2001	13:00	14:00	1	MISC	P	COND1	(NPT) Re-positioned rig and stabbed in 36" hole. ROV assisted with sonar.
30.11.2001	14:00	14:30	0,5	MISC	P	COND1	(NPT) Continued to RIH from 393 m to 462 m.
30.11.2001	14:30	15:00	0,5	MISC	P	COND1	(NPT) Drilled and reamed fill from 462 m to 468 m with 1-3 MT WOB, 50 RPM, 5000 lpm.
30.11.2001	15:00	16:30	1,5	MISC	P	COND1	(NPT) Drilled 36" hole from 468 m to 471 m with 4-8 MT WOB, 80 rpm, 5000 lpm.
30.11.2001	16:30	17:00	0,5	MISC	P	COND1	(NPT) Circulated 7 m3 Hi-Vis pill and displaced hole with 1,60 SG mud
30.11.2001	17:00	18:00	1	MISC	P	COND1	(NPT) POOH to 404 m. Waited 30 min.
30.11.2001	18:00	18:30	0,5	MISC	P	COND1	(NPT) Ran back to bottom. Had 2 m fill. Displaced hole to 1,60 SG mud.
30.11.2001	18:30	19:30	1	MISC	P	COND1	(NPT) POOH to 400 m and topped up well with 1,60 SG mud.
30.11.2001	19:30	21:00	1,5	MISC	P	COND1	(NPT) Continued to POOH from 400 m. Racked back 36" BHA.
30.11.2001	21:00	21:30	0,5	MISC	P	COND1	(NPT) M/U stand with 5 1/2" DP to 30" running tool. Lifted 30" running tool and inner string out of 30" housing. Then suddenly the 30" housing and casing (74,83 m) dropped in the sea. ROV observed casing landed 13 m from the well with approx. 19 m penetration into the sea bed and an angle of 15-20 deg.
30.11.2001	21:30	22:00	0,5	MISC	P	COND1	(NPT) Racked back 30" running tool in the derrick and POOH with inner string. Skidded trolley with the guide base to the side and inspected the lock down dogs in the guide base. Severe wear on all 4 lock down dogs.
30.11.2001	22:00	00:00	2	MISC	P	COND1	(NPT) Ran 2 stand 5 1/2" DP inner string and M/U 30" running tool. RIH with 5 1/2" DP to top of 30" casing (top of 30" casing was 56 m above sea bed). Re-positioned rig and entered 30" casing. 00:00 - 06:00 Activity 00:00 - 02:00 Run the 2 stand of 5 1/2" DP into the 30" casing. Re-positioned the rig and entered the 30" running tool into the 30" housing. Turned the string 5 turn to the left and engaged the running tool. Pulled the 30" casing loose with 120 MT overpull. 02:00 - 04:00 POOH with the 30" casing to 75 m. 04:00 - 06:00 Installed false rotary and POOH with 2 stands inner string. Offloaded 20" and back up 30" casing from Balder Viking. Skandi Stolmen dep. at 14:45 and Balder Viking dep. 23:00 for Sandnessjøen. HSE: RUH 1
01.12.2001	00:00	02:00	2	MISC	P	COND1	(NPT) Ran the 2 stands of 5 1/2" DP into the 30" casing. Re-positioned the rig and entered the 30" running tool into the 30" housing (top fish). Turned the string 5 turn to the left and engaged the running tool. Pulled the 30" casing loose with 120 MT overpull.

	SKARV 4 – 6507/5-5	COMPLETION REPORT	Page: 107 of 202
Chapter: 7	DRILLING DATA	Date: 03/05/02	Rev: 0

Date	Time From	Time To	Time (hr)	Activity	Code	Phase	Description of Currently Highlighted Operation
01.12.2001	02:00	04:30	2,5	MISC	P	COND1	(NPT) POOH with the 30" casing to 75 m.
01.12.2001	04:30	05:30	1	MISC	P	COND1	(NPT) Performed pre-job safety meeting, installed scaffolding and false rotary.
01.12.2001	05:30	06:00	0,5	MISC	P	COND1	(NPT) POOH with DP inner string and racked back same in derrick.
01.12.2001	06:00	06:45	0,75	MISC	P	COND1	(NPT) Changed to 30" handling equipment.
01.12.2001	06:45	09:00	2,25	MISC	P	COND1	(NPT) L/D 30" housing, 4 joints of 30" casing and 30" shoe joint. Shoe joint had minor damage of chipped cmt on bottom.
01.12.2001	09:00	09:45	0,75	MISC	P	COND1	(NPT) Changed handling equipment.
01.12.2001	09:45	10:00	0,25	MISC	P	COND1	(NPT) RIH with 36" BHA to 20 m.
01.12.2001	10:00	10:15	0,25	MISC	P	COND1	(NPT) L/D top single 9 1/2" DC on top of 36" holeopener stand due to problem to remove lift sub.
01.12.2001	10:15	11:15	1	MISC	P	COND1	(NPT) Continued RIH with 36" BHA to 158 m.
01.12.2001	11:15	13:00	1,75	MISC	P	COND1	(NPT) Continued RIH with 5 1/2" DP from 158 m to 388 m. Re-positioned rig and stabbed into 36" hole using ROV sonar. Continued RIH and tagged 36" bottom at 469 m (17 1/2" bottom at 472 m).
01.12.2001	13:00	13:15	0,25	MISC	P	COND1	(NPT) Displaced hole to 1,60 SG mud. Pumped 50 m3 mud.
01.12.2001	13:15	14:15	1	MISC	P	COND1	(NPT) POOH to 400 m. Topped hole with 1,60 SG mud and continued to POOH to 158 m.
01.12.2001	14:15	15:15	1	MISC	P	COND1	(NPT) POOH with 36" BHA. P/U 1 single 9 1/2" DC and racked back 36" holeopener stand in derrick.
01.12.2001	15:15	15:45	0,5	SAFE	P	COND1	(NPT) Performed pre-job safety meeting prior to run 30" casing.
01.12.2001	15:45	16:15	0,5	MISC	P	COND1	(NPT) R/U 30" casing handling equipment.
01.12.2001	16:15	18:15	2	MISC	P	COND1	(NPT) P/U and ran 30" shoe, 4 joints 30" casing and 30" housing.
01.12.2001	18:15	18:30	0,25	MISC	P	COND1	(NPT) Changed to 5 1/2" handling equipment. R/U scaffolding and false rotary for running inner string.
01.12.2001	18:30	19:00	0,5	MISC	P	COND1	(NPT) Ran 67 m 5 1/2" inner string.
01.12.2001	19:00	21:30	2,5	MISC	P	COND1	(NPT) M/U 30" running tool to the 30" housing. Run in and M/U housing to the guide base.
01.12.2001	21:30	23:00	1,5	MISC	P	COND1	(NPT) RIH with 30" casing on 5 1/2" to 5 m above sea bed. Casing weight 80 MT. Filled casing with sea water when entered sea and closed fill up valve on running tool.
01.12.2001	23:00	00:00	1	MISC	P	COND1	(NPT) Re-positioned rig and attempted to stab into 36" hole using ROV sonar. No go. 00:00 - 06:00 Activity 00:00 - 06:00 Continued attempting to stab into 36" hole using ROV sonar. Not possible to see 36" hole due to sea bed clouds. Did not see the same cuttings beds as seen earlier on sonar, probably due to heavy mud pumped. HSE: RUH 2 ASA 1
02.12.2001	00:00	11:30	11,5	MISC	P	COND1	(NPT) Continued attempting to stab into 36" hole using ROV sonar. The cuttings mound could not be identified on ROV sonar. Visibility on the seabed was obscured by clouds of sediments as in all previous seabed observations. A rigorous search was conducted using the ROV sonar, the 2 marker boys and the crater from the previous dropped csg as a reference points to locate the well. The seabed was probed 42 times and the original well was assumed lost.
02.12.2001	11:30	12:30	1	MISC	P	COND1	(NPT) POOH with the 30" casing to moon pool.
02.12.2001	12:30	12:45	0,25	SAFE	P	COND1	(NPT) Performed pre-job safety meeting prior to release guide frame.
02.12.2001	12:45	16:30	3,75	MISC	P	COND1	(NPT) Landed guide base and 30" casing on trolley skid. Released same and set 30" casing in rotary table. Racked back 30" running tool stand. R/U scaffolding and installed false rotary. POOH with inner string and racked in derrick.

	SKARV 4 – 6507/5-5	COMPLETION REPORT	Page: 108 of 202
Chapter: 7	DRILLING DATA	Date: 03/05/02	Rev: 0

Date	Time From	Time To	Time (hr)	Activity	Code	Phase	Description of Currently Highlighted Operation
02.12.2001	16:30	18:30	2	MISC	P	COND1	(NPT) Pulled out and L/D 30" casing.
02.12.2001	18:30	19:00	0,5	MISC	P	COND1	(NPT) Changed handling equipment to 5 1/2".
02.12.2001	19:00	20:00	1	MISC	P	COND1	(NPT) Re-arranged 5 1/2" pup joint on 30" running tool stand. Removed TITUS dart from cement stand.
02.12.2001	20:00	21:00	1	MISC	P	COND1	(NPT) P/U 36" hole opener stand and broke out 17 1/2" bit and bit sub.
02.12.2001	21:00	21:30	0,5	RIGR	P	COND1	(NPT) Changed elevator due to leak on hydraulic block on BX frame 1 elevator.
02.12.2001	21:30	22:30	1	MISC	P	COND1	(NPT) P/U 1 single and racked back 9 1/2" DC stand.
02.12.2001	22:30	23:00	0,5	MISC	P	COND1	(NPT) Changed out casing bails to drilling bails.
02.12.2001	23:00	00:00	1	MISC	P	COND1	(NPT) Changed out 36" hole opener. 00:00 - 06:00 Activity 00:00 - 02:30 Continued to change out 36" hole opener and made up new 17 1/2" bit and bit sub. Re-positioned rig to new spud location 15 m from original wellbore on a heading of 161,8 deg. 02:30 - 03:00 RIH with 36" BHA and 5 1/2" DP. Tagged sea bed at 393 m. 03:00 - 04:00 ROV placed out 3 marker boys 8 m from well in direction 290 deg, 200 deg and 50 deg. 04:00 - 06:00 Spudded well and drilled from 393 m to 424 m. At 393 m WOB 0,5-1,0 MT, RPM 50, pump rate 1200 lpm. At 405 m WOB 0,5-2,0 MT, RPM 70, pump rate 3000 lpm. At 410 WOB 1,0-3,0 MT, 80 RPM, pump rate 5000 lpm. Survey at 415 m 2,0 deg inclination. Balder Viking offloaded 20" csg, risers and 5 1/2" DP. Departed rig at 22:30 hrs for Tananger. ETA 17:00 hrs 04.12.01. HSE: RUH 9 HSE Weekly: RUH 17 ASA 3 SOR 1 Observation of critical task 1
03.12.2001	00:00	02:30	2,5	MISC	P	COND1	(NPT) Continued to change out 36" hole opener and made up new 17 1/2" bit and bit sub. Note: Re-positioned rig to new spud location 15 m from original wellbore on a heading of 161,8 deg.
03.12.2001	02:30	03:00	0,5	MISC	P	COND1	(NPT) RIH with 36" BHA and 5 1/2" DP. Tagged sea bed at 393 m.
03.12.2001	03:00	04:00	1	MISC	P	COND1	(NPT) ROV placed out 3 marker boys 8 m from well in direction 290 deg, 200 deg and 50 deg.
03.12.2001	04:00	17:00	13	MISC	P	COND1	(NPT) Spudded well and drilled 36" hole from 393 m to 471 m (17 1/2" hole to 474 m). Pumped Hi-Vis pills every 15 m. Drilled with following parameters: At 393 m WOB 0,5-1,0 MT, RPM 50, Pump rate 1200 lpm, Torque 3-8 kftlbs. At 405 m WOB 0,5-2,0 MT, RPM 70, Pump rate 3000 lpm, Torque 3-8 kftlbs. At 410 m WOB 1,0-3,0 MT, RPM 80, Pump rate 5000 lpm, Torque 3-10 kftlbs. At 447 m WOB 2,0-5,0 MT, RPM 80, Pump rate 5000 lpm, Torque 6-25 kftlbs. At 471 m WOB 1,0-5,0 MT, RPM 80, Pump rate 5000 lpm, Torque 6-25 kftlbs. Pump pressure 2030 psi. Survey at 415 m 2,0° at 443 m 2,0° reamed back to 1,75° at 454 m 2,25° reamed back to 1,25° at 462 m 1,0° inclination.
03.12.2001	17:00	17:45	0,75	MISC	P	COND1	(NPT) Pumped 8 m3 Hi-Vis pill and swept out same. Displaced hole to 1,40 SG mud.
03.12.2001	17:45	18:00	0,25	MISC	P	COND1	(NPT) POOH from 471 m to 405 m. No obstruction.
03.12.2001	18:00	18:30	0,5	MISC	P	COND1	(NPT) ROV re-checked marker bouys. OK. Inspected derrick and top drive for falling objects.
03.12.2001	18:30	19:30	1	MISC	P	COND1	(NPT) RIH from 405 m to 472 m (17 1/2" bit depth). 2 m fill.
03.12.2001	19:30	20:00	0,5	MISC	P	COND1	(NPT) Displaced hole to 1,40 SG mud.
03.12.2001	20:00	21:00	1	MISC	P	COND1	(NPT) POOH to 400 m. Topped up hole with 1,40 SG mud.
03.12.2001	21:00	22:00	1	MISC	P	COND1	(NPT) POOH and racked back 36" BHA in derrick.
03.12.2001	22:00	22:30	0,5	SAFE	P	COND1	(NPT) Performed pre-job safety meeting.
03.12.2001	22:30	22:45	0,25	MISC	P	COND1	(NPT) Rigged up to run 30" casing.

	SKARV 4 – 6507/5-5	COMPLETION REPORT	Page: 109 of 202
Chapter: 7	DRILLING DATA	Date: 03/05/02	Rev: 0

Date	Time From	Time To	Time (hr)	Activity	Code	Phase	Description of Currently Highlighted Operation
03.12.2001	22:45	00:00	1,25	MISC	P	COND1	(NPT) P/U 30" shoe joint from catwalk and started to run 30" casing. 00:00 - 06:00 Activity 00:00 - 00:30 Continued to run 30" casing, shoe joint, 4 csg joints and housing to 75 m below rotary. 00:30 - 00:45 Changed to 5 1/2" handling equipment. R/U scaffolding and false rotary for running inner string. 00:45 - 01:15 Ran 67 m 5 1/2" inner string. 01:15 - 02:30 M/U 30" running tool to the 30" housing. Run in and M/U housing to the guide base. 02:30 - 03:30 RIH with 30" casing on 5 1/2" DP to 5 m above sea bed. Casing weight 80 MT. Filled casing with sea water when entered sea and closed fill up valve on running tool. 03:30 - 03:45 Re-positioned rig and stabbed into well with 30" csg using ROV sonar. 03:45 - 04:30 Continued to RIH with 30" casing to 466 m. Observed 1,5 m stick up. Guide base heading 295 deg. 04:30 - 05:00 Pumped 15 m3 Hi-Vis pill and circulated out. Performed pre-job safety meeting. 05:00 - 06:00 Pumped 3 m3 spacer and mixed and pumped cement. HSE: RUH none reported.
04.12.2001	00:00	00:30	0,5	MISC	P	COND1	(NPT) Continued to run 30" casing, shoe joint, 4 casing joints and housing joint to 75 m below rotary.
04.12.2001	00:30	00:45	0,25	MISC	P	COND1	(NPT) Changed to 5 1/2" handling equipment. R/U scaffolding and false rotary for running inner string.
04.12.2001	00:45	01:15	0,5	MISC	P	COND1	(NPT) Ran 67 m 5 1/2" inner string.
04.12.2001	01:15	02:30	1,25	MISC	P	COND1	(NPT) M/U 30" running tool to the 30" housing. Ran in and M/U housing to the guide base.
04.12.2001	02:30	03:30	1	MISC	P	COND1	(NPT) RIH with 30" casing on 5 1/2" DP to 5 m above sea bed. Casing weight 80 MT. Filled casing with sea water when entered sea and closed fill up valve on running tool.
04.12.2001	03:30	03:45	0,25	CSG	P	COND1	(45f) Re-positioned rig and stabbed into well with 30" casing using ROV sonar.
04.12.2001	03:45	04:30	0,75	CSG	P	COND1	(45f) Continued RIH with 30" casing to 466,5 m (off bottom) and with 1,5 m stick up. Guide base heading 295 deg.
04.12.2001	04:30	05:00	0,5	CIRC	P	COND1	(48) Pumped 15 m3 Hi-Vis pill and circulated out. Performed pre-job safety meeting.
04.12.2001	05:00	06:30	1,5	CMTP	P	COND1	(50) Pumped 3 m3 (20 bbls) spacer and mixed and pumped 49 m3 (310 bbls) 1,92 SG cement slurry mixed with Dyckerhoff Class G cement, CaCl2 0,49 gps, NF-6 0,01 gps and sea water 4,68 gps. Yield 1,17 ft3/sk. Displaced cement with 7,5 m3 (47 bbls) sea water. Observed cement returns at sea bed approx 5 m3 prior to displacement.
04.12.2001	06:30	12:45	6,25	WOC	P	COND1	(52) Waited on cement. Observed bullseye with ROV, 0,75 and 1,5 deg.
04.12.2001	12:45	14:45	2	TRIP	P	COND1	(56,57,58) Set down weight and released 30" running tool with 4,5 RH turns and 0-5 MT overpull. POOH and L/D 30" running tool and inner string. Re-checked bullseye on guide base, 0,75 deg FWD and 1,5 deg FORW Port.
04.12.2001	14:45	15:00	0,25	RIGS	P	COND1	(58) Cleaned rig floor.
04.12.2001	15:00	16:30	1,5	MISC	P	COND1	(62) L/D cement stand in derrick and M/U Halliburton remote operated cement head loaded with dart. Pressure tested against low torque valve to 150 bar. OK. Racked back same in derrick.
04.12.2001	16:30	18:00	1,5	MISC	P	COND1	(62a) M/U 18 3/4" housing assembly and racked back in derrick.
04.12.2001	18:00	20:00	2	BHA	P	COND1	(64) LD 36" BHA from derrick.
04.12.2001	20:00	22:30	2,5	BHA	P	SURF	(65) M/U 26" BHA and RIH to 142 m.
04.12.2001	22:30	23:30	1	BHA	P	SURF	(65) Continued RIH with 5 1/2" HWDP to 226 m. L/D 2 singles (miss matched tool joint OD) and P/U 5 singles.

	SKARV 4 – 6507/5-5	COMPLETION REPORT	Page: 110 of 202
Chapter: 7	DRILLING DATA	Date: 03/05/02	Rev: 0

Date	Time From	Time To	Time (hr)	Activity	Code	Phase	Description of Currently Highlighted Operation
04.12.2001	23:30	00:00	0,5	TRIP	P	SURF	(66) Continued to RIH with 5 1/2" DP to 393 m. 00:00 - 06:00 Activity 00:00 - 01:00 Stabbed into 30" housing with 26" bit and RIH to 450 m. 01:00 01:30 Performed pre-job safety meeting and shallow gas procedures. 01:30 - 03:30 Continued to RIH and drilled soft cement from 461 m to 465 m. Drilled 30" casing shoe and rat hole to 474 m (hard cement) with WOB 3-5 MT, RPM 50, Pump rate 4000 lpm, pump pressure 150 bar. 03:30 - 06:00 Continued to drill 26" hole from 474 m to 508 m with WOB 5-10 MT, RPM 50-110, Pump rate 4500 lpm, Pump pressure 180 bar, Torque 5-16 kftlbs. HSE: RUH 4 ASA 1
05.12.2001	00:00	01:00	1	TRIP	P	SURF	(66) Stabbed into 30" housing with 26" bit and RIH to 450 m.
05.12.2001	01:00	01:30	0,5	TRIP	P	SURF	(66) Performed pre-job safety meeting and shallow gas procedures.
05.12.2001	01:30	04:00	2,5	DRL	P	SURF	(67) Continued to RIH and drilled soft cement from 461 m to 465 m. Drilled 30" casing shoe and rat hole to 474 m (hard cement) with WOB 3-5 MT, RPM 50, Pump rate 4000 lpm, Pump pressure 150 bar.
05.12.2001	04:00	23:30	19,5	DRL	P	SURF	(69) Drilled 26" hole from 474 m to 828 m with WOB 2-11 MT, RPM 70-120, Pump rate 4500 lpm, Pump pressure 170 bar, Torque 5-15 kftlbs. Pumped Hi-Vis pills every 15 m drilled. Reamed hole on every stand to reduce build tendency.
05.12.2001	23:30	00:00	0,5	RIGR	P	SURF	(NPT) Changed cross-threaded saver sub and racked back 1 stand 5 1/2" DP with damaged threads in the box. 00:00 - 06:00 Activity 00:00 - 06:00 Continued drilling 26" hole from 828 m to 955 m with WOB 5-11 MT, RPM 120, Pump rate 4500 lpm, Pump pressure 175 bar, Torque 5-15 kftlbs. HSE: RUH 2
06.12.2001	00:00	11:45	11,8	DRL	P	SURF	(69) Continued to drill 26" hole from 828 m to 1060 m with WOB 3-9 MT, RPM 120, Pump rate 4500 lpm, Pump pressure 175-182 bar, Torque 3-15 kftlbs. Pumped Hi-Vis pills every 15 m drilled. Reamed hole on every stand to reduce build tendency.
06.12.2001	11:45	14:00	2,25	DSPL	P	SURF	(70,71) Pumped 12 m3 Hi-Vis pill and swept out same. Displaced hole with 1,20 SG mud.
06.12.2001	14:00	14:30	0,5	MISC	P	SURF	(NPT) Attempted to break out drilling pup with top drive torque wrench. No go. POOH from 1060 m to 1036 m.
06.12.2001	14:30	15:00	0,5	RIGR	P	SURF	(NPT) Set back 1 stand and got problems with standlift head stuck on tool joint. Released same OK.
06.12.2001	15:00	18:00	3	TRIP	P	SURF	(72) POOH from 1036 m to 455 m with drilling pup on top drive. No drag. Hole in good condition.
06.12.2001	18:00	20:30	2,5	MISC	P	SURF	(NPT) L/D top drive torque wrench and broke drilling pup with rig tongs due to over torqued pipe.
06.12.2001	20:30	21:00	0,5	TRIP	P	SURF	(75) Topped up hole with 1,20 SG mud and POOH to guide base. Washed wellhead with sea water. Not able to wash properly due to drill string drifted off.
06.12.2001	21:00	22:30	1,5	TRIP	P	SURF	(75,76) Continued to POOH with 26" BHA and racked back in derrick.
06.12.2001	22:30	23:00	0,5	SAFE	P	SURF	(80) Performed pre-job safety and SJA (no.137) meeting prior to start running 20" casing and using manual side door elevator.
06.12.2001	23:00	23:45	0,75	CSG	P	SURF	(81) R/U casing handling equipment. Re-installed top drive torque wrench.
06.12.2001	23:45	00:00	0,25	CSG	P	SURF	(82) P/U 20" shoe joint from catwalk. Checked shoe joint, M/U centralizer and tied double ropes on to stop collar with 4 pad-eyes and guide wire. 00:00 - 06:00 Activity 00:00 - 01:00 Continued to P/U intermediate joint and float joint. Checked

	SKARV 4 – 6507/5-5	COMPLETION REPORT	Page: 111 of 202
Chapter: 7	DRILLING DATA	Date: 03/05/02	Rev: 0

Date	Time From	Time To	Time (hr)	Activity	Code	Phase	Description of Currently Highlighted Operation
							floats OK. M/U casing with 25 kftlbs torque and installed anti rotation pins. 01:00 - 05:00 Continued to RIH with 20" casing to 390 m. M/U casing with 25 kftlbs and anti rotation pins. 05:00 - 05:30 Re-positioned rig and stabbed 20" casing into 30" housing (2 ropes broken prior to stab in casing). 05:30 - 06:00 Continued to RIH with 20" casing to 430 m. Skandi Stolmen arrived at 12:10 hrs and departed at 20:08 hrs 06.12.01 for Norne. HSE: RUH 4 ASA 1
07.12.2001	00:00	00:30	0,5	CSG	P	SURF	(82) Continued to P/U intermediate 20" casing joint and 20" casing float joint. Checked floats OK. M/U casing with 25 kftlbs torque and installed anti rotation pins.
07.12.2001	00:30	05:15	4,75	CSG	P	SURF	(83) Continued to RIH with 20" casing from 37 m to 387 m. M/U casing with 25 kftlbs and installed anti rotation pins.
07.12.2001	05:15	05:30	0,25	CSG	P	SURF	(84) Re-positioned rig and stabbed 20" casing into 30" housing (2 ropes broken prior to stab in casing).
07.12.2001	05:30	06:15	0,75	CSG	P	SURF	(85) Continued to RIH with 20" casing to 435 m.
07.12.2001	06:15	06:30	0,25	RIGR	P	SURF	(NPT) Safe load indicator on gantry crane malfunctioned. Repaired same.
07.12.2001	06:30	07:00	0,5	CSG	P	SURF	(85) Continued to RIH with 20" casing from 435 m to 470 m. Casing started to take up to 30 MT weight. Pulled casing up into 30" casing shoe.
07.12.2001	07:00	11:15	4,25	CSG	P	SURF	(85) P/U 20" circulating swedge and worked and circulated 20" casing down from 470 m to 544 m (5 joints with centralizers).
07.12.2001	11:15	12:15	1	CSG	P	SURF	(85) Continued to RIH with 20" casing from 544 m to 652 m. No excessive weight. M/U casing with 25 kftlbs torque and installed anti rotation pins.
07.12.2001	12:15	16:30	4,25	CSG	P	SURF	(86-91) P/U 18 3/4" wellhead stand from the derrick and M/U same to the 20" casing. RIH with 20" casing on the 5 1/2" DP landing string. M/U cement stand to the landing string and landed the 18 3/4" wellhead housing into the 30" housing. Took 10 MT overpull. OK. ROV confirmed bullseye on guide base to 0,5 deg FWD (port PGB) and 1 deg Port (Stbd PGB).
07.12.2001	16:30	17:00	0,5	CSG	P	SURF	(94) Connected cement hose and pressure tested same against Low Torque valve to 275 bar. OK. Connected hoses for remote operated cement head.
07.12.2001	17:00	18:00	1	CIRC	P	SURF	(93,95) Circulated casing with sea water with 2100 lpm and 36 bars. Performed pre-job safety meeting prior to cement job.
07.12.2001	18:00	22:15	4,25	CMTP	P	SURF	(96) Mixed and pumped 139 m3 (873 bbls) 1,50 SG (12,5 ppg) lead cement slurry mixed with Norcem G cement, Econolite 0,5 gps, NF-6 0,01gps, SW 12,59 gps. Yield 2,22 ft3/sk. Followed with 46,7 m3 (294 bbls) 1,92 SG (16 ppg) tail slurry mixed with Norcem G cement, CaCl2 0,25 gps, NF-6 0,01 gps, SW 4,92 gps. Yield 1,16 ft3/sk. Observed good return to mudline with ROV.
07.12.2001	22:15	23:15	1	CMTP	P	SURF	(97) Dropped dart and displaced cement with 4,6 m3 (29 bbls) sea water (Halliburton pump) until dart sheared plug. Continued to displace cement with 112,5 m3 (708 bbls) sea water using rig pumps. Pump rate 3000 lpm. Slowed down to 400 lpm and bumped plug OK with 70 bar (35 bare above final circulating pressure). Pump eff. 97,5%. Observed good cement return to mudline with ROV.
07.12.2001	23:15	23:45	0,5	CSGT	P	SURF	(98) Pressure tested 20" casing to 110 bar (1600 psi) for 10 min using Halliburton pump. OK. Pumped 6 bbls, bled back 6 bbls.
07.12.2001	23:45	00:00	0,25	MISC	P	SURF	(99) Backed out 20" running tool with 5,5 turns and attempted to pull out running tool. No go. 00:00 - 06:00 Activity 00:00 - 00:30 Re-positioned rig and pulled out running tool OK. Pulled

	SKARV 4 – 6507/5-5	COMPLETION REPORT	Page: 112 of 202
Chapter: 7	DRILLING DATA	Date: 03/05/02	Rev: 0

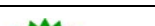
Date	Time From	Time To	Time (hr)	Activity	Code	Phase	Description of Currently Highlighted Operation
							rig 30 m off location to starboard. ROV confirmed same bullseye on guide base as above. 00:30 - 03:00 Set back cement stand and POOH with 5 1/2" DP landing string. 03:00 - 04:00 Broke out and LD 20" running tool. L/D remote cement head. 04:00 - 06:00 L/D 26" BHA due to bad weather forecast for running BOP's. HSE: RUH 2 ASA 1
08.12.2001	00:00	00:30	0,5	CSG	P	SURF	(99) Re-positioned rig and pulled out 20" running tool OK. Moved rig 30 m off location to starboard side. ROV confirmed bullseye on guide base to 0,5 deg FWD (port PGB) and 1 deg Port (Stbd PGB).
08.12.2001	00:30	03:00	2,5	TRIP	P	SURF	(100,101) Set back cement stand and POOH with 5 1/2" DP landing string. L/D 20" running tool and 5 1/2" pup joints.
08.12.2001	03:00	04:00	1	MISC	P	SURF	(102) L/D cement stand, broke out crossover and L/D remote cement head.
08.12.2001	04:00	07:00	3	BHA	P	SURF	(169) L/D 26" BHA. P/U 1 single 5 1/2" DP and racked back on 2 x 9 1/2" DC in derrick. Performed this operation due to bad weather forecast for running BOP's.
08.12.2001	07:00	07:30	0,5	RIGS	P	SURF	(169) Cleaned rig floor.
08.12.2001	07:30	09:00	1,5	MISC	P	SURF	(167) M/U hang off tool stand, checked threads OK and racked back in derrick.
08.12.2001	09:00	11:00	2	MISC	P	SURF	(166) M/U 13 3/8" hanger stand and racked same in derrick.
08.12.2001	11:00	14:00	3	RIGR	P	SURF	(NPT) Investigated noise on drawwork low clutch. Repaired fault and tested OK. Re-installed drawwork guards.
08.12.2001	14:00	15:30	1,5	MISC	P	SURF	(166) M/U cement stand with re-loaded remote cement head. Installed control hoses and cement hose and tested cement line against low torque valve to 275 bar. OK.
08.12.2001	15:30	17:30	2	BHA	P	SURF	(172) M/U 17 1/2" BHA with MPR Sub to MWD modular connection. Installed seals and attempted to make up connection. Small damage to seal area on MPR Sub during make up. Checked and decided to L/D same and P/U back up tool.
08.12.2001	17:30	18:30	1	MISC	P	SURF	(NPT) Broke off bit and L/D MPR Sub.
08.12.2001	18:30	21:00	2,5	MISC	P	SURF	(NPT) P/U back up MPR Sub and M/U to bit and MWD. Connected test cable and tested tool. No go. No response on gamma ray and near bit inclination.
08.12.2001	21:00	22:00	1	MISC	P	SURF	(NPT) Broke off bit and L/D MPR Sub.
08.12.2001	22:00	23:00	1	MISC	P	SURF	(NPT) P/U first MPR Sub and M/U to 17 1/2" bit and bit sub. P/U MWD tool and made up same. Connected test cable and tested MWD. OK.
08.12.2001	23:00	00:00	1	BHA	P	SURF	(172) Continued to M/U 17 1/2" BHA and RIH to 31 m. 00:00 - 06:00 Activity 01:00 - 01:15 Continued to M/U 17 1/2" BHA. Racked back same in derrick. 01:15 - 01:30 Cleared rig floor. 01:30 - 02:45 R/U and tested kelly hose to 500/5000 psi, 5/10 min. OK. Attempted to test IBOP. No go, leaked. 02:45 - 04:30 Changed IBOP and saver sub (4 1/2" IF for running BOP's). IBOP pre-tested to 500/7500 psi, 5/10 min. 04:30 - 06:00 R/U and picked up 4 stands 5 1/2" DP. HSE: RUH 3 ASA 2
09.12.2001	00:00	01:15	1,25	BHA	P	SURF	(172) Continued to M/U 17 1/2" BHA. Racked back same in derrick.
09.12.2001	01:15	01:30	0,25	RIGS	P	SURF	(172) Cleared rig floor.
09.12.2001	01:30	02:45	1,25	PRST	P	SURF	(171) R/U and pressure tested kelly hose to 500/5000 psi, 5/10 min. OK. Attempted to test IBOP. No go, leaked.
09.12.2001	02:45	03:45	1	RIGR	P	SURF	(NPT) Changed IBOP and saver sub (4 1/2" IF for running BOP's). IBOP pre-tested to 500/7500 psi, 5/10 min. OK.

	SKARV 4 – 6507/5-5	COMPLETION REPORT	Page: 113 of 202
Chapter: 7	DRILLING DATA	Date: 03/05/02	Rev: 0

Date	Time From	Time To	Time (hr)	Activity	Code	Phase	Description of Currently Highlighted Operation
09.12.2001	03:45	09:30	5,75	TBMV	P	SURF	(170) P/U 484 m (17 stands) 5 1/2" DP and racked in derrick
09.12.2001	09:30	10:00	0,5	SAFE	P	SURF	(104) Performed SJA prior to prepare and run BOP's and risers.
09.12.2001	10:00	18:30	8,5	BOPU	P	SURF	(105-120) Prepared rig to run BOP's and risers. Removed eagle light frame and split guide beams. Installed 500 MT bails and elevator. Isolated and disconnected rotary table shaft. Cleaned and adjusted drawwork brakes. Installed riser spider and P/U 20 ft riser pup joint. Installed dolly extension rails and removed hand rails. Opened rig floor hatches and installed rotary table lifting equipment. Performed TOFS prior to lift off dolly extensions.
09.12.2001	18:30	19:00	0,5	SAFE	P	SURF	(120) Cleared and cleaned working area prior to lift rig floor and skid BOP's to moon pool (Performed fire/muster drill).
09.12.2001	19:00	19:30	0,5	SAFE	P	SURF	(120) Performed pre-job safety meeting/TOFS with night crew prior to P/U running tool and run BOP's.
09.12.2001	19:30	00:00	4,5	BOPU	P	SURF	(120-126) P/U rig floor and skidded BOP's into moon pool. Connected 20 ft riser pup joint, closed V-door hatches and closed cat walk beams. Removed lock down on skid and installed secondary guide. P/U BOP's and moved transport skid out of moon pool. Landed BOP's on support beams. Installed guidelines. 00:00 - 06:00 Activity 00:00 - 01:45 Installed pod hoses. Retracted BOP's secondary guide. P/U BOP's and retracted support beams. Moved BOP's into guide position and deballasted rig up 1 m. Landed rotary on drill floor and set lock pins. Removed lift gear for rotary and removed dolly beams. Laid down rig floor hatches. 01:45 - 02:45 Pressure tested riser kill and choke lines to 500/5500 psi, 5/10 min. OK. Pressure tested conduite lines to 3000 psi, 10 min. OK. 02:45 - 06:00 Run BOP's and marine risers (5 x 50 ft joints). Skandi Stolmen arrived rig 08:35 hrs 08.12.01 and departed 14:15 hrs 09.12.01 for Norne. HSE: RUH 5 ASA 1 HSE Weekly: RUH 24 ASA 5
10.12.2001	00:00	01:45	1,75	BOPU	P	SURF	(126-130) Installed pod hoses. Retracted BOP's secondary guide. P/U BOP's and retracted support beams. Moved BOP's into guide position and deballasted rig up 1 m. Landed rotary on drill floor and set lock pins. Removed lift gear for rotary and removed dolly beams. Laid down rig floor hatches.
10.12.2001	01:45	02:45	1	PRST	P	SURF	(131) Pressure tested riser kill and choke lines to 500/5500 psi, 5/10 min. OK. Pressure tested conduite lines to 3000 psi, 10 min. OK.
10.12.2001	02:45	08:30	5,75	RISR	P	SURF	(132) P/U 1 x 50 ft riser joint and ran BOP's through splash zones at 03:30 hrs. Continued to run BOP's and marine risers to 141 m.
10.12.2001	08:30	10:00	1,5	PRST	P	SURF	(132) Pressure tested kill and choke lines to 500/5500 psi, 5/10 min and conduite lines to 3000 psi, 10 min. OK.
10.12.2001	10:00	14:30	4,5	RISR	P	SURF	(132) Continued to run marine risers from 141 m to 263 m (changed choke/kill seals on joint no.8).
10.12.2001	14:30	16:00	1,5	PRST	P	SURF	(132) Pressure tested kill and choke lines to 500/5500 psi, 5/10 min and conduite lines to 3000 psi, 10 min. OK.
10.12.2001	16:00	20:30	4,5	RISR	P	SURF	(132) Continued to run marine risers from 263 m to 362 m.
10.12.2001	20:30	21:30	1	PRST	P	SURF	(132) Pressure tested kill and choke lines to 500/5500 psi, 5/10 min and conduite lines to 3000 psi, 10 min. OK. Meanwhile performed pre-job safety meeting prior to P/U slip joint and connect lines and Rucker wires.
10.12.2001	21:30	00:00	2,5	RISR	P	SURF	(133-142) P/U slip joint and connected to riser pup joint in spider. Ran in with slip joint and landed same in spider. Stroked out inner barrel and dressed slip joint. Installed manifolds. 00:00 - 06:00 Activity 00:00 - 02:15 Continued connected

	SKARV 4 – 6507/5-5	Page: 114 of 202
Chapter: 7	DRILLING DATA	Date: 03/05/02 Rev: 0

Date	Time From	Time To	Time (hr)	Activity	Code	Phase	Description of Currently Highlighted Operation
							manifolds and connected Rucker wires. 02:15 - 04:00 Re-positioned rig over wellhead and connected guide wires to guide posts with ROV. 04:00 - 06:00 Landed BOP's on wellhead at 04:10 hrs. Closed connector and performed 25 MT overpull test. OK. Slacked off pod hoses and connected junction boxes. P/U diverter and landed in diverter housing. Stril Hercules departed for crew change 12:35 hrs 10.12.01. ETA Kristiansund 06:00 hrs 11.12.01. Stril Safety arrived rig 12:35 hrs 10.12.01 HSE: RUH 6 ASA 3
11.12.2001	00:00	02:15	2,25	BOPU	P	SURF	(143-148) Continued to connect kill/choke/booster manifold and installed Rucker wires.
11.12.2001	02:15	04:00	1,75	BOPU	P	SURF	(149) Re-positioned rig over wellhead and connected guide wires to guide posts with ROV.
11.12.2001	04:00	05:45	1,75	BOPU	P	SURF	(150-155) Landed BOP's on wellhead at 04:10 hrs. Closed connector and performed 25 MT overpull test. OK. Slacked off pod hoses, installed pod hose saddles in moon pool and connected junction boxes.
11.12.2001	05:45	09:30	3,75	BOPU	P	SURF	(156-157) P/U diverter and landed same in diverter housing. Closed lock down dogs. Remover riser spider and running tool for diverter. Installed outer ring and master bushing. Hooked up slip joint packer lines. Pressure tested connector against shear ram and 20" casing to 1000 psi. 10 min. OK. (3 bbls pumped).
11.12.2001	09:30	11:30	2	MISC	P	SURF	(158) Changed out bails, elevator and saver sub. Installed top drive torque wrench and cleared the rig floor of excess equipment.
11.12.2001	11:30	14:00	2,5	PLUG	P	SURF	(159) M/U bullnose and RIH with 4 stands 5 1/2" HWDP. M/U 18 3/4" test plug assembly and RIH. Landed off at 390,5 m.
11.12.2001	14:00	14:30	0,5	PRST	P	SURF	(160) Pressure tested BOP/wellhead connector to 300/5200 psi, 5/10 mins. OK. Meanwhile performed SJA prior to install flow line and trip tank line.
11.12.2001	14:30	18:00	3,5	MISC	P	SURF	(162) Installed flow line and trip tank line. Function tested BOP's on yellow pod from driller and remote location. Re-installed eagle light beams and laser index system. Function tested diverter system and adjusted drawwork brakes. Flow check flowline and trip tank seals.
11.12.2001	18:00	20:00	2	PLUG	P	SURF	(161) POOH with BOP test string and L/D 18 3/4" test plug, crossover and bullnose.
11.12.2001	20:00	23:00	3	MISC	P	SURF	(162) Continued to re-install eagle light beams, eagle light, rotary shaft and mouse hole.
11.12.2001	23:00	00:00	1	TRIP	P	SURF	RIH with 17 1/2" BHA to 87m
12.12.2001	00:00	00:30	0,5	BHA	P	SURF	(172) Continued to RIH with 17 1/2" BHA from 87m to 142m.
12.12.2001	00:30	01:00	0,5	MISC	P	SURF	(172) Changed to 5 1/2" handling equipment. Installed diverter insert packer.
12.12.2001	01:00	01:30	0,5	TRIP	P	SURF	(172) Continued to RIH with 5 1/2" HWDP from 142m to 253m.
12.12.2001	01:30	02:00	0,5	TRIP	P	SURF	(173) RIH with 17 1/2" BHA on 5 1/2" DP from 253m to 453m.
12.12.2001	02:00	03:00	1	TBMV	P	SURF	(173a) PU 18 singles of 5 1/2" DP from deck and RIH from 453m to 626m.
12.12.2001	03:00	03:30	0,5	TRIP	P	SURF	(173) Tested MWD tool with 3000 Lpm. Tool working ok.
12.12.2001	03:30	04:00	0,5	TRIP	P	SURF	(173) Continued to RIH with 17 1/2" BHA from 626m to 960m.
12.12.2001	04:00	05:00	1	SAFE	P	SURF	(174) L/D single and PU drilling pup. Held choke drill with drill crew.
12.12.2001	05:00	05:30	0,5	BOPT	P	SURF	(174a) Function tested Middle pipe rams and Lower pipe rams on blue pod. Changed to yellow pod and function tested same from remote control panel.

	SKARV 4 – 6507/5-5		COMPLETION REPORT	Page: 115 of 202
Chapter: 7	DRILLING DATA		Date: 03/05/02	Rev: 0

Date	Time From	Time To	Time (hr)	Activity	Code	Phase	Description of Currently Highlighted Operation
12.12.2001	05:30	06:00	0,5	TRIP	P	SURF	(173) Continued to RIH and tagged top of cement at 1025m.
12.12.2001	06:00	09:45	3,75	CMTD	P	SURF	(175) Drilled cement and float collar and shoe from 1025m to 1051m. Drilled cement with 2-8 MT WOB, 90 RPM and 4-18 ft-lbs torque. Pumped 4420 Lpm with 205 bars. Cleaned rathole.
12.12.2001	09:45	10:15	0,5	DRL	P	SURF	(176) Took weight at 1060m. Drilled 3m of new formation from 1060m to 1063m.
12.12.2001	10:15	11:30	1,25	CIRC	P	SURF	(177) Circulated BU and conditioned mud till mud weight was 1.20 sg. Circulated with 4360 Lpm and 215 Bars.
12.12.2001	11:30	13:30	2	LKOF	P	SURF	(NPT) Lined up and performed LOT. Unable to obtain sufficient pressure build up. Pressure bled off at 200 Psi.
12.12.2001	13:30	14:15	0,75	LKOF	P	SURF	(179,180, 181) Checked surface system and repeated LOT. 20" Shoe depth: 1051.3m MW: 1.20 SG Leak Off Pressure: 538 Psi EMW: 1,56 SG Pumped 6 Bbls, Bled back 5 1/2 Bbls.
12.12.2001	14:15	00:00	9,75	DRL	P	INTER1	(184) Drilled 17 1/2" hole from 1063m to 1311m. Initially drilled with 6-7 MT WOB and 110 rpm till both stabilizers were out in open hole then optimised drilling parameters for ROP. Drilled section with 10-12 MT WOB, 130-135 rpm and 6-12 kft-lbs, 4350 LPM and 228 Bars. 06:00 Hours Update 00:00 - 00:15 Drilled 17 1/2" hole from 1311 to 1313m. Observed drilling break while drilling from 1313m to 1317m. ROP increased from 40 to 70 m/hr. 00:15 - 00:30 Flow checked well for 10 minutes-static. 00:30 - 04:30 Continued to drill 17 1/2" hole from 1317m to 1464m. Bottoms up gas from drilling break at 1313m was 4.8%. 04:30-05:00 Flow checked well due to increased ROP and increased gas readings. Observed pump press decrease of 15-20 bars over last 17m drilled. Did not see any indications on resistivity. Max drill gas 8.3%. Well Static. 05:00-06:00 Circulate Bottoms up from 1464m. Maximum bottoms up gas 28%. In meantime increasing mud weight to 1.35 SG HSE: RUH 5
13.12.2001	00:00	00:15	0,25	DRL	P	INTER1	(184) Continued drilling 17 1/2" hole from 1311m to 1313m. Observed drilling break while drilling from 1313m to 1317m. ROP increased from 40 to 70 m/hr.
13.12.2001	00:15	00:30	0,25	FCHK	P	INTER1	(184) Flow checked well for 10 minutes - well static.
13.12.2001	00:30	04:30	4	DRL	P	INTER1	Drilled 17 1/2" hole from 1317m to 1464m. Drilled section with 6-14 MT WOB, 130-135 rpm, 4-14 kN-m 4270 Lpm and 235 Bars. Bottoms up gas from drilling break at 1313m was 4.8%. Top Kai formation identified from LWD at 1393m.
13.12.2001	04:30	05:00	0,5	FCHK	P	INTER1	(184) Flow checked well due to increased ROP and gas readings. Observed 15-20 Bars reduction in pump pressure over last 17m drilled. Did not see any indications on resistivity or connection gas. Max drilled gas 8.3%. Well Static.
13.12.2001	05:00	06:00	1	CIRC	P	INTER1	(184) Circulated Bottoms up from 1464m. Maximum bottoms up gas was 28%. In meantime increasing mudweight in active to 1.35 SG.
13.12.2001	06:00	06:30	0,5	CIRC	P	INTER1	(NPT) Bottoms up blinded shakers. Cleaned out header box and changed shaker screens.
13.12.2001	06:30	10:30	4	DRL	P	INTER1	(184) Continued to drill 17 1/2" hole from 1464m to 1546m. Drilled at a controlled ROP of 40-50 m/hr with 6-14 MT WOB, 4175 Lpm, 250 Bar, 135 RPM and 6-14 kN-m. Maximum 20% gas.
13.12.2001	10:30	11:00	0,5	FCHK	P	INTER1	(184) Flow check- well static. In meantime cleaned out header box and shaker screens.
13.12.2001	11:00	13:30	2,5	DRL	P	INTER1	(184) Continued to drill 17 1/2" hole from 1546m to 1590m. Reduce ROP to 40 m/hr to prevent shakers blinding off. Max 40% gas readings.

	SKARV 4 – 6507/5-5	COMPLETION REPORT	Page: 116 of 202
Chapter: 7	DRILLING DATA	Date: 03/05/02	Rev: 0

Date	Time From	Time To	Time (hr)	Activity	Code	Phase	Description of Currently Highlighted Operation
13.12.2001	13:30	16:45	3,25	RIGR	P	INTER1	(NPT) Electrical fault. Not getting enough power to drawworks and mud pumps. Able to rotate at 10 rpm and pump with 1140 Lpm at 38 bars. One of the feeders was broke and needed replacement.
13.12.2001	16:45	20:45	4	RIGR	P	INTER1	(NPT) Flow checked well and started to POOH with 17 1/2" BHA while mobilising replacement parts. Pumped out of the hole from 1590m to 1270m with 1150 Lpm and 32 bars. Had maximum 15-20 MT overpull.
13.12.2001	20:45	23:00	2,25	RIGR	P	INTER1	(NPT) Got steady 15-20 MT overpull and took 20-30 MT weight going down. Some indications of packing off with increase in pump pressure. Started to slowly backream and pump back to the shoe. Pumped at 1000 Lpm at 28 Bars and rotated at 25 rpm. In meantime changing pump liners on mud pumps from 6 1/2" to 6" liners.
13.12.2001	23:00	00:00	1	RIGR	P	INTER1	(NPT) Circulated Bottoms up from the 20" casing shoe with bit at 1046m. Pumped with 1500 Lpm and 40 Bars. Helicopter arrived with spare feeder at 23:32 hours. 06:00 Hours Update: 00:00-01:00 Continued to circulate BU while changing out feeder arm to SCR. Feeder arm replaced and fully operational again. 01:00-02:00 Continued circulating bottoms up while staging up flowrate to 3150 Lpm and 160 Bars. Lots of sticky fines coming over the shakers causing the shakers to blind off frequently. In meantime serviced topdrive. 02:00-04:00 RIH with 17 1/2" BHA from 1046m to 1560m. Tagged bottom at 1590m and took SCR's. 04:00-06:00 Continued drilling 17 1/2" hole from 1590m to 1625m HSE: 6 RUH and 5 ASA
14.12.2001	00:00	01:00	1	RIGR	P	INTER1	(NPT) Continued to circulate bottoms up with 1500 Lpm and 40 Bars. In meantime changed feeder arm to SCR. Feeder replaced and back on full power again.
14.12.2001	01:00	02:00	1	CIRC	P	INTER1	(184) Continued to circulate bottoms up. Staged up flowrate to 3150 Lpm and 160 Bars. Lots of sticky cutting and fines coming over the shakers causing the shakers to blind off frequently. In meantime serviced topdrive.
14.12.2001	02:00	04:00	2	RIGR	P	INTER1	(NPT) RIH with 17 1/2" BHA from 1046m to 1560m. Made up Topdrive and tagged bottom at 1590m. Took SCR's.
14.12.2001	04:00	00:00	20	DRL	P	INTER1	(184b) Drilled 17 1/2" Hole from 1590m to 2039m. Drilled with 7-20 MT WOB, 80-135 RPM with 7-17 kN-m and 4100 Lpm at 300 Bars. Drilled stringers at the following intervals: 1810m 1866 to 1889m 1894 to 1898m 2027 to 2029m. The stringer at 2027m to 2029m was hard to drill. Had to back off rotary speed to 80 rpm and increased weight to 20 MT. 06:00 Hours Update 00:00-03:30 Continued drilling 17 1/2" hole from 2029m to 2106m. 03:30-0600 Circulated shakers clean HSE: 6 RUH
15.12.2001	00:00	03:30	3,5	DRL	P	INTER1	(184b) Continued to drill 17 1/2" hole from 2039m to section TD at 2106m. Drilled with 10-20 MT WOB, 130-135 RPM and 10-17 kN-m and 4100 Lpm at 300 Bars. Increased MW as per weight up program to 1.5 SG at section TD.
15.12.2001	03:30	06:30	3	CIRC	P	INTER1	(185) Circulated till shakers were clean. Required two bottoms up before shakers cleaned up. Circulated at 4100 Lpm and 305 Bars. Note: changed to short bails while circulating bottoms up in preparation for trip out of the hole.
15.12.2001	06:30	06:45	0,25	FCHK	P	INTER1	(186) Flow checked well - static
15.12.2001	06:45	14:00	7,25	TRIP	P	INTER1	(187) POOH from 2106m to 1599m. Needed to work tight spots clean. At 1949m required up to 25 MT overpull to clean tight spot. Unable to wipe tight spot at 1845m. Made up

	SKARV 4 – 6507/5-5	COMPLETION REPORT	Page: 117 of 202
Chapter: 7	DRILLING DATA	Date: 03/05/02	Rev: 0

Date	Time From	Time To	Time (hr)	Activity	Code	Phase	Description of Currently Highlighted Operation
							topdrive and pumped out of the hole from 1845m to 1559m. Circulated 970 Lpm with 27 Bars. Limited overpull to 10 MT and differential pressure to 5 Bars.
15.12.2001	14:00	16:00	2	TRIP	P	INTER1	(188) RIH from 1559m to 2106m. Tagged up at 2100m. Made up topdrive and washed and rotated fill away from 2100m to 2106m
15.12.2001	16:00	17:30	1,5	CIRC	P	INTER1	(189) Circulated shakers clean. Shakers overloaded, lots of cuttings coming over the shakers and blinding off same. Maximum BU gas 1.2%.
15.12.2001	17:30	17:45	0,25	FCHK	P	INTER1	(190) Flow checked well - well static
15.12.2001	17:45	19:30	1,75	TRIP	P	INTER1	(193) POOH from 2106m to 1816m. Hole in good condition. Tight spot at 1816m unable to wipe clean with 20 MT.
15.12.2001	19:30	20:00	0,5	TRIP	P	INTER1	(193) Made up topdrive and pumped through tight spot. Wiped same clean without circulation.
15.12.2001	20:00	21:45	1,75	TRIP	P	INTER1	(193) Continued to POOH from 1806m to back in 20" casing shoe at 1046m. Hole from 1806m to 1595m was in good condition. Hole took upto 20 MT weight at 1528, 1522 and 1514m. All intervals were wiped clean
15.12.2001	21:45	22:45	1	CIRC	P	INTER1	(193a) Circulated Bottoms up at 20" casing shoe. No significant amount of cuttings coming over shakers. Hole clean.
15.12.2001	22:45	23:00	0,25	FCHK	P	INTER1	(194) Flow checked well - well static. Pumped slug
15.12.2001	23:00	23:45	0,75	TRIP	P	INTER1	(194) POOH from 1046m to 682m
15.12.2001	23:45	00:00	0,25	FCHK	P	INTER1	Flow checked well prior to pulling BHA through BOP - well static. 06:00 Hours Update: 00:00-00:45 Continued to POOH from 682m to 253m. 00:45-01:00 Changed slips and pulled diverter insert. 01:00-02:30 POOH and racked back 17 1/2" BHA including LWD and bit. Some small pieces of clay sticking to stabilizers and drillcollars. Overall BHA clean. Bit in gauge. 02:30-03:00 Made up Dril Quip wear bushing running too. 03:00-04:30 RIH with wear busing running tool to 391.3m to laser mark. Latched into wear bushing, set down 10 MT and jetted wellhead with 3000 Lpm and 30 Bars. Recovered Wear bushing with 5 MT overpull. 04:30-05:30 Set back stand and dropped 2 7/8" drift. POOH with wearbushing. Circulated riser volume while POOH over booster line. 05:30-06:00 Recovered 2 7/8" drift. Broke off wear bushing and laid out wearbushing running tool. HSE: 9 RUH and 2 ASA
16.12.2001	00:00	00:45	0,75	TRIP	P	INTER1	(194) Continued to POOH from 682m to 253m.
16.12.2001	00:45	01:00	0,25	TRIP	P	INTER1	(194) Changed slips and pulled diverter insert.
16.12.2001	01:00	02:30	1,5	BHA	P	INTER1	(195) POOH and racked back 17 1/2" BHA including LWD and bit. Some small pieces of clay sticking to stabilizers and drillcollars. Overall BHA clean. Bit in gauge.
16.12.2001	02:30	03:00	0,5	CSG	P	INTER1	(200) Made up Dril Quip wear bushing running tool
16.12.2001	03:00	04:30	1,5	CSG	P	INTER1	(200, 201) RIH with wear busing running tool to 391.3m to laser mark. Latched into wear bushing, set down 10 MT and jetted wellhead with 3000 Lpm and 30 Bars.
16.12.2001	04:30	05:30	1	CSG	P	INTER1	(200) Recovered Wear bushing with 5 MT overpull. Set back stand and dropped 2 7/8" drift. POOH with wearbushing. Circulated riser volume while POOH over booster line.
16.12.2001	05:30	06:00	0,5	CSG	P	INTER1	(200) Recovered 2 7/8" drift. Broke off 18 3/4" wear bushing and laid out wearbushing running tool.
16.12.2001	06:00	06:30	0,5	CSG	P	INTER1	Rig down short drilling bails and drillpipe elevator. Cleaned rig floor
16.12.2001	06:30	07:30	1	CSG	P	INTER1	RU 13 3/8" Casing running equipment. Installed La fleur circulating packer, flush mounted slips and tested Weatherford

	SKARV 4 – 6507/5-5	COMPLETION REPORT	Page: 118 of 202
Chapter: 7	DRILLING DATA	Date: 03/05/02	Rev: 0

Date	Time From	Time To	Time (hr)	Activity	Code	Phase	Description of Currently Highlighted Operation
							tong
16.12.2001	07:30	08:00	0,5	SAFE	P	INTER1	Conducted SJA prior to running 13 3/8" casing with both the deck and rig crew.
16.12.2001	08:00	10:30	2,5	CSG	P	INTER1	PU 13 3/8" Shoe and PU lock joint and Float collar joint. Baker locked connections. Checked floats working ok.
16.12.2001	10:30	19:00	8,5	CSG	P	INTER1	Ran 13 3/8", 72 ppf, P110 casing with New Vam connections from 34m to 696m. Note: Initial running speed extremely slow due to problems with making up the New Vam threads. Averaged 5 joints per hour from 34m to 314m. Consulted with town and changed make up torque settings. Slowly increased running speed to 8-9 jnts an hour. Filled pipe with rig hose every joint ran. Installed bow type centralizers on the first 4 joints ran.
16.12.2001	19:00	19:30	0,5	SAFE	P	INTER1	Held SJA with night drilling and deck crew about running 13 3/8" casing.
16.12.2001	19:30	00:00	4,5	CSG	P	INTER1	RIH with 13 3/8", 72 ppf, P-110, NVam casing from 696m to 1200m. Averaged 9 jnts and hour. Filled casing every joint ran with rig hose. 06:00 Hours Update 00:00-04:00 Continued to RIH with 13 3/8", 72 ppf, P-110, NVam casing from 1200m to 1708m. 04:00-04:45 R/D La Fleur and long bails and casing handling equipment. RU short bails and 5 1/2" elevator. PU weight 207 MT and SO weight 177 MT 04:45-05:15 Checked joints on deck and MU 13 3/8" hanger. Fit over lock ring and check hanger. 05:15-05:30 Changed out Flush mounted spider and installed master bushing and 5 1/2" slips 05:30-06:00 RIH with 13 3/8" casing on 5 1/2" landing string. HSE: 13 RUH
17.12.2001	00:00	04:00	4	CSG	P	INTER1	(205) Continued to RIH with 13 3/8", 72 ppf, P-110, NVam casing from 1200m to 1708m.
17.12.2001	04:00	04:45	0,75	CSG	P	INTER1	(207) R/D La Fleur and long bails and casing handling equipment. RU short bails and 5 1/2" elevator. PU weight 207 MT and SO weight 177 MT
17.12.2001	04:45	05:15	0,5	CSG	P	INTER1	(206) 04:45-05:15 Checked joints on deck and MU 13 3/8" hanger. Fit over lock ring and check hanger.
17.12.2001	05:15	05:30	0,25	CSG	P	INTER1	(207) Changed out Flush mounted spider and installed master bushing and 5 1/2" slips
17.12.2001	05:30	08:30	3	CSG	P	INTER1	(208, 209) RIH with 13 3/8" casing on 5 1/2" landing string. Made up top drive and precautionary washed down from 1982m to 2100m with 950 Lpm and 20 bars. Landed casing in hanger. Slacked off to landing string weight and confirmed landed off in hanger with index laser.
17.12.2001	08:30	10:00	1,5	CIRC	P	INTER1	(214) Staged up flowrate from 1000 Lpm and 30 Bars to 2000 Lpm and 80 bars. Pressure increased to 105 bars and leveled out. Started to loose mud at 36 m3/hr. Backed off flowrate to 1620 Lpm and 75 Bars without losses. Lost a total of 30 m3. Had pre-job cement meeting while circulating bottoms up.
17.12.2001	10:00	10:30	0,5	CMTP	P	INTER1	(213, 215) Pressure tested cement line to 5000 Psi and pumped 3 m3 of fresh water spacer with Halliburton
17.12.2001	10:30	12:00	1,5	CMTP	P	INTER1	(215, 216) Pumped 13 m3 spacer 500 with rig pumps at 1050 lpm. Dropped ball and pumped 203 bbls of 1.62 SG lead cement (Yield 1.76 cuft/sk) followed by 120 bbls of 1.92 SG tail cement (Yield 1.13 cuft/sx). Released dart and released top plug with 179 bars.
17.12.2001	12:00	14:00	2	CMTP	P	INTER1	(216) Displaced cement with rig pumps at 1600 Lpm and 50 Bars. Reduced pump to 485 Lpm and 42 bars. Bumped plug with 70 Bars over final displacement pressure (96% efficiency) No losses during the cement job and displacement.

	SKARV 4 – 6507/5-5	COMPLETION REPORT	Page: 119 of 202
Chapter: 7	DRILLING DATA	Date: 03/05/02	Rev: 0

Date	Time From	Time To	Time (hr)	Activity	Code	Phase	Description of Currently Highlighted Operation
17.12.2001	14:00	14:30	0,5	CMTF	P	INTER1	(217) Bled down pressure and checked floats - ok. Pressure tested casing to 5000 Psi for 10 minutes. Pumped 12.5 bbls and bled back 12.5 bbls
17.12.2001	14:30	15:00	0,5	CSG	P	INTER1	(220) Disconnected cement hose and set seal assembly. Closed upper annular and pressured up to 3000 Psi and locked seal assembly in place.
17.12.2001	15:00	16:00	1	BOPT	P	INTER1	(220) Pressure tested seal assembly against upper annular to 500/5200 Psi. Pressure tested lower annular to 500/5200 Psi and opened BOP.
17.12.2001	16:00	16:30	0,5	CSG	P	INTER1	(223) Released running tool from hanger with 38 MT. Flushed wellhead with 1620 lpm and 8 bars. Closed upper annular and pressure tested seal assembly to 3000 Psi-ok.
17.12.2001	16:30	19:30	3	CSG	P	INTER1	(NPT) Attempted to POOH with running tool. Tool hanging up in lower annular. Functioned annular and worked string with upto 25 MT Overpull - no go. Re-positioned rig and attempted to work through annular - no go. Attempted to pump and rotate through annular - no go. Jumped ROV to check lower marine riser package and angle.
17.12.2001	19:30	20:00	0,5	CSG	P	INTER1	(223) Pumped 1620 Lpm and 43 bar. Observed sudden pressure increase to 245 Bars and lost pressure again to 43 bars. Picked up and pulled through annular with 15 MT overpull.
17.12.2001	20:00	20:30	0,5	CSG	P	INTER1	(224) Cleared rig floor of casing equipment and racked back cement stand
17.12.2001	20:30	21:15	0,75	CSG	P	INTER1	(225) Pooh with landing string
17.12.2001	21:15	21:45	0,5	CSG	P	INTER1	(225) Inspected Running tool. Small mark on running tool indicating some metal-to-metal contact. Laid out tool.
17.12.2001	21:45	22:45	1	BOPT	P	INTER1	(226) MU combined 13 3/8" cup tester and 12 1/4" wearbushing running tool. Closed shear rams and performed casing test to 5200 Psi for 10 minutes. Pumped 14.5 bbls and returned 14.5 bbls.
17.12.2001	22:45	00:00	1,25	BOPT	P	INTER1	(227) RIH with cup tester and wearbushing and set same. 06:00 Hours update 00:00-02:15 (221) Continued to test BOP rams to 500/5200 Psi for 5/10 minutes. 02:15-03:30 (228) POOH with multi purpose tool and L/O cup tester and multi purpose tool. 03:30-04:30 (224) L/D cement head and PU single racked back stand 04:30-05:30 (230) Took TOFS and Changed washpipe on topdrive. 05:30-06:00 RU chiksan to test IBOP and Kelly hose. HSE: 5 RUH and 1 ASA
18.12.2001	00:00	02:15	2,25	BOPT	P	INTER1	(221) Continued to test BOP rams to 500/5200 Psi for 5/10 minutes. Re-tested the lower annular to 500/5200 - ok. Function tested BOP from remote station. Tested acoustic system.
18.12.2001	02:15	03:30	1,25	BOPT	P	INTER1	(228) POOH with multi purpose tool and L/O cup tester and multi purpose tool.
18.12.2001	03:30	04:30	1	CMTF	P	INTER1	(224) L/D cement head and PU single racked back stand
18.12.2001	04:30	05:30	1	RIGS	P	INTER1	(230) Took TOFS and Changed washpipe on topdrive in preparation for OBM section.
18.12.2001	05:30	07:00	1,5	BOPT	P	INTER1	(230) RU chiksan to test IBOP and Kelly hose. Tested kelly hose and washpipe to 300/5000 Psi. and IBOP to 300/5200 Psi.
18.12.2001	07:00	08:00	1	BOPT	P	INTER1	(230) L/D tool breaker to deck and rigged down chiksan and broke off 5 1/2" x 2 " Weco crossover from topdrive. Changed handling equipment
18.12.2001	08:00	11:30	3,5	BHA	P	INTER1	(235) Held SJA to use rig tongs and manual slips and L/D 17 1/2" BHA to deck

	SKARV 4 – 6507/5-5	COMPLETION REPORT	Page: 120 of 202
Chapter: 7	DRILLING DATA	Date: 03/05/02	Rev: 0

Date	Time From	Time To	Time (hr)	Activity	Code	Phase	Description of Currently Highlighted Operation
18.12.2001	11:30	14:00	2,5	BHA	P	INTER1	(236) Changed handling equipment and cleaned rig floor. Made up 12 1/4" BHA from deck
18.12.2001	14:00	15:00	1	BHA	P	INTER1	(236) MU MWD and program same.
18.12.2001	15:00	16:00	1	BHA	P	INTER1	(236) Continue to MU 12 1/4" BHA from deck.
18.12.2001	16:00	17:00	1	BHA	P	INTER1	(236) PU 6 x 8" DC from deck
18.12.2001	17:00	21:30	4,5	RIGR	P	INTER1	(NPT) Problems with drawwork clutch. Troubleshoot same and repaired low clutch on drawworks. In meantime pressure tested choke and standpipe manifold. Performed derrick inspection and sealed the rig floor drains.
18.12.2001	21:30	23:30	2	TRIP	P	INTER1	(236) RIH with BHA from derrick. Attempted to break out 7 5/8" XO - no go. Performed TOFS. Used rig tongs at max pull to break out. L/O XO-ver
18.12.2001	23:30	00:00	0,5	BHA	P	INTER1	(236) Surface tested MWD with 2500 Lpm and 70 bars. MWD working fine. Installed diverter element. 06:00 Hours update (237) Picked up 5 1/2" DP from deck and RIH. PU 25 jnts an hour. HSE: RUH 7 and 5 ASA
19.12.2001	00:00	09:30	9,5	TBMV	P	INTER1	(237) Picked up 5 1/2" DP from deck and RIH to 1638 m. Press test Gray Valve and Kelly cocks. Cont. seal off rig floor. Bring rig up to 20,5 m due to weather cond.
19.12.2001	09:30	10:30	1	TBMV	P	INTER1	(237) P/U drilling stand change top joint. Tested kelly cock.
19.12.2001	10:30	12:00	1,5	TBMV	P	INTER1	(237) Lay down 2 ea joints of over torqued drill pipe.
19.12.2001	12:00	12:30	0,5	SAFE	P	INTER1	(237a) Held Pre Job meeting :Cut and slip drlg line in bad weather.
19.12.2001	12:30	14:30	2	RIGS	P	INTER1	(237b) Slip and cut 110' drill-line. Extra pre-cautious due to bad weather and slippery rig floor.
19.12.2001	14:30	15:15	0,75	RIGS	P	INTER1	(337c) Service DDM.Clean and tidy rig floor. M/U Top drive to string, open compensator prepare for choke drill
19.12.2001	15:15	16:15	1	RIGR	P	INTER1	(NPT) Repair broken hydraulic hose on DDM.
19.12.2001	16:15	16:30	0,25	BOPT	P	INTER1	(222) Function test Lower Pipe Ram from yellow pod on rig floor and blue pod from rig office.
19.12.2001	16:30	17:00	0,5	SAFE	P	INTER1	(241) Held kick drill with crew.
19.12.2001	17:00	18:00	1	TRIP	P	INTER1	(240) Cont. RIH with 12 1/4" BHA from 1672 m to 2045 m.
19.12.2001	18:00	18:30	0,5	TRIP	P	INTER1	(240) Make up drillstand fill dp and break circ in steps.
19.12.2001	18:30	19:30	1	TRIP	P	INTER1	(240) Wash down from 2045 m to 2075 m, tag cement with 2 mT down.
19.12.2001	19:30	20:00	0,5	SAFE	P	INTER1	(242a) Perform JSA due to displace hole to oil based mud
19.12.2001	20:00	21:00	1	DSPL	P	INTER1	(242b) Displace hole to OBM as per program.
19.12.2001	21:00	21:30	0,5	RIGR	P	INTER1	(NPT) Fault find on Mud Pump problems (Loss off suction and pressure)
19.12.2001	21:30	00:00	2,5	DSPL	P	INTER1	(242b) Cont. displace hole with OBM. Displace Booster, choke and kill lines 06:00 Update: (242) Drilling on shoe track with various parameters: 5-15 mT on bit. Slow circ. rate slow rotation. Slow circ. fast rotation. Slow rotation max weight on bit. Fast rotation, start on 0 mT weight increasing to max. HSE: RUH 9 and x 2 ASA
20.12.2001	00:00	08:30	8,5	CMTD	P	INTER1	(242) Drill float collar with various parameters @ 08:30 drill firm cement from 2077 m to 2099 m. Max weight 10 mT.
20.12.2001	08:30	11:00	2,5	CMTD	P	PROD1	(243) Drill firm cement from 2099 m to 2102m . Soft cement from 2102 to 2106 m. Max weight 10 mT.
20.12.2001	11:00	11:15	0,25	DRL	P	PROD1	(243) Drill new formation from 2106m to 2109 m
20.12.2001	11:15	11:30	0,25	TRIP	P	PROD1	(243) POOH from 2109 m to 2073 m. Rack back 1 std in drk.
20.12.2001	11:30	12:30	1	CIRC	P	PROD1	(244) Circ. bottom up prior to leak off test
20.12.2001	12:30	13:30	1	LKOF	P	PROD1	(248) Test lines to 3000 psi 5 min. Close MPR press down

	SKARV 4 – 6507/5-5 COMPLETION REPORT	Page: 121 of 202
Chapter: 7	DRILLING DATA	Date: 03/05/02 Rev: 0

Date	Time From	Time To	Time (hr)	Activity	Code	Phase	Description of Currently Highlighted Operation
							choke and drill string with Halliburton. Perform Leak off test equal to 1,90 sg. 13 3/8" casing shoe 2106 m MW : 1,58 sg
20.12.2001	13:30	14:00	0,5	CIRC	P	INTER1	(249) Take slow circ rate up choke and riser.
20.12.2001	14:00	14:30	0,5	TRIP	P	INTER1	(243) Pick up drilling stand RIH from 2073 m to 2109 m
20.12.2001	14:30	00:00	9,5	DRL	P	INTER1	(251) Drill 12 1/4" hole from 2109 m to 2476 m. Parameters: WOB: 0 - 5 Mt. RPM. 180. Torque: 4 - 10 klbs. SPM: 224. Press: 303 Bars Max Gas: 0, 55 % 06:00 Update: (251) Cont. drilling 12 1/4" hole from 2476 m to 2543 m 01:30 - 02:00 Circ at reduced rate to clear augers 02:00 - 03:15 Drilled from 2543 m to 2586 m 03:15 - 03:45 Repair electrical problem 03:45 - 06:00 Drilled from 2685 m to 2675 m Skips Update: 34 filled up. HSE: RUH: 10 ASA: 2
21.12.2001	00:00	01:30	1,5	DRL	P	PROD1	(251) Cont drilling 12 1/4" hole from 2476 m to 2543 m Slowly increasing ROP in stages to find optimum penetration rate. 100 m/hrs
21.12.2001	01:30	02:00	0,5	CIRC	P	PROD1	(251) Circ at reduced rate to clear augers
21.12.2001	02:00	03:15	1,25	DRL	P	PROD1	(251) Drilled from 2543 m to 2586 m (Kvitnos 2559 m mMDBRT 2540.7 mTVDSS)
21.12.2001	03:15	03:45	0,5	RIGR	P	PROD1	(NPT) Investigate on electrical problem on DRW and Mud Pumps. Circ on bottom with pump # 2: 90 strks 70 bar and 20 RPM 6 -8 kflb torque
21.12.2001	03:45	10:00	6,25	DRL	P	PROD1	(251) Drilled from 2586 m to 2800 m. (Lange 2752.5 mMDBRT 2734.2 mTVDSS) Stringers @ 2755 m
21.12.2001	10:00	00:00	14	DRL	P	PROD1	(252) Cont drill 12 1/4" hole from 2800 m to 3090 m Stringers @ 2830 m 2897 m and 2970 m Parameters: WOB 2 -10 mT RPM :90 - 180 . Torque 7 -30 kNm Flow rate : 3300 l/min Press :300 bar Max gas :1,8 % 06:00 Update : (252) 00:00 - 01:00 Cont drill 12 1/4" hole from 3090 m to 3100 m (253) 01:00 - 06:00 Cont drill 12 1/4" hole from 3100 m to 3168 m HSE : 12 RUH ASA : 2
22.12.2001	00:00	01:00	1	DRL	P	PROD1	(252) Cont drill 12 1/4" hole from 3090 m to 3100 m
22.12.2001	01:00	00:00	23	DRL	P	PROD1	(253) Cont drill 12 1/4" hole from 3100 m to 3363 m Stringers : 3118 - 3120 m 10 mT max 3140 - 3143 m 11 mT max 3148 - 3152 m 12 mT max 3187 - 3188 m 13 mT max 3193 - 3195 m 15 mT max 3224 - 3227 m 13 mT max 3235 - 3240 m 10 mT max 3246 - 3251 m 11 mT max 3278 - 3281 m 16 mT max 3288 - 3299 m 15 mT max 3315 - 3317 m 16 mT max 3329 - 3331 m 15 mT max 3334 - 3340 m 15 mT max Note : Top Melke picked @ 3372 m Parameters: WOB 2 -16 mT RPM :80 - 180 . Torque 7 -33 kNm Flow rate : 3594 l/min Press : 297 bar Max gas :3,3 % 06:00 Update : (253) Cont drilling 12 1/4 " hole from 3363 m to 3421 m HSE : RUH : 2 ASA : 1
23.12.2001	00:00	00:00	24	DRL	P	PROD1	(253) Cont drill 12 1/4" hole from 3100 m to 3363 m Stringers : 3118 - 3120 m 10 mT max 3140 - 3143 m 11 mT max 3148 - 3152 m max 12 mT max 3187 - 3188 m 13 mT max 3193 - 3195 m 15 mT max 3224 - 3227 m 13 mT max 235 - 3240 m 10

	SKARV 4 – 6507/5-5	Page: 122 of 202
Chapter: 7	DRILLING DATA	Date: 03/05/02 Rev: 0

Date	Time From	Time To	Time (hr)	Activity	Code	Phase	Description of Currently Highlighted Operation
							mT max 3246 - 3251 m 11 mT max 3278 - 3281 m 16 mT max 3288 - 3299 m 15 mT max 3315 - 3317 m 16 mT max 3329 - 3331 m 15 mT max 3334 - 3340 m 15 mT max 3389 m -3383 m 12 mT max 3392 m - 3427 m 15mT max 3430 m - 3437 m 15 mT max 3442 m - 3445 m 13 mT max 3450 m - 3445 m 10 mT max 3460 m - 3462 m 11 mT max and 3468 m - 3471 m 15mT max Note : Top Melke picked @ 3372 m Note : Resitivity marker No 1 picked @ 3514 m MD. 06:00 Update : (253) 0:00 - 03:30 Cont drill 12 1/4" hole from 3363 m to 3600 m (254) 03:30 - 06:00 Cont drill 12 1/4" hole from 3600 m to 3628 m NOTE : Resitivity marker No 2 picked @ 3594 m MD. Resitivity marker No 3 picked @ 3615 m MD. Max gas :0.7 % HSE : RUH 9 ASA 2 HSE Weekly: RUH :43 ASA :12
24.12.2001	00:00	03:30	3,5	DRL		PROD1	(253) Cont drill 12 1/4" hole from 3363 m to 3600 m NOTE : Resitivity marker No 2 picked @ 3594 m MD.
24.12.2001	03:30	07:30	4	DRL	P	PROD1	(254) Cont drill 12 1/4" hole from 3600 m to 3638 m Resitivity marker No 3 picked @ 3615 m MD.
24.12.2001	07:30	10:15	2,75	CIRC	P	PROD1	(255) Circ hole clean . Max gas 0,46 % Bost riser on second circ.
24.12.2001	10:15	10:30	0,25	TRIP	P	PROD1	(255a) Take torque readings prior to run liner
24.12.2001	10:30	12:00	1,5	CIRC	P	PROD1	(255) Cont circ hole clean while evaluate logs.
24.12.2001	12:00	13:00	1	DRL	P	PROD1	(254) Cont drill 12 1/4" hole from 3638 m to 3643 m.
24.12.2001	13:00	14:30	1,5	CIRC	P	PROD1	(255) Circ bottom up. Max gas 0.20%
24.12.2001	14:30	15:00	0,5	FCHK	P	PROD1	(260) Flow check. Static.
24.12.2001	15:00	15:30	0,5	TRIP	P	PROD1	(257) POOH from 3643 m to 3530 m
24.12.2001	15:30	16:30	1	TRIP	P	PROD1	(257) Pump slug. Cont POOH from 3530 m to 3200 m Tight spots up to 20 mT
24.12.2001	16:30	00:00	7,5	TRIP	P	PROD1	(257) Cont POOH pumping and reaming. From 3200 m to 2788 m. Max over pull 20 mT 06:00 Update: 00:00 - 01:00 (257) Cont backream out of hole from 2788 m to 2702 m. POOH without backreaming to 2645 m 01:00 - 03:30 (257 a) RIH from 2645 m to 3617 m. Brake circ and cont run in to 3643 m. No fill 03:30 - 05:30 (257a) Circ bottom up. Max gas 0.5 %. 05:30 06:00 (257a) Boost riser. Flow check well. Static. HSE: RUH: 9 ASA :2
25.12.2001	00:00	01:00	1	RMBK	P	PROD1	(261) Cont backream out of hole from 2788 m to 2702 m. POOH without backreaming to 2645 m Note: Top Lange at 2752m
25.12.2001	01:00	03:30	2,5	TRIP	P	PROD1	(261a) RIH from 2645 m to 3617 m. Broke circulation and continued run in to 3643 m. Trip in Hole was without any problems hole in good condition. No fill on bottom.
25.12.2001	03:30	05:30	2	CIRC	P	PROD1	(261b) Circulated bottoms up . Max bottoms up gas 0.5 %. No significant amount of cuttings coming over shakers. Boosted riser at the same time.
25.12.2001	05:30	06:00	0,5	CIRC	P	PROD1	(261c) Flow checked well . Static.
25.12.2001	06:00	06:30	0,5	TRIP	P	PROD1	(261) POOH from 3643 m to 3502 m. No drag
25.12.2001	06:30	12:00	5,5	TRIP	P	PROD1	(261) Pump slug. POOH from 3502 m to 2070 m. No tights spots hole in good condition. Needed to trip out in low-low due to high winds. Had thrusters running to keep the rig on position resulting in less power being available to the drawworks.
25.12.2001	12:00	12:30	0,5	FCHK	P	PROD1	(261) Flow check well inside 20" casing shoe. Well static. Took torque readings prior to run liner

	SKARV 4 – 6507/5-5	COMPLETION REPORT	Page: 123 of 202
Chapter: 7	DRILLING DATA	Date: 03/05/02	Rev: 0

Date	Time From	Time To	Time (hr)	Activity	Code	Phase	Description of Currently Highlighted Operation
25.12.2001	12:30	15:00	2,5	TRIP	P	PROD1	(261) Cont POOH from 2070 m to 700 m.
25.12.2001	15:00	15:30	0,5	FCHK	P	PROD1	(261) Flow check well. OK (Perform kick drill with crew)
25.12.2001	15:30	16:30	1	TRIP	P	PROD1	(261) Cont POOH from 700 m to 270 m
25.12.2001	16:30	17:30	1	BHA	P	PROD1	(262) Cont POOH with 5 1/2" HWDP from 270 m to 158 m. Re-installed diverter insert packer. Changed handling equipment
25.12.2001	17:30	20:00	2,5	BHA	P	PROD1	(262) Continued to POOH with 12 1/4" BHA. All three stabilisers were in gauge. The first 10 cm of the near bit stabilizer had the hardfacing missing. The bit was graded 2-5-BT-S-X-I-LT-TD
25.12.2001	20:00	23:30	3,5	SAFE	P	PROD1	(TOFS) Time out for safety. Due to the cold weather ice was building up in derrick and ice blocks came loose and fell down on rig floor and deck. Removed ice from derrick.
25.12.2001	23:30	00:00	0,5	LOG	P	PROD1	(267) Held pre-job safety meeting prior to wireline job. Rig up wireline equipment 06:00 Update: 00:00 - 01:30 (269) Continued to rig up wireline equipment. 01:30 - 03:30 (269) Made up Schlumberger logging tool string run #1: DSI/IPLT/GR/AMS 03:30 - 06:00 (270) RIH with wireline run #1 NOTE: Jumped ROV after storm to check guidebase and BOP bullseyes: 1 deg fwd port. Port PGB: 1,5 deg Forward (moving port stb) Stb PGB: 1,5 deg Fwd Port HSE: ASA: 0 RUH: 7
26.12.2001	00:00	01:30	1,5	LOG	P	PROD1	(269) Continued to rig up wireline equipment.
26.12.2001	01:30	03:30	2	LOG	P	PROD1	(269) Made up Schlumberger logging tool string run #1: DSI/IPLT/GR/AMS
26.12.2001	03:30	13:30	10	LOG	P	PROD1	(272) RIH with wireline run #1 to 3644,5 m. Temp 120 deg C. Commenced Repeat log. Tension up 6000 lbs. Finish Repeat section. RIH to btm at 6000 ft/hr. Start main log at 600 ft/hr.
26.12.2001	13:30	15:00	1,5	LOG	P	PROD1	(275) Held pre-job meeting. Remove RA source Lay down tool string.
26.12.2001	15:00	15:30	0,5	LOG	P	PROD1	(275) Rig down logging equipment.
26.12.2001	15:30	16:30	1	RIGS	P	PROD1	(279) Changed saver-sub on DDM. Installed torque wrench on same.
26.12.2001	16:30	18:00	1,5	CSG	P	PROD1	(279) Rig up 9 5/8 " casing equipment prior to run liner.
26.12.2001	18:00	20:30	2,5	CMTD	P	PROD1	(NPT) Make up Nodeco cement head on a dbl joint. Tried to rack back in derrick. No go. Lay down Nodeco cement head. (Cause of the weight of the Nodeco head the pipe underneath bent so much that it was impossible to get it into the finger in the derrick)
26.12.2001	20:30	21:00	0,5	CSG	P	PROD1	(280) Continued to rig up 9 5/8 " equipment prior to run liner.
26.12.2001	21:00	23:00	2	CSG	P	PROD1	(281) Pick up 9 5/8 " shoe, float and landing collar. Baker-lock, test and run same. Install Piptag on shoe jnt.
26.12.2001	23:00	00:00	1	CSG	P	PROD1	(282) Run 9 5/9 " as pr tally to 101 m NOTE: Due to cold weather freezing problem occurred on equipment. Safety-meeting was held due to use of steam to melt ice on tooljoints and equipment. 06:00: Update 00:00 - 05:15 (282) Cont run 9 5/8 " Casing from 101 m to xxx m as pr program. Piptag installed bx jnt 145. 05:15 - 06:00 (NPT) Rig down Weatherford tong. HSE: RUH: 7 ASA: 1
27.12.2001	00:00	05:00	5	CSG	P	PROD1	(282) Cont run 9 5/8" casing from 101 - 610 m as per program. PipTag installed on box end of Jt # 145.
27.12.2001	05:00	07:00	2	CSG	P	PROD1	(NPT) Change Weatherford Jam Tong due to failure. Perform JSA due to rigging and use of manual tong.
27.12.2001	07:00	14:45	7,75	CSG	P	PROD1	(282) Continue to run 9 5/8" csg from 610 - 1585 m.
27.12.2001	14:45	15:00	0,25	SAFE	P	PROD1	(279) Perform pre-job safety meeting prior to PU liner hanger.
27.12.2001	15:00	15:30	0,5	CSG	P	PROD1	(284) PU Liner hanger. Dress and MU to liner. Perform PU test

	SKARV 4 – 6507/5-5	COMPLETION REPORT	Page: 124 of 202
Chapter: 7	DRILLING DATA	Date: 03/05/02	Rev: 0

Date	Time From	Time To	Time (hr)	Activity	Code	Phase	Description of Currently Highlighted Operation
							to 100 MT.
27.12.2001	15:30	16:30	1	TRIP	P	PROD1	(283) Change handling equipment to 5 1/2". Clean rig floor.
27.12.2001	16:30	17:30	1	TRIP	P	PROD1	(285) Make up 5 1/2" HWDP to Liner hanger. Circ liner volume. Fill PBR with fresh water.
27.12.2001	17:30	20:30	3	TRIP	P	PROD1	(286) Install pipe wiper. RIH from 1599 m to 2100 . Open compensator when hanger went through BOP. OK. ROV checked BOP position. Bulls eye.
27.12.2001	20:30	21:00	0,5	TRIP	P	PROD1	(286) Break circulation in steps at csg shoe. Took torque readings. Up weight 156 MT, down weight 156 MT.
27.12.2001	21:00	00:00	3	TRIP	P	PROD1	(287) Continued to RIH with the liner from 2100 m to 3258 m as per program. 06:00 Update (287) 00:00 - 01:30 Continued RIH with 9 5/8" casing from 3258 m to 3630 m. (284) 01:30 - 02:30 P/U Nodeco cement head. Made up same and connected hydraulic hoses and cement hose. Circulated hole while making up head. (288) 02:30 - 04:00 Washed last stand to 1 m above bottom. Continued to circulate and condition mud. (291) 04:00 - 06:00 Released ball and pumped down same. Pressure increased to 140 bars. Attempted to set hanger. No go. Pulled up 2 m. Bled off pressure to 0 bar. Pressured up to 160 bars. HSE: RUH 9 ASA 2
28.12.2001	00:00	01:30	1,5	CSG	P	PROD1	(287) Continued to RIH with 9 5/8" liner from 3258 m to 3630 m.
28.12.2001	01:30	02:30	1	CSG	P	PROD1	(288) P/U Nodeco cement head. Made up same, connected hydraulic hoses and cement hose. Circulated hole while making up head.
28.12.2001	02:30	04:00	1,5	CIRC	P	PROD1	(289) Washed down from 3630 m to 3642 m. Circulated and conditioned mud. Pump rate 1300 lpm, pump pressure 60 bars.
28.12.2001	04:00	06:30	2,5	CSG	P	PROD1	(291,292) Released ball and pumped down same. Pressured up to 140 bars. Set down half liner weight, 50 MT. Hanger did not set. P/U liner to setting depth. Increased pressure to 160 bars. Set down liner weight plus 15 MT. Hanger set OK. Bled off pressure and kept 10 MT weight on running tool. Released running tool with 10 right hand turn. Torque parameters indicated running tool released OK. Sheared ball seat with 210 bars (sheared was set to 224 bars). Pressure decreased to 85 bars. Liner set at 3642 mMD, Landing collar at 3604 mMD, Top of PBR at 2044,5 mMD.
28.12.2001	06:30	11:00	4,5	CSG	P	PROD1	(293) Started to circulate and condition mud. Performed pre-job safety meeting prior to cement job. Observed high pressure with slow pump rate, 100 bars with 10 spm. Increased pump rate and pressure in steps to 120 spm and 179 bars. Pressure slowly dropped off to 165 bars. Increase pressure to 300 bars with 173 spm. No pressure drop observed.
28.12.2001	11:00	14:00	3	CIRC	P	PROD1	(NPT) Prepared and pumped carbide tracer. Pumped with 1900 lpm and 155 bars. Observed slight pressure drop of 7-8 bars per hour while circulated. No gas tracer detected in return.
28.12.2001	14:00	14:30	0,5	CMTF	P	PROD1	(290) Pressure tested cement line to 5000 psi, 10 min. OK.
28.12.2001	14:30	15:00	0,5	CMTF	P	PROD1	(294) Pumped 3 m3 (20 bbls) base oil and 16 m3 (100 bbls) 1,64 SG (13,7 ppg) Tuned Spacer E+ with rig pumps.
28.12.2001	15:00	16:45	1,75	CMTF	P	PROD1	(295) Mixed and pumped 54,7 m3 (344 bbls) 1,66 SG (13,85 ppg) lead slurry mixed with Norcem G + 41% SSA-1, Gascon 0,6 gps, SCR-100L 0,28 gps, Halad-413L 0,8 gps, NF-6 0,01 gps, FW 9,37 gps. Yield 2,08 ft3/sk. Followed with 6,5 m3 (41 bbls) 1,92 SG (16 ppg) tail slurry mixed with Norcem G + 41% SSA-1, SCR-100L 0,28 gps, Gascon 0,35 gps, CFR-3L 0,1 gps, Halad-413L 0,4 gps, NF-6 0,01 gps, FW 5,30 gps. Yield

	SKARV 4 – 6507/5-5	Page: 125 of 202
Chapter: 7	DRILLING DATA	Date: 03/05/02 Rev: 0

Date	Time From	Time To	Time (hr)	Activity	Code	Phase	Description of Currently Highlighted Operation
							1,56 ft3/sk.
28.12.2001	16:45	18:00	1,25	CMTF	P	PROD1	(296,297) Released dart and circulated down with rig pump. 118 spm/130 bars. Sheared plug with 250 bars, 1425 stokes, 94% eff. Continued to displace cement. Observed spacer at surface when displaced 77,18 m3. Total displacement 79,9 m3 (5095 strokes), 94% eff (overdisplaced 1/2 shoe track). Plug did not bump.
28.12.2001	18:00	19:00	1	CMTF	P	PROD1	(300) Set TSP packer by P/U to 103 MT string weight plus 3,7 m. Set down weight and sheared TSP with 25 MT. Put on additional 15 MT weight. L/D cement head plus single DP.
28.12.2001	19:00	23:30	4,5	MISC	P	PROD1	(301) Circulated long way due to spacer in return. Received all pumped cement in return (total 150 m3 of contaminated OBM and cement). Added sugar and retarder SCR-100L to cement and diverted into slop pits. Circulated and conditioned mud in the hole.
28.12.2001	23:30	00:00	0,5	MISC	P	PROD1	(301) Flushed kill and choke lines and operated rams on BOP's. 00:00 - 06:00 Activity 00:00 - 01:00 Continued to circulate and condition cement contaminated mud. 01:00 - 02:30 Flow checked well. Neg. Slugged pipe. L/D pup joint on top of stand. Broke off and L/D cement head and single DP joint. 02:30 - 06:00 POOH with 5 1/2" DP landing string. Note: ROV observed PGB and BOP bulls eyes for movement every 15 mins over a 6 hours period. HSE: RUH 3
29.12.2001	00:00	01:00	1	CIRC	P	PROD1	(301) Continued to circulate and condition cement contaminated mud.
29.12.2001	01:00	02:30	1,5	MISC	P	PROD1	(302,305) Flow checked well. Neg. Slugged pipe. L/D pup joint on top of stand. Broke off and L/D cement head and single DP joint.
29.12.2001	02:30	07:00	4,5	TRIP	P	PROD1	(303) POOH with 5 1/2" DP landing string and liner running tool from 2000 m.
29.12.2001	07:00	07:30	0,5	MISC	P	PROD1	(304) L/D liner running tool. Running tool had wash out in ports on the floating junk bonnet sleeve.
29.12.2001	07:30	08:00	0,5	PLUG	P	PROD1	(309) Changed handling equipment. Prepared for running BOP test plug.
29.12.2001	08:00	10:30	2,5	PLUG	P	PROD1	(309) M/U and RIH with jet sub on DP and M/U BOP test plug and RIH. Washed wellhead and BOP area. Pump rate 1000 lpm, pressure 100 bar.
29.12.2001	10:30	12:00	1,5	MISC	P	PROD1	(NPT) Attempted to run BOP test plug through BOP lower annular. No go.
29.12.2001	12:00	14:30	2,5	MISC	P	PROD1	(NPT) POOH with BOP test plug. Cleaned lots cement off test plug. Racked same in derrick.
29.12.2001	14:30	15:30	1	MISC	P	PROD1	(NPT) P/U 6 x 8 1/2" DC from deck. M/U same under BOP test plug.
29.12.2001	15:30	17:30	2	MISC	P	PROD1	(NPT) RIH with BOP test plug. Washed through BOP and wellhead area. Circulated riser volume. Pump rate 1200 lpm, pressure 80 bars. Ran BOP test plug through lower annular with 12 MT weight. OK.
29.12.2001	17:30	20:00	2,5	BOPT	P	PROD1	(310,311) Pressure tested BOP's. Rams, annulars and valves to 500/5200 psi, 5/10 min. OK. Functioned tested BOP's on yellow pod from tool pusher office. OK.
29.12.2001	20:00	22:00	2	PRST	P	PROD1	(314) Pressure tested kelly hose and Top Drive IBOP to 300/5000 psi, 5/10 min. OK.
29.12.2001	22:00	00:00	2	PLUG	P	PROD1	(312) POOH with BOP test plug. Had 10 MT overpull when pulled test plug through lower annular. L/D test plug and racked back 2 stands 8 1/2" DC. 00:00 - 06:00 Activity 00:00 - 01:00 Cleaned rig floor and changed handling equipment. Function

	SKARV 4 – 6507/5-5	COMPLETION REPORT	Page: 126 of 202
Chapter: 7	DRILLING DATA	Date: 03/05/02	Rev: 0

Date	Time From	Time To	Time (hr)	Activity	Code	Phase	Description of Currently Highlighted Operation
							tested shear ram. OK. 01:00 - 02:30 M/U 8 1/2" BHA and RIH with same to 140 m. 02:30 - 04:00 Installed diverter insert. Continued to RIH with 5 1/2" DP from 140 m to 880 m. 04:00 - 04:30 Filled pipe. Functioned tested lower pipe ram from drill floor and tool pusher office. OK. Tested acoustics. OK. 04:30 - 06:00 Continued to RIH from 880 m to 1844 m. McNee Tide departed West Alpha 29.12.01 at 20:00 hrs. ETA Mongstad 30.12.01 at 19:00 hrs. Skandi Stolmen dep. Sandessjøen 30.12.2001 at 02:00 hrs. ETA at West Alpha 30.12.2001 at 18:00 hrs. HSE: RUH 0 ASA 1 Performed weekly safety inspection in engine room.
30.12.2001	00:00	01:00	1	BOPT	P	PROD1	(312) Cleaned rig floor and changed handling equipment. Function tested shear ram. OK.
30.12.2001	01:00	02:30	1,5	BHA	P	PROD1	(NPT) M/U 8 1/2" BHA and RIH with same to 140 m.
30.12.2001	02:30	04:00	1,5	TRIP	P	PROD1	(NPT) Installed diverter insert. Continued to RIH with 5 1/2" DP from 140 m to 880 m.
30.12.2001	04:00	04:30	0,5	BOPT	P	PROD1	(311) Filled pipe. Function tested lower pipe ram from driller's cabin and tool pusher office. OK. Tested acoustics. OK.
30.12.2001	04:30	06:15	1,75	TRIP	P	PROD1	(NPT) Continued to RIH from 880 m to 1950 m.
30.12.2001	06:15	06:30	0,25	CIRC	P	PROD1	(NPT) Filled pipe and broke circulation.
30.12.2001	06:30	07:00	0,5	TRIP	P	PROD1	(NPT) Continued to RIH from 1950 m to top of PBR at 2045 m.
30.12.2001	07:00	07:30	0,5	TRIP	P	PROD1	(NPT) M/U top drive and entered PBR with 3 RPM. RIH to 2067 m. No obstruction.
30.12.2001	07:30	10:30	3	TRIP	P	PROD1	(NPT) Continued to RIH from 2067 m to 2915 m. Washed through obstruction at 2805 m with 900 lpm and 650 psi.
30.12.2001	10:30	11:00	0,5	TBMV	P	PROD1	(NPT) P/U 6 single DP from deck and RIH from 2915 m to 2973 m.
30.12.2001	11:00	13:00	2	TRIP	P	PROD1	(NPT) Continued to RIH from 2973 m to 3605 m. Tagged wiper plug/landing collar with 10 MT WOB at 3605 m.
30.12.2001	13:00	14:30	1,5	CSGT	P	PROD1	(NPT) Attempted to pressure test casing. No go. Pressured up to 70 bars with 1,1 m3 mud, held 1 min. OK. Continued to pressure up to 85 bars with total of 1,7 m3. Pressure bled off to 73 bars. Continued to pressure up to 100 bars with total 2,8 m3 pumped. Pressure bled off to 73 bars. Bled back 0,6 m3 of 2,8 m3 pumped.
30.12.2001	14:30	19:00	4,5	RAT	P	PROD1	(NPT) Drilled wiper plug and landing collar with pump rate 200-1500 lpm, pump pressure 25-110 bar, RPM 5-80, torque 3-12 ftklbs.
30.12.2001	19:00	19:45	0,75	RAT	P	PROD1	(NPT) Continued to wash to top of float collar at 3625 m. Drilled same with pump rate 1500 lpm, pump pressure 100 bar, RPM 60, torque 3-4 ftklbs.
30.12.2001	19:45	20:30	0,75	RAT	P	PROD1	(NPT) Continued to wash to top of float shoe at 3642 m. Drilled same with parameters as above. Broke through and tagged bottom of hole at 3643 m. Circulated 20 mins.
30.12.2001	20:30	21:00	0,5	LKOF	P	PROD1	(NPT) Closed annular preventer and performed injection test: 1 bpm 67 bar 2 bpm 75 bar 4 bpm 87 bar Pressure bled back to 67 bar when stopped pumping. Pumped total 2,6 m3. Bled back 1,5 m3 mud.
30.12.2001	21:00	21:30	0,5	FCHK	P	PROD1	(NPT) Flow checked well. Neg. Pumped slug.
30.12.2001	21:30	00:00	2,5	TRIP	P	PROD1	(NPT) POOH from 3643 m to 2400 m. 00:00 - 06:00 Activity 00:00 - 03:30 POOH from 2400 m. 03:30 - 04:15 Cleaned rig floor and changed handling equipment. 04:15 - 06:00 P/U 3 1/2" DP from deck and RIH to 193 m. Scandi Stolmen arrived West Alpha 30.12.2001 at 15:40 hrs and departed 30.12.2001 at 23:10 hrs. ETA Stena Don 31.12.2001 at 01:10 hrs. HSE:

	SKARV 4 – 6507/5-5	COMPLETION REPORT	Page: 127 of 202
Chapter: 7	DRILLING DATA	Date: 03/05/02	Rev: 0

Date	Time From	Time To	Time (hr)	Activity	Code	Phase	Description of Currently Highlighted Operation
							RUH 6 ASA 1 Performed fire/muster drill and weekly safety meeting. HSE Weekly: RUH 43 ASA 8 No serious incidents.
31.12.2001	00:00	02:00	2	TRIP	P	PROD1	(NPT) Continued to POOH from 2400 m to 550 m.
31.12.2001	02:00	02:15	0,25	FCHK	P	PROD1	(NPT) Performed kick drill. Flow checked well. Neg.
31.12.2001	02:15	03:30	1,25	TRIP	P	PROD1	(NPT) Continued to POOH from 550 m.
31.12.2001	03:30	04:00	0,5	TBMV	P	PROD1	(NPT) Cleaned rig floor and changed handling equipment.
31.12.2001	04:00	07:00	3	TBMV	P	PROD1	(NPT) P/U cement diverter tool and 30 x 3 1/2" DP joints from deck and RIH to 290 m.
31.12.2001	07:00	09:00	2	TRIP	P	PROD1	(NPT) Continued to RIH with 5 1/2" DP to 2037 m.
31.12.2001	09:00	09:30	0,5	TRIP	P	PROD1	(NPT) Entered PBR at 2044 m and broke circulation at 2092 m.
31.12.2001	09:30	11:00	1,5	TRIP	P	PROD1	(NPT) Continued to RIH from 2092 m to 3643 m.
31.12.2001	11:00	13:00	2	CIRC	P	PROD1	(NPT) Circulated bottoms up with 2300 lpm and 230 bars. Meanwhile pressure tested surface lines to 345 bars, and performed pre-job safety meeting prior to cement job.
31.12.2001	13:00	13:30	0,5	CMTR	P	PROD1	(NPT) Pumped 5,6 m3 (35,6 bbls) 1,64 SG (13,7 ppg) Spacer E+ with 950 lpm and 66 bars.
31.12.2001	13:30	14:00	0,5	CMTR	P	PROD1	(NPT) Mixed and pumped 10 m3 (63 bbls) 1,98 SG (16,5 ppg) Norcem G + 35% SSA-1 cement slurry mixed with Gascon 0,35 gps, CFR-3L 0,21 gps, SCR-100L 0,26 gps, Halad-413L 0,4 gps, NF-6 0,01 gps, FW 4,34 gps. Yield 1,41 ft3/sx.
31.12.2001	14:00	14:30	0,5	DSPL	P	PROD1	(NPT) Displaced cement with 2,8 m3 (17,5 bbls) Spacer E+ and 34,2 m3 (215 bbls) mud with 845 lpm and 40 bars.
31.12.2001	14:30	16:00	1,5	TRIP	P	PROD1	(NPT) POOH dry to 3263 m. Closed middle pipe ram.
31.12.2001	16:00	16:15	0,25	CMTR	P	PROD1	(NPT) Squeezed 4,8 m3 (30 bbls) cement slurry with 600 lpm and 72,5-79,3 bars. Stop pump initial pressure 65 bars, decreased to 60 bars during 5 mins. Bled back 630 ltrs, well flowed back. Squeezed back 630 ltrs with 400 lpm and 73 bars. Stop pump initial pressure 65 bars.
31.12.2001	16:15	18:15	2	WOC	P	PROD1	(NPT) Waited on cement. Pressure decreased from 60 bars to 41 bars.
31.12.2001	18:15	18:30	0,25	CMTR	P	PROD1	(NPT) Bled back 515 ltrs to zero pressure.
31.12.2001	18:30	19:00	0,5	TRIP	P	PROD1	(NPT) Broke off cement single and changed elevator.
31.12.2001	19:00	20:00	1	TRIP	P	PROD1	(NPT) POOH from 3266 m to 2975 m.
31.12.2001	20:00	21:30	1,5	CIRC	P	PROD1	(NPT) Dropped Halliburton wash ball. Circulated bottoms up with 2500 lpm and 230 bars.
31.12.2001	21:30	00:00	2,5	TRIP	P	PROD1	(NPT) Pumped slug and POOH from 2975 m to 1391m. 00:00 - 06:00 Activity 00:00 - 02:00 POOH from 1391 m to 290 m. 02:00 - 02:30 Changed handling equipment. 02:30 - 03:30 POOH with 3 1/2" cement stinger. Racked back same in derrick. 03:30 - 06:00 L/D 12 1/4" BHA. HSE: RUH 1 ASA 0
01.01.2002	00:00	02:00	2	TRIP	P	PROD1	(NPT) Continued to POOH from 1391 m to 290 m.
01.01.2002	02:00	02:30	0,5	TRIP	P	PROD1	(NPT) Removed diverter insert, broke off x-o and changed handling equipment.
01.01.2002	02:30	03:30	1	TRIP	P	PROD1	(NPT) POOH with 3 1/2" cement stinger. Racked back same in derrick.
01.01.2002	03:30	09:00	5,5	BHA	P	PROD1	(319) Changed handling equipment. L/D 12 1/4" BHA from derrick.
01.01.2002	09:00	10:30	1,5	RIGS	P	PROD1	Slipped and cut 34 m drill line.
01.01.2002	10:30	11:00	0,5	RIGS	P	PROD1	Lubricated rig.
01.01.2002	11:00	11:30	0,5	RIGR	P	PROD1	(NPT) Repaired brake rim on drawwork.
01.01.2002	11:30	13:00	1,5	CSGT	P	PROD1	(323) Pressure tested 9 5/8" x 13 3/8" casing to 359 bars (5200 psi). 10 mins. OK. Pumped 3,9 m3, bled back 3,7 m3.
01.01.2002	13:00	19:00	6	BHA	P	PROD1	(320) M/U 8 1/2" BHA and RIH to 248 m.

	SKARV 4 – 6507/5-5	COMPLETION REPORT	Page: 128 of 202
Chapter: 7	DRILLING DATA	Date: 03/05/02	Rev: 0

Date	Time From	Time To	Time (hr)	Activity	Code	Phase	Description of Currently Highlighted Operation
01.01.2002	19:00	19:15	0,25	TRIP	P	PROD1	(320) Re-arranged 5 1/2" HWDP in derrick.
01.01.2002	19:15	20:00	0,75	TRIP	P	PROD1	(324) RIH with 5" DP from 248 m to 523 m.
01.01.2002	20:00	21:00	1	TRIP	P	PROD1	(324) Changed handling equipment and continued to RIH from 523 m to 860 m.
01.01.2002	21:00	21:30	0,5	CIRC	P	PROD1	(324) Filled pipe and broke circulation. Attempted to test MWD, no pulse signals received.
01.01.2002	21:30	00:00	2,5	TRIP	P	PROD1	(325) Continued to RIH with 5 1/2" DP from 860 m to 2250 m. 00:00 - 06:00 Activity 00:00 - 02:00 Continued to RIH from 2250 m to 3390 m. Took 20 MT weight. 02:00 - 04:30 Washed from 3390 m to 3490 m with 1-5 MT WOB, 1500 lpm and 160 bars. Took 5-6 MT weight at 3490-3500 m with 1500 lpm and 15 RPM. Confirmed firm cement. MWD working OK. Good pulsing. 04:30 - 05:00 Performed pre-job safety meeting prior to displacement to WBM. 05:00 - 06:00 Continued to circulate and condition mud while preparing for displacement. HSE: RUH 2 ASA 2
02.01.2002	00:00	02:00	2	TRIP	P	PROD1	(325) Continued to RIH from 2250 m to 3390 m. Took 20 MT weight at 3390 m.
02.01.2002	02:00	04:30	2,5	REAM	P	PROD1	(325) Washed from 3390 m to 3490 m, with 1-5 MT WOB, 1500 lpm and 160 bars. Took 5-6 MT weight at 3490-3500 m with 1500 lpm and 15 RPM. Confirmed firm cement. MWD worked OK. Good pulsing.
02.01.2002	04:30	05:00	0,5	SAFE	P	PROD1	(325) Performed pre-job safety meeting prior to displacement to WBM.
02.01.2002	05:00	06:15	1,25	CIRC	P	PROD1	(325) Continued to circulate and condition mud while preparing for displacement. Cleaned out mud pump strainers.
02.01.2002	06:15	10:00	3,75	DSPL	P	PROD1	(325) Pumped wash train consisting of: 13 m3 Baseoil + 9 m3 Surfactant wash + 9 m3 HiVis KCL mud spacer. Displaced well to 1,20 SG WBM with 1300 - 2200 lpm, 90 - 250 bars, 15-20 RPM.
02.01.2002	10:00	11:00	1	SAFE	P	PROD1	(326) Performed kick drill. Circulated through choke and took SCR up riser and choke line.
02.01.2002	11:00	14:00	3	CMTD	P	PROD1	(327,329) Drilled firm cement from 3500 m to 3643 m with 2500 lpm, 210 bars, WOB 4-10 MT, 100 RPM and 5-6 ftklbs torque.
02.01.2002	14:00	16:00	2	DRL	P	PROD1	(330) Drilled formation from 3643 m to 3655 m with 2500 lpm, 210 bars, 100 RPM, WOB 5-10 MT and 5-7 ftklbs. Top garn at 3651,5 m, picked by resistivity and gamma ray.
02.01.2002	16:00	19:30	3,5	CIRS	P	PROD1	(331) Circulated bottoms up for sample with 2500 lpm and 210 bars. Max gas 0,28% from 3655 m.
02.01.2002	19:30	20:00	0,5	FCHK	P	PROD1	(331) Flow checked well. Neg. Slugged pipe.
02.01.2002	20:00	00:00	4	TRIP	P	PROD1	(331) POOH from 3655 m to 1050 m. 00:00 - 06:00 Activity 00:00 - 03:15 Continued to POOH from 1050 m. Racked back BHA in derrick. 03:15 -03:45 Performed pre-job safety meeting prior to P/U core assembly. 03:30 - 06:00 P/U 8 1/2" core assembly. McNee Tide arrived West Alpha 01.01.2002 at 16:30 hrs. Departed 02.01.2002 at 18:50 hrs. ETA Mongstad 03.01.2002 at 20:00 hrs. HSE: RUH 3 ASA 4
03.01.2002	00:00	00:45	0,75	TRIP	P	PROD1	(331) Continued to POOH from 1050 m to 600 m.
03.01.2002	00:45	01:00	0,25	FCHK	P	PROD1	(331) Flow checked well. Neg. Held kick drill with crew.
03.01.2002	01:00	01:30	0,5	TRIP	P	PROD1	(331) Changed handling equipment. Continued to POOH with 5" DP from 600 m to 248 m.
03.01.2002	01:30	03:30	2	TRIP	P	PROD1	(331) Continued to POOH with BHA from 248 m. Racked back same in derrick.
03.01.2002	03:30	04:00	0,5	SAFE	P	PROD1	(333) Performed pre-job safety meeting prior to P/U core

	SKARV 4 – 6507/5-5	COMPLETION REPORT	Page: 129 of 202
Chapter: 7	DRILLING DATA	Date: 03/05/02	Rev: 0

Date	Time From	Time To	Time (hr)	Activity	Code	Phase	Description of Currently Highlighted Operation
							assembly. Cleaned rig floor.
03.01.2002	04:00	06:00	2	CORE	P	PROD1	(333) M/U 8 1/2" core head and RIH with 83 m core outer barrel.
03.01.2002	06:00	08:00	2	CORE	P	PROD1	(333) P/U and run aluminum inner barrels.
03.01.2002	08:00	09:00	1	CORE	P	PROD1	(NPT) Attempted to install top sub. Found crack in threads on inner barrel damaged while handling. Changed out same.
03.01.2002	09:00	10:00	1	CORE	P	PROD1	(333) Installed adjustable sub with top sub, float sub and circ sub.
03.01.2002	10:00	12:00	2	CORE	P	PROD1	(333) Continued to RIH with BHA to 582 m.
03.01.2002	12:00	17:00	5	CORE	P	PROD1	(333) RIH with 5 1/2" DP from 582 m to 3616 m. Filled pipe every 1000 m.
03.01.2002	17:00	18:00	1	CORE	P	PROD1	(334) Circulated string volume. Tagged bottom at 3655 m. P/U 1 single for space out. M/U drilling stand.
03.01.2002	18:00	22:00	4	CORE	P	PROD1	(334) Cut core from 3655 m to 3736 m with 1000 lpm, 50-53 bars, 70-100 RPM, 3-9 MT WOB, 7-18 ftklbs torque. Max gas 5,44% from 3665 m. Trip gas 0,39% from 3655 m.
03.01.2002	22:00	22:30	0,5	CORE	P	PROD1	(334) Broke core off bottom with 7 MT overpull. Flow checked well. Neg.
03.01.2002	22:30	00:00	1,5	CORE	P	PROD1	(335) POOH with core from 3736 m to 3200 m. 00:00 - 06:00 Activity 00:00 - 06:00 POOH with core from 3200 m to 430 m. HSE: RUH 6 ASA 3
04.01.2002	00:00	05:15	5,25	CORE	P	PROD1	(335) Continued to POOH with core from 3200 m to 726 m.
04.01.2002	05:15	05:30	0,25	CORE	P	PROD1	(335) Flow checked well. Neg. Performed kick drill.
04.01.2002	05:30	06:00	0,5	CORE	P	PROD1	(335) Continued to POOH from 726 m to 583 m.
04.01.2002	06:00	09:30	3,5	CORE	P	PROD1	(335) Changed handling equipment and POOH from 583 m to 85 m. Broke off float sub and circ sub.
04.01.2002	09:30	10:00	0,5	CORE	P	PROD1	(336) Performed pre-job safety meeting and SJA meeting prior to lay down core.
04.01.2002	10:00	14:00	4	CORE	P	PROD1	(336) Laid down inner barrel. Recovered 81 m, 100%. When sub on top of inner barrel was unscrewed a gas energized column of core gel surged from the inner core barrel. The surging gel had enough energy to unload approx. 12,5 m core. These pieces of core varied in length 10-30 cm.
04.01.2002	14:00	15:00	1	CORE	P	PROD1	(336) POOH with outer barrel. L/D 3 single barrels and racked back 2 stands.
04.01.2002	15:00	18:00	3	TRIP	P	PROD1	(343) P/U new 8 1/2" bit and RIH with 8 1/2" BHA to 523 m.
04.01.2002	18:00	18:15	0,25	TRIP		PROD1	(343) Changed to 5 1/2" handling equipment.
04.01.2002	18:15	00:00	5,75	TRIP	P	PROD1	(344,345) Continued to RIH with 5 1/2" DP from 523 m to 3300 m. 00:00 - 00:30 Continued to RIH from 3300 m to 3640 m. 00:30 - 05:30 Reamed and logged from 3640 m to 3736 m with 2000 lpm, 160 bars, 50 RPM, 8-10 ftklbs torque and ROP 25-30 m/hr. Trip gas 2,4%. 05:30 - 06:00 Drilled 8 1/2" hole from 3736 m to 3746 m. Skandi Stolmen arrived West Alpha 04.01.2002 at 23:00 hrs. HSE: RUH 5 ASA 1
05.01.2002	00:00	00:30	0,5	TRIP	P	PROD1	(345) Continued to RIH from 3300 m to 3640 m.
05.01.2002	00:30	05:30	5	REAM	P	PROD1	(346) Reamed and logged from 3640 m to 3736 m with 2000 lpm, 160 bars, 50 RPM, 8-10 ftklbs torque and ROP 25-30 m/hr. Trip gas 2,4%.
05.01.2002	05:30	11:00	5,5	DRL	P	PROD1	(347) Drilled 8 1/2" hole from 3736 m to 3837 m with 2500 lpm, 210 bars, 2-5 MT WOB, 100-130 RPM and 5-17 ftklbs torque.
05.01.2002	11:00	11:30	0,5	FCHK	P	PROD1	(347) Flow checked drilling break at 3835 m. Neg.
05.01.2002	11:30	19:00	7,5	DRL	P	PROD1	(347) Continued to drill 8 1/2" hole from 3837 m to 3950 m TD with same parameters as above.

	SKARV 4 – 6507/5-5	Page: 130 of 202
Chapter: 7	DRILLING DATA	Date: 03/05/02 Rev: 0

Date	Time From	Time To	Time (hr)	Activity	Code	Phase	Description of Currently Highlighted Operation
05.01.2002	19:00	20:30	1,5	CIRC	P	PROD1	(348) Circulated and conditioned mud.
05.01.2002	20:30	21:00	0,5	FCHK	P	PROD1	(349) Flow checked well. Neg. Took torque readings at 3950 m: 10, 20, 30 RPM, 4,5 ftklbs 50 RPM, 5,1 ftklbs Up/down weight 170/172 MT.
05.01.2002	21:00	22:00	1	TRIP	P	PROD1	(350) POOH from 3950 m to 3614. No drag. Hole in good condition.
05.01.2002	22:00	22:30	0,5	FCHK	P	PROD1	(353) Flow checked well. Neg. Performed kick drill. Pumped slug. Torque readings from inside csg shoe: 10, 20, 30, 50 RPM , 3,7 ftklbs. Up/down weight 158/163 MT.
05.01.2002	22:30	00:00	1,5	TRIP	P	PROD1	(354) Continued to POOH from 3614 m to 2242 m. 00:00 - 06:00 Activity 00:00 - 02:00 Continued to POOH from 2242 m to 523 m. 02:00 - 02:30 Changed handling equipment and POOH with 5" DP from 523 m to 248 m. 02:30 - 04:00 Continued to POOH with BHA. L/D MWD and bit. 04:00 - 05:30 L/D 2 stands outer core barrel. 05:30 - 06:00 Performed pre-job safety meeting prior to rig up for wireline logging. Scandi Stolmen departed West Alpha 05.01.2001 at 09:05 hrs. ETA Sandnessjøen 05.01.2001 at 20:00 hrs. HSE: RUH 7 ASA 0 Weekly Rig Safety Inspection: ShakerRm, MP Rm, Drill Floor, Derrick
06.01.2002	00:00	02:00	2	TRIP	P	PROD1	(354) Continued to POOH from 2242 m to 523 m.
06.01.2002	02:00	02:30	0,5	TRIP	P	PROD1	(355) Changed handling equipment and POOH with 5" DP from 523 m to 248 m.
06.01.2002	02:30	04:00	1,5	TRIP	P	PROD1	(355) Continued to POOH with BHA. L/D MWD and bit.
06.01.2002	04:00	05:30	1,5	TBMV	P	PROD1	(357) L/D 2 stands of outer core barrel.
06.01.2002	05:30	06:00	0,5	SAFE	P	PROD1	(360) Performed pre-job safety meeting prior to rig up for wireline logging.
06.01.2002	06:00	07:00	1	LOG	P	PROD1	(361) R/U logging sheaves.
06.01.2002	07:00	08:00	1	LOG	P	PROD1	(362) P/U logging toolstring no. 1 DSI/HLRA/GR/EMS/SP
06.01.2002	08:00	13:00	5	LOG	P	PROD1	(364-366) RIH with toolstring no. 1 and logged from TD at 3946,5 m (wireline depth) to 3440 m. Wireline csg shoe depth 3641 m. POOH.
06.01.2002	13:00	14:15	1,25	LOG	P	PROD1	(367) L/D toolstring no. 1.
06.01.2002	14:15	14:45	0,5	LOG	P	PROD1	(369) P/U toolstring no. 2 IPLT and installed R/A sources.
06.01.2002	14:45	19:30	4,75	LOG	P	PROD1	(371-373) RIH with toolstring no. 2 and logged from TD to 3596 m. BHT measured to 130 degC. POOH.
06.01.2002	19:30	21:00	1,5	LOG	P	PROD1	(374-375) Removed R/A sources and L/D toolstring no. 2.
06.01.2002	21:00	22:30	1,5	LOG	P	PROD1	(377) P/U toolstring no. 3 MDT/GR.
06.01.2002	22:30	00:00	1,5	LOG	P	PROD1	(379-381) RIH with toolstring no. 3 and logged for pressure points. 00:00 - 06:00 Activity 00:00 - 06:00 Continued to log for pressure points. Skandi Stolmen arrived West Alpha 06.01.2002 at 20:20 hrs and offloaded food containers. Departed 06.01.2002 at 21:00 hrs. ETA Nome 06.01.2002 at 23:00 hrs. HSE: RUH 6 ASA 2 Held weekly muster/ abandonment drill and safety meeting. HSE Weekly: RUH 21 ASA 14 No major incidents.
07.01.2002	00:00	11:30	11,5	LOG	P	PROD1	(380) Continued to log with run no. 3 MDT/GR. Performed total of 44 pressure points, only 12 good tests. No drag observed during pressure points. Max 10 minutes static on tests. Errors recorded on OFA.
07.01.2002	11:30	12:00	0,5	MISC	P	PROD1	(NPT) Pulled out to 9 5/8" casing shoe and attempted to correct OFA errors. No go.
07.01.2002	12:00	13:45	1,75	MISC	P	PROD1	(NPT) POOH with log run no. 3 MDT/GR.
07.01.2002	13:45	15:45	2	MISC	P	PROD1	(NPT) Repaired MDT tool due to leak and changed out fluid

	SKARV 4 – 6507/5-5	COMPLETION REPORT	Page: 131 of 202
Chapter: 7	DRILLING DATA	Date: 03/05/02	Rev: 0

Date	Time From	Time To	Time (hr)	Activity	Code	Phase	Description of Currently Highlighted Operation
07.01.2002	15:45	18:30	2,75	MISC	P	PROD1	analyzer.
07.01.2002	18:30	00:00	5,5	LOG	P	PROD1	(NPT) RIH with log run no. 3 MDT/GR. Stopped in casing shoe. Checked tool, problems with communication. Re-established communication.
07.01.2002	18:30	00:00	5,5	LOG	P	PROD1	(380) RIH to sample point 3668 m. Performed pre-test and cleaned up for 3 hours. Proceeded with sampling. Retracted tool ok. Static period 5 hours and 10 minutes. No overpull. 00:00 - 06:00 Activity 00:00 - 04:15 Moved tool to 3653,5 m and started pre-test, clean up and sampling. Retracted tool ok. 04:15 - 06:00 Moved tool to 3702,5 m and attempted to pre-test. No go. Moved tool to 3701,8 m, pre-tested and started to clean up for water sample. Scandi Stolmen arrived West Alpha 08.01.2002 at 01:15 hrs. Attempted to offload boat. No go due to bad weather. Standing by. HSE: RUH 2 ASA 0
08.01.2002	00:00	04:15	4,25	LOG	P	PROD1	(380) Moved tool to 3653,5 m, pre-tested, cleaned up and sampled. Retracted tool ok. No overpull.
08.01.2002	04:15	05:00	0,75	LOG	P	PROD1	(380) Moved tool to 3702,5 m and attempted to pre-test. No go.
08.01.2002	05:00	09:00	4	LOG	P	PROD1	(380) Moved tool to 3701,8 m, pre tested, cleaned up and sampled. Retracted tool ok. No overpull.
08.01.2002	09:00	09:30	0,5	LOG	P	PROD1	(380) Moved tool to 3707,2 m, and started clean up. Tight formation.
08.01.2002	09:30	10:00	0,5	LOG	P	PROD1	(380) Moved tool to 3708,2 m and attempted to clean up. Tight formation.
08.01.2002	10:00	11:00	1	LOG	P	PROD1	(380) Moved tool to 3837,0 m and attempted to clean up. Tight formation.
08.01.2002	11:00	13:00	2	LOG	P	PROD1	(381) POOH with log no. 3 MDT/GR.
08.01.2002	13:00	14:45	1,75	LOG	P	PROD1	(382) R/D toolstring no. 3 MDT/GR.
08.01.2002	14:45	17:15	2,5	LOG	P	PROD1	(386) Re-dressed cable and tool head due to swelling caused by gas. R/U toolstring no. 4 ZO-VSP/GR.
08.01.2002	17:15	20:30	3,25	LOG	P	PROD1	(388) RIH with toolstring no.4 ZO-VSP/GR to casing shoe at 3641 m. Took checkshots at 1822 m and 2560 m.
08.01.2002	20:30	22:00	1,5	LOG	P	PROD1	(388) Entered open hole and got indication of communication problems. RIH to TD and started to pull up. Still communication problems.
08.01.2002	22:00	00:00	2	MISC	P	PROD1	(NPT) POOH with toolstring no. 4 ZO-VSP/GR. 00:00 - 06:00 Activity 00:00 - 00:30 Continued to POOH with toolstring no. 4 ZO-VSP/GR. 00:30 - 01:15 L/D toolstring no. 4. 01:15 - 03:00 Replaced all connections on head due to swelling caused by gas. Removed bottom shuttle (#4) and tested toolstring no.4 ZO-VSP/GR. OK. 03:00 - 05:45 RIH with toolstring no. 4. Took check shot at 1822 m. Continued RIH to 3150 m. Got communication errors with tool. Re-gained communication and continued RIH. Skandi Stolmen offloaded 7" liner and running equipment and departed 08.01.2002 at 12:05 hrs. ETA Stena Don 08.01.2002 at 14:05 hrs. HSE: RUH 7 ASA 0
09.01.2002	00:00	00:30	0,5	LOG	P	PROD1	(NPT) Continued to POOH with toolstring no. 4 ZO-VSP/GR.
09.01.2002	00:30	01:15	0,75	LOG	P	PROD1	(NPT) L/D toolstring no.4.
09.01.2002	01:15	03:00	1,75	LOG	P	PROD1	(NPT) Replaced all connections on cable head due to swelling caused by gas. Removed bottom shuttle (#4) and tested toolstring no. 4 ZO-VSP/GR. OK.
09.01.2002	03:00	06:30	3,5	LOG	P	PROD1	(NPT) RIH with toolstring no. 4. Took check shot at 1822 m. Continued RIH to 3150 m. Got communication errors with tool. Re-gained communication and continued RIH to TD. Took checkshot at 3591 m.

	SKARV 4 – 6507/5-5	Page: 132 of 202
Chapter: 7	DRILLING DATA	Date: 03/05/02 Rev: 0

Date	Time From	Time To	Time (hr)	Activity	Code	Phase	Description of Currently Highlighted Operation
09.01.2002	06:30	12:30	6	LOG	P	PROD1	(389) Logged checkshots surveys every 100 m from 3946,4 m TD.
09.01.2002	12:30	13:15	0,75	LOG	P	PROD1	(390) POOH with toolstring no. 4 ZO-VSP/GR.
09.01.2002	13:15	14:30	1,25	LOG	P	PROD1	(391) R/D toolstring no.4 and wireline equipment.
09.01.2002	14:30	16:00	1,5	TBMV	P	PROD2	(5) M/U cement stand and pressure tested cement hose to 345 bars. OK.
09.01.2002	16:00	17:30	1,5	CSG	P	PROD2	(7) Changed handling equipment and R/U for running 7" liner.
09.01.2002	17:30	18:00	0,5	SAFE	P	PROD2	(6) Performed pre-job/SJA meeting prior to run 7" liner.
09.01.2002	18:00	23:00	5	CSG	P	PROD2	(8,9) P/U 7" liner shoe joint, float joint, intermediate joint and landing collar joint. Baker locked shoe track. Ran 7" liner, 29 lb/ft, L80, New Vam.
09.01.2002	23:00	23:15	0,25	SAFE	P	PROD2	(10) Performed pre-job meeting prior to P/U liner hanger.
09.01.2002	23:15	00:00	0,75	CSG	P	PROD2	(10) P/U 7" liner hanger and MU same. 00:00 - 06:00 Activity 00:00 - 00:30 Filled PBR/Floating Junk Bonnet with freshwater. Circulated liner volume with 1500 lpm and 12 bars. 00:30 - 03:00 RIH with 7" liner on 4 stands 5 1/2" HWDP and 5 1/2" DP to 1550 m. Filled pipe every 10 stands. 03:00 - 04:15 M/U hang off stand. RIH and hung off string with 7" liner shoe at 1975,5 m. Closed middle pipe ram. Max heave 4,6 m, max wind gusts 60 knots. 04:15 - 05:00 POOH with hang off string. Closed shear ram. 05:00 - 06:00 WOW. Deballasted rig from drilling draft (21,5m) to survival draft (19,5m) at 03:50 hrs, finished deballasting 05:00 hrs. HSE: RUH 1 ASA 2
10.01.2002	00:00	00:30	0,5	CSG	P	PROD2	(10) Filled PBR/Floating Junk Bonnet with fresh water. Circulated liner volume with 1500 lpm and 12 bars. (Total length 7" liner 407,34 m).
10.01.2002	00:30	03:00	2,5	CSG	P	PROD2	(10) RIH with 7" liner on 4 stands 5 1/2" HWDP and 5 1/2" DP to 1550 m. Filled pipe every 10 stands.
10.01.2002	03:00	04:15	1,25	WAIT	P	PROD2	(NPT) M/U hang off stand. RIH and hung off string with 7" liner shoe at 1975,5 m. Closed middle pipe ram. Max heave 4,6 m, max wind gusts 60 knots.
10.01.2002	04:15	05:00	0,75	WAIT	P	PROD2	(NPT) POOH with hang off string. Closed shear ram.
10.01.2002	05:00	00:00	19	WAIT	P	PROD2	(NPT) Waited on weather (WOW). Deballasted rig from drilling draft (21,5 m) to survival draft (19,5 m) at 03:50 hrs, finished deballasting 05:00 hrs. Ballasted rig from 19,5 m to 20,5 m at 11:30 hrs. Time Wind (knots) Sea (m) Heave (m) 05:00 60 10 4 07:00 60 12 5 09:00 60 12 4 11:00 60 12 4,8 13:00 60 12 6,3 15:00 56 12 5 17:00 58 10 5 19:00 54 10 4,2 21:00 54 10 5,9 23:00 54 10 4,8 01:00 52 10 5,2 03:00 50 10 5,2 05:00 42 9 4 HSE: RUH 8 ASA 1
11.01.2002	00:00	12:00	12	WAIT	P	PROD2	(NPT) Waited on weather (WOW). Time Wind (knots) Sea (m) Heave (m) 07:00 40 8 4,4 09:00 40 10 4,2

	SKARV 4 – 6507/5-5	COMPLETION REPORT	Page: 133 of 202
Chapter: 7	DRILLING DATA	Date: 03/05/02	Rev: 0

Date	Time From	Time To	Time (hr)	Activity	Code	Phase	Description of Currently Highlighted Operation
							11:00 46 10 2,9 13:00 50 9 3,9 15:00 50 9 2,7 17:00 52 9 4,5 19:00 24 8 2,6
11.01.2002	12:00	13:00	1	WAIT	P	PROD2	(NPT) RIH with hang off string above BOP.
11.01.2002	13:00	18:30	5,5	WAIT	P	PROD2	(NPT) Continued to wait on weather (WOW). Meanwhile performed HS2 briefing with crew.
11.01.2002	18:30	19:00	0,5	MISC	P	PROD2	(NPT) Attempted to recover hang off tool. Rotated with no sign of torque.
11.01.2002	19:00	19:45	0,75	MISC	P	PROD2	(NPT) POOH with hang off string.
11.01.2002	19:45	20:15	0,5	MISC	P	PROD2	(NPT) Changed out x-o from 4 1/2" IF to 6 5/8" FH connection.
11.01.2002	20:15	21:15	1	MISC	P	PROD2	(NPT) RIH with hang off string.
11.01.2002	21:15	22:45	1,5	WAIT	P	PROD2	(NPT) Latched on to hang off tool. Rotated 8 turns to the right. Got torque ok. POOH with 105 MT. Had 10 MT overpull through lower annular.
11.01.2002	22:45	00:00	1,25	WAIT	P	PROD2	(NPT) Serviced hang off tool. Installed ACME sub and racked hang off stand in derrick. 00:00 - 06:00 Activity 00:00 - 00:15 POOH 1 stand and L/D kelly cock and Gray valve. 00:15 - 00:30 Installed diverter element and auto slips. 00:30 - 01:30 RIH with 7" liner from 1582 m to 1811 m on 5 1/2" DP. 01:30 - 01:45 Performed pre-job safety meeting prior to run 7" liner/7" liner hanger into 9 5/8" liner top. 01:45 - 06:00 Continued to RIH with 7" liner from 1811 m to 3001 m. Compensated string when 7" liner and 7" liner hanger entered 9 5/8" liner top. Ballasted rig to drilling draft (21,5 m) at 20:15 hrs. HSE: RUH 3 ASA 0 Performed weekly muster/abandonment drill.
12.01.2002	00:00	00:15	0,25	WAIT	P	PROD2	(NPT) POOH 1 stand and L/D kelly cock and Gray valve.
12.01.2002	00:15	00:30	0,25	CSG	P	PROD2	(14) Installed diverter element and auto slips.
12.01.2002	00:30	01:30	1	CSG	P	PROD2	(14) RIH with 7" liner from 1582 m to 1811 m on 5 1/2" DP.
12.01.2002	01:30	01:45	0,25	SAFE	P	PROD2	(14) Performed pre-job safety meeting prior to run 7" liner/7" liner hanger into 9 5/8" liner top.
12.01.2002	01:45	09:00	7,25	CSG	P	PROD2	(14) Continued to RIH with 7" liner from 1811 m to 3640 m. Compensated string when 7" liner and 7" liner hanger entered 9 5/8" liner top. Filled liner every 5 stands. Running speed in 9 5/8" casing 2 min/stand.
12.01.2002	09:00	09:15	0,25	CSG	P	PROD2	(14) Broke circulation and circulated with 500 lpm and 14-16 bars. Took torque readings and up/down weights. Torque with 10 RPM: 3-4 ftklbs Up/down/free rotation weights with 10 RPM: 158/158/158 MT.
12.01.2002	09:15	09:30	0,25	SAFE	P	PROD2	(15) Performed pre-job safety meeting prior to run 7" liner in open hole.
12.01.2002	09:30	11:30	2	CSG	P	PROD2	(15) Continued RIH with 7" liner from 3642 m to 3940 m. Tagged fill. No obstruction in open hole.
12.01.2002	11:30	12:00	0,5	CSG	P	PROD2	(15) L/D 5 1/2" DP pup (15 ft).
12.01.2002	12:00	12:45	0,75	CSG	P	PROD2	(16) M/U cement stand and washed to bottom at 3942,8 m. Pulled up 4 m to 3938,8 m.
12.01.2002	12:45	15:00	2,25	CIRC	P	PROD2	(17) Circulated bottoms up with 1400 lpm and 77 bars. Max gas 28,5%. Meanwhile performed pre-job safety meeting prior to set and cement liner.
12.01.2002	15:00	15:30	0,5	CSG	P	PROD2	(19,20) Dropped setting ball and pumped ball down with 300 lpm and 925 strokes.
12.01.2002	15:30	16:00	0,5	CSG	P	PROD2	(21,22) Pressured up to 144 bars and set hanger. Slacked off weight from 165 MT to 135 MT, and ensured hanger set. Released running tool by 8 right hands turn and torque build up

	SKARV 4 – 6507/5-5	COMPLETION REPORT	Page: 134 of 202
Chapter: 7	DRILLING DATA	Date: 03/05/02	Rev: 0

Date	Time From	Time To	Time (hr)	Activity	Code	Phase	Description of Currently Highlighted Operation
							indicated free tool. Laid on 5 MT weight to 130 MT. Sheared out ball seat with 214 bars pressure. 7" liner shoe set at 3938,8 m and top PBR at 3531,5 m.
12.01.2002	16:00	16:15	0,25	PRST	P	PROD2	(18) Pressure tested surface lines to 345 bars.
12.01.2002	16:15	16:30	0,25	CMTP	P	PROD2	(24) Pumped 8 m3 1,59 Sg spacer with rig pumps.
12.01.2002	16:30	17:00	0,5	CMTP	P	PROD2	(25) Mixed and pumped 8 m3 1,92 SG Norcem G+35% SSA-1 cement slurry mixed with 0,4 gps SCR-100L, 0,4 gps Halad-413L, 0,35 gps Gascon, 0,15 gps CFR-3L, 0,01 gps NF-6 and 4,96 gps fresh water. Yield 1,5 ft3/sk.
12.01.2002	17:00	17:45	0,75	CMTP	P	PROD2	(26-30) Dropped dart and displaced cement with rig pump. Displaced with 1500 lpm and 25 bars. Wiper plug sheared after 2178 strokes and 100 bars pressure. Continued to displace and bumped plug after 2585 strokes (97,5% eff). Rotated liner with 20 RPM and max 6,6 kftlbs torque during cementing. Final circulating pressure 50 bars, increased to 110 bars. Bled off and checked floats. OK. No losses.
12.01.2002	17:45	18:15	0,5	CSGT	P	PROD2	(31) Pressure test 7" liner to 345 bars. 10 mins. OK.
12.01.2002	18:15	18:30	0,25	CSG	P	PROD2	(32,33) Pulled out 4,5 m and set liner packer by applying 20 MT weight. Had flicker indication and applied 5 MT more weight. Held for 30 seconds.
12.01.2002	18:30	19:30	1	CIRR	P	PROD2	(34) Pulled out and reversed out excess cement with 1700 lpm and 113 bars. Dumped spacer and 1 M3 cement.
12.01.2002	19:30	20:00	0,5	TRIP	P	PROD2	(36) Racked back cement stand and pumped slug. Installed auto slips.
12.01.2002	20:00	00:00	4	TRIP	P	PROD2	(37) POOH with 5 1/2" running string from 3625 m to 598 m. 00:00 - 06:00 Activity 00:00 - 01:00 Continued to POOH with running string. 01:00 - 01:45 L/D liner hanger running tool. 01:45 - 02:30 L/D cement stand. 02:30 - 03:30 Changed elevator and re-arranged stands in derrick. 03:30 - 05:15 M/U 6" bit, 7" csg scraper, bit sub and P/U 6 x 4 3/4" DC. RIH to 86 m. 05:15 - 05:30 Changed elevator and slips. 05:30 - 06:00 RIH with 3 1/2" DP from 86 m to 172 m. Tor Viking arrived West Alpha 12.01.2002 at 08:00 hrs, departed 13.01.2002 at 02:45 hrs. ETA Sandnessjøen 13.01.2002 at 15:00 hrs. Scandi Stolmen arrived West Alpha 13.01.2002 at 00:05 hrs, departed 04:30 hrs. ETA Stena Don 06:00 hrs. HSE: RUH 2 ASA 3
13.01.2002	00:00	01:00	1	TRIP	P	PROD2	(37) Continued to POOH with 5 1/2" DP running string.
13.01.2002	01:00	01:45	0,75	TBMV	P	PROD2	(39) L/D liner hanger running tool.
13.01.2002	01:45	02:30	0,75	TBMV	P	PROD2	(40) L/D cement stand.
13.01.2002	02:30	03:30	1	BHA	P	PROD2	(41) Changed elevator and re-arranged stands in derrick.
13.01.2002	03:30	05:15	1,75	BHA	P	PROD2	(43) M/U 6" bit, 7" csg scraper, bit sub and P/U 6 x 4 3/4" DC. RIH to 86 m.
13.01.2002	05:15	05:30	0,25	TRIP	P	PROD2	(43) Changed elevator and slips.
13.01.2002	05:30	06:30	1	TRIP	P	PROD2	(43) RIH with 3 1/2" DP from 86 m to 345 m.
13.01.2002	06:30	08:15	1,75	RIGS	P	PROD2	Slipped and cut 33,6 m drill line.
13.01.2002	08:15	09:45	1,5	TBMV	P	PROD2	(43) Laid out 1 single 3 1/2" DP, changed elevator, P/U x-o, bit sub, tie back mill and top dress mill.
13.01.2002	09:45	10:15	0,5	TRIP	P	PROD2	(44) RIH from 343 m to 380 m. Installed auto slips and wiper.
13.01.2002	10:15	10:45	0,5	CIRC	P	PROD2	(44) Washed BOP area with 2000 lpm and 120 bars.
13.01.2002	10:45	14:00	3,25	TRIP	P	PROD2	(44) Continued to RIH with 5 1/2" DP from 380 m to 2204 m.
13.01.2002	14:00	16:00	2	RIGR	P	PROD2	(NPT) Stopped operation due to redundancy emergency generator shut down. Repaired same. OK.
13.01.2002	16:00	18:00	2	TRIP	P	PROD2	(44) Continued to RIH with 5 1/2" DP from 2204 m to 3528 m.
13.01.2002	18:00	18:15	0,25	CIRC	P	PROD2	(44) Washed and entered top of 7" PBR at 3531,5 m with 800 lpm and 30 bars. No obstruction.

	SKARV 4 – 6507/5-5	COMPLETION REPORT	Page: 135 of 202
Chapter: 7	DRILLING DATA	Date: 03/05/02	Rev: 0

Date	Time From	Time To	Time (hr)	Activity	Code	Phase	Description of Currently Highlighted Operation
13.01.2002	18:15	18:30	0,25	TRIP	P	PROD2	(44) Continued to RIH with 5 1/2" DP from 3548 m to 3605 m.
13.01.2002	18:30	18:45	0,25	CIRC	P	PROD2	(45) Washed and scraped DST packer setting area from 3605 m to 3624 m with 800 lpm and 32 bars.
13.01.2002	18:45	20:45	2	TRIP	P	PROD2	(46) Continued to RIH with 5 1/2" DP from 3624 m to 3874 m.
13.01.2002	20:45	21:30	0,75	CIRC	P	PROD2	(46) Tagged top of 7" PBR at 3531,5 m and dressed off same with 800 lpm, 35 bars and 20 RPM.
13.01.2002	21:30	00:00	2,5	DSPL	P	PROD2	(47) Pumped 15 m3 sea water, 8 m3 Hi-Vis brine spacer and displaced well to 1,20 SG NaCl brine with 2500 lpm, 190 bars and 10 RPM. Meanwhile performed SJA prior to trip wet out of hole. 00:00 - 06:00 Activity 00:00 - 05:00 POOH with clean out string from 3870 m to 343 m. 05:00 - 05:30 L/D top dress mill, tie back mill and bit sub. 05:30 - 06:00 Changed elevator and slips. P/U 1 single 3 1/2" DP and POOH with 3 1/2" DP from 343 m to 180 m. HSE: RUH 10 ASA 1 Performed weekly muster/abandonment drill. HSE Weekly: RUH 29 ASA 8 No major incidents.
14.01.2002	00:00	05:00	5	TRIP	P	PROD2	(48) POOH with clean out string from 3870m to 343 m.
14.01.2002	05:00	05:30	0,5	BHA	P	PROD2	(48) L/D top dress mill, tie back mill and bit sub.
14.01.2002	05:30	06:30	1	TRIP	P	PROD2	(48) Changed elevator and slips. P/U 1 single 3 1/2" DP and POOH with 3 1/2" DP from 343 m. L/D bit and csg scraper. Meanwhile attempted to pressure test 7" x 9 5/8" x 13 3/8" casing. No go. Pressured up to 359 bars and pressure dropped to 334 bars in 15 mins. Pumped a total of 3,2 m3, bled back 2,4 m3.
14.01.2002	06:30	07:00	0,5	TRIP	P	PROD2	(48) Cleaned rig floor.
14.01.2002	07:00	10:30	3,5	PLUG	P	PROD2	(49) M/U jet sub and RIH with 3 stands of 6 1/2" DC. M/U test tool, x-o and checked same. Continued RIH with test tool on 5 1/2" DP.
14.01.2002	10:30	11:15	0,75	BOPT	P	PROD2	(49) Set test plug and started to test BOP's.
14.01.2002	11:15	12:00	0,75	WKIL	P	PROD2	(NPT) Observed brine in return up the DP while performing the first low pressure test. No leak on pressure test indicated flow from wellbore. Pulled out with test plug and 3 stands and 6 1/2" DC to above the BOP. Closed shear ram.
14.01.2002	12:00	13:00	1	WKIL	P	PROD2	(NPT) Observed well. Total influx 800 ltrs. Pressure increased steady and leveled off at 53 bars at 16:00 hrs.
14.01.2002	13:00	14:30	1,5	WKIL	P	PROD2	(NPT) POOH with BOP test plug and racked back 3 stands of 6 1/2" DC.
14.01.2002	14:30	14:45	0,25	WKIL	P	PROD2	(NPT) Changed elevator and slips, and installed diverter element.
14.01.2002	14:45	16:00	1,25	WKIL	P	PROD2	(NPT) RIH with 5 1/2" DP to 372 m. Installed Gray valve and kelly cock.
14.01.2002	16:00	21:30	5,5	WKIL	P	PROD2	(NPT) Monitored well. Shut in pressure stabilized at 56 bars.
14.01.2002	21:30	22:30	1	WKIL	P	PROD2	(NPT) Pressured up well to 172 bar with 1340 ltrs 1,20 SG brine. Observed pressure drop to 165 bars in 15 mins. Bled off pressure from 165 bars to 56 bars on choke manifold. Pressure increased to 70 bars in 5 mins. Bled back to 56 bars. Pressure increased to 66 bars in 7 mins. Bled back to 56 bars. Pressure stabilized at 56 bars. Total volume bled back 970 ltrs (total pumped 1340 ltrs). No gas or oil observed in return.
14.01.2002	22:30	00:00	1,5	WKIL	P	PROD2	(NPT) Pressured up well to 172 bars with 1065 ltrs 1,20 SG brine. Observed pressure drop to 171 bars in 15 mins. Bled off pressure from 171 bars to 56 bars on choke manifold. Pressure increased to 70 bars in 8 mins. Bled back to 56 bars. Pressure increased to 65 bars in 12 mins and stabilized. Bled back to 56 bars. Pressure increased to 61 bars and stabilized. No gas or

	SKARV 4 – 6507/5-5	COMPLETION REPORT	Page: 136 of 202
Chapter: 7	DRILLING DATA	Date: 03/05/02	Rev: 0

Date	Time From	Time To	Time (hr)	Activity	Code	Phase	Description of Currently Highlighted Operation
							oil observed in return. 00:00 - 06:00 Activity 00:00 - 01:00 Bled down pressure to 56 bars. Pressure stabilized at 56 bars. Total volume bled back 980 ltrs (total pumped 1065 ltrs). 01:00 - 03:30 Pressured up well to 172 bars with 1002 ltrs 1,20 SG brine. Observed pressure drop to 164 bars in 15 mins. Bled off pressure from 164 bars to 56 bars on choke manifold. Pressure increased to 69 bars in 12 mins and stabilized. Bled back to 56 bars. Pressure increased to 58 bars in 12 mins and stabilized. Bled back to 56 bars and stabilized at 56 bars. Total bled back 890 ltrs (total pumped 1002 ltrs). 03:30 - 04:45 Pressured up well to 172 bars with 1145 ltrs 1,20 SG brine. Observed pressure drop to 161 bars in 15 mins. Bled off pressure from 161 bars to 56 bars on choke manifold. Pressure stabilized at 56 bars the first 3 minutes. Then pressure decreased to 48 bars the next 10 mins, and stabilized at 48 bars. Total bled back 800 ltrs (total pumped 1145 ltrs). 04:45 - 06:00 Pressured up well to 172 bars with 1224 ltrs 1,20 SG brine. Observed pressure drop to 170,5 bars in 15 mins. Bled off pressure from 170 bars to 56 bars on choke manifold. Pressure stabilized the first 5 mins, and then increased to 80 bar during next 30 mins. Then pressure stabilized at 80 bars. Bled back pressure to 56 bars. Total bled back 950 ltrs (total pumped 1224 ltrs). No gas or oil observed in return. HSE: RUH 4 ASA 0
15.01.2002	00:00	01:00	1	WKIL	P	PROD2	(NPT) Bled down pressure to 56 bars. Pressure stabilized at 56 bars. Total volume bled back 980 ltrs (total pumped 1065 ltrs).
15.01.2002	01:00	03:30	2,5	WKIL	P	PROD2	(NPT) Pressured up well to 172 bars with 1002 ltrs 1,20 SG brine. Observed pressure drop to 164 bars in 15 mins. Bled off pressure from 164 bars to 56 bars on choke manifold. Pressure increased to 69 bars in 12 mins and stabilized. Bled back to 56 bars. Pressure increased to 58 bars in 12 mins and stabilized. Bled back to 56 bars and stabilized at 56 bars. Total bled back 890 ltrs (total pumped 1002 ltrs). No oil or gas observed in return.
15.01.2002	03:30	04:45	1,25	WKIL	P	PROD2	(NPT) Pressured up well to 172 bars with 1145 ltrs 1,20 SG brine. Observed pressure drop to 161 bars in 15 mins. Bled off pressure from 161 bars to 56 bars on choke manifold. Pressure stabilized at 56 bars the first 3 minutes. Then pressure decreased to 48 bars the next 10 mins, and stabilized at 48 bars. Total bled back 800 ltrs (total pumped 1145 ltrs). No oil or gas observed in return.
15.01.2002	04:45	06:45	2	WKIL	P	PROD2	(NPT) Pressured up well to 172 bars with 1224 ltrs 1,20 SG brine. Observed pressure drop to 170,5 bars in 15 mins. Bled off pressure from 170 bars to 56 bars on choke manifold. Pressure stabilized the first 5 mins, and then increased to 80 bars during next 30 mins. Then pressure stabilized at 80 bars. Bled back pressure to 56 bars. Total bled back 1030 ltrs (total pumped 1224 ltrs). No oil or gas observed in return.
15.01.2002	06:45	10:45	4	WKIL	P	PROD2	(NPT) Monitored well. Observed slight pressure drop from 56 bars to 50 bars.
15.01.2002	10:45	11:15	0,5	WKIL	P	PROD2	(NPT) Broke off kelly cock on top of stand 14 while monitoring the well.
15.01.2002	11:15	14:15	3	WKIL	P	PROD2	(NPT) Monitored the well. Observed a slight pressure drop from 50 bars to 48 bars.
15.01.2002	14:15	15:00	0,75	WKIL	P	PROD2	(NPT) POOH with 5 1/2" DP from 372 m to RKB.
15.01.2002	15:00	16:00	1	WKIL	P	PROD2	(NPT) RIH with 5 1/2" DP. Installed Gray valve on top of stand 1 and RIH to 372 m.
15.01.2002	16:00	17:45	1,75	WKIL	P	PROD2	(NPT) Monitored well. Observed a slight pressure drop from 48

	SKARV 4 – 6507/5-5	COMPLETION REPORT	Page: 137 of 202
Chapter: 7	DRILLING DATA	Date: 03/05/02	Rev: 0

Date	Time From	Time To	Time (hr)	Activity	Code	Phase	Description of Currently Highlighted Operation
							bars to 46 bars. Performed pre-job safety meeting prior to open well and RIH with 5 1/2" DP.
15.01.2002	17:45	20:30	2,75	WKIL	P	PROD2	(NPT) Open well over choke manifold and bled down pressure from 46 bars to 0 bars. Gained 470 ltrs from bleed off. Open shear ram. RIH with 5 1/2" DP from 373 m to 2088 m. Gained 2220 ltrs while running in hole.
15.01.2002	20:30	20:45	0,25	WKIL	P	PROD2	(NPT) Installed kelly cock, spaced out 5 1/2" DP and closed middle pipe ram.
15.01.2002	20:45	00:00	3,25	WKIL	P	PROD2	(NPT) Monitored well. Choke pressure increased to 46 bars during 50 mins. And pressure stabilized at 46 bars. 00:00 - 06:00 Activity 00:00 - 01:00 Observed well. Choke pressure stable at 46 bars. 01:00 -01:30 Performed pre-job safety meeting with crew prior to circulate well and take onboard 1,50 SG NaBr2 brine. 01:30 - 01:45 Circulated down buster line with mud pump and filled up mud system with 1,20 Sg brine. Total pumped 680 strokes. 01:45 - 04:30 Circulated well over choke with Drillers Method. Maintained constant BHP with 72 bars pressure on standpipe and start up choke pressure 56 bars (10 bars safety factor). No gas, oil or OBM observed in return. Brine weight steady 1,20 SG. 04:30 - 06:00 Closed in well with 46 bars on choke. Monitored well. Observed pressure increase from 46 bars to 51 bars at 06:00 hrs. Tor Viking arrived West Alpha 16.01.2002 at 03:30 hrs. Started to offload NaBr2 1,50 SG brine. HSE: RUH 5 ASA 0
16.01.2002	00:00	01:00	1	WKIL	P	PROD2	(NPT) Closed middle pipe ram and observed well. Choke pressure stable at 46 bars.
16.01.2002	01:00	01:30	0,5	WKIL	P	PROD2	(NPT) Performed pre-job safety meeting with crew prior to circulating well and taking onboard 1.5 SG NaBr2 brine from Tor Viking.
16.01.2002	01:30	01:45	0,25	WKIL	P	PROD2	(NPT) Circulated down buster line with mud pump and filled up mud system with 1.2 SG brine. Pumped a total of 680 strokes (11 m3).
16.01.2002	01:45	04:30	2,75	WKIL	P	PROD2	(NPT) Circulated well over choke with Drillers Method. Maintained constant BHP with 72 bars pressure on standpipe and start up choke pressure 56 bars (10 bars safety factor). No gas, oil or OBM observed in return. Brine weight steady 1,20 SG. Pumped a total of 8038 strokes (130.1 m3)
16.01.2002	04:30	10:30	6	WKIL	P	PROD2	(NPT) Closed in well with 46 bars on choke. Monitored well. Observed pressure increase from 46 bars to 51 bars at 06:00 hrs. Pressure further increased to 55 Bars at 10:30 hours. In meantime held pre-job safety meeting prior to opening up BOP to continue to RIH to top of 7" liner hanger. Continued offloading brine from the Tor Viking. Got a total of 271 m3 out of 300 m3
16.01.2002	10:30	12:45	2,25	WKIL	P	PROD2	(NPT) Bled off pressure from well from 55 Bars to zero on choke. Opened pipe ram and RIH with 5 1/2" DP from 2088m to 3515m. Closely observed well on trip tank and gained a total of 3.12 m3 (19.6 bbls) while running in.
16.01.2002	12:45	13:00	0,25	WKIL	P	PROD2	(NPT) Installed kelly cock and made up topdrive to drillstring. Positioned drillstring and closed middle pipe ram.
16.01.2002	13:00	15:30	2,5	WKIL	P	PROD2	(NPT) Monitored well. Shut in Casing Pressure increased from zero to 54 bars and stabilised.
16.01.2002	15:30	19:00	3,5	WKIL	P	PROD2	(NPT) Circulated well according to drillers method. Maintained constant bottomhole pressure. Pumped with 50 SPM and maintained 92 Bars Standpipe pressure (included 10 bars safety factor) Maximum gas during circulation was 0.53%. Had

	SKARV 4 – 6507/5-5 COMPLETION REPORT	Page: 138 of 202
Chapter: 7	DRILLING DATA	Date: 03/05/02 Rev: 0

Date	Time From	Time To	Time (hr)	Activity	Code	Phase	Description of Currently Highlighted Operation
							some OBM in brine returns (Strung out). Brine weight in return fluctuated between 1.19 and 1.21 SG.
16.01.2002	19:00	22:45	3,75	WKIL	P	PROD2	Observed well. SICP increased from 46 Bars to 65 Bars and stabilised. Held Pre-job meeting prior to pumping 1.50 SG NaBr2 killweight brine in the hole.
16.01.2002	22:45	00:00	1,25	WKIL	P	PROD2	(NPT) Commenced killing well at 41 SPM according to wait and weight method. Pumped a total of 3000 strokes out of a total of 10800 strokes. 00:00-06:00 Hours update 00:00-03:15 Continued to kill well according to Wait and weight method. Followed step down on DP pressure from 75 Bars to 30 to kill drillstring and maintained 30 Bars DP pressure while displacing annulus to 1.50 SG Brine (All including 10 Bars safety). Observed OBM in brine returns at theoretical bottoms up of 10780 strokes. Pumped a total of 10975 strokes and confirmed 1.50 SG brine all the way around. Good Volume control during entire killing operation - no losses. 03:15-04:15 Bled off Choke pressure in stages. Monitoring pressure build up after every stage. Bled pressure off till choke pressure was zero. 04:15-05:30 Flowchecked well on trip tank. Well stable. 05:30-06:00 Closed well on Choke and displaced riser through kill line to 1.50 SG brine (In meantime observing choke pressure = 0) Tor Viking left West Alpha 18:30 hours destination Krisiandsund. ETA 07:30 on 17 Jan 2002. Scandi Stolman arrived West Alpha 01:50 Hours. Released Scandi Stolman at 03:50 heading for Sandnessjøen. ETA 16:00 hrs 17 Jan 2002. Safety: 5 RUH and 2 ASA
17.01.2002	00:00	03:15	3,25	WKIL	P	PROD2	(NPT) Continued to kill well according to Wait and weight method. Followed step down on DP pressure from 75 Bars to 30 to kill drillstring and maintained 30 Bars DP pressure while displacing annulus to 1.50 SG Brine (All including 10 Bars safety). Observed OBM in brine returns at theoretical bottoms up of 10780 strokes. Pumped a total of 10975 strokes and confirmed 1.50 SG brine all the way around. Good Volume control during entire killing operation - no losses.
17.01.2002	03:15	04:15	1	WKIL	P	PROD2	(NPT) Bled off Choke pressure in stages. Monitoring pressure build up after every stage. Bled pressure off till choke pressure was zero.
17.01.2002	04:15	05:30	1,25	WKIL	P	PROD2	(NPT) Flowchecked well on trip tank. Well stable.
17.01.2002	05:30	06:45	1,25	WKIL	P	PROD2	(NPT) Closed well on Choke and displaced riser through kill line to 1.50 SG NaBr2 brine (In meantime observing choke pressure = 0). Pumped all 1.5 SG brine in riser, pumped a total of 76 m3. This left 4 m3 of 1.2 SG brine inside the riser.
17.01.2002	06:45	07:00	0,25	WKIL	P	PROD2	(NPT) Monitored well before opening BOP
17.01.2002	07:00	12:30	5,5	WKIL	P	PROD2	(NPT) Opened BOP and flowchecked on trip tank. Got total of 1.3 m3 gain in trip tank in first 2 1/2 hours. Pit gain dropping over time.
17.01.2002	12:30	14:45	2,25	WKIL	P	PROD2	(NPT) Continued to monitor well on trip tank - well static. In meantime preparing pit room for displacing riser back to 1.2 SG brine to have enough 1.5 SG mud to circulate the well again. Held pre-job meeting prior to displacing
17.01.2002	14:45	15:30	0,75	WKIL	P	PROD2	(NPT) Displaced riser from 1.50 SG NaBr2 brine to 1.20 NaCl brine. Indications of 1.20 SG brine channeling through 1.50 SG brine resulting in no clear interface. Re-directed returns into different pits to maximise the amount of 1.50 SG from riser. Well closed on upper pipe ram.
17.01.2002	15:30	17:30	2	WKIL	P	PROD2	(NPT) Monitored well on choke and riser on trip tank. Well

	SKARV 4 – 6507/5-5	COMPLETION REPORT	Page: 139 of 202
Chapter: 7	DRILLING DATA	Date: 03/05/02	Rev: 0

Date	Time From	Time To	Time (hr)	Activity	Code	Phase	Description of Currently Highlighted Operation
							static. Prepared for circulating bottoms up with 1.50 NaBr2 brine.
17.01.2002	17:30	21:45	4,25	WKIL	P	PROD2	(NPT) Circulated well with 1.50 NaBr2 brine at 40 SPM and 13 Bars. Pumped a total of 9100 strokes (146 m3). Initially observed some heavy OBM coming over the shakers. Brine cleaned up afterwards with no further signs of OBM on bottoms up.
17.01.2002	21:45	00:00	2,25	WKIL	P	PROD2	Flowchecked well on trip tank with choke open - well static. In meantime mixing new 1.50 SG bentonite mud to displace riser. 06:00 Hours Update 00:00-04:45 Continued to mix 1.50 SG bentonite mud to displace riser while monitoring well on trip tank. 04:45-06:00 Displaced riser with 61m3 of 1.50 SG bentonite mud followed by 1.50 SG NaBr2 brine. HSE: 3 RUH
18.01.2002	00:00	04:45	4,75	WKIL	P	PROD2	(NPT) Continued to mix 1.50 SG bentonite mud to displace riser while monitoring well on trip tank. 04:45-06:00 Displaced riser with 61m3 of 1.50 SG bentonite mud followed by 1.50 SG NaBr2 brine.
18.01.2002	04:45	06:15	1,5	WKIL	P	PROD2	(NPT) Displaced riser with 61m3 of 1.50 SG bentonite mud followed by 20 m3 of 1.50 SG NaBr2 brine.
18.01.2002	06:15	06:45	0,5	WKIL	P	PROD2	(NPT) Opened choke and Flow checked well - well static.
18.01.2002	06:45	08:00	1,25	WKIL	P	PROD2	(NPT) Opened upper pipe rams and flow checked well. 06:50 - 07:20 hrs: Gained 0.39 m3 (0.78 m3/hr) 07:20 - 07:45 hrs: Gained 0.30 m3 (0.72 m3/hr) 07:45 - 08:00 hrs: Well static
18.01.2002	08:00	08:45	0,75	WKIL	P	PROD2	(NPT) POOH from 3515 to 3348m
18.01.2002	08:45	09:00	0,25	WKIL	P	PROD2	(NPT) Flow checked well - well static
18.01.2002	09:00	09:15	0,25	WKIL	P	PROD2	(NPT) POOH from 3348 to 3204 m
18.01.2002	09:15	09:45	0,5	WKIL	P	PROD2	(NPT) Flow checked well - well static
18.01.2002	09:45	10:15	0,5	WKIL	P	PROD2	(NPT) POOH from 3204 to 2918 m
18.01.2002	10:15	10:30	0,25	WKIL	P	PROD2	(NPT) Flow checked well - well static
18.01.2002	10:30	12:00	1,5	WKIL	P	PROD2	(NPT) POOH from 2918m to 2032m (Top of 9 5/8" PBR at 2044.5m)
18.01.2002	12:00	12:30	0,5	WKIL	P	PROD2	(NPT) Flow checked well - well static
18.01.2002	12:30	15:00	2,5	WKIL	P	PROD2	(NPT) POOH from 2032m to 486m
18.01.2002	15:00	15:30	0,5	WKIL	P	PROD2	(NPT) Flow checked well - well static
18.01.2002	15:30	16:15	0,75	WKIL	P	PROD2	(NPT) POOH with 5 1/2" DP to surface
18.01.2002	16:15	18:00	1,75	WKIL	P	PROD2	(NPT) MU 9 5/8" RTTS packer on 5 1/2" DP. In meantime closed shear rams and displaced riser back to 1.50 SG NaBr2 brine
18.01.2002	18:00	22:00	4	WKIL	P	PROD2	(NPT) RIH with RTTS packer on 5 1/2" DP to 2054m.
18.01.2002	22:00	22:30	0,5	WKIL	P	PROD2	(NPT) Rotated string two turns and slacked off 25 MT to set 9 5/8" RTTS packer at 2054m.
18.01.2002	22:30	23:00	0,5	WKIL	P	PROD2	(NPT) Lined up and tested annulus above RTTS packer to 2500 Psi. Held pressure for 10 minutes. Pumped 5.6 bbls and returned 4.85 bbls.
18.01.2002	23:00	00:00	1	WKIL	P	PROD2	(NPT) Lined up to test through the drillstring and test below 9 5/8" RTTS packer. Took initially 3 bbls to pressure up from 90 psi to 570 Psi. Held pressure while checking line up. Pressure bled off to 470 psi in 5 minutes. Confirmed line up and continued to increase pressure after 7 bbls to 2400 Psi. Pumped away at 2400 Psi. Continued to pump a total of 7 1/2 bbls at 2480 Psi and shut in. Observed pressure and pressure dropped to 1160 psi in 25 minutes (still dropping). Bled off pressure and returned 2 1/2 bbls. 06:00 Hours update: 00:00-00:30 Unseat RTTS by picking straight up - no overpull. Waited 15 minutes for the element to relax while flow checking

	SKARV 4 – 6507/5-5	Page: 140 of 202
Chapter: 7	DRILLING DATA	Date: 03/05/02 Rev: 0

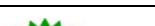
Date	Time From	Time To	Time (hr)	Activity	Code	Phase	Description of Currently Highlighted Operation
							well - well static. 00:30-03:45 Continued to RIH with 9 5/8" RTTS packer to 3380 03:45-04:00 Turn string three turns to the right and set 9 5/8" RTTS packer with 25 MT weight down. 04:00-04:30 Lined up and pressure test above RTTS packer to 2500 Psi. Pressure dropped to 2490 psi in 10 minutes. Pumped 8.3 bbls and bled back 6.3 bbls. 04:30-05:00 Lined up and pressure tested down the drillstring to 2570 psi. Held pressure for 10 min. Increased pressure to 2885 Psi and held pressure for 10 minutes. Pumped a total of 3.8 bbls and bled back 3.8 bbls. 05:00-06:00 Lined up and pressure tested on annulus again. Increased pressure to 3080 Psi. Pumped a total of 9.3 bbls. Pressure bled back to 2540 Psi in 20 minutes. Attempted to pressure back up to 3080 Psi. Pumped an additional 0.7 bbls away with 2570 Psi. Observed pressure for 10 minutes and dropped additional 360 bars. Bled off and returned 6 bbls. Tor Viking arrived 12:00 hrs on 18 January and departed 21:55 on 18 January. Destination Sandnesjøen ETA 10:00 hrs 19 January Safety: 5 RUH
19.01.2002	00:00	00:30	0,5	WKIL	P	PROD2	(NPT) Unseated RTTS from 2054m by picking straight up - no overpull. Waited 15 minutes for the element to relax while flow checking well - well static.
19.01.2002	00:30	03:45	3,25	WKIL	P	PROD2	(NPT) Continued to RIH with 9 5/8" RTTS packer from 2054 to 3380m
19.01.2002	03:45	04:00	0,25	WKIL	P	PROD2	(NPT) Turned string three turns to the right and set 9 5/8" RTTS packer with 25 MT weight down.
19.01.2002	04:00	04:30	0,5	WKIL	P	PROD2	(NPT) Lined up and pressure tested above RTTS packer to 2500 Psi. Pressure dropped to 2490 psi in 10 minutes. Pumped 8.3 bbls and bled back 6.3 bbls.
19.01.2002	04:30	05:00	0,5	WKIL	P	PROD2	(NPT) Lined up and pressure tested down the drillstring to 2570 psi. Held pressure for 10 min. Increased pressure to 2885 Psi and held pressure for 10 minutes. Pumped a total of 3.8 bbls and bled back 3.8 bbls.
19.01.2002	05:00	06:00	1	WKIL	P	PROD2	(NPT) Lined up and pressure tested on annulus again. Increased pressure to 3080 Psi. Pumped a total of 9.3 bbls. Pressure bled back to 2540 Psi in 20 minutes. Attempted to pressure back up to 3080 Psi. Pumped an additional 0.7 bbls away with 2570 Psi. Observed pressure for 10 minutes and dropped additional 360 psi. Bled off and returned 6 bbls.
19.01.2002	06:00	06:30	0,5	WKIL	P	PROD2	(NPT) Released RTTS by picking straight up - No overpull. Flow checked well while relaxing element - well static.
19.01.2002	06:30	09:15	2,75	WKIL	P	PROD2	(NPT) POOH from 3380m to 3233m and flow checked - well static. Continued to POOH from 3233m to 2689m and flow checked - well static.
19.01.2002	09:15	10:00	0,75	WKIL	P	PROD2	(NPT) Set RTTS packer at 2682m with 25 MT down. Tested annulus to 2600 Psi. Pumped a total of 7.6 bbls. Increased pressure to 3375 Psi. Pumped a total of 9.8 bbls. Pressure dropping off 942 Psi in 20 minutes. Bled off pressure and returned 6 bbls.
19.01.2002	10:00	10:45	0,75	WKIL	P	PROD2	(NPT) Pressure increased to 28 bars on choke over 18 minutes. Bled off pressure on choke without returns observed at trip tank. Closed choke and pressure increased to 12 Bars in 7 minutes. Bled off without returns. Closed in well on choke and pressure increased to 4 bars over 7 min. Opened choke without returns in trip tank.
19.01.2002	10:45	11:15	0,5	WKIL	P	PROD2	(NPT) Opened annular and released RTTS packer. Flow checked for 15 minutes while packer element relaxed - well

	SKARV 4 – 6507/5-5	Page: 141 of 202
Chapter: 7	DRILLING DATA	Date: 03/05/02 Rev: 0

Date	Time From	Time To	Time (hr)	Activity	Code	Phase	Description of Currently Highlighted Operation
							static.
19.01.2002	11:15	12:45	1,5	WKIL	P	PROD2	(NPT) POOH with 5 1/2" DP from 2689m to 2032m (Inside 13 3/8" casing)
19.01.2002	12:45	15:00	2,25	WKIL	P	PROD2	(NPT) Flow checked - static. Continued to POOH with 5 1/2" DP from 2032m to 400m.
19.01.2002	15:00	16:00	1	WKIL	P	PROD2	(NPT) Flow checked - static. POOH with RTTS packer
19.01.2002	16:00	17:00	1	WKIL	P	PROD2	(NPT) Removed diverter element. Broke off and L/O 9 5/8" RTTS packer. Packer in good condition.
19.01.2002	17:00	17:30	0,5	WKIL	P	PROD2	(NPT) MU 13 3/8" scraper assembly: 13 3/8" scraper - Bit sub with float and XO to 5 1/2" DP.
19.01.2002	17:30	22:30	5	WKIL	P	PROD2	(NPT) Installed diverter element and RIH with 13 3/8" scraper assembly. Took 40 MT weight at 1734m. PU and worked through area -ok. Continued to RIH and took 7 MT weight from 1746m to 1760m. Worked through and continued to RIH to 1868m. Took 12 MT weight and worked through. Continued to RIH to 2032m.
19.01.2002	22:30	00:00	1,5	WKIL	P	PROD2	MU topdrive and filled pipe and circulated with 3000 Lpm and 70 Bars and scraped across packer setting area twice. RIH and tagged top of 9 5/8" PBR at 2046,3m (1,8m deep). Indications of hydraulic out of the hole while tagging top of PBR. Continued to circulate hole clean while scraping area. Lot of cement fines coming over bottom shakers. Circulated 1.2 times bottoms up before well cleaned up. 06:00 Update: 00:00-00:30 Flow checked well - Static 00:30-03:00 POOH with 13 3/8" scraper from 2046m to 744m. Precautionary scraped areas where scraper took weight on the way in at 1868m, 1760-1746 and 1734m. Areas clear. 03:00-03:15 Flow checked - well static 03:15-03:45 Continued to POOH from 744m to 400m 03:45-04:00 Flow checked - well static 04:00-05:00 Continued to POOH with 13 3/8" scraper to surface. Removed diverter insert. Scraper in good condition. 05:00-05:30 Broke off and L/O 13 3/8" scraper 05:30-06:00 Commenced breaking off XO from hang off tool. Safety: 5 RUH
20.01.2002	00:00	00:30	0,5	WKIL	P	PROD2	(NPT) Flow checked well - Static
20.01.2002	00:30	03:00	2,5	WKIL	P	PROD2	(NPT) POOH with 13 3/8" scraper from 2046m to 744m. Precautionary scraped areas where scraper took weight on the way in at 1868m, 1760-1746 and 1734m. Areas clear.
20.01.2002	03:00	03:15	0,25	WKIL	P	PROD2	(NPT) Flow checked - well static
20.01.2002	03:15	03:45	0,5	WKIL	P	PROD2	(NPT) Continued to POOH from 744m to 429m
20.01.2002	03:45	04:00	0,25	WKIL	P	PROD2	(NPT) Flow checked - well static
20.01.2002	04:00	05:00	1	WKIL	P	PROD2	(NPT) Continued to POOH with 13 3/8" scraper from 429m to surface. Removed diverter insert. Scraper in good condition.
20.01.2002	05:00	05:30	0,5	WKIL	P	PROD2	(NPT) Broke off and L/O 13 3/8" scraper
20.01.2002	05:30	06:30	1	WKIL	P	PROD2	(NPT) Cleared rig floor. Broke off XO from hang off tool, as this XO is needed for the scab 7" liner job.
20.01.2002	06:30	07:30	1	WKIL	P	PROD2	(NPT) RU to run 7" liner. Installed diverter packer and MU safety valve assembly from 7" New vam x 5 1/2" FH Note held SJA and pre-job meeting with crew prior to running 7" casing.
20.01.2002	07:30	20:30	13	WKIL	P	PROD2	(NPT) PU seal stinger and checked seal stacks. RIH with 7", 32 ppf, P-110, New Vam casing to 1374m. Note: Used dog collar to 400m. Held safety meeting and SJA with new crew at 19:00 Hours.
20.01.2002	20:30	21:00	0,5	WKIL	P	PROD2	(NPT) Flow checked well. Had 300 ltr gain before tank leveled out.
20.01.2002	21:00	22:00	1	WKIL	P	PROD2	(NPT) Continued to RIH with 7" liner from 1374m to 1500m.

	SKARV 4 – 6507/5-5	COMPLETION REPORT	Page: 142 of 202
Chapter: 7	DRILLING DATA	Date: 03/05/02	Rev: 0

Date	Time From	Time To	Time (hr)	Activity	Code	Phase	Description of Currently Highlighted Operation
							Removed auto slips and diverter element. Total gain while RIH with 7" liner 2972 ltr.
20.01.2002	22:00	00:00	2	WKIL	P	PROD2	(NPT) Changed handling equipment. Installed XO-ver and lifting nubbing in hanger. PU hanger and packer assembly. MU to 7" liner. PU and check hanger -ok. Filled PBR with water. 07:00 Hours update RIH with 7" scab liner on 5 1/2" DP to 3480m. Took up and down weights. Moved down to 3497m and circulated with 1000 Lpm and 16 bars. Increased to 1490 lpm and 40 bars. Circulated for 10 minutes and reduced rate to 200 lpm and 3 bars. RIH and observed pressure increase to 7 bar while entering PBR (on depth). Bled off pressure and Strapped in an additional 5.8 meters before bottoming out on no-go. Set down 37 MT and increased pressure to 111 bars to set hanger. PU to free up weight of 161 MT and picked up 1 m and pressured up to 11 bars. Slacked off to string weight plus additional 20 MT and confirmed packer set at correct depth Safety: RUH 1
21.01.2002	00:00	00:30	0,5	WKIL	P	PROD2	(NPT) Continued to check hanger and packer assembly.
21.01.2002	00:30	01:00	0,5	WKIL	P	PROD2	(NPT) RIH with 7" scab liner to 1621 on 5 1/2" HWDP. Installed diverter element and drillpipe wiper. Installed 5 1/2" autoslips in rotary.
21.01.2002	01:00	05:00	4	WKIL	P	PROD2	(NPT) Continued to RIH with 7" scab liner on 5 1/2" DP to 3480m. Took up and down weights (Up 161 MT and Dow 162 MT)
21.01.2002	05:00	08:00	3	WKIL	P	PROD2	(NPT) RIH to 3497m and circulated with 1000 Lpm and 16 bars. Increased flowrate to 1490 lpm and 40 bars. Circulated for 10 minutes and reduced rate to 200 lpm and 3 bars. RIH and observed pressure increase to 7 bar while entering PBR (on depth). Bled off pressure and Strapped in an additional 5.8 meters before bottoming out on no-go. Set down 37 MT and increased pressure to 111 bars to set hanger. PU to free up weight of 161 MT and picked up 1 m and pressured up to 11 bars. Slacked off to string weight plus additional 20 MT and confirmed packer set at correct depth. Released running tool and picked up and set packer by setting 40 MT down (observed shear after 25 MT). Top scap liner PBR at 2028m. Total gain while tripping in from start 4.9 cubes.
21.01.2002	08:00	08:30	0,5	WKIL	P	PROD2	(NPT) Lined up well to annulus and pressure tested 9 5/8" scab liner packer to 3640 Psi with 1.50 SG brine in the well. Held pressure for 10 minutes. Pumped 7.1 bbls and bled back 7.1 bbls. Good test.
21.01.2002	08:30	09:00	0,5	WKIL	P	PROD2	(NPT) Racked back 1 stand of 5 1/2" drillpipe to pulling running tool out of scab liner.
21.01.2002	09:00	09:45	0,75	WKIL	P	PROD2	(NPT) Lined up and Pressure tested well to 2835 Psi with 1.50 SG brine in the well for 10 minutes. Pumped 11.3 bbls and bled back 11.3 bbls. Good test.
21.01.2002	09:45	10:15	0,5	WKIL	P	PROD2	(NPT)Flow checked well - well static.
21.01.2002	10:15	14:00	3,75	WKIL	P	PROD2	(NPT) POOH from 2030m to 128m. Had backflow through drillpipe at 1040m. Stabbed kelly cock and flow checked well - static. At same time took TOFS to remind people of avoiding brine/skin contact.
21.01.2002	14:00	14:30	0,5	WKIL	P	PROD2	(NPT) Changed out handling gear and removed diverter element and pipe rubber.
21.01.2002	14:30	15:00	0,5	WKIL	P	PROD2	(NPT) POOH with 5 1/2" HWDP.
21.01.2002	15:00	15:30	0,5	WKIL	P	PROD2	(NPT) Laid out 7" liner running tool.
21.01.2002	15:30	16:45	1,25	WKIL	P	PROD2	(NPT) Made up hang off assembly and checked ACME threads.

	SKARV 4 – 6507/5-5		COMPLETION REPORT	Page: 143 of 202
Chapter: 7	DRILLING DATA		Date: 03/05/02	Rev: 0

Date	Time From	Time To	Time (hr)	Activity	Code	Phase	Description of Currently Highlighted Operation
							Racked same in derrick. In meantime pressure test well to 2835 Psi for 15 minutes - ok
21.01.2002	16:45	17:30	0,75	BOPT	P	PROD2	Re-arranged derrick to get access to 6 1/2" DC
21.01.2002	17:30	20:15	2,75	BOPT	P	PROD2	RIH with 10 stands of 5 1/2" DP. MU BOP test tool. Continued to RIH with test tool and land same in BOP
21.01.2002	20:15	23:15	3	BOPT	P	PROD2	Test BOPs to 5200 Psi
21.01.2002	23:15	23:30	0,25	BOPT	P	PROD2	Pull BOP test tool out of the BOP.
21.01.2002	23:30	00:00	0,5	BOPT	P	PROD2	Function tested lower pipe ram on blue pod from TP office and from yellow pod from Drillers panel. 06:00 Hours Update 00:00-01:15 (NPT) Continued to POOH with BOP test tool. Broke out test tool and POOH with 10 stands of 5 1/2" DP. 01:15-02:45 (NPT) RU and Pressure tested IBOP and kelly hose to 5000 Psi. R/D equipment. 02:45-03:15 (NPT) Held pre-job meeting and SJA prior to running 3 1/2" tubing cleanout string. 03:15-03:45 (NPT) Changed handling equipment and RU to run 3 1/2" tubing. 03:45-04:15 (NPT) MU pup joint and RIH with two joints. Trouble latching elevators. 04:15-05:00 (NPT) Attempted to improve elevator latching mechanism. Still not working satisfactory. RU back up elevators. 05:00-06:00 (NPT) Continued to RIH with 3 1/2" tubing to 90m. Running speed is circa 8 joints an hour due to use of dog collar and the inability to latch slip type elevators before joint has been made up by Weatherford. Safety: 6 RUH 1 ASA
22.01.2002	00:00	01:15	1,25	BOPT	P	PROD2	Continued to POOH with BOP test tool. Broke out test tool and POOH with 10 stands of 5 1/2" DP.
22.01.2002	01:15	02:45	1,5	BOPT	P	PROD2	RU and Pressure tested IBOP and kelly hose to 5000 Psi. R/D equipment.
22.01.2002	02:45	03:15	0,5	WKIL	P	PROD2	(NPT) Held pre-job meeting and SJA prior to running 3 1/2" tubing cleanout string.
22.01.2002	03:15	03:45	0,5	WKIL	P	PROD2	(NPT) Changed handling equipment and installed diverter element. RU to run 3 1/2" tubing.
22.01.2002	03:45	04:15	0,5	WKIL	P	PROD2	(NPT) MU pup joint and RIH with two joints. Trouble latching elevators.
22.01.2002	04:15	05:00	0,75	WKIL	P	PROD2	(NPT) Attempted to improve elevator latching mechanism. Still not working satisfactory. RU back up elevators.
22.01.2002	05:00	18:30	13,5	WKIL	P	PROD2	(NPT) Continued to RIH with 3 1/2" tubing to 1868m. Running speed initially was circa 8 joints an hour due to use of dog collar and the inability to latch slip type elevators before joint had been made up by Weatherford. Running speed increased to 16 joints an hour when dog collar was not necessary anymore
22.01.2002	18:30	19:00	0,5	WKIL	P	PROD2	(NPT) Installed XO to 5 1/2" DP and changed handling equipment. Held kick drill with crew.
22.01.2002	19:00	20:00	1	WKIL	P	PROD2	(NPT) Continued to RIH with 3 1/2" tubing on 5 1/2" DP to 2328m.
22.01.2002	20:00	21:30	1,5	WKIL	P	PROD2	(NPT) Slipped and cut drill line
22.01.2002	21:30	23:45	2,25	WKIL	P	PROD2	(NPT) Continued to RIH with 3 1/2" tubing on 5 1/2" DP from 2328m to 3863m
22.01.2002	23:45	00:00	0,25	WKIL	P	PROD2	(NPT) Held pre-job meeting prior to displacing well from 1.5 SG mud to 1.2 SG mud. 00:00-00:15 (NPT) Activated heave compensator and closed MPR. 00:15-02:30 (NPT) Displaced well from 1.5 SG back to 1.2 SG over fully open choke with 1650 Lpm and 270-290 Bars. Re-directed 5m3 of OBM into triptank on bottoms up. Difficult to see interface observed spacer at surface followed by 1.2 SG brine. 02:30-03:30 Flowchecked well while preparing pits to displace riser to 1.2 SG brine. Emptied trip tank into slob tanks. 03:30-05:00

	SKARV 4 – 6507/5-5	COMPLETION REPORT	Page: 144 of 202
Chapter: 7	DRILLING DATA	Date: 03/05/02	Rev: 0

Date	Time From	Time To	Time (hr)	Activity	Code	Phase	Description of Currently Highlighted Operation
							Displaced riser to 1.2 brine while continuing to observe well on choke. Choke Pressure 5 bars. Bled off same to trip tank-no returns. 05:00-05:30 Lined up and Pressure tested well to 4500 Psi for 10 min. Pumped 11.7 bbls and bled back 11.7 bbls 05:30-06:00 Open well and flow check on trip tank. Safety: 4 RUH and 2 ASA
23.01.2002	00:00	00:15	0,25	WKIL	P	PROD2	(NPT) Activated heave compensator and closed MPR.
23.01.2002	00:15	02:30	2,25	WKIL	P	PROD2	(NPT) Displaced well from 1.5 SG back to 1.2 SG over fully open choke with 1650 Lpm and 270-290 Bars. Re-directed 5m3 of OBM into triptank on bottoms up. Difficult to see interface observed spacer at surface followed by 1.2 SG brine.
23.01.2002	02:30	03:30	1	WKIL	P	PROD2	(NPT) Flowchecked well while preparing pits to displace riser to 1.2 SG brine. Emptied trip tank into slop tanks.
23.01.2002	03:30	05:00	1,5	WKIL	P	PROD2	(NPT) Displaced riser to 1.2 brine while continuing to observe well on choke. Choke Pressure 5 bars. Bled off same to trip tank-no returns.
23.01.2002	05:00	05:30	0,5	WKIL	P	PROD2	(NPT) Lined up and Pressure tested well to 4500 Psi for 10 min. Pumped 11.7 bbls and bled back 11.7 bbls
23.01.2002	05:30	06:15	0,75	WKIL	P	PROD2	(NPT) Open well and flow check on trip tank.
23.01.2002	06:15	06:30	0,25	WKIL	P	PROD2	(NPT) POOH with 7 std. Observed back flow through drill string.
23.01.2002	06:30	07:15	0,75	WKIL	P	PROD2	(NPT) Make up DDM to string and circ string volume due to back flow.
23.01.2002	07:15	08:15	1	WKIL	P	PROD2	Flow check. Back flow through string. POOH from 3873 m to 3587 m. Back flow increased.
23.01.2002	08:15	09:00	0,75	WKIL	P	PROD2	(NPT) Circulated conditioned well fluid @ 137 strokes 2200 l/min 300 bar
23.01.2002	09:00	12:45	3,75	WKIL	P	PROD2	(NPT) POOH from 3587 m to 1870 m. (Reduced visibility due to snow storm - T.O.F.S.)
23.01.2002	12:45	14:00	1,25	WKIL	P	PROD2	(NPT) Change to 3 ½ " handling equipment. Install adapter plate on Racking arm.
23.01.2002	14:00	15:00	1	RIGR	P	PROD2	(NPT) Racking board spears seized due to snow ice and low temperature. free off same.
23.01.2002	15:00	15:30	0,5	SAFE	P	RIG	(55a) Job safety analyse meeting for making up flow head. Change out 3 ½ " elevator due to picking up flow head.
23.01.2002	15:30	17:30	2	DSTT	P	RIG	(55b) Pick up flow head from deck torque up connections and lay down same to deck.
23.01.2002	17:30	18:00	0,5	WKIL	P	RIG	(NPT) Change to 3½" elevator and rig up mud bucket due to back flow.
23.01.2002	18:00	18:30	0,5	RIGR	P	PROD2	(NPT) Pull out 1 std PS 16 slips not setting. Change to MH auto. slips
23.01.2002	18:30	19:00	0,5	RIGR	P	PROD2	(NPT) Stand pipe slippage in racking arm. Check and adjust.
23.01.2002	19:00	23:30	4,5	WKIL	P	PROD2	(NPT) Continue POOH with 3 ½ " tubing from 1843 m to surface.
23.01.2002	23:30	00:00	0,5	WKIL	P	PROD2	(NPT) Lay down pup joint and 2 ea singles. 06:00 Update: 00:00 - 00:30 Perform SJA meeting due to hooking up kill and choke hoses. 00:30 - 04:45 Make up choke and kill hose to test stand pipe. 04:45 - 05:15 Perform SJA prior to make up TCP gun assemblies 05:15 - 06:00 Soft brake 3 ea connection on Tubing Fill Tester Valve HSE: RUH: 4 ASA: 0
24.01.2002	00:00	00:30	0,5	SAFE	P	RIG	Performed SJA meeting prior to hooking up kill and choke hoses.
24.01.2002	00:30	04:45	4,25	SSSV	P	RIG	Made up choke and kill hose to test stand pipe.
24.01.2002	04:45	05:15	0,5	SAFE	P	RIG	(56) Performed SJA prior to make up of TCP gun assemblies
24.01.2002	05:15	06:15	1	INSP	P	RIG	(NPT) Changed handling equipment. Picked up from deck and

	SKARV 4 – 6507/5-5	COMPLETION REPORT	Page: 145 of 202
Chapter: 7	DRILLING DATA	Date: 03/05/02	Rev: 0

Date	Time From	Time To	Time (hr)	Activity	Code	Phase	Description of Currently Highlighted Operation
							soft break 3 ea connection on Tubing Fill Tester Valve laid down same.
24.01.2002	06:15	07:30	1,25	DSTR	P	RIG	(56) Picked up TCP guns from deck.
24.01.2002	07:30	08:00	0,5	SAFE	P	RIG	(56) Performed SJA with new crew prior to run TCP
24.01.2002	08:00	12:45	4,75	DSTR	P	RIG	(56) Continued to run TCP tool string from 55 m to 106 m
24.01.2002	12:45	14:00	1,25	DSTR	P	RIG	(57) Picked up remainder of DST BHA and 2 ea 4 3/4" Drill collars. Iron roughneck's lowest setting 13 k ft/lbs. Weatherford changed dies and linked up Jam unit. Made up 4 3/4 " DC with Weatherford.
24.01.2002	14:00	16:15	2,25	DSTR	P	RIG	(58) Continued to run in hole with 4 3/4" drill collars to 269 m
24.01.2002	16:15	17:30	1,25	DSTR	P	RIG	(58) Tool box meeting to re-interate danger from slip joints opening. Run in with slips joint from 269 m to 306 m
24.01.2002	17:30	18:00	0,5	DSTR	P	RIG	(5) Changed out 4 3/4 " equipment to 3 ½ " handling equipment.
24.01.2002	18:00	18:30	0,5	DSTR	P	RIG	(58) Picked up 1 joint 3-½ " tubing from deck run in hole. Rig up to pressure test chicksan lines to 6000 psi.
24.01.2002	18:30	19:45	1,25	DSTR	P	RIG	(59) Pressure tested surface lines to 300 psi (5 min) and 6000 psi (10 min). OK Rigged down test equipment.
24.01.2002	19:45	00:00	4,25	DSTR	P	RIG	(61) Continued picked up 3 ½ " tubing from deck and ran in hole from 315 m to 808 m. 06:00 Update: 00:00 - 06:00 (61) Continued picked up 3 ½ " tubing from deck and run in hole from 808 m to 1501 m . Tor Viking arrived West Alpha 21:55 hrs 24.01. 2002. HSE : RUH : 5 ASA : 1
25.01.2002	00:00	06:00	6	DSTR	P	RIG	(61) Continued picking up 3 ½ " tubing from deck and run in hole from 808 m to 1501 m .
25.01.2002	06:00	07:30	1,5	DSTR	P	RIG	(63) Pressure tested string against TFTV to 300 psi/ 5 min and 6000 psi / 10 min . Rigged down test assembly.
25.01.2002	07:30	15:00	7,5	DSTR	P	RIG	(62) Ran in hole with 3 ½ " tubing from derrick 1491 m to 2100 m. (Strap check lengths of 3 stands.) Continued to run in hole @ 1 ½ min a stand inside 7 " liner to 3312 m. Backflow increased while run in when packer in 7 " liner
25.01.2002	15:00	15:30	0,5	DSTR	P	RIG	(63) Removed Diverter insert and wiper. Rigged up to pressure test string
25.01.2002	15:30	16:15	0,75	DSTR	P	RIG	(63) Pressure tested string against TFTV to 300 psi / 5 min and 6000 psi / 10 min.
25.01.2002	16:15	16:30	0,25	DSTR	P	RIG	(68) Rigged down test equipment. Painted 1 joint of drill pipe
25.01.2002	16:30	17:00	0,5	DSTR	P	RIG	(66) Changed to 5 " handling equipment for Dummy Hanger
25.01.2002	17:00	17:30	0,5	DSTR	P	RIG	(66) Picked up and made up Dummy Hanger and connections.
25.01.2002	17:30	18:00	0,5	DSTR	P	RIG	(66) Changed to 5½" handling equipment
25.01.2002	18:00	18:30	0,5	DSTR	P	RIG	(66) Run in with Dummy Hanger to 3345 m on 1 stand 5½" drill pipe.
25.01.2002	18:30	21:00	2,5	DSTR	P	RIG	(NPT) Changed elevator segments from 3 ½ " to 4 ½ ". Changed segments in casing tong. (Lip guide on elevator had wrong size)
25.01.2002	21:00	00:00	3	DSTR	P	RIG	(66) Ran in hole with 4 ½ " tubing from 3345 m to 3567 m. 06:00 Update: 00:00 - 02:00 (66) Continued to run in with 4 ½ " tubing from 3567 m to 3674 m 02:00 - 03:30 (69) Rigged up Schlumberger sheaves and long bails. 03:30 - 05:00 (68) Ran in with 2 joints of 4 ½ " tubing and landed of in wear-bushing @ 390.82 m. Operated rams to mark the pipe. 05:00 - 05:30 (69) Rigged up Schlumberger wire line sheaves. 05:30 - 06:00 (70) Run in hole with wire line Tor Viking arrived 21:55 hrs on 24.01. 2002 departed 12:25 hrs on 25.01. 2002. ETA Sandnesjøen 24 :00 hrs. HSE : RUH : 2 ASA : 2

	SKARV 4 – 6507/5-5	COMPLETION REPORT	Page: 146 of 202
Chapter: 7	DRILLING DATA	Date: 03/05/02	Rev: 0

Date	Time From	Time To	Time (hr)	Activity	Code	Phase	Description of Currently Highlighted Operation
26.01.2002	00:00	02:00	2	DSTR	P	RIG	(66) Continued to run in with 4 ½ " tubing from 3567 m to 3674 m
26.01.2002	02:00	03:30	1,5	DSTR	P	RIG	(69) Rigged up Schlumberger top wireline sheave and long bails. Inserted GR/CCL tool in tubing string.
26.01.2002	03:30	05:00	1,5	DSTR	P	RIG	(68) Ran in with 2 joints of 4 ½ " tubing and landed of in wear-bushing @ 390.82 m. Operated rams to mark the pipe. Note: Cause of pitch and roll the long bails was secured with air tugger through elevator.
26.01.2002	05:00	05:30	0,5	DSTR	P	RIG	(69) Rigged up Schlumberger bottom wire line sheave.
26.01.2002	05:30	08:15	2,75	DSTR	P	SLIC	(70) Run in hole with wire line to correlate dept. Pull out of hole with wire line, out of hole @ 08:15 hrs
26.01.2002	08:15	08:30	0,25	LOG	P	RIG	(72) Rigged down logging sheave and tools
26.01.2002	08:30	09:15	0,75	DSTR	P	RIG	(73) Pulled out of hole with 3 joints and 2 pups 4 ½ " tubing
26.01.2002	09:15	10:00	0,75	DSTR	P	RIG	(73) Changed out long bails and laid down logging sheave.
26.01.2002	10:00	12:00	2	DSTR	P	RIG	(73) Pulled out of hole with 4 ½ " tubing. Racked back same in derrick
26.01.2002	12:00	14:30	2,5	DSTR	P	RIG	(73) Changed to 5 ½ " handling equipment. Racked 5½" drill pipe back in derrick. Measured drill pipe marks. Laid down dummy hanger. Changed to 3½" handling equipment. POOH with one stand of 3 ½ " and racked back. Picked up 2 pup joints for space out. (Total length 3,66 m) Ran in with one stand.
26.01.2002	14:30	17:30	3	DSTR	P	RIG	(NPT) Prepared for well test while evaluated missing locking collet on Dummy hanger. Two locking collets were installed on dummy hanger to keep donut in place. Upon retrieval it was found that one collet was missing. Other collet was found loose
26.01.2002	17:30	19:15	1,75	DSTR	P	RIG	(78) Picked up Schlumberger test equipment.
26.01.2002	19:15	19:45	0,5	SAFE	P	RIG	(78) Performed tool box meeting prior to ran control line.
26.01.2002	19:45	22:45	3	DSTR	P	RIG	(78) Picked up and made up Hanger and Sen Tree assembly. Torqued all connections and hooked up control lines. Tested unlatch and latch function.
26.01.2002	22:45	00:00	1,25	DSTR	P	RIG	(80) Made up circulation head and rig chicksan to 4½" tubing. Equalized pressure to 300 psi above valve and opened same 06:00 Update: 00:00 - 00:45 (80) Pressure tested 4 ½" tubing against TFTV to 6000 psi pumped 1 bbl. Bled back to 500 psi, 0.1 bbl returned. Held for 15 min. Good test. 1 bbl returned after bled off. 00:45 - 01:45 (80) Rigged down chicksan line and broke off circulating head. Cleared rig floor for excess equipment. Held tool box meeting: Maersk demonstrated oxygen lines and breathing apparatuses. TOFS: Cleared rig floor for people, broke down ice from derrick. 01:45 - 02:15 (NPT) Ran in with 4½" tubing from derrick, clamp on control line. Control hose unit started leaking. 02:15 - 03:15 (NPT) Pulled out 1 stand of 4½" tubing racked back same. 03:15 - 04:15 (NPT) Disconnected hoses and changed out control hose unit. Re-connected control hoses 04:15 - 05:30 (NPT) Rigged up circ head and lines from cmt unit. Pressured up tubing to 400 psi to open flapper valve. Pumped 0.2 bbls bleed back 0.2 bbls. Rigged down circulation head and hose. 05:30 - 06:00 (81) Run in with 4½" tubing HSE: RUH: 4 ASA: 0
27.01.2002	00:00	00:45	0,75	DSTR	P	RIG	(80) Pressure tested 4 ½" tubing against TFTV to 6000 psi pumped 1 bbl. Held for 15 min. Good test. 1 bbl returned after bled off.
27.01.2002	00:45	01:45	1	DSTR	P	RIG	(80) Rigged down chicksan line and broke off circulating head. Cleared rig floor for excess equipment. Held tool box meeting: Maersk demonstrated oxygen lines and breathing apparatuses. TOFS: Cleared rig floor for people, broke down ice from derrick.

	SKARV 4 – 6507/5-5 COMPLETION REPORT	Page: 147 of 202
Chapter: 7	DRILLING DATA	Date: 03/05/02 Rev: 0

Date	Time From	Time To	Time (hr)	Activity	Code	Phase	Description of Currently Highlighted Operation
27.01.2002	01:45	02:15	0,5	DSTR	P	RIG	(NPT) Ran in with 4½" tubing from derrick, clamp on control line. Control hose unit started leaking.
27.01.2002	02:15	03:15	1	DSTR	P	RIG	(NPT) Pulled out 1 stand of 4½" tubing racked back same.
27.01.2002	03:15	04:15	1	DSTR	P	RIG	(NPT) Disconnected hoses and changed out control hose unit. Re-connected control hoses
27.01.2002	04:15	05:30	1,25	DSTR	P	RIG	(NPT) Rigged up circ head and lines from cmt unit. Pressured up tubing to 400 psi to open flapper valve. Pumped 0.2 bbls bleed back 0.2 bbls. Rigged down circulation head and hose.
27.01.2002	05:30	07:00	1,5	DSTR	P	RIG	(81) Run in with 4½" tubing to 3516 m
27.01.2002	07:00	08:00	1	RIGR	P	RIG	(NPT) 3 stands felt out off finger in derrick. Pulled back same.
27.01.2002	08:00	09:30	1,5	DSTR	P	RIG	(81) Continued run in with 4½" tubing from 3516 m
27.01.2002	09:30	10:00	0,5	DSTR	P	RIG	TOFS: Cleared rig floor for people removed ice from derrick.
27.01.2002	10:00	10:30	0,5	DSTR	P	RIG	(81) Picked up 4 joint of 4½" tubing from deck to replace the 5 ½" drill pipe that was used for dummy run.
27.01.2002	10:30	13:00	2,5	DSTR	P	RIG	(82) Held tool box meeting @ 10:45 Picked up Lubricator valves from deck. Connected hydraulic and chemical injection lines to lower lubricator valve. Pressure tested same to 6000 psi 5 / min.
27.01.2002	13:00	15:00	2	DSTR	P	RIG	(84) Held toolbox meeting. @ 13:15 hrs Rigged up and pressure tested lines. Pressure tested TFTV to 6000 psi 15/ min. OK Pressure tested chemical injection lines to 6000 psi / 5 min. OK.
27.01.2002	15:00	16:00	1	DSTT	P	RIG	(84) Tested upper and lower connections on the Lubricator valves 6000 psi / 15 min. Inflow tested upper and lower Lubricator valves.
27.01.2002	16:00	17:30	1,5	DSTR	P	RIG	(87) Rigged down chicksan lines. Cleaned rig floor. Prepared to pick up Flow head. Changed to 45' bails. @ 16:30 hrs held tool box meeting with crew.
27.01.2002	17:30	19:30	2	DSTR	P	RIG	(87) Picked up Flow head from deck ran in mouse hole. Installed kill and choke line coflexip hoses and hydraulic lines.
27.01.2002	19:30	20:00	0,5	DSTR	P	RIG	(87) Picked up Flow head and connected to tubing landing string. Upweight 127mT Ran in and landed of in wellhead 390,66 m @ 20:00 hrs.
27.01.2002	20:00	20:30	0,5	DSTR	P	RIG	(88) Held tool box meeting : Went through Flow head test procedures.
27.01.2002	20:30	21:45	1,25	DSTR	P	RIG	(89) Lined up flow path. Close Middle Pipe Ram on slick joint and reverse circulated 10 bbls 1.2 sg brine across Schlumberger choke to surge tank. Flushed 4 bbls brine across lower lubricator valve through Schlumberger choke manifold.
27.01.2002	21:45	00:00	2,25	DSTR	P	RIG	(89) Pressure tested the following valves from Halliburton cement unit: 1. Kill Wing valve 300 psi / 5 min. 6000 psi / 15 min. 2. Upper lubricator wing valve and Schlumberger choke 300 psi / 5 min. 6000 psi / 15 min. 3. Shut down valve 02. 300 psi / 5 min. 6000 psi / 15 min. 4. Flow wing valve 300 psi / 5 min. 6000 psi / 15 min. 06:00 Update: 00:00 - 01:00 (88) Continued pressure with Halliburton 5. Master valve inflow test 500 psi / 15 min 6. Kill line valve inflow test 500 psi / 15 min 01:00 - 02:30 (90) Spaced out tubing. Secured connected lubricator hoses. Turned pipe 3 turn clockwise and worked torque down. Set DST packer @ 3613,5 m. Closed middle pipe rams. 02:30 - 03:00 (95) Pressure tested TST packer from above 1160 psi / 15 min. 03:00 - 03:30 (95) Set IRDV tester valve in sequence mode. 1000 psi. Volume pumped 0.4 bbls and returned 0.4 bbls. 03:30 - 04:00 (95) Opened reverse circulating ports with 1400 psi. Pumped 0.6 bbls 0.6 bbls returned. 04:00 - 05:00 (95) Halliburton pumped 65 bbls diesel and 5 bbls 1,2 sg. brine spacer. Returned 69 bbls 05:00 - 06:00

	SKARV 4 – 6507/5-5		COMPLETION REPORT	Page: 148 of 202
Chapter: 7	DRILLING DATA		Date: 03/05/02	Rev: 0

Date	Time From	Time To	Time (hr)	Activity	Code	Phase	Description of Currently Highlighted Operation
							(95) Attempted to close IRDV reverse circulating ports with 1400 psi. Halliburton hold 1500 psi back pressure HSE Weekly: RUH: 24 ASA: 11 HSE: RUH: 6 ASA: 3
28.01.2002	00:00	01:00	1	DSTR	P	RIG	(88) Trapped 6000 psi in test string and pressure tested the following valves on the surface test tree with Halliburton 5. Master valve inflow test 500 psi / 15 min 6. Kill line valve inflow test 500 psi / 15 min
28.01.2002	01:00	02:30	1,5	DSTR	P	RIG	(90) Spaced out tubing. Secured connected lubricator hoses. Turned pipe 3 turn clockwise and worked torque down. Set DST packer @ 3613,5 m. Closed middle pipe rams.
28.01.2002	02:30	03:00	0,5	DSTR	P	RIG	(95) Pressure tested TST packer from above 1160 psi / 15 min.
28.01.2002	03:00	03:30	0,5	DSTR	P	RIG	(95) Set IRDV tester valve in sequence mode. 1000 psi. Volume pumped 0.4 bbls and returned 0.4 bbls.
28.01.2002	03:30	04:00	0,5	DSTR	P	RIG	(95) Opened reverse circulating ports with 1400 psi. Pumped 0.6 bbls 0.6 bbls returned.
28.01.2002	04:00	05:00	1	DSTR	P	RIG	(95) Halliburton pumped 65 bbls diesel and 5 bbls 1,2 sg. brine spacer. Returned 69 bbls
28.01.2002	05:00	06:15	1,25	DSTT	P	RIG	(95) Attempted to close IRDV reverse circulating ports with 1400 psi. Halliburton hold 1500 psi back pressure. Halliburton increased tubing pressure to 1750 psi. Indicator of ports not closed. Repeated procedure. Successfully. Bleed back 1 bbl pumped 1 bbl.
28.01.2002	06:15	09:00	2,75	DSTT	P	RIG	(95) Pressured up annulus to 500 psi opened IRDV down hole tester valve.
28.01.2002	09:00	10:00	1	DSTT	P	RIG	(105) Carried out check list duties. Held pre job meeting ahead of start flowing the well. Prepared to flow well
28.01.2002	10:00	18:00	8	DSTT	P	RIG	(110) Pressured string up to 5468 psi. Activated TCP guns bled back to 300 ps. Wellhead pressure increased to 715 Psi. At 10:44 hrs open well. Maintained 500 -580 psi on annulus and holding IRDV open. At 11:52 hrs started flowing on starboard side at 13:50 hrs changed to port burner. Well flowing info : WHP WHT WHDCP OILQ GASQ GOR H2S Choke psia degC psia bbl/d MMscf/d scf/bbl ppm 11:00: 811,02 5.88 111.74 28/64 12:00:1565.16 6.72 435.20 40/64 14:00: 917.00 13.25 602.47 6678.46 5.91 885.52 8 52/64 15:00 1102.75 14.43 573.06 6390.00 5.97 934.70 12 52/64 16:00 1111.93 15.53 582.16 6245.92 52/64 17:00 1224.01 15.93 931.83 6426.92 18:00 1182.46 16.62 850.92 6381.78 BSW max : 0.80% CO2 max : 4 % Oil gravity : 0.850 @ 25.5 deg
28.01.2002	18:00	00:00	6	DSTT	P	RIG	(123) Shut in well by closing IRDV Down hole valve. (Bled off 500 psi on annulus to zero. Valve closed. Continued to flow burners and reduce well head pressure to create a differential pressure across IRDV tester valve. Shut in the Schlumberger choke. Start main build up @ 18:03 hrs. Flushed cooling lines and displaced to brine. Checked annulus top up each 2 hrs. Monitor annulus on trip tank. Rig crew carried out PM's and cleaned out rotary drip tray. 06:00 Update: 00:00 - 02:30 :(123) Continued main build up with the well shut in. Checked

	SKARV 4 – 6507/5-5	COMPLETION REPORT	Page: 149 of 202
Chapter: 7	DRILLING DATA	Date: 03/05/02	Rev: 0

Date	Time From	Time To	Time (hr)	Activity	Code	Phase	Description of Currently Highlighted Operation
							annulus top up each 2 hrs. Monitor annulus on trip tank. Rig crew carried out PM's and cleaned out rotary drip tray. 02:30-03:00 (126) Disabled the first sequential mode on IRDV. Held meeting regarding the 8 hrs activating of the bottom hole sample 03:00 - 04:00 (126) Halliburton commenced the first activation sequence. 04:00 - 04:45 (126) Disabled the second sequential mode on IRDV. Halliburton commenced the second activation sequence. 04:45 - 05:30 (126) Held tool box meeting: about re-opened the well. Completed the check list. Applied 1000 psi to annulus and set IRDV in sequence mode. 05:30 - 06:00 (127) Applied 500 psi to annulus and open well for main flow HSE: RUH: 4 ASA: 0
29.01.2002	00:00	02:30	2,5	DSTR	P	RIG	(123) Continued build up after clean up flow. Checked annulus top up each 2 hrs. Monitor annulus on trip tank. Rig crew carried out PM's and cleaned out rotary drip tray.
29.01.2002	02:30	03:00	0,5	DSTT	P	RIG	(126) Disabled the first sequential mode on IRDV. Held meeting regarding the 8 hrs activating of the bottom hole sample
29.01.2002	03:00	04:00	1	DSTT	P	RIG	(126) Halliburton commenced the first activation sequence.
29.01.2002	04:00	04:45	0,75	DSTT	P	RIG	(126) Disabled the second sequential mode on IRDV. Halliburton commenced the second activation sequence.
29.01.2002	04:45	05:30	0,75	DSTT	P	RIG	(126) Held tool box meeting: about re-opening the well. Completed the check list. Applied 1000 psi to annulus and set IRDV in sequence mode.
29.01.2002	05:30	19:45	14,3	DSTT	P	RIG	(127) Applied 500 psi to annulus and open well for main flow WHP WHT WHDCP OILQ GASQ GOR H2S Ch. psia degC psia bbl/d MMscf/d scf/bbl ppm 06:00: 1177.25 10.2 384.31 48/64 07:00: 1111.54 15.43 575.99 5818.40 8 52/64 08:00: 1117.59 17.35 579.47 5841.90 5.81 993.89 9 " 09:00: 1126.19 19.39 584.54 5842.04 5.86 1002.91 9 " 10:00: 1130.56 20.25 579.25 5848.60 5.90 1009.56 10 " 11:00: 1135.09 21.44 579.93 5880.56 5.94 1010.93 10 " 12:00: 1138.20 22.71 580.01 5888.61 5.99 1017.25 10 " 13:00: 1141.23 22.62 588.06 5897.99 5.97 1012.24 12 " 14:00: 1143.77 23.67 582.17 5907.08 5.96 1009.49 12 " 15:00: 1143.86 24.25 583.18 5900.78 6.01 1018.21 12 " 16:00: 1147.09 24.46 582.70 5903.23 6.0 1015.61 12 " 17:00: 1143.97 23.66 587.40 5902.14 5.95 1008.27 12 " 18:00: 1147.09 24.23 587.55 5927.12 5.94 1001.56 12 " 19:00: 1147.09 24.99 583.80 5910.67 5.97 1009.57 12 " BSW max : 0.50% CO2 max : 3.5 % Oil gravity : 0.810 @ 39.5 deg Gas gravity : 0.735 Meter factor :0.930 at 5.5 degC
29.01.2002	19:45	00:00	4,25	DSTT	P	RIG	(127) Bled off annulus pressure to close IRDV. Bled down THP to 900 psi. Well closed in at 19:43 hrs. Monitored annulus on

	SKARV 4 – 6507/5-5	Page: 150 of 202
Chapter: 7	DRILLING DATA	Date: 03/05/02 Rev: 0

Date	Time From	Time To	Time (hr)	Activity	Code	Phase	Description of Currently Highlighted Operation
							trip tank. Topped up every 2 nd hrs. Displaced cooling lines from fresh water to 1.2 sg brine . 06:00 Update: 00:00 - 06:00 (127) Continued main build. Monitored annulus on trip tank. Topped up every 2 nd hrs. HSE : RUH : 4 ASA : 1
30.01.2002	00:00	00:00	24	DSTT	P	RIG	(129) Continued main build. Monitored annulus on trip tank. Topped up every 2 hrs. 06:00 Update: 00:00 - 01:30 (129) Continued main build up. Monitored annulus on trip tank. Topped up every 2 hrs. Prepared to kill the well. Held tool box meeting with crew. 01:30 - 02:15 (132) Opened Schlumberger choke to burners bled down the string contents. Closed Schlumberger choke. 00:2:15 - 03:15 (133) Attempted to open reverse circulation ports on IRDV. No go. Tried several times. No go. Enabled sequential mode. Send command valve opened. 03:15 - 03:30 (133) Opened reverse circulating valve. 03:30 - 04:30 (133) Reverse circulated string to 1.2 sg brine. Flared gas. Took fluid to Schlumberger tank totally 80 bbls. 04:30 - 05:00 (134) Lined up Halliburton and pumped 70 bbls 1.25 sg kill brine down the tubing. 05:00 - 0600 (135) Attempted to close the circulations port on IRDV. . HSE : RUH : 10 ASA:
31.01.2002	00:00	01:30	1,5	DSTT	P	RIG	(129) Continued main build up. Monitored annulus on trip tank. Topped up every 2 hrs. Prepared to kill the well. Held tool box meeting with crew. .
31.01.2002	01:30	02:15	0,75	DSTT	P	RIG	(132) Opened Schlumberger choke to burners bled down the string contents. Closed Schlumberger choke.
31.01.2002	02:15	03:15	1	DSTT	P	RIG	(133) Attempted to open reverse circulation ports on IRDV.
31.01.2002	03:15	03:30	0,25	DSTT	P	RIG	(133) Opened reverse circulating valve.
31.01.2002	03:30	04:30	1	DSTT	P	RIG	(133) Reverse circulated string to 1.2 sg brine. Flared gas. Took fluid to Schlumberger tank totally 80 bbls.
31.01.2002	04:30	05:00	0,5	DSTT	P	RIG	(134) Lined up Halliburton and pumped 70 bbls 1.25 sg kill brine down the tubing.
31.01.2002	05:00	05:45	0,75	DSTT	P	RIG	(135) Attempted to close the circulation port on IRDV
31.01.2002	05:45	06:00	0,25	DSTT	P	RIG	(135) Sheared rupture disc in IRDV with 240 bars (3480 psi)
31.01.2002	06:00	07:00	1	DSTT	P	RIG	(135) Bullheaded well with Halliburton. Squeezed kill pill to perforations with 19 bbls. @ 5 bpm 40 psi. Squeezed 2,5 bbls into perforations @ 0,2 bpm. Squeeze pressure increased to 1000 psi. Stopped pumping. Pressure bled down to 320 psi after 5 minutes
31.01.2002	07:00	07:30	0,5	DSTT	P	RIG	(135) Flow checked tubing. OK Displaced riser to 1.20 sg brine.
31.01.2002	07:30	08:00	0,5	DSTT	P	RIG	(135) Flow checked through BOP choke line while prepared to release packer. Well static.
31.01.2002	08:00	08:30	0,5	DSTT	P	RIG	(135) Opened middle pipe rams on BOP. Released packer. Pulled out 8 meter. Closed upper pipe rams.
31.01.2002	08:30	10:00	1,5	DSTT	P	RIG	(136) Attempted to circulated well long way. No go Pressured up to 138 bars. Trouble shoot surface valves and DST valves
31.01.2002	10:00	10:30	0,5	DSTT	P	RIG	(136) Attempted to reverse circulate. No go. Max pressure in annulus 30 bars. Bled down annulus.
31.01.2002	10:30	13:00	2,5	DSTT	P	RIG	(136) Open upper pipe rams, ran down 2 m. String weight decreased from 128 mT to 120 mT. Verified that packer was set.
31.01.2002	13:00	13:30	0,5	DSTT	P	RIG	(136) Picked up 2 meter on tubing string to check free point. Rotate 1 turn left to un- jay packer. Slacked off from 128 mT to 120 mT. Packer not released. Picked up string to 128 mT turned 1 turn left lower string. Packer released. Landed hanger in Well head. Closed Middle Pipe rams.

	SKARV 4 – 6507/5-5	COMPLETION REPORT	Page: 151 of 202
Chapter: 7	DRILLING DATA	Date: 03/05/02	Rev: 0

Date	Time From	Time To	Time (hr)	Activity	Code	Phase	Description of Currently Highlighted Operation
31.01.2002	13:30	19:15	5,75	DSTT	P	RIG	(137) Circulated well clean 2 times bottom up. 55 stk/ min 130 bar. Note: Maximum circulating rate through DST tools
31.01.2002	19:15	19:45	0,5	DSTT	P	RIG	(137) Displaced riser to 1.2 sg brine.
31.01.2002	19:45	20:45	1	DSTT	P	RIG	(137) Flow checked well. Static
31.01.2002	20:45	22:45	2	DSTR	P	RIG	(139) Broke off flow head. Set flow head in mouse hole. Broke off kill and choke lines. Service broke 2 connections on x/o-vers.
31.01.2002	22:45	23:45	1	DSTR	P	RIG	(139) Laid out 45' bails. Picked up drilling bails and 4 ½" tubing elevator. Laid out wire line equipment from DDM.
31.01.2002	23:45	00:00	0,25	DSTR	P	RIG	(139) Pulled and laid out 4 ½" landing sting and control lines 06:00 Update: 00:00 - 05:15 (139) Continued laying out 4½" landing sting 05:15 - 06:00 (139) Laid down Sentree. Changed to 3½" handling equipment. HSE : RUH : 8 ASA : 2
01.02.2002	00:00	05:00	5	DSTR	P	RIG	(139) Continued laying out 4½" landing sting to 3299 m. Removing clamps and control hoses. L/down lubricator, pup joints and SSTT.
01.02.2002	05:00	05:30	0,5	DSTR	P	RIG	(139) Disconnected hoses and laid down Sentree. Changed to 3½" handling equipment.
01.02.2002	05:30	06:00	0,5	DSTR	P	RIG	(140) Cleared rig floor for excess equipment
01.02.2002	06:00	08:00	2	DSTR	P	RIG	(140) Pulled out of hole with 3½" tubing. Rack back in derrick from 3290 m to 2743 m
01.02.2002	08:00	19:00	11	DSTR	P	RIG	(140) Pulled out of hole with 3½" tubing. Laid down same to deck from 2743 m to 1415 m.
01.02.2002	19:00	20:00	1	BOPT	P	RIG	(140) Function tested Lower Pipe rams, Upper Pipe Rams, Lower Annular and Upper Annular from drillers panel on Yellow pod changed to Blue pod. Tested the same rams from Toolpusher panel. Note: Shear rams and middle pipe rams to be tested February 2nd.
01.02.2002	20:00	22:45	2,75	DSTR	P	RIG	(140) Continued pulled out of hole with 3½" tubing from 2743 m to 1415 m.
01.02.2002	22:45	23:00	0,25	DSTB	P	RIG	(142) Flow checked well. Static. Held Pre job meeting before started on test string bottom hole assembly
01.02.2002	23:00	00:00	1	DSTB	P	RIG	(142) Pulled out of hole with test string bottom hole assemblies. From 325 m to 269 m. 06:00 Update: 00:00 - 06:00 (142) Continued pulled out test string bottom hole assembly. Laid down same to deck Note: Scandi Stolmen arrived 18:45 hrs unloaded deck cargo. St.by due to bad weather 21:25 hrs. Continued work vessel 02:05 hrs. Unloaded drill water HSE: RUH: 2 ASA: 0
02.02.2002	11:00	13:00	2	PKRP	P	PXA	(142) Held pre job meeting. Rig up wire line to run EZSV.
02.02.2002	13:00	17:00	4	PLUG	P	PXA	(142) Ran in hole with EZSV plug on Schlumberger wire line, due to increasing weather condition. Set EZSV cement retainer @ 3641 m.
02.02.2002	17:00	18:00	1	PLUG	P	PXA	(142) Held pre job meeting. Rigged down wire line equipment cleared rig floor.
02.02.2002	18:00	19:00	1	WAIT	P	PXA	(NPT) Laid down mouse hole: Closed shear rams. Displaced riser with seawater.
02.02.2002	19:00	20:00	1	WAIT	P	PXA	(142) Made up cement stand. Racked same in derrick.
02.02.2002	20:00	00:00	4	WAIT	P	PXA	(433) Laid down excess 5½ " drill pipe from derrick while waiting on weather. Time Wind (knots) Sea (m) Heave (m) 16:00 54 4-6 5 18:00 63 4-6 6 20:00 46 5-6 7

	SKARV 4 – 6507/5-5 COMPLETION REPORT	Page: 152 of 202
Chapter: 7	DRILLING DATA	Date: 03/05/02 Rev: 0

Date	Time From	Time To	Time (hr)	Activity	Code	Phase	Description of Currently Highlighted Operation
							22:00 36 5-6 7 00:00 50 6 7,5 Note : Scandi Stolmen arrived 01.02 @ 18:45 hrs Departed 02.02 @16:00 hrs ETA Sandnesjøen 03.02 @ 16:00 hrs 06:00 Update : 00:00: 06:00 (433) Continued laying down excess 5½" drill pipe from derrick while waiting on weather. Time Wind (knots) Sea (m) Heave (m) 02:00 60 6 5 04:00 56 6 5,5 06:00 63 6 6,4 HSE: RUH: 1 ASA: 3
03.02.2002	00:00	09:00	9	WAIT	P	PXA	(433) Continued laying down excess 5½" drill pipe from derrick while waiting on weather. Totally 144 joints. Time Wind (knots) Sea (m) Heave (m) 02:00 60 6 5 04:00 56 6 5,5 06:00 63 6 6,4
03.02.2002	09:00	10:00	1	WAIT	P	PXA	(433) Continued laid down 5½" HWDP to deck.
03.02.2002	10:00	11:00	1	WAIT	P	PXA	(433) Changed handling equipment to 3½" and removed 15 stand tubing from drill collar finger to starboard set back
03.02.2002	11:00	12:00	1	WAIT	P	PXA	(433) Laid down 3 stand of 4 3/4 " drill collar from derrick.
03.02.2002	12:00	14:30	2,5	WAIT	P	PXA	(433) Changed handling equipment and laid down 11 singles 6½" drill collars and jars.
03.02.2002	14:30	15:30	1	WAIT	P	PXA	(433) Rearranged pipe in derrick and prepared to run in with 3½" tubing
03.02.2002	15:30	16:00	0,5	WAIT	P	PXA	(411) Displaced riser to 1,20 sg brine. Made up 7" drag block stinger.
03.02.2002	16:00	22:00	6	TRIP	P	PXA	(411) Ran in hole with 7" drag block stinger on 3½" tubing to 1630 m
03.02.2002	22:00	23:30	1,5	TRIP	P	PXA	(413) Changed handling equipment to 5½" continued ran in hole from 1630 m to 2576 m on 5½" drill pipe.
03.02.2002	23:30	00:00	0,5	BOPT	P	PXA	(411) Function tested Middle pipe rams on yellow pod from drill floor and toolpushers office 06:00 Update: 00:00 - 01:30 (413) Continued run in hole 7" Drag bloc stinger on 5½" drill pipe from 2576 m to 3348 m. 01:30 - 02:00 (413) Pick up cement head installed hose and rack back in derrick. 02:00 - 02:30 (413) Continued run in hole from 3348 to 3625 m. 02:30 - 03:30 (415) Pick up cement stand make up same . Hooked up hoses. Tested same 4500 psi 5 min. OK Broke circulation. 03:30 - 04:30 (415) Performed Toolbox meeting: Cement squeeze job. 04: - 05:00 (415) Pumped 1 bbl /min with Halliburton sting into cement retainer at 3645 m. Cement pressure increased to 600 psi. Stopped pumping. 05:00 - 06:00 (415) Performed injection test #1. Pressured up to 3100 psi stopped. Bleed down to 1789 psi 10 min. Increased pressure to 4500 psi Stopped. Bleed down to 3000 psi 3 min. Pumped 7,3 bbls bleed back 2,5 bbls. No go. Pulled out of retainer and 2 m. Made a second attempt. Stinged into retainer. Closed upper annular preventer. Put 290 psi back pressure in annulus. Pressured up drill pipe to 4500 psi stopped. Bleed down to 3125 psi 3 min. Pumped 4 bbls bleed back 2,5 bbls. No go Weekly HSE: RUH: 39 ASA: 8 HSE: RUH: 12 ASA: 3
04.02.2002	00:00	01:30	1,5	TRIP	P	PXA	(413) Continued run in hole with 7" Drag block stinger on 5½" drill pipe from 2576 m to 3348 m.
04.02.2002	01:30	02:00	0,5	TRIP	P	PXA	(413) Pick up cement head installed hose and rack back in

	SKARV 4 – 6507/5-5	COMPLETION REPORT	Page: 153 of 202
Chapter: 7	DRILLING DATA	Date: 03/05/02	Rev: 0

Date	Time From	Time To	Time (hr)	Activity	Code	Phase	Description of Currently Highlighted Operation
							derrick.
04.02.2002	02:00	02:30	0,5	TRIP	P	PXA	(413) Continued run in hole from 3348 to 3625 m.
04.02.2002	02:30	03:30	1	CIRC	P	PXA	(415) Pick up cement stand make up same . Hooked up hoses. Tested same 4500 psi 5 min. OK Broke circulation.
04.02.2002	03:30	04:30	1	SAFE	P	PXA	(415) Performed Toolbox meeting: Cement squeeze job.
04.02.2002	04:30	06:30	2	CMTR	P	PXA	(415) Stung into cement retainer pumping with 1 bpm at 150 psi. Tag cement retainer at 3645 m. Pressure increased to 600 psi. Stopped pumping. Slacked off 10 mT. Conducted injection test to : 3700 psi - No sq break down 4500 psi - No sq break down. Unsting circulated stinger OK Sting into cement retainer slacked of 10 mt. Closed annular preventer. Press up annulus to 20 bar Injection test no 2 4500 psi - No sq break down. Bleed off annulus and unsting.
04.02.2002	06:30	08:00	1,5	CMTP	P	PXA	(417) Set balanced cement plug on top of cement retainer from 3641 m to 3346 m. Pumped 31,3 bbls spacer @ 1,56 sg. Mixed and pumped 36 bbls 1,92 sg Norcem G cement + 35% SSA 1 cement mixed with Gascon 0,35 gps, CFR -3L 0,15 gps, SCR-100L 0,40 gps, Halad-413 L 0,40 gps, NF-6 001 gps, DW 4,95 gps. Yield 1,50 ft/sack. Displaced cement with 7,2 bbls spacer E+ and 158 bbls brine
04.02.2002	08:00	10:00	2	TRIP	P	PXA	(421) Racked back cement stand and pulled out of hole from 3640 m to 3020 m
04.02.2002	10:00	10:45	0,75	CIRR	P	PXA	(421) Rigged up and reverse circulated. Recovered traces of spacer.
04.02.2002	10:45	11:00	0,25	CMTR	P	PXA	(421) Rigged down cement hose and side entry sub.
04.02.2002	11:00	11:30	0,5	CIRC	P	PXA	(419) Dropped 2 wash balls circulated same out off pipe.
04.02.2002	11:30	12:30	1	CMTR	P	PXA	(420) Closed middle pipe rams. Pressure tested cement plug and retainer in 1000 psi stages to 3164 psi for 10 min with 1,20 sg brine. Held OK Pumped and bled back 8,2 bbls.
04.02.2002	12:30	13:30	1	RIGR	P	PXA	(NPT) Black out on rig.
04.02.2002	13:30	14:00	0,5	CIRC	P	PXA	(419) Spotted 18 m3 oil contaminated brine slops. Displaced same.
04.02.2002	14:00	14:30	0,5	RIGR	P	PXA	(NPT) Problem with start up phase after Black out.
04.02.2002	14:30	16:00	1,5	TRIP	P	PXA	(421) Pulled out of hole with 5½" drill pipe from 3020 m to 1632 m.
04.02.2002	16:00	23:30	7,5	TRIP	P	PXA	(423) Pulled out of hole 3½" PH 6 tubing from 1632 m 720 m .Laid down same to deck.
04.02.2002	23:30	00:00	0,5	TRIP	P	PXA	(NPT) Failure on Weatherford casing tong. Changed same. 06:00 Update: 00:00 - 01:30 (NPT) Continued to change out Weatherford casing tong. 01:00 - 05:00 (423) Pulled out of hole with 3½" PS 6 tubing from 720 m to surface. 05:00 - 05:30 (423) Laid down 2 stands of tubing from derrick 05:30 - 06:00 (423) Rigged down Weatherford tong and 3½" handling equipment. HSE . RUH : 12 ASA : 1
05.02.2002	00:00	01:30	1,5	TBMV	P	PXA	(NPT) Continued to change out Weatherford casing tong.
05.02.2002	01:30	05:00	3,5	TBMV	P	PXA	(423) Pulled out of hole with 3½" PS 6 tubing from 720 m to surface.
05.02.2002	05:00	05:30	0,5	TBMV	P	PXA	(423) Laid down 2 stands of 3½" PS 6 tubing from derrick
05.02.2002	05:30	06:30	1	TBMV	P	PXA	(423) Rigged down Weatherford tong and 3½" handling equipment
05.02.2002	06:30	07:15	0,75	TRIP	P	PXA	(425) Picked up 1 stand 5" drill pipe from derrick made up 13 3/8" EZSV.
05.02.2002	07:15	09:30	2,25	TRIP	P	PXA	(426) Installed diverter inserts and wiper rubber. Ran in hole with EZSV on 5" drill pipe to 520 m
05.02.2002	09:30	13:00	3,5	TRIP	P	PXA	(426) Changed handling equipment to 5½". Continued ran in

	SKARV 4 – 6507/5-5	Page: 154 of 202
Chapter: 7	DRILLING DATA	Date: 03/05/02 Rev: 0

Date	Time From	Time To	Time (hr)	Activity	Code	Phase	Description of Currently Highlighted Operation
							hole from 520 m to 2018 m.
05.02.2002	13:00	14:00	1	CMTF	P	PXA	(427) Set EZSV @ 2018 m. 25 right hand turns slacked off 7 mT. Sheared off at 17 mT. Held cement pre job meeting.
05.02.2002	14:00	14:30	0,5	CMTF	P	PXA	(428) Rig up and prepared for cement job. Tested cement hose and valve to 4500 psi 10 min.
05.02.2002	14:30	16:00	1,5	CMTF	P	PXA	(429) Set cement plug from 2018 m to 1932 m. Pumped 40 bbls 1,56 sg tuned spacer E+. Mixed and pumped: 35,5 bbls at 1,95 SG average and 4,5 bbls at 1,71 SG average. G cement + 35% SSA cement with HR-4L 0,1 gps,NF-6 .01 gps. and DW 6,15 gps. Yield 1,49 ft/sack. Displaced with 5,9 bbls spacer followed by 126 bbls 1,20 sg brine. Had problems getting cement slurry to designed density.
05.02.2002	16:00	16:30	0,5	TRIP	P	PXA	(430) Pulled out of hole from 2018 m to 1857 m.
05.02.2002	16:30	17:00	0,5	CMTF	P	PXA	(430) Rigged up and reverse circulated 1,5 times string volume. Traces of spacer in return: No cement.
05.02.2002	17:00	18:30	1,5	PRST	P	PXA	(431) Rigged up and pressure tested EZSV bridge plug in 1000 psi stages to 3150 psi. 10 min OK. Pumped and bleed off 8,1 bbls.
05.02.2002	18:30	19:30	1	CIRC	P	PXA	(432) Dropped wash ball and pumped 5 m3 hi-visk pill and 47 m3 slops.
05.02.2002	19:30	23:00	3,5	TRIP	P	PXA	(433) Pumped 1,5 sg slug. Pulled out of hole from 1857 m to 1381 m. Laid down 5 ½" drill pipe to deck.
05.02.2002	23:00	23:30	0,5	RIGR	P	PXA	(NPT) Repaired broken hose on catwalk machine.
05.02.2002	23:30	00:00	0,5	TRIP	P	PXA	(433) Continued pulled out of hole from 1381 m to 1267 m 06:00 Update: 00:00 - 00:30 (433) Continued pulling out of hole from 1267 m to 1230 m. Laid down drill pipe to deck 00:30 - 02:00 (NPT) Problems to reset drawworks SCR's after emergency stop tripped due to eagle light malfunction. Held SJA working without eagle light 02:00 - 05:00 (433) Continued pulled out of hole from 1230 m to 790 m. Laid down pipe to deck 05:00 - 05:30 (433) Spotted hi-visk pill @ 790 m to 700 m 05:30 - 06:00 (433) Continued pulled out of hole. HSE: RUH : 6 ASA: 0
06.02.2002	00:00	00:30	0,5	TBMV	P	PXA	(433) Continued pulling out of hole from 1267 m to 1230 m. Laid down drill pipe to deck
06.02.2002	00:30	02:00	1,5	RIGR	P	PXA	(NPT) Problems to reset drawworks SCR's after emergency stop tripped due to eagle light malfunction. Held SJA working without eagle light
06.02.2002	02:00	05:00	3	TBMV	P	PXA	(433) Continued pulled out of hole from 1230 m to 790 m. Laid down pipe to deck
06.02.2002	05:00	05:30	0,5	DSPL	P	PXA	(433) Spotted 6 m3 hi-visk pill @ 790 m to 700 m .
06.02.2002	05:30	06:00	0,5	TBMV	P	PXA	(433) Continued pulled out of hole 5½" dp from 790 m to 700 m. Laid down pipe to deck.
06.02.2002	06:00	07:30	1,5	CIRC	P	PXA	(433) Displaced kill and choke lines and well with 1,5 SG brine.
06.02.2002	07:30	08:30	1	TRIP	P	PXA	(433) Continued to pull out of hole with 5" dp from 700 m to 523 m.
06.02.2002	08:30	10:30	2	TRIP	P	PXA	(433) Changed handling equipment. Continued pulling out of hole with 5" drill pipe from 523 m to surface.
06.02.2002	10:30	11:00	0,5	TRIP	P	PXA	(433) Broke Halliburton setting tool. Cleared rig floor. Held SJA: Running in hole with wire line.
06.02.2002	11:00	12:00	1	PLUG	P	PXA	(435) Rigged up wireline to run 13 3/8" EZSV .
06.02.2002	12:00	14:00	2	PLUG	P	PXA	(NPT) Ran in hole with EZSV. Could not get current to the setting tool. CCL not able to detect 13 3/8" casing collars.
06.02.2002	14:00	17:00	3	PLUG	P	PXA	(NPT) Pulled out of hole with wireline. Inspected EZSV setting tool. Found short circuit in cable head. Changed out cable

	SKARV 4 – 6507/5-5	COMPLETION REPORT	Page: 155 of 202
Chapter: 7	DRILLING DATA	Date: 03/05/02	Rev: 0

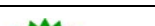
Date	Time From	Time To	Time (hr)	Activity	Code	Phase	Description of Currently Highlighted Operation
							head.
06.02.2002	17:00	17:30	0,5	PLUG	P	PXA	(433) Ran in hole with EZSV on wire line . Set same @ 639 m.
06.02.2002	17:30	19:00	1,5	PLUG	P	PXA	(437) Pulled out of hole with wire line. Rigged down same. Closed blind shear rams. Pressure tested EZSV plug to 3160 psi 10 min. OK. Pumped in and bleed back 1,7 bbls Cleared and tidy rig floor.
06.02.2002	19:00	20:00	1	CUT	P	PXA	(441) Picked up 13 3/8" casing cutter assembly. Tested mud motor and knives by circ. OK.
06.02.2002	20:00	20:30	0,5	CUT	P	PXA	(442) Ran in hole with casing cutter on 5 1/2" drill pipe to 235 m.
06.02.2002	20:30	21:00	0,5	CUT	P	PXA	(443) Made up xo-vers to Drill Quip MPT multi purpose pulling tool.
06.02.2002	21:00	22:00	1	CUT	P	PXA	(442) Continued ran in hole with 13 3/8" cutter assembly to 626 m
06.02.2002	22:00	23:00	1	CUT	P	PXA	(443) Engaged multi purpose tool. Pulled wear bushing free with 39 mT over pull. Broke circulation to activate Weatherford cutting tool . Pumps cavitating due to air in mud.
06.02.2002	23:00	00:00	1	CUT	P	PXA	(NPT) Conditioned mud and checked strainers in mud pumps. 06:00 Update: 00:00 - 01:30 (NPT) Continued treat mud and cleaned out strainers in mud pumps. 01:30 - 02:00 (447) Start circulation 2450 l/min cut casing at 626,6 m. 02:00 - 02:15 (448) Observed well. No flow. OK 02:15 - 03:00 (NPT) Attempt to pooh. Most tool hanging up in flex joint. Worked pipe 03:00 - 05:30 (449) Pulled out off hole. Racked back MOST tool in derrick. Laid down cutting tool on deck. 05:30 - 06:00 (450) Break out Drill Quip MPT and wear bushing HSE : RUH : 6 ASA : 3
07.02.2002	00:00	01:30	1,5	CUT	P	PXA	(NPT) Continued treat mud and cleaned out strainers in mud pumps.
07.02.2002	01:30	02:00	0,5	CUT	P	PXA	(447) Start circulation 2450 l/min cut casing at 626,6 m.
07.02.2002	02:00	02:15	0,25	CUT	P	PXA	(448) Observed well. No flow. OK
07.02.2002	02:15	03:00	0,75	TRIP	P	PXA	(NPT) Attempt to pooh. Most tool hanging up in flex joint. Worked pipe
07.02.2002	03:00	05:30	2,5	TRIP	P	PXA	(449) Pulled out off hole. Racked back MOST tool in derrick. Laid down cutting tool on deck.
07.02.2002	05:30	06:30	1	TRIP	P	PXA	(450) Break out Drill Quip MPT and wear bushing laid down same.
07.02.2002	06:30	08:00	1,5	CUT	P	PXA	(453) Picked up spear assembly from deck Ran in hole with same on 5 1/2" drill pipe.
07.02.2002	08:00	08:30	0,5	CUT	P	PXA	(454) Closed annular preventer. Engaged seal assembly pulled free with 20 mT overpull. OK
07.02.2002	08:30	09:00	0,5	CUT	P	PXA	(455) Flow checked well for 15 min. Static. Opened annular preventer.
07.02.2002	09:00	09:30	0,5	CUT	P	PXA	(456) Engaged spear. Pulled 13 3/8" casing free with 16 mT overpull.
07.02.2002	09:30	10:30	1	TRIP	P	PXA	(457) Pulled out of hole with 13 3/8" casing on 5 1/2" drill pipe from 626 m to 235 m.
07.02.2002	10:30	11:00	0,5	BHA	P	PXA	(459) Set slips and released 13 3/8" spear assembly. Laid down same.
07.02.2002	11:00	12:00	1	CSG	P	PXA	(460) Rigged up to pull 13 3/8" casing. Held pre job meeting.
07.02.2002	12:00	14:30	2,5	CSG	P	PXA	(460) Pulled and laid down 13 3/8" casing. Totally 18 joints.
07.02.2002	14:30	15:30	1	CSG	P	PXA	(461) Changed handling equipment. Laid down Weatherford tongs. Cleaned and tidy rig floor.
07.02.2002	15:30	16:00	0,5	TRIP	P	PXA	(463) Ran in hole with cement stinger: 3 1/2" diverter tool and 3 1/2" drill pipe 288 m.

	SKARV 4 – 6507/5-5	COMPLETION REPORT	Page: 156 of 202
Chapter: 7	DRILLING DATA	Date: 03/05/02	Rev: 0

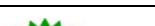
Date	Time From	Time To	Time (hr)	Activity	Code	Phase	Description of Currently Highlighted Operation
07.02.2002	16:00	17:00	1	TRIP	P	PXA	(463) Changed handling equipment. Ran in hole with 5 ½" drill pipe from 288 m to 633 m
07.02.2002	17:00	17:45	0,75	SAFE	P	PXA	(463) Held pre job meeting. Rigged up cement hose and valve.
07.02.2002	17:45	19:00	1,25	CMTF	P	PXA	(464) Pumped 35 bbls 1,58 SG spacer. Mixed and pumped 220 bbls 1,95 SG G cement 0,2 gal/sack, CaCl ₂ 0,1 gal/sack, NF-6 .0,01 gal/sack. sea water yield 1.11ft ³ /sack. Displaced with 24 bbls 1,50 SG mud. Lost 22 bbls return during cement job.
07.02.2002	19:00	20:00	1		P	PXA	(466) Pulled out off hole from 633 m to 408 m
07.02.2002	20:00	20:30	0,5		P	PXA	(467) Closed annular preventer and reverse circulated 2 times string volume. Trace of spacer in return. No cement.
07.02.2002	20:30	21:00	0,5		P	PXA	(467) Connected Top Drive and washed BOP.
07.02.2002	21:00	22:30	1,5		P	PXA	(467) Pulled out of hole from 408 m. Laid down 5½" drill pipe to deck. @ 22:15 hrs changed to 3½" equipment.
07.02.2002	22:30	00:00	1,5		P	PXA	(466) Pulled out of hole with 3½" drill pipe. Laid down same to deck 06:00 Update: 00:00 - 01:30 (466) Continued pulling out off hole with 3 ½" drill pipe laying down same. 01:30 - 02:00 (466) Picked up 5" hwdp from derrick laid down same. 02:00 - 03:30 (466) Run in with 6 joints of 8 drill collars from deck, pulled back and racked back same. 03:30 - 06:00 (466) Made up jet sub ran in. Washed BOP stack with mud. Washed down to 457 m. Laid down drill pipe. WOC. Skandi Stolmen arrived @ 12:25 hrs 07.02.02. Departed 21:35 hrs 07.02.02. ETA Sandnessjøen 08:00 hrs 08.02.02. Note: Tor Viking arrived location: 23:15 hrs 07.02.02. Stock : Diesel : 608 m3 Lub Oil : 1973 l and FW : 62 m3 Note : St.by boat : Strilvard departed for Åsgård 08:50 hrs. ETA Åsgård : 13:00 hrs 07.02.02. St.by boat Stril Hercules arrived location 08:50 hrs 07.02.02. HSE: RUH: 10 ASA: 1 Held Pre Job Safety meeting with Derrick climbers.
08.02.2002	00:00	01:30	1,5	CUT	P	PXA	(466) Continued pulling out off hole with 3 ½" drill pipe laying down same.
08.02.2002	01:30	02:00	0,5	TRIP	P	PXA	(466) Picked up 5" hwdp from derrick laid down same.
08.02.2002	02:00	03:30	1,5	TRIP	P	PXA	(466) Run in with 6 joints of 8 drill collars from deck, pulled back and racked back same.
08.02.2002	03:30	06:00	2,5	TRIP	P	PXA	(466) Made up jet sub ran in. Washed BOP stack with mud. Washed down to 430 m. Laid down drill pipe. WOC.
08.02.2002	06:00	06:30	0,5		P	PXA	(466) Ran in and tag hard cement at 457 m. Slacked off 12 mT.
08.02.2002	06:30	07:30	1		P	PXA	(470) Spaced out drill pipe, closed middle pipe rams. Press tested cement up to 500 psi. Pressure leaked off to 145 psi. Pumped 2 bbls. Made 2 attempts to re-test cement. Both attempts leaked off at 185 and 295 psi. Pumped in 0.7 and 0.3 bbls. WOC
08.02.2002	07:30	09:00	1,5		P	PXA	(470) Opened pipe rams pulled out and racked back 2 stands. Laid down emergency hanger tool.
08.02.2002	09:00	09:30	0,5		P	PXA	(470) Pulled out and racked back 3 stands of 5½" Drill pipe. Closed blind shear rams.
08.02.2002	09:30	10:00	0,5		P	PXA	(470) Pressure tested choke line to 100 bar (1450 psi). Pressure tested cement with 1.50 SG mud to 600 psi X 10 min. Held OK. WOC
08.02.2002	10:00	12:30	2,5		P	PXA	(470) Ran in hole with 2 stand 5½" drill pipe. Lined up and displaced riser, kill, choke and booster line to seawater. Hanged off Eagle Light.
08.02.2002	12:30	13:00	0,5		P	PXA	(470) Pulled out off hole with 2 stand 5 ½" drill pipe. Disp choke line to 1.50 SG mud. Closed blind shear rams. Tested cement to 110 bars (1595 psi) X 10 min. Held OK. Pumped in 0.5 bbls.

	SKARV 4 – 6507/5-5	Page: 157 of 202
Chapter: 7	DRILLING DATA	Date: 03/05/02 Rev: 0

Date	Time From	Time To	Time (hr)	Activity	Code	Phase	Description of Currently Highlighted Operation
08.02.2002	13:00	14:00	1		P	PXA	(470) Pulled out off hole with 5½" drill pipe from 344 m to surface.
08.02.2002	14:00	19:30	5,5		P	PXA	(487) Prepared to pull the BOP. Flushed all surface lines.
08.02.2002	19:30	21:00	1,5		P	PXA	(487) Laid down diverter housing.
08.02.2002	21:00	00:00	3	TRIP	P	PXA	(488) Disconnected BOP @ 21:00 hrs. Undressed slip joint 06:00 Update: 00:00 - 01:00 (492) Continued undress slip joint. 01:00 - 06:00 (489) Pulled BOP and laid down riser. Note : Tor Viking departed 18:22 hrs 08.02.2002. ETA : Sandnessjøen 09:00 hrs 09.02.2002. Note: Balder Viking arrived Skarv location at 02:30 09.02.02 Bulks on board: Fuel 610 m3 Lube 17915 L FW 60 m3 HSE : RUH : 2 ASA :1
09.02.2002	00:00	02:00	2	CUT	P	PXA	(492) Continued undress slip joint. Held pre job meeting.
09.02.2002	02:00	03:00	1		P	PXA	(501) Pulled BOP and laid down riser.
09.02.2002	03:00	16:00	13		P	PXA	(503) Pulled BOP into lower primary BOP guide. Installed lifting gear and guide beams.
09.02.2002	16:00	17:30	1,5		P	PXA	(504) Picked up and landed BOP on support beams. Removed guide lines.
09.02.2002	17:30	19:30	2		P	PXA	(507) Locked BOP onto transporter. Skidded out and parked same.
09.02.2002	19:30	23:30	4		P	PXA	(509) Lowered rotary closed hatches, removed lifting gear and dolly extension beams. Laid down 20 ft riser pup. Removed spider and installed bushings. Changed bails and elevator. Installed rails and iron roughneck.
09.02.2002	23:30	00:00	0,5		P	PXA	(512) Picked up 20" x 30" cutter assembly 06:00 Update: 00:00 - 01:30 (512) Continued picking up cutter assembly. Tested rotation and knives Made up guide ropes to cutter assembly. 01:30 - 03:15 (514) Ran in with 3 std 8" dc and 11 std 5½" drill pipe and stabbed into well head with ROV 03:30 - 04:30 (515) Cut 20 " and 30 " casing 5 m below seabed. 04:30 - 05:00 (516) Engaged MOST tool and pulled free with 22 mT over pull. 05:00 -06:00 (516) ROV activated 2 out of 3 locking device on MOST tool. Released guide lines, pulled same to surface. Tor Viking arrived location 22:47 hrs 09.02.2002. Scandi Stolmen arrived 18:35 hrs 09.02.2002 HSE: RUH: 3 ASA: 1 Weekly safety tour: Mechanic, electric, lifting shops and boiler room.
10.02.2002	00:00	01:30	1,5	CUT	P	PXA	(512) Continued to pick up 20" x 30" casing cutting assembly. Tested rotation and function of cutters and installed guide ropes from cutting assembly to guide lines.
10.02.2002	01:30	03:30	2	TRIP	P	PXA	(513) and (514) Ran in with the cutting assembly on 3 stands of 8" Drill Collars and 11 stands of 5 1/2" drill pipe. Stabbed in to 20" housing at 390.05 meters using the ROV to have the cutters at 398 meters (5 meters below the mudline).
10.02.2002	03:30	04:30	1	CUT	P	PXA	(515) Cut the 20" and 30" casing at 398 metres.
10.02.2002	04:30	06:30	2	CUT	P	PXA	(516) Engaged MOST Tool and pulled casing strings free with 22 metric tons overpull. ROV activated 2 out of 3 locking devices on MOST tool and then released the guide lines. Pulled same to surface. NOTE. At 05:15 hrs, OIM started to deballast rig prior to commencing anchor handling operations.
10.02.2002	06:30	07:30	1	TRIP	P	PXA	(517) and (518) Pulled out with Wellhead housings and 30" and 20" casing stumps to the moonpool. NOTE. At 06:30 hrs, Anchor handling operations commenced as a simultaneous operation with recovering the Wellhead housings. OIM passed anchor handling procedures and a Safety Briefing to both AHV vessels and conducted a Safety Meeting with the rig deck crew

	SKARV 4 – 6507/5-5		COMPLETION REPORT	Page: 158 of 202
Chapter: 7	DRILLING DATA		Date: 03/05/02	Rev: 0

Date	Time From	Time To	Time (hr)	Activity	Code	Phase	Description of Currently Highlighted Operation
							prior to commencement of operations. At 06:36 hrs passed pennant wire #7 to "Tor Viking". At 06:42 hrs passed pennant wire #4 to "Balder Viking".
10.02.2002	07:30	09:00	1,5	BHA	P	PXA	(519), (520) and (524) Secured Wellhead housings on moonpool trolley and released MOST tool. Laid down cutting assembly and then laid down Wellhead housings and casing stumps. Conducted seabed survey with ROV. OK. NOTE. At 08:05 hrs #4 anchor was on the deck of "Balder Viking" At 08:20 hrs #7 anchor was on the deck of "Tor Viking". At 08:28 hrs all rig chain was pulled in on #4 anchor. At 08:32 hrs, #4 pennant wire was passed back to rig. At 08:40 hrs, passed pennant wire #2 to "Balder Viking". At 08:55 hrs, had problem with Kenter link on #7 anchor. Started to cut same. 09:00 hrs marked the end of simultaneous operations.
10.02.2002	09:00	18:00	9	ANCH	P	POST	(526) Continued to pull anchors as follows :- At 09:21 hrs, Kenter link on #7 anchor was cut. At 09:21 hrs, #2 anchor was on stern roller of "Balder Viking" but had problems developing with #2 anchor winch. At 09:30 hrs stopped de-ballasting rig at 13 metres draft. At 09:45 hrs, all chain on #7 anchor was pulled in to rig. At 09:55 hrs, #7 pennant wire was passed back to rig. At 10:05 hrs, passed #6 pennant wire to "Tor Viking". At 11:25 hrs, #6 anchor was on deck of "Tor Viking" and secured. At 12:00 hrs, anchor winch #2 was repaired and once again operational. (Repaired electric motor to cooling system). At 12:05 hrs, #6 pennant wire passed back to rig. At 12:20 hrs, passed #1 pennant wire to "Tor Viking". At 13:14 hrs, #2 anchor was bolstered. At 13:16 hrs, #2 pennant wire was passed back to rig. At 13:30 hrs, #5 pennant wire was passed to "Balder Viking". At 14:20 hrs, #1 anchor was on deck of "Tor Viking" and secured. At 14:33 hrs, #1 chain was pulled in to 200 metres outside lower fairlead ready for towing. At 14:45 hrs, #5 anchor was on deck of "Balder Viking" and secured. At 15:05 hrs, all anchor chain had been pulled in on #5 anchor. At 15:15 hrs, #5 pennant wire passed back to rig. At 15:23 hrs, #8 pennant wire passed to "Balder Viking". At 15:40 hrs, #1 towline was connected to rig chain by "Tor Viking" ready to commence towing. At 15:57 hrs, anchor #8 off bottom and rig starting to pull in same. At 16:30 hours, rig started to pull in #3 anchor chain. (Moving rig over anchor). At 16:57 hrs, anchor #8 was on deck of "Balder Viking" and secured. At 17:12 hours, #8 anchor chain was pulled in to 200 metres outside lower fairlead ready for towing. At 17:19 hrs, rig was over #3 anchor and the anchor was lifted off of bottom. At 17:30 hrs, #8 towline was connected to rig chain by "Balder Viking" ready to commence towing. At 17:46 hrs, #3 anchor was bolstered and both "Tor Viking" and "Balder Viking" were ready to commence towing operations. 17:50 hrs marked the end of Anchor Handling operations. Continued to de-ballast rig to bring rig up to Transit draft of +/- 10 metres. Note.
10.02.2002	18:00	00:00	6	ANCH	P	POST	(532) Rig under tow by "Tor Viking" and "Balder Viking" at 17:50 hours from the Skarv 4 location to Haugesand. Rig at Transit draft of +/- 10 metres at 19:00 hrs. 06:00 hrs update. Continued Tow from Skarv 4 location. Distance travelled since departure = 53 Nautical Miles. Average transit speed = 4.41 Nautical Miles per hour. Distance to go to Haugesand = 357 Nautical Miles. ETA Haugesand is 15:00 hrs on Wednesday 13th of February.

	SKARV 4 – 6507/5-5		COMPLETION REPORT	Page: 159 of 202
Chapter: 7	DRILLING DATA		Date: 03/05/02	Rev: 0

Date	Time From	Time To	Time (hr)	Activity	Code	Phase	Description of Currently Highlighted Operation
11.02.2002	00:00	00:00	24	ANCH	P	PXA	(532) Continued to tow rig with both "Tor Viking" and "Balder Viking" from Skarv 4 location. Distance traveled since departure = 167 Nautical Miles. Average transit speed = 5.566 Nautical Miles per hour. Distance to go to Haugesund = 243 Nautical Miles. ETA Haugesund is 11:00 hrs on 14.02.2002. HSE. 1 RUH. 06:00 hrs update. Continued tow to Haugesund. Distance traveled since departure = 208 Nautical Miles. Average transit speed = 5.77 Nautical Miles per hour. Distance to go to Haugesund = 202 Nautical Miles.
12.02.2002	00:00	00:00	24	ANCH	P	PXA	(532) Continued to tow rig with both "Tor Viking" and "Balder Viking" from Skarv 4 location. Distance traveled since departure = 319 Nautical Miles. Average transit speed = 5.907 Nautical Miles per hour. Distance to go to Haugesund = 91 Nautical Miles. ETA Haugesund at 11:00 hrs on 14.02.2002. HSE. 1 RUH 06:00 hrs update. Continued tow from Skarv 4 location to Haugesund. Distance traveled since departure = 353 Nautical Miles. Average transit speed = 5.883 Nautical Miles per hour. Distance to go to Haugesund = 57 Nautical Miles.
13.02.2002	00:00	15:30	15,5	ANCH	P	PXA	(532) Continued to tow rig with both "Tor Viking" and "Balder Viking" from Skarv 4 location. Arrived at WP4 in position N 59. 31.3' x E 004. 56.1' at 15:30 hrs, 10 Nautical Miles from entrance to Haugesund.
13.02.2002	15:30	00:00	8,5	ANCH	P	PXA	(533) Waited at WP4 with the rig using Dynamic Positioning and with both Anchor Handling Vessels connected to towing chains, for the arrival of the Haugesund port Pilot who is expected at 08:00 hrs tomorrow Thursday the 14th of February 2002, so that the rig can be berthed alongside the quay during daylight hours. HSE. 1 RUH 06:00 hrs update. Continued to wait on daylight and the arrival of the Haugesund port Pilot. ETA of port Pilot is 08:00 hrs. ETA of rig berthing is 11:00 hrs 14.02.2002.
14.02.2002	00:00	06:30	6,5	ANCH	P	PXA	(533) Waited at WP4 with the rig using Dynamic Positioning and with both Anchor Handling Vessels connected to towing chains, for the arrival of the Haugesund port Pilot and daylight. At 06:00 hrs, started to pull in #8 towing chain and bolstered same at 06:30 hours.
14.02.2002	06:30	09:00	2,5	ANCH	P	PXA	(534) Rig departed waiting position 4 and proceeded towards the entrance of Haugesund harbor and arrived at the waiting position to receive the Haugesund port Pilot at 07:45 hrs. At 07:52 hrs, rig started to pull in on anchor chain #1 and bolstered same at 08:10 hrs. At 08:20 hrs, Haugesund port tug "Bison" was connected to the forward towing bridle. At 08:45 hrs the Haugesund port Pilot (Jostein Koch) arrived on the rig. At 08:50 hrs, Haugesund port tug "Håbull" was connected to towing line on Port Aft Pontoon. At 08:52 hrs, Pilot arrived onboard port tug "Bison". At 08:55 hrs, Pilot arrived onboard Anchor Handling Vessel "Tor Viking". At 08:57 hrs, "Tor Viking" passed #1 pennant wire back to rig. At 09:00 hrs, "Balder Viking" passed #8 pennant wire back to the rig. "Balder Viking" then departed the rig to offload 2 anchors at the ABB yard in Haugesund.
14.02.2002	09:00	12:00	3	ANCH	P	PXA	(535) Left waiting position outside Haugesund harbor with Pilot onboard at 09:00 hrs and proceeded to enter Haugesund harbor under tow from tugs "Bison" and "Håbull". "Tor Viking"

	SKARV 4 – 6507/5-5 COMPLETION REPORT	Page: 160 of 202
Chapter: 7	DRILLING DATA	Date: 03/05/02 Rev: 0

Date	Time From	Time To	Time (hr)	Activity	Code	Phase	Description of Currently Highlighted Operation
							sent to ABB yard to offload 2 anchors. At 10:40 hours, offloading of anchors by "Balder Viking" was completed and she was demobilised to Stavanger. "Balder Viking" ETA Stavanger at 13:00 hrs on 14.02.2002. Fuel and Lube oil status of "Balder Viking" at demobilisation :- Fuel 445m3 Lube 16,995 Ltrs. Fresh Water 43m3 At 10:50 hrs "Tor Viking" was alongside the ABB yard and by 11:23 hrs had offloaded the 2 anchors. At 11:35 hrs #1 pennant wire was passed to "Tor Viking" and mooring operations commenced. At 12:00 hrs, rig "West Alpha" was handed over from BP to Smedvig Offshore AS to be used at their discretion and sole responsibility. Fuel and Lube oil status of "West Alpha" at end of Skarv 4 well at 12:00 hrs on 14th February 2002 was as follows :- Fuel 240m3. Lube 8000 Ltrs. Fresh Water 45m3. Drill Water 93m3. NOTE. "Tor Viking" remains on contract until she has been backloaded with all the remaining rental and excess equipment.
14.02.2002	12:00	00:00	12		P	PXA	End of Skarv 4 operations. NOTE. "Tor Viking" finished taking remaining backload and departed "West Alpha" at 00:20 hrs on Friday 15th of February 2002. Fuel and Lube Oil status of "Tor Viking" upon departure was: - Fuel 399m3 Lube Oil 18,958 Ltrs. Fresh Water 41m3.

	SKARV 4 – 6507/5-5		COMPLETION REPORT		Page: 161 of 202
	Chapter: 7	DRILLING DATA		Date: 03/05/02	Rev: 0

7.2 Bit record

BIT DATA SUMMARY TABLE																									
BIT N°	SIZE (in)	VENDOR	TYPE	SERIAL N°	JETS (1/32in)	TFA (in²)	DEPTH IN(m)	DIST (m)	BIT hrs	CIRC hrs	ROP (m/hr)	WOB (tonn)	RPM bit	TRQ (kNm)	PRESS (bars)	FLOW (l/min)	TBR (k)	IADC GRADING							
																		I	O	DC	L	B	G	OC	RP
WELL : 6507/5-5 SPUD #1																									
1	17.5	Sec. DBS	XT02C	-	12:13:22:14c	0.7616	393	78	*21.0	*21.0	*3.7	*1-30	*45-80	*0-35	*60-180	*1200-5050	*94.5	1	1	BT	N	E	I	NO	PT
Run with 26/36" holeopener w/ 6x10, 6x12 jets. 36" Cutters 3m behind bit.																									
* NB ALL DATA ESTIMATED AS MUDLOGGING COMMENCED AT 452m.																									
2RR1	17.5	Sec. DBS	XT02C	-	12:13:22:14c	0.7616	471	3	0.2	0.2	15.0	5-10	60-80	5-20	150-160	5050	1.1	1	1	NO	A	E	I	NO	TD
Run with 26/36" holeopener w/ 6x10, 6x12 jets. 36" Cutters 3m behind bit.																									
3RR1	17.5	Sec. DBS	XT02C	-	12:13:22:14c	0.7616																			
Wiper trip run with 26/36" holeopener w/ 6x10, 6x12 jets. 36" Cutters 3m behind bit.																									
WELL : 6507/5-5 SPUD #2																									
4	17.5	Smith	No Name	742172	14:14:14:16	0.6473	393	81	8.2	13.0	9.9	0-4	50-80	1-15	2-145	100-5200	38.4	1	1	NO	A	E	I	NO	PT
Run with 26/36" holeopener w/ 6x10, 6x12 jets. 36" Cutters 3m behind bit.																									
5	26	Sec. DBS	XT02C	737607	18:18:20:20	1.1106	474	586	21.3	31.8	27.5	0-11	55-120	2-17	141-202	3900-4500	148.8	1	1	NO	A	E	I	NO	PT
6	17.5	Smith	MSDSSHC	LK9161	20:18:18:14c	0.9541	1060	1046	34.5	64.3	30.9	1-14	95-145	3-14	180-305	3500-4550	255.6	3	4	WT	A	E	I	NO	TD
7	12.25	Smith	S987BHPX	JR8801	9x16	1.7671	2106	1537	74.6	100.2	20.6	0.5-16	80-180	4-33	210-308	2800-3850	646.7	2	5	BT	S	X	I	LT	TD
8	8.5	Smith	SVH	LB 3351	2x18, 1x12	0.607	3643	-	-	5.0	-	-	-	-	-	-	18.3	-	-	-	-	-	-	-	-
Above drilled plug and float only.																									
9	8.5	Smith	15GFDGPD	MJ1200	2x18, 1x12	0.607	3643	12	1.9	14.9	6.3	1-10	56-102	1-7.7	215-230	2400-2600	24.8	1	1	NO	A	E	I	NO	CP
10(CB1)	8.5	Hughes	ARC427C3	1902478	-	1.1	3655	81	3.6	4.6	22.5	4-12	75-105	5-18	46-60	935-1140	17.3	1	1	NO	A	D	I	NO	PF
11	8.5	Smith	M50N	JQ8519	6x12	0.6627	3736	214	11.0	18.8	19.4	0-12	88-135	6-21	177-239	2170-2620	92.2	3	4	CT	A	X	1/8	ER	TD

Chapter:
7

DRILLING DATA

Date:
03/05/02

Rev: 0

7.3 BHA Record

BP AMOCO

Page 1 of 8

BHA Summary Report

Legal Well Name: 6507/5-5

Common Well Name: SKARV 4

Event Name: ORIG DRILLING

Contractor Name: SMEDVIG

Rig Name: WEST ALPHA

Start: 10.10.2001

Rig Release: 14.02.2002

Rig Number:

Spud Date:

End:

BHA #1

BHA Name	Bit#	Purpose	Bit to Survey (m)	Min Id (in)	Motor	Pred. Perf. Act. Perf.	Pred. Build/Walk Act. Build/Walk	I O D L B G O R
36" Spud assy	1	DRILLING			N			1/1/BT/N E/INO/PT

Date In: 28.11.2001 Time In: 01:00 TMD In: 393.00 (m) Date Out: 29.11.2001 Time Out: 04:30 TMD Out: 468.00 (m)

BHA Detail	#	Length	OD	ID	Connection	Pin	Gauge (in)	Serial #	Spiral	Fishing	Blade
Item Description	Jts	(m)	(in)	(in)	Size (in)	Type	Box	In	Out	Neck (in)	Width (in)
BIT	1	0.43	17,500								
BIT SUB	1	0.88	11,250								
Hole Opener	1	4.32	36,000								
XO	1	0.78	11,250							0.33	
Andergauge	1	3.26	9,625								
STAB	1	1.86	36,000								
DRILL COLLAR	2	17.90	9,500	3,065						0.48	
XO	1	0.96	9,500	3,000						0.60	
DRILL COLLAR	6	53.03	8,000	2,875							
XO	1	0.96	7,250	3,565						0.50	
HWDP	9	83.15	5,500	3,500							
Total Length:		167.53									

BHA	Check	Check	Check	Hook Load (psi)	String Weight (lbs)	Drag	BHA Wt	Torque (ft-lbf)	
Chk	TMD (m)	Date	Time	Allow	Actual	Up	Down	Rot	
1	468.00	28.11.2001	21:00	2 030	2 030	152 000		152 000	

BHA #2

BHA Name	Bit#	Purpose	Bit to Survey (m)	Min Id (in)	Motor	Pred. Perf. Act. Perf.	Pred. Build/Walk Act. Build/Walk	I O D L B G O R
36" Spud assy	2	DRILLING			N			1/1/BT/N E/INO/PT

Date In: 30.11.2001 Time In: 11:00 TMD In: 468.00 (m) Date Out: 30.11.2001 Time Out: 21:00 TMD Out: 471.00 (m)

BHA Detail	#	Length	OD	ID	Connection	Pin	Gauge (in)	Serial #	Spiral	Fishing	Blade
Item Description	Jts	(m)	(in)	(in)	Size (in)	Type	Box	In	Out	Neck (in)	Width (in)
BIT	1	0.43	17,500								
BIT SUB	1	0.88	11,250								
Hole Opener	1	4.32	36,000								
XO	1	0.78	11,250							0.33	
Andergauge	1	3.26	9,625								
STAB	1	1.86	36,000								
DRILL COLLAR	2	17.90	9,500	3,065						0.48	
XO	1	0.96	9,500	3,000						0.60	
DRILL COLLAR	6	53.03	8,000	2,875							
XO	1	0.96	7,250	3,565						0.50	
HWDP	9	83.15	5,500	3,500							

	SKARV 4 – 6507/5-5 COMPLETION REPORT	Page: 163 of 202
Chapter: 7	DRILLING DATA	Date: 03/05/02 Rev: 0

BP AMOCO												Page 2 of 8	
BHA Summary Report													
Legal Well Name:		6507/5-5					Spud Date:						
Common Well Name:		SKARV 4					Start:		10.10.2001				
Event Name:		ORIG DRILLING					End:		14.02.2002				
Contractor Name:		SMEDVIG					Rig Release:		14.02.2002				
Rig Name:		WEST ALPHA					Rig Number:						
BHA Detail	#	Length	OD	ID	Connection		Pin	Gauge (in)		Serial #	Spiral	Fishing	Blade
Item Description	Jts	(m)	(in)	(in)	Size (in)	Type	Box	In	Out			Neck (in)	Width (in)
Total Length:		167,53											
BHA #3													
BHA Name	Bit#	Purpose		Bit to Survey (m)	Min Id (in)	Motor	Pred. Perf. Act. Perf.		Pred. Build/Walk Act. Build/Walk		I O D L B G O R		
36" Spud assy	3	DRILLING				N							
Date In: 01.12.2001 Time In: 09:45 TMD In: 471,00 (m) Date Out: 01.12.2001 Time Out: 15:15 TMD Out: 471,01 (m)													
BHA Detail	#	Length	OD	ID	Connection		Pin	Gauge (in)		Serial #	Spiral	Fishing	Blade
Item Description	Jts	(m)	(in)	(in)	Size (in)	Type	Box	In	Out			Neck (in)	Width (in)
BIT	1	0,43	17,500										
BIT SUB	1	0,88	11,250										
Hole Opener	1	4,32	36,000										
XO	1	0,78	11,250									0,33	
Andergauge	1	3,26	9,625										
STAB	1	1,86	36,000										
DRILL COLLAR	2	17,90	9,500	3,065								0,48	
XO	1	0,96	9,500	3,000								0,60	
DRILL COLLAR	6	53,03	8,000	2,875									
XO	1	0,96	7,250	3,565								0,50	
HWDP	9	83,15	5,500	3,500									
Total Length:		167,53											
BHA #4													
BHA Name	Bit#	Purpose		Bit to Survey (m)	Min Id (in)	Motor	Pred. Perf. Act. Perf.		Pred. Build/Walk Act. Build/Walk		I O D L B G O R		
36" Spud assy	4	DRILLING				N					1/1/NO/A E/ /NO/ PT		
Date In: 03.12.2001 Time In: 02:30 TMD In: 395,00 (m) Date Out: 03.12.2001 Time Out: 22:00 TMD Out: 471,00 (m)													
BHA Detail	#	Length	OD	ID	Connection		Pin	Gauge (in)		Serial #	Spiral	Fishing	Blade
Item Description	Jts	(m)	(in)	(in)	Size (in)	Type	Box	In	Out			Neck (in)	Width (in)
BIT	1	0,44	17,500										
BIT SUB	1	0,88	11,250										
Hole Opener	1	4,32	36,000										
Andergauge	1	3,26	9,625										
STAB	1	1,86	36,000										
DRILL COLLAR	2	17,90	9,500	3,065								0,48	
XO	1	0,96	9,500	3,000								0,60	

Printed: 22.03.2002 10:08:07

	SKARV 4 – 6507/5-5 COMPLETION REPORT	Page: 164 of 202
Chapter: 7	DRILLING DATA	Date: 03/05/02 Rev: 0

BP AMOCO												Page 3 of 8		
BHA Summary Report														
Legal Well Name: 6507/5-5 Common Well Name: SKARV 4 Event Name: ORIG DRILLING Contractor Name: SMEDVIG Rig Name: WEST ALPHA														
Start: 10.10.2001 Rig Release: 14.02.2002 Spud Date: End: Rig Number:														
BHA Detail		#	Length	OD	ID	Connection		Pin	Gauge (in)		Serial #	Spiral	Fishing	Blade
Item Description		Jts	(m)	(in)	(in)	Size (in)	Type	Box	In	Out			Neck (in)	Width (in)
DRILL COLLAR		6	53,03	8,000	2,875									
XO		1	0,96	7,250	3,565								0,50	
HWDP		9	83,16	5,500	3,500									
Total Length:			166,76											
BHA	Check	Check	Check	Hook Load (psi)		String Weight (lbs)			Drag	BHA Wt	Torque (ft-lbf)			
Chk	TMD (m)	Date	Time	Allow	Actual	Up	Down	Rot	(lbs)	Jar (lbs)	On	Off		
1	471,00	03.12.2001	22:00	2 030	2 030	152 000	140 000	152 000			25	6		

BHA #5														
BHA Name	Bit#	Purpose	Bit to Survey (m)	Min Id (in)	Motor	Pred. Perf. Act. Perf.	Pred. Build/Walk Act. Build/Walk	I O D L B G O R						
26" BHA assembly	5	DRILLING			N			1/1/NO/A E/ I/NO/ PT						
Date In: 04.12.2001 Time In: 20:00 TMD In: 471,00 (m) Date Out: 06.12.2001 Time Out: 23:00 TMD Out: 1 060,00 (m)														
BHA Detail		#	Length	OD	ID	Connection		Pin	Gauge (in)		Serial #	Spiral	Fishing	Blade
Item Description		Jts	(m)	(in)	(in)	Size (in)	Type	Box	In	Out			Neck (in)	Width (in)
BIT		1	0,55	26,000										
BIT SUB		1	0,87	9,375										
XO		1	1,22	11,250	2,000								1,20	
MWD		1	9,14	9,250										
SAVER SUB		1	0,78	9,375										
STAB		1	2,49	26,000	3,000								0,76	
DRILL COLLAR		2	17,90	9,500	3,065								0,48	
XO		1	0,96	9,500	3,000								0,60	
DRILL COLLAR		6	53,03	8,000	2,875									
JAR		1	9,65	7,625	3,000								0,58	
DRILL COLLAR		2	17,40	8,000	2,875								0,33	
XO		1	0,96	7,250	3,565								0,50	
HWDP		12	111,69	5,500	3,500									
Total Length:			226,64											
BHA	Check	Check	Check	Hook Load (psi)		String Weight (lbs)			Drag	BHA Wt	Torque (ft-lbf)			
Chk	TMD (m)	Date	Time	Allow	Actual	Up	Down	Rot	(lbs)	Jar (lbs)	On	Off		
1	471,00	05.12.2001	23:59		2 500	202 000	195 000	198 000	4 000		15			
1	1 060,00	06.12.2001	06:09		2 600	202 000	195 000	198 000	4 000		15 000			

BHA #6									
BHA Name	Bit#	Purpose	Bit to Survey (m)	Min Id (in)	Motor	Pred. Perf. Act. Perf.	Pred. Build/Walk Act. Build/Walk	I O D L B G O R	
17 1/2" Drilling BHA	6	DRILLING			N			3/4/WT/A E/ I/NO/ PT	
Date In: 11.12.2001 Time In: 23:00 TMD In: 1 060,00 (m) Date Out: 16.12.2001 Time Out: 02:30 TMD Out: 2 106,00 (m)									

Printed: 22.03.2002 10:10:41

	SKARV 4 – 6507/5-5 COMPLETION REPORT	Page: 165 of 202
Chapter: 7	DRILLING DATA	Date: 03/05/02 Rev: 0

BP AMOCO												Page 4 of 8	
BHA Summary Report													
Legal Well Name: 6507/5-5 Common Well Name: SKARV 4 Event Name: ORIG DRILLING Contractor Name: SMEDVIG Rig Name: WEST ALPHA													
										Spud Date: End:			
										Start: 10.10.2001 Rig Release: 14.02.2002 Rig Number:			
BHA Detail	#	Length	OD	ID	Connection		Pin	Gauge (in)		Serial #	Spiral	Fishing	Blade
Item Description	Jts	(m)	(in)	(in)	Size (in)	Type	Box	In	Out			Neck (in)	Width (in)
BIT	1	0,41	17,500										
XO	1	0,80	9,375										
MPR SUB	1	5,38	8,250										
MWD	1	11,25	8,250										
SAVER SUB	1	0,50	8,250										
FLOAT SUB	1	1,07	8,000										
XO	1	0,81											
STAB	1	1,79	17,500										
DRILL COLLAR	2	18,12	9,500	3,125									
STAB	1	1,84	17,500	3,000									
DRILL COLLAR	2	17,90	9,500	3,063									
XO	1	0,96	9,500	3,000									
DRILL COLLAR	6	53,03	7,875	3,000									
JAR	1	9,65	7,625	3,000									
DRILL COLLAR	2	17,40	8,000	2,875									
XO	1	0,96	7,250	3,560									
HWDP	12	111,69	5,500	3,500									
Total Length:		253,56											
BHA	Check	Check	Check	Hook Load (psi)		String Weight (lbs)			Drag	BHA Wt	Torque (ft-lbf)		
Chk	TMD (m)	Date	Time	Allow	Actual	Up	Down	Rot	(lbs)	Jar (lbs)	On	Off	
1	1 311,00	12.12.2001	23:59	3 500	3 500	104 000	104 000	102 000	2 000	42 000	14 000	4 000	
1	1 590,00	13.12.2001	13:30	3 625	3 625	249 000	245 000	247 000	2 000	42 000	19 000	4 000	
1	2 039,00	14.12.2001	23:59	4 350	4 350	273 000	271 000	273 000		42 000	22 000	7 000	
1	2 106,00	15.12.2001	05:10	43 500	4 350	274 000	272 000	274 000		42 000	22 000	7 000	
BHA #7													
BHA Name		Bit#	Purpose		Bit to Survey (m)	Min Id (in)	Motor	Pred. Perf. Act. Perf.	Pred. Build/Walk Act. Build/Walk		I O D L B G O R		
12 1/4" Drilling BHA		7	DRILLING				N				2/5/BT/S D/ILT/PT		
Date In: 18.12.2001 Time In: 23:59 TMD In: 2 106,00 (m) Date Out: 25.12.2001 Time Out: 19:45 TMD Out: 3 643,00 (m)													
BHA Detail	#	Length	OD	ID	Connection		Pin	Gauge (in)		Serial #	Spiral	Fishing	Blade
Item Description	Jts	(m)	(in)	(in)	Size (in)	Type	Box	In	Out			Neck (in)	Width (in)
BIT	1	0,29	12,250										
STAB	1	1,66	12,250	2,785									
MPR SUB	1	5,05	8,500										
Modular Stab	1	1,32	12,250										
MWD	1	11,30	8,375										
SAVER SUB	1	0,84	8,000	2,750									
FLOAT SUB	1	0,97	8,000	2,750									
STAB	1	1,80	12,250	2,813									
DRILL COLLAR	12	106,79	8,000	2,875									
JAR	1	9,65	7,625	3,000									

Printed: 22.03.2002 10:08:07

	SKARV 4 – 6507/5-5 COMPLETION REPORT	Page: 166 of 202
Chapter: 7	DRILLING DATA	Date: 03/05/02 Rev: 0

Page 5 of 8

BP AMOCO

BHA Summary Report

Legal Well Name: 6507/5-5
Common Well Name: SKARV 4
Event Name: ORIG DRILLING
Contractor Name: SMEDVIG
Rig Name: WEST ALPHA

Spud Date:
Start: 10.10.2001
End: 14.02.2002
Rig Release:
Rig Number:

BHA Detail	#	Length	OD	ID	Connection		Pin	Gauge (in)		Serial #	Spiral	Fishing	Blade
Item Description	Jts	(m)	(in)	(in)	Size (in)	Type	Box	In	Out			Neck (in)	Width (in)
DRILL COLLAR	2	17,40	7,250	2,875									
XO	1	0,96	7,250	3,563									
HWDP	12	111,69	5,500	3,750									
Total Length:		269,72											

BHA	Check	Check	Check	Hook Load (psi)		String Weight (lbs)			Drag	BHA Wt	Torque (ft-lbf)	
Chk	TMD (m)	Date	Time	Allow	Actual	Up	Down	Rot	(lbs)	Jar (lbs)	On	Off
1	2 476,00	20.12.2001	00:00	4 393	4 300	256 000		260 000	-4 000			
1	3 090,00	21.12.2001	00:00	4 350	4 300	297 000		299 000	-2 000		30 000	6 600
1	3 363,00	22.12.2001	00:00	4 306	4 290	298 000		302 000	-4 000		30 000	6 600
1	3 565,00	23.12.2001	00:00	4 205	4 205	363 000	360 000	361 000	2 000		31 000	6 500
1	3 643,00	24.12.2001	00:00	4 219	4 219	367 000	367 000	363 000	4 000		31 000	6 500
1	3 643,00	25.12.2001	19:45									

BHA #8

BHA Name	Bit#	Purpose	Bit to Survey	Min Id	Motor	Pred. Perf.	Pred. Build/Walk	IOD L
			(m)	(in)		Act. Perf.	Act. Build/Walk	B G O R
8 1/2" Drilling BHA	8	DRILLING			N			1/1/NO/A E/ I/NO/ PT

Date In: 30.12.2001 Time In: 01:00 TMD In: 3 643,00 (m) Date Out: 31.12.2001 Time Out: 03:30 TMD Out: 3 643,01 (m)

BHA Detail	#	Length	OD	ID	Connection		Pin	Gauge (in)		Serial #	Spiral	Fishing	Blade
Item Description	Jts	(m)	(in)	(in)	Size (in)	Type	Box	In	Out			Neck (in)	Width (in)
BIT	1	0,25	8,500										
BIT SUB	1	0,75	6,375	3,000									
DRILL COLLAR	3	26,97	6,500	2,815								0,42	
XO	1	0,98	6,375	3,500								0,52	
HWDP	12	111,69	5,500	3,500								0,47	
Total Length:		140,64											

BHA #9

BHA Name	Bit#	Purpose	Bit to Survey	Min Id	Motor	Pred. Perf.	Pred. Build/Walk	IOD L
			(m)	(in)		Act. Perf.	Act. Build/Walk	B G O R
8 1/2" Drilling BHA	9	DRILLING			N			1/1/NO/A E/ I/NO/ PF

Date In: 01.01.2002 Time In: 13:00 TMD In: 3 643,01 (m) Date Out: 03.01.2002 Time Out: 03:30 TMD Out: 3 655,00 (m)

BHA Detail	#	Length	OD	ID	Connection		Pin	Gauge (in)		Serial #	Spiral	Fishing	Blade
Item Description	Jts	(m)	(in)	(in)	Size (in)	Type	Box	In	Out			Neck (in)	Width (in)
BIT	1	0,25	8,500										
MPR SUB	1	4,89	6,625									1,00	
Modular Stab	1	1,23	6,750									0,66	
MWD	1	11,34	6,500									1,00	

	SKARV 4 – 6507/5-5 COMPLETION REPORT	Page: 167 of 202
Chapter: 7	DRILLING DATA	Date: 03/05/02 Rev: 0

BP AMOCO												Page 6 of 8	
BHA Summary Report													
Legal Well Name: 6507/5-5 Common Well Name: SKARV 4 Event Name: ORIG DRILLING Contractor Name: SMEDVIG Rig Name: WEST ALPHA													
Start: 10.10.2001 Rig Release: 14.02.2002 Rig Number:													
Spud Date: End:													
BHA Detail	#	Length	OD	ID	Connection		Pin	Gauge (in)		Serial #	Spiral	Fishing	Blade
Item Description	Jts	(m)	(in)	(in)	Size (in)	Type	Box	In	Out			Neck (in)	Width (in)
FLOAT SUB	1	0,80	6,750	2,750								0,80	
STAB	1	1,48	8,500	2,813								0,66	
DRILL COLLAR	10	89,55	6,500	2,875								0,33	
JAR	1	9,85	6,500	2,750								0,75	
DRILL COLLAR	2	17,78	6,500	2,875								0,40	
HWDP	12	111,10	5,000	3,000									
DRILL PIPE	30	275,63	5,000	3,500									
XO	1	0,98	6,375	3,500								0,52	
Total Length:		524,88											
BHA #10													
BHA Name	Bit#	Purpose		Bit to Survey (m)	Min Id (in)	Motor	Pred. Perf. Act. Perf.	Pred. Build/Walk Act. Build/Walk		I O D L B G O R			
8 1/2" Core Assembly	10	CORING				N				1/1/NO/A D/ I/NO/ PF			
Date In: 03.01.2002 Time In: 03:30 TMD In: 3 655,00 (m) Date Out: 04.01.2002 Time Out: 15:00 TMD Out: 3 736,00 (m)													
BHA Detail	#	Length	OD	ID	Connection		Pin	Gauge (in)		Serial #	Spiral	Fishing	Blade
Item Description	Jts	(m)	(in)	(in)	Size (in)	Type	Box	In	Out			Neck (in)	Width (in)
Core Bit	1	0,42	8,500	4,000								0,17	
XO	1	0,30	6,750	5,375								1,00	
Core Barrel	9	83,56	8,469	5,375								0,72	
Outer Tube Ext	1	1,14	6,750	5,375								1,14	
Top Sub	1	0,45	6,750	3,156									
FLOAT SUB	1	0,57	6,375	2,875									
Circ Sub	1	0,77	6,375	2,250									
DRILL COLLAR	9	80,57	6,500	2,750								0,75	
JAR	1	9,85	6,500	2,750								0,75	
DRILL COLLAR	2	17,88	6,600	2,875								0,44	
HWDP	12	111,10	5,000	3,000									
DRILL PIPE	30	275,63	5,000	3,500									
XO	1	0,98	6,375	3,500								0,52	
Total Length:		583,22											

	SKARV 4 – 6507/5-5 COMPLETION REPORT	Page: 168 of 202
Chapter: 7	DRILLING DATA	Date: 03/05/02 Rev: 0

BP AMOCO												Page 7 of 8	
BHA Summary Report													
Legal Well Name:		6507/5-5						Spud Date:					
Common Well Name:		SKARV 4						Start:		10.10.2001			
Event Name:		ORIG DRILLING						End:					
Contractor Name:		SMEDVIG						Rig Release:		14.02.2002			
Rig Name:		WEST ALPHA						Rig Number:					
BHA #11													
BHA Name	Bit#	Purpose	Bit to Survey (m)	Min Id (in)	Motor	Pred. Perf. Act. Perf.	Pred. Build/Walk Act. Build/Walk /	I O D L B G O R					
8 1/2" Drilling BHA	11	DRILLING			N			2/3/CT/S D/ 1WT/ PT					
Date In: 04.01.2002 Time In: 15:00 TMD In: 3 736,00 (m) Date Out: 06.01.2002 Time Out: 04:00 TMD Out: 3 950,00 (m)													
BHA Detail	#	Length (m)	OD (in)	ID (in)	Connection		Pin	Gauge (in)		Serial #	Spiral	Fishing Neck (in)	Blade Width (in)
Item Description	Jts				Size (in)	Type	Box	In	Out				
BIT	1	0,30	8,500										
MPR SUB	1	4,89	6,625									1,00	
Modular Stab	1	1,23	6,750									0,66	
MWD	1	11,34	6,500									1,00	
FLOAT SUB	1	0,80	6,750	2,750								0,80	
STAB	1	1,48	8,500	2,813								0,66	
DRILL COLLAR	10	89,55	6,500	2,875								0,33	
JAR	1	9,85	6,500	2,750								0,75	
DRILL COLLAR	2	17,78	6,500	2,875								0,40	
HWDP	12	111,10	5,000	3,000									
DRILL PIPE	30	275,63	5,000	3,500									
XO	1	0,98	6,375	3,500								0,52	
Total Length:		524,93											
BHA	Check	Check	Check	Hook Load (psi)		String Weight (lbs)		Drag		BHA Wt		Torque (ft-lbf)	
Chk	TMD (m)	Date	Time	Allow	Actual	Up	Down	Rot	(lbs)	Jar (lbs)	On	Off	
1	3 736,00	05.01.2002	06:00		3 050	365 000	363 000	367 000	-2 000			12 500	
BHA #12													
BHA Name	Bit#	Purpose	Bit to Survey (m)	Min Id (in)	Motor	Pred. Perf. Act. Perf.	Pred. Build/Walk Act. Build/Walk /	I O D L B G O R					
6" clean out assy	12	CLEAN OUT			N								
Date In: 13.01.2002 Time In: 03:30 TMD In: 3 950,00 (m) Date Out: 14.01.2002 Time Out: 05:00 TMD Out: 3 950,01 (m)													
BHA Detail	#	Length (m)	OD (in)	ID (in)	Connection		Pin	Gauge (in)		Serial #	Spiral	Fishing Neck (in)	Blade Width (in)
Item Description	Jts				Size (in)	Type	Box	In	Out				
BIT	1	0,18	6,000										
Csg Scraper	1	0,81	6,184	1,375								0,23	
BIT SUB	1	0,91	4,625	2,000								0,91	
DRILL COLLAR	9	84,62	4,750	2,250								0,56	
DRILL PIPE	27	250,67	3,500										
Tie Back Mill	1	4,64	7,250	2,000								0,45	
Top Dressing Mill	1	0,32	8,150	2,000									
BIT SUB	1	0,73	6,625	3,000									
XO	1	0,98	7,250	3,500								0,58	
Total Length:		343,86											

	SKARV 4 – 6507/5-5 COMPLETION REPORT	Page: 169 of 202
Chapter: 7	DRILLING DATA	Date: 03/05/02 Rev: 0

7.4 Drilling Fluids Report

BP AMOCO Mud Summary Report															
Legal well name:	6507/5-5								Start:	20.11.2001					
Common well name:	SKARV 4								Spud date:	28.11.2001					
Event name:	Original drilling								Rig release:	14.02.2002					
Contractor name:	SMEDVIG														
Rig name:	WEST ALPHA														
Date	TMD (m)	Mud type	MW (sg)	Visc. (s/qt)	PV (cp)	YP (lb/100ft2)	Gels 10 Sec. (lb/100ft2)	Gels 10 Min. (lb/100ft2)	API WL (cc/30min)	pH	CL (mg/l)	Sand (%)	LGS (ppb)	MBT (ppb)	
27.11.01	393	SPUD MUD	1	105	0	0	0	0	0	10,5	0	0	0	0	
28.11.01	471	SPUD MUD	1	105	0	0	0	0	0	10,5	0	0	0	0	
29.11.01	471	SPUD MUD	1	105	0	0	0	0	0	10,5	0	0	0	0	
30.11.01	474	SPUD MUD	1	105	0	0	0	0	0	10,5	0	0	0	0	
01.12.01	474	SPUD MUD	1	105	0	0	0	0	0	10,5	0	0	0	0	
02.12.01	393	SPUD MUD	1	105	0	0	0	0	0	10,5	0	0	0	0	
03.12.01	474	SPUD MUD	1	105	0	0	0	0	0	10,5	0	0	0	0	
04.12.01	466,5	SPUD MUD	1	105	0	0	0	0	0	10,5	0	0	0	0	
05.12.01	822	SPUD MUD	1	105	0	0	0	0	0	10,5	0	0	0	0	
06.12.01	1 060,0	SPUD MUD	1	105	0	0	0	0	0	10,5	0	0	0	0	
07.12.01	1 060,0	SPUD MUD	1,2	105	0	0	0	0	0	10,5	0	0	0	0	
08.12.01	1 060,0	SPUD MUD	1,2	105	0	0	0	0	0	10,5	0	0	0	0	
09.12.01	1 060,0	SPUD MUD	1,2	105	0	0	0	0	0	10,5	0	0	0	0	
10.12.01	1 060,0	SPUD MUD	1,2	105	0	0	0	0	0	10,5	0	0	0	0	
11.12.01	1 060,0	SPUD MUD	1,2	107	0	0	0	0	0	10,5	0	0	0	0	
12.12.01	1 085,0	POLYMER	1,2	64	15	14	4	8	3	10,1	67 000	0,1	42	0	
12.12.01	1 287,0	POLYMER	1,2	63	17	18	4	8	2,8	9,8	63 000	0,75	36	2,5	
13.12.01	1 591,0	POLYMER	1,39	73	23	45	7	18	2,5	9,2	68 000	1	2,24	10	
13.12.01	1 323,0	POLYMER	1,39	69	16	23	6	9	2,9	9,4	68 000	0,75	13,21	5	
14.12.01	1 910,0	POLYMER	1,43	74	27	35	8	10	2,4	8,8	0	1,2	36,39	10	
14.12.01	1 762,0	POLYMER	1,4	71	26	38	7	8	2,3	9	0	1,3	25,27	10	
14.12.01	1 591,0	POLYMER	1,39	76	24	38	7	17	2,8	9,3	64 000	8	62,58	10	
14.12.01	2 013,0	POLYMER	1,44	72	26	38	9	16	2,8	9,2	0	1,1	22,11	10	
15.12.01	2 106,0	POLYMER	1,5	82	33	49	10	29	2,6	8,7	64 000	1	27,49	15	
15.12.01	2 106,0	POLYMER	1,5	78	26	36	10	13	2,7	80,9	69 000	0,5	18,9	10	
15.12.01	2 106,0	POLYMER	1,5	78	25	39	9	13	2,7	8,9	66 000	1	25,87	10	
16.12.01	2 106,0	POLYMER	1,5	78	26	35	9	13	2,7	8,7	66 000	75	26	13	
16.12.01	2 106,0	OILBASE	1,58	0	35	20	90	15	0	0	0	0	113	0	
17.12.01	2 106,0	POLYMER	1,5	78	26	38	9	12	2,7	86	66 000	0,75	27,02	13	
18.12.01	2 106,0	POLYMER	1,5	78	25	37	9	13	2,8	8,6	66 000	0,75	25,87	13,1	

	SKARV 4 – 6507/5-5 COMPLETION REPORT		Page: 170 of 202
Chapter: 7	DRILLING DATA	Date: 03/05/02	Rev: 0

Date	TMD (m)	Mud type	MW (sg)	Visc. (s/qt)	PV (cp)	YP (lb/100ft ²)	Gels 10 Sec. (lb/100ft ²)	Gels 10 Min. (lb/100ft ²)	API WL (cc/30min)	pH	CL- (mg/l)	Sand (%)	LGS (ppb)	MBT (ppb)
19.12.01	2 106,0	OILBASE	1,58	68	28	35	9	15	0	93	197 000	0	95	0
20.12.01	2 106,0	OILBASE	1,58	67	25	19	9	16	0	0	194 000	0,5	39,83	0
20.12.01	2 332,0	OILBASE	0	74	31	19	11	16	0	0	0	0,5	95	0
20.12.01	2 184,0	OILBASE	1,58	76	30	18	11	14	0	0	0	0,75	95,07	0
21.12.01	3 012,0	OILBASE	1,58	72	33	18	12	16	0	0	194 000	0,75	77,54	0
21.12.01	2 840,0	OILBASE	1,58	75	31	19	12	15	0	0	193 000	0,75	253	0
21.12.01	2 680,0	OILBASE	1,58	74	30	20	11	15	0	0	0	0,75	202	0
22.12.01	3 334,0	OILBASE	1,58	67	31	23	12	16	0	0	193 500	0,25	132	0
22.12.01	3 239,0	OILBASE	1,58	68	33	20	12	15	0	0	195 000	0,25	132	0
22.12.01	3 087,0	OILBASE	1,58	71	32	20	12	16	0	0	192 000	0,5	132	0
23.12.01	3 469,0	OILBASE	1,58	65	34	15	12	15	0	0	0	0,5	147	0
23.12.01	3 400,0	OILBASE	1,58	69	30	19	10	15	0	0	185 000	0,25	93,79	0
23.12.01	3 540,0	OILBASE	1,58	68	33	16	12	15	0	0	0	0,5	148	0
24.12.01	3 643,0	OILBASE	1,58	68	31	20	12	15	0	0	193 000	0,5	93,79	0
24.12.01	3 600,0	OILBASE	1,58	67	32	19	12	15	0	0	193 000	0,75	93,79	0
25.12.01	3 643,0	OILBASE	1,58	71	28	25	11	15	0	0	193 000	0,5	93,79	0
25.12.01	3 643,0	OILBASE	1,58	58	29	24	11	15	0	0	193 000	0,5	93,79	0
26.12.01	3 643,0	OILBASE	1,58	77	28	25	11	15	0	0	193 000	0,5	136,13	0
27.12.01	3 643,0	OILBASE	1,58	83	28	25	11	16	0	0	193 000	0,5	160,44	0
28.12.01	3 643,0	OBM	1,58	84	28	25	10	16	0	0	45 000	0,5	180,82	0
29.12.01	3 643,0	OBM	1,58	84	28	25	10	16	0	0	45 000	0,5	180,82	0
30.12.01	3 643,0	OBM	1,58	83	28	25	11	19	0	0	42 000	0,5	219,96	0
31.12.01	3 643,0	OBM	1,58	83	28	25	11	19	0	0	42 000	0,5	219,96	0
01.01.02	3 643,0	OBM	1,58	86	28	25	11	18	0	0	44 000	0,5	147,71	0
02.01.02	3 643,0	OBM	1,58	60	28	25	4	5	3,6	11,8	68 000	0,1	39,48	0
03.01.02	3 643,0	KCL	1,2	62	19	13	5	9	3,5	11,3	68 000	0,2	39,48	0
04.01.02	3 643,0	KCL	1,2	62	19	13	5	9	3,5	10,8	67 000	0,1	25,81	0
05.01.02	3 643,0	KCL	1,2	58	15	12	5	9	2,7	11,9	64 000	0,1	49,74	0,5
06.01.02	3 643,0	KCL	1,2	60	16	12	5	9	2,6	11,8	63 000	0,1	52,27	0,5
07.01.02	3 643,0	KCL	1,2	60	15	13	5	9	2,6	11,8	63 000	0,1	52,27	0,5
08.01.02	3 643,0	KCL	1,2	60	15	13	5	9	2,6	11,8	63 000	0,1	52,27	0,5
09.01.02	3 643,0	KCL	1,2	60	15	13	5	9	2,6	11,8	63 000	0,1	52,27	0,5
09.01.02	3 643,0	KCL	1,2	60	15	13	5	9	2,6	11,8	63 000	0,1	52,27	0,5
10.01.02	3 643,0	KCL	1,2	60	14	14	5	9	2,6	11,8	63 000	0,1	52,27	0,5
11.01.02	3 643,0	KCL	1,2	60	15	13	5	9	2,6	11,8	63 000	0,1	52,27	0,5
12.01.02	3 643,0	KCL	1,2	58	15	13	5	9	2,6	11,8	63 000	0,1	52,27	0,5
13.01.02	3 643,0	BRINE	1,2	0	0	0	0	0	0	0	63 000	0	0	0
14.01.02	3 643,0	BRINE	1,2	0	0	0	0	0	0	0	63 000	0	0	0
15.01.02	3 643,0	BRINE	1,2	34	4	2	0	0	0	9,5	0	0	0	0
16.01.02	3 643,0	BRINE	1,2	34	4	2	0	0	0	9,5	0	0	74,57	0
17.01.02	3 643,0	BRINE	1,5	34	4	2	0	0	0	9,5	0	0	74,57	0
18.01.02	3 643,0	BRINE	1,5	34	4	2	0	0	0	9,5	0	0	74,57	0
19.01.02	3 643,0	BRINE	1,5	34	4	2	0	0	0	9,5	0	0	74,57	0
20.01.02	3 643,0	BRINE	1,5	34	4	2	0	0	0	9,5	0	0	74,57	0
21.01.02	3 643,0	BRINE	1,5	34	4	2	0	0	0	9,5	0	0	74,57	0
22.01.02	3 643,0	BRINE	1,5	34	4	2	0	0	0	9,5	0	0	74,57	0
23.01.02	3 643,0	BRINE	1,2	34	4	2	0	0	0	9,5	0	0	74,57	0
24.01.02	3 643,0	BRINE	1,2	34	4	2	0	0	0	9,5	0	0	74,57	0
25.01.02	3 643,0	BRINE	1,2	34	4	2	0	0	0	9,5	0	0	74,57	0
26.01.02	3 643,0	BRINE	1,2	34	4	2	0	0	0	9,5	0	0	74,57	0

[illegible]

	SKARV 4 – 6507/5-5		COMPLETION REPORT	Page: 172 of 202
Chapter: 7	DRILLING DATA		Date: 03/05/02	Rev: 0

7.5 Directional Surveys

BP AMOCO Deviation Summary Report												
Legal well name:		6507/5-5		Start:		20.11.2001		TMD:		3950 (m)		
Common well name:		SKARV 4		Spud date:		28.11.2001		TVD:		3948 (m)		
Event name:		Original drilling		Rig release:		14.02.2002		Calculation method: Minimum curvature				
Contractor name:		SMEDVIG										
Rig name:		WEST ALPHA										
S/T #	TMD (m)	Angle (deg)	Azimuth (deg)	C	Tie in	Miss run	TVD (m)	N/-S (m)	E/-W (m)	Section (m)	DLS (deg/30m)	BUR (deg/30m)
OH	393,00	0	0 N	Y	N		393,00	0,00	0,00	0,00	0,00	0,00
OH	415,00	2	0 N	Y	N		415,00	0,00	0,00	0,00	0,00	0,00
OH	415,00	2	0 N	Y	N		415,00	0,00	0,00	0,00	0,00	0,00
OH	443,00	1,75	0 N	Y	N		445,00	0,00	0,00	0,00	0,00	0,00
OH	445,00	1	0 N	Y	N		445,00	0,00	0,00	0,00	0,00	0,00
OH	454,00	1,25	0 N	Y	N		454,00	0,00	0,00	0,00	0,00	0,00
OH	462,00	1	0 N	Y	N		462,00	0,00	0,00	0,00	0,00	0,00
OH	468,00	1	0 N	Y	N		468,00	0,00	0,00	0,00	0,00	0,00
OH	480,00	0,8	59,7 Y	N	N		480,00	0,31	0,52	0,31	0,28	0,28
OH	507,00	0,8	56,6 Y	N	N		506,99	0,51	0,84	0,51	0,05	0,00
OH	536,00	0,8	56,6 Y	N	N		535,99	0,73	1,18	0,73	0,00	0,00
OH	564,00	0,8	60,2 Y	N	N		563,99	0,93	1,52	0,93	0,05	0,00
OH	594,00	1	57,4 Y	N	N		593,99	1,18	1,92	1,18	0,21	0,20
OH	622,00	0,9	61,7 Y	N	N		621,98	1,41	2,32	1,41	0,13	-0,11
OH	650,00	0,7	48,4 Y	N	N		649,98	1,63	2,64	1,63	0,30	-0,22
OH	679,00	1	6,2 Y	N	N		678,98	2,00	2,80	2,00	0,71	0,32
OH	707,00	1,5	7,7 Y	N	N		706,97	2,61	2,87	2,61	0,55	0,54
OH	736,00	0,8	7,9 Y	N	N		735,96	3,18	2,95	3,18	0,74	-0,74
OH	765,00	0,9	12,5 Y	N	N		764,96	3,61	3,03	3,61	0,13	0,11
OH	794,00	1,3	12,3 Y	N	N		793,95	4,15	3,15	4,15	0,42	0,42
OH	823,00	1,4	4,5 Y	N	N		822,95	4,82	3,25	4,82	0,22	0,11
OH	851,00	1,3	0,9 Y	N	N		850,94	5,48	3,28	5,48	0,14	-0,11
OH	880,00	1,4	346,5 Y	N	N		879,93	6,16	3,20	6,16	0,37	0,11
OH	909,00	1,7	350,8 Y	N	N		908,92	6,93	3,05	6,93	0,34	0,32
OH	937,00	2	351 Y	N	N		936,91	7,82	2,91	7,82	0,33	0,33
OH	965,00	1,7	353,8 Y	N	N		964,89	8,71	2,79	8,71	0,34	-0,33
OH	995,00	2,1	347,8 Y	N	N		994,87	9,69	2,62	9,69	0,45	0,41
OH	1 023,00	2,2	350,6 Y	N	N		1 022,85	10,73	2,43	10,73	0,16	0,11
OH	1 052,00	2,5	352,2 Y	N	N		1 051,83	11,90	2,25	11,90	0,32	0,32
OH	1 091,00	0,9	342,7 Y	N	N		1 090,81	13,04	2,04	13,04	1,27	-1,25
OH	1 120,00	0,8	338,2 Y	N	N		1 119,81	13,44	1,90	13,44	0,13	-0,11
OH	1 148,00	0,5	1,1 Y	N	N		1 147,81	13,75	1,83	13,75	0,43	-0,33
OH	1 178,00	1	352,8 Y	N	N		1 177,80	14,14	1,80	14,14	0,52	0,51
OH	1 207,00	0,4	317,6 Y	N	N		1 206,80	14,46	1,70	14,46	0,75	-0,63
OH	1 235,00	0,7	347,1 Y	N	N		1 234,80	14,70	1,59	14,70	0,44	0,33
OH	1 264,00	0,4	336,1 Y	N	N		1 263,80	14,97	1,51	14,97	0,33	-0,32
OH	1 292,00	0,5	317,3 Y	N	N		1 291,80	15,15	1,39	15,15	0,19	0,11
OH	1 321,00	0,7	308,3 Y	N	N		1 320,80	15,35	1,17	15,35	0,23	0,21
OH	1 349,00	0,5	315,7 Y	N	N		1 348,80	15,54	0,95	15,54	0,23	-0,22
OH	1 378,00	0,5	298,1 Y	N	N		1 377,79	15,69	0,75	15,69	0,16	0,00
OH	1 406,00	0,5	301,9 Y	N	N		1 405,79	15,81	0,54	15,81	0,04	0,00
OH	1 435,00	0,2	286,5 Y	N	N		1 434,79	15,89	0,38	15,89	0,33	-0,32

	SKARV 4 – 6507/5-5 COMPLETION REPORT		Page: 173 of 202
Chapter: 7	DRILLING DATA	Date: 03/05/02	Rev: 0

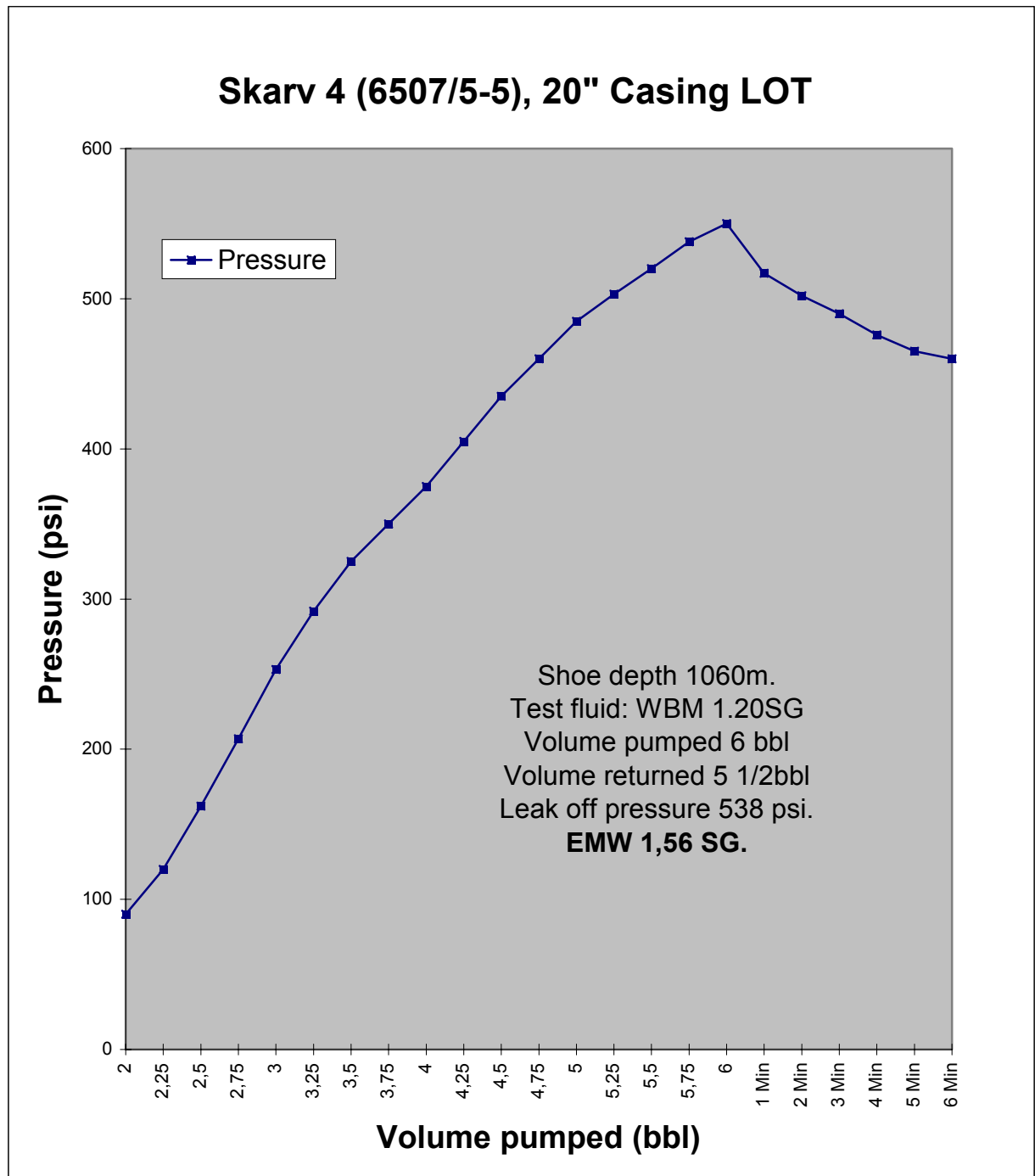
S/T #	TMD (m)	Angle (deg)	Azimuth (deg)	C	Tie in	Miss run	TVD (m)	N/-S (m)	E/-W (m)	Section (m)	DLS (deg/30m)	BUR (deg/30m)
OH	1 464,00	0,3	273	Y	N	N	1 463,79	15,91	0,26	15,91	0,12	0,11
OH	1 492,00	0,5	282,2	Y	N	N	1 491,79	15,94	0,06	15,94	0,23	0,22
OH	1 520,00	0,4	290,8	Y	N	N	1 519,79	16,00	-0,15	16,00	0,13	-0,11
OH	1 549,00	0,4	312,1	Y	N	N	1 548,79	16,11	-0,32	16,11	0,16	0,00
OH	1 577,00	0,4	327,5	Y	N	N	1 576,79	16,26	-0,44	16,26	0,12	0,00
OH	1 606,00	0,2	17	Y	N	N	1 605,79	16,39	-0,48	16,39	0,33	-0,21
OH	1 635,00	0,1	5,9	Y	N	N	1 634,79	16,46	-0,47	16,46	0,11	-0,11
OH	1 663,00	0	110,7	Y	N	N	1 662,79	16,49	-0,46	16,49	0,11	-0,11
OH	1 691,00	0,3	21,1	Y	N	N	1 690,79	16,56	-0,44	16,56	0,33	0,33
OH	1 718,00	0,2	42,8	Y	N	N	1 717,79	16,66	-0,38	16,66	0,15	-0,11
OH	1 748,00	0,1	47,8	Y	N	N	1 747,79	16,71	-0,32	16,71	0,10	-0,10
OH	1 777,00	0,2	241,7	Y	N	N	1 776,79	16,70	-0,35	16,70	0,31	0,11
OH	1 806,00	0,3	276,5	Y	N	N	1 805,79	16,69	-0,47	16,69	0,19	0,11
OH	1 835,00	0,4	342,8	Y	N	N	1 834,79	16,79	-0,57	16,79	0,41	0,11
OH	1 863,00	0,5	39,9	Y	N	N	1 862,79	16,98	-0,53	16,98	0,48	0,11
OH	1 891,00	0,3	16,3	Y	N	N	1 890,79	17,15	-0,43	17,15	0,28	-0,22
OH	1 920,00	0,9	316	Y	N	N	1 919,78	17,38	-0,56	17,38	0,84	0,63
OH	1 949,00	0,8	347,4	Y	N	N	1 948,78	17,74	-0,77	17,74	0,49	-0,11
OH	1 978,00	0,8	11,2	Y	N	N	1 977,78	18,14	-0,77	18,14	0,35	0,00
OH	2 006,00	1,3	25,8	Y	N	N	2 005,77	18,62	-0,59	18,62	0,61	0,54
OH	2 035,00	1,1	24,6	Y	N	N	2 034,77	19,17	-0,34	19,17	0,21	-0,21
OH	2 064,00	0,7	21,2	Y	N	N	2 063,76	19,59	-0,16	19,59	0,42	-0,42
OH	2 093,00	0,7	21,2	Y	N	N	2 092,76	19,92	-0,03	19,92	0,00	0,00
OH	2 118,00	0,6	275,7	Y	N	N	2 117,76	20,07	-0,10	20,07	1,26	-0,12
OH	2 175,00	0,7	276,8	Y	N	N	2 174,76	20,14	-0,75	20,14	0,05	0,05
OH	2 232,00	0,5	274	Y	N	N	2 231,75	20,20	-1,34	20,20	0,11	-0,11
OH	2 290,00	0,6	269,5	Y	N	N	2 289,75	20,22	-1,90	20,22	0,06	0,05
OH	2 347,00	0,3	288,3	Y	N	N	2 346,75	20,26	-2,34	20,26	0,18	-0,16
OH	2 403,00	0,3	268,7	Y	N	N	2 402,75	20,30	-2,62	20,30	0,06	0,00
OH	2 460,00	0,5	276,8	Y	N	N	2 459,75	20,33	-3,02	20,33	0,11	0,11
OH	2 518,00	0,5	309	Y	N	N	2 517,75	20,52	-3,47	20,52	0,15	0,00
OH	2 575,00	0,7	317,2	Y	N	N	2 574,74	20,93	-3,89	20,93	0,12	0,11
OH	2 632,00	0,6	275	Y	N	N	2 631,74	21,21	-4,43	21,21	0,26	-0,05
OH	2 689,00	0,7	279,7	Y	N	N	2 688,74	21,30	-5,07	21,30	0,06	0,05
OH	2 746,00	0,7	280	Y	N	N	2 745,73	21,42	-5,76	21,42	0,00	0,00
OH	2 803,00	0,8	284,9	Y	N	N	2 802,73	21,58	-6,48	21,58	0,06	0,05
OH	2 860,00	0,8	284,5	Y	N	N	2 859,72	21,78	-7,25	21,78	0,00	0,00
OH	2 918,00	0,9	293,7	Y	N	N	2 917,71	22,06	-8,06	22,06	0,09	0,05
OH	2 975,00	0,8	302,9	Y	N	N	2 974,71	22,46	-8,81	22,46	0,09	-0,05
OH	3 032,00	1	291,2	Y	N	N	3 031,70	22,86	-9,60	22,86	0,14	0,11
OH	3 089,00	1	302,6	Y	N	N	3 088,69	23,30	-10,49	23,30	0,11	0,00
OH	3 148,00	0,9	311,4	Y	N	N	3 147,68	23,89	-11,27	23,89	0,09	-0,05
OH	3 203,00	1,2	319,2	Y	N	N	3 202,67	24,61	-11,97	24,61	0,18	0,17
OH	3 261,00	1,1	339	Y	N	N	3 260,66	25,59	-12,56	25,59	0,21	-0,05
OH	3 318,00	1,3	333,1	Y	N	N	3 317,65	26,68	-13,05	26,68	0,13	0,11
OH	3 376,00	1,3	329,9	Y	N	N	3 375,64	27,83	-13,68	27,83	0,04	0,00
OH	3 432,00	1,7	320,5	Y	N	N	3 431,62	29,02	-14,53	29,02	0,25	0,22
OH	3 490,00	2,5	325	Y	N	N	3 489,58	30,72	-15,80	30,72	0,43	0,42
OH	3 519,00	2,5	325,1	Y	N	N	3 518,55	31,76	-16,52	31,76	0,00	0,00
OH	3 548,00	3,2	331,4	Y	N	N	3 547,51	32,99	-17,27	32,99	0,80	0,74
OH	3 577,00	3,5	337,8	Y	N	N	3 576,46	34,52	-18,00	34,52	0,50	0,32
OH	3 605,00	3,8	339,6	Y	N	N	3 604,41	36,18	-18,64	36,18	0,35	0,33
OH	3 624,00	4,1	340,9	Y	N	N	3 623,36	37,41	-19,08	37,41	0,50	0,48
OH	3 664,00	4,5	337,7	Y	N	N	3 663,25	40,22	-20,15	40,22	0,36	0,30
OH	3 692,00	4,4	336,5	Y	N	N	3 691,17	42,22	-20,99	42,22	0,15	-0,11
OH	3 721,00	4,6	339,1	Y	N	N	3 720,08	44,32	-21,85	44,32	0,30	0,21
OH	3 750,00	5,1	339	Y	N	N	3 748,97	46,61	-22,73	46,61	0,53	0,53
OH	3 776,00	5	340,1	Y	N	N	3 774,87	48,76	-23,53	48,76	0,16	-0,12
OH	3 805,00	5,2	340,2	Y	N	N	3 803,76	51,18	-24,40	51,18	0,21	0,21

	SKARV 4 – 6507/5-5 COMPLETION REPORT		Page: 174 of 202
Chapter: 7	DRILLING DATA	Date: 03/05/02	Rev: 0

S/T #	TMD (m)	Angle (deg)	Azimuth (deg)	C	Tie in	Miss run	TVD (m)	N/-S (m)	E/-W (m)	Section (m)	DLS (deg/30m)	BUR (deg/30m)
OH	3 833,00	5,6	339,6	Y	N	N	3 831,63	53,66	-25,31	53,66	0,44	0,44
OH	3 862,00	5,8	339,1	Y	N	N	3 860,49	56,35	-26,33	56,35	0,22	0,21
OH	3 891,00	5,8	341,1	Y	N	N	3 889,34	59,11	-27,32	59,11	0,21	0,00
OH	3 919,00	6,3	339,7	Y	N	N	3 917,18	61,89	-28,31	61,89	0,57	0,54
OH	3 939,00	6,6	340,8	Y	N	N	3 937,06	64,00	-29,07	64,00	0,49	0,46

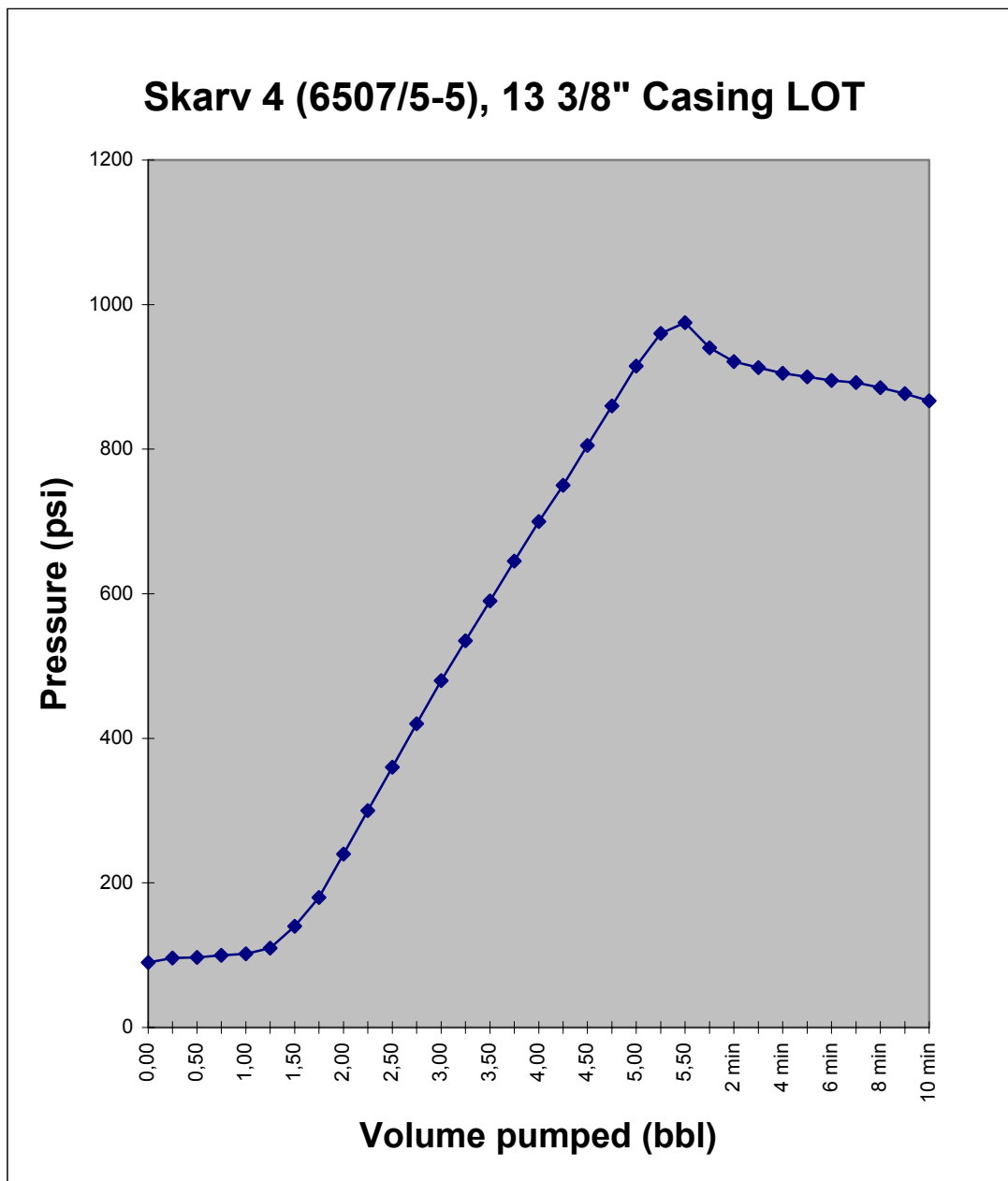
	SKARV 4 – 6507/5-5 COMPLETION REPORT		Page: 175 of 202
Chapter: 7	DRILLING DATA	Date: 03/05/02	Rev: 0

7.6 LOT/FIT Data



Volume pumped	2	2,5	3	3,5	4	4,5	5	5,5	6	1 min	2 min	4 min	6 min
Pressure (psi)	90	120	253	325	375	435	485	520	550	517	502	476	460

	SKARV 4 – 6507/5-5 COMPLETION REPORT		Page: 176 of 202
Chapter: 7	DRILLING DATA	Date: 03/05/02	Rev: 0



LOT Pressure was 960 psi.
 13 3/8" csg depth 2100m (6890 ft)
 Test Fluid was mud with Density 1.58 SG
Equivalent Mud Wt is 1.90 SG.

Volume (bbls)	1,5	2	2,5	3	3,5	4	4,5	5	5,5	1 min	3 min	6 min	10 min
Pressure (psi)	140	240	360	480	590	700	805	915	975	940	913	895	867

	SKARV 4 – 6507/5-5 COMPLETION REPORT	Page: 177 of 202
Chapter: 8	FORMATION EVALUATION	Date: 03/05/02 Rev: 0

8 FORMATION EVALUATION

8.1 Pore Pressure and Fracture Gradient

INTRODUCTION

A pore pressure evaluation of the previous Skarv wells was the base for the porepressure prognosis prepared by Knowledge System Inc./Eamonn Doyl before spud of the 6507/5-5 well. DxC Exponent, realtime LWD, formation gases and hole conditions were reviewed to provide information on formation pressure variations while drilling. Post well analysis has been carried out using wireline logs, drilling data, gas data and information acquired from pressure tests using MDT to refine the pore pressure estimation in 6507/5-5.

SUMMARY OF WORK PROCESSES

Data analysis for Pore Pressure:

Because there was no MDT values in the 12 ¼” section there was no option to calibrate the semi-quantitative indications from Corrected Drilling Exponent (Dxc)(calculated offshore while drilling), Sonic and Resistivity data. All available data was gathered to give a most complete picture of the actual pore pressure versus estimated pore pressure. Bp software Presgraf was used to calculate the final values.

Drilling exponent:

No MDT values was available in the 12 ¼” section and no option to correct the pore pressure calculated from Dxc for the 6507/5-5 well. The trend shows a fairly good match with the prognoses but the values for the pore pressure is lower than prognosed and equivalents from sonic and resistivity.

Sonic:

In the 6507/5-5 well sonic data was available from 12 ¼” casing shoe to 8 ½” TD (2100 to 3950m BRT). A pore pressure dataset, ‘55data D45’, was created from the ‘DT shale’. Because no MDT values was available in the 12 ¼” section there was no option to correct the values calculated from the sonic values.

Resistivity:

The pore pressure curve has been calculated from the shale resistivity dataset for the 6507/5-5 well. Resistivity values were used over intervals where sonic data was not available. No MDT values was available to correct the values calculated from resistivity.

Gas:

All reported gas peak values were extracted from the daily geological reports and included in the project, together with total gas and chromatograph data. No confirmed CG peaks were reported.

	SKARV 4 – 6507/5-5 COMPLETION REPORT	Page: 178 of 202
Chapter: 8	FORMATION EVALUATION	Date: 03/05/02 Rev: 0

Caliper and Hole Condition:

The wellbore is in gauge through almost all of the intervals covered by the caliper logs, except for a small interval with maximum hole gauge of about 13" in the 12.25" hole section at around 3300m.

Instances of tight hole, drag and fill on bottom during trips and/or connections were gathered from reports and logs.

8.1.1 Overburden Gradient

An OBG curve had been created previously for the Dønna Terrace and used in the PP prognosis for the 6507/5-5 wells. This Dønna Terrace average OBG compares well with the OBG calculated from Presgraf used for this PP evaluation.

8.1.2 Pore Pressure

Pore pressure indicators are not calibrated due to no direct measurements measurement in the interval.

Main features of the final pore pressure profile are:

Normal hydrostatic pressure from seabed to approximately 1550mTVD BRT

Steady increase in PP from 1550m to 1.45sg at 2150m, within the Shetland group.

Calculated pressure of approximately 1.33sg in the upper part of the Cromer Knoll group in the 6507/5-5 well represents the likely minimum pore pressure of the Cretaceous.

Pressure increase from 1.33sg at approximately 2850m to a maximum of 1.51g at 3350m at the base of the Cretaceous.

Pressure drops from the top of Upper Jurassic Viking group. Experience puts the main decrease in the lower part of the Viking but the sonic log indicates that the drop starts right at top of the Viking Group and continues throughout the Viking.

Maximum measured pressure in the Fangst Group was 1.083sg at 3754.0m RKB.

8.1.3 Fracture Gradient

The final fracture gradient curve was calculated using the Presgraf (Eaton/Penebaker).

The graph shows a fairly good match with the prognosed curve, although the LOT at 2109m BRT is 1.9SG EMW.

This FG indicates minimum formation strengths of 1.57SG in the Kai Formation, 1.74GSG in the top of the Brygge Formation, and 1.91sg in the basal Cretaceous. All match fairly well with prognosed even though the calculations above 12 1/4" are based on resistivity only (above 1450m BRT calculations are non conclusive).

8.1.4 Conclusions

The well OBG is very similar to the average OBG for the Dønna Terrace.

The pore pressure prognosed for the well before drilling is generally slightly higher than the final calculated pressure profile, although the prognosed curve itself match all the pressure events very well.

Increased gas readings in Kai Formation are not believed to be a function of mismatch between MW and PP but an effect of gas created by cuttings. Same effect was seen in

	SKARV 4 – 6507/5-5 COMPLETION REPORT		Page: 179 of 202
Chapter: 8	FORMATION EVALUATION	Date: 03/05/02	Rev: 0

6507/5-4 but lower gas values, caused by different way of measuring the gas (equipment related).

Pore pressure calculated from surface pressures detected when the well was shut in because of the casing leakage; match fairly well the pore pressure calculated for the formation (Lange sands) who caused the inflow.

	SKARV 4 – 6507/5-5 COMPLETION REPORT	Page: 180 of 202
Chapter: 8	FORMATION EVALUATION	Date: 03/05/02 Rev: 0

8.2 MDT pressure test data

8 ½” Hole Section

Run	Test	Depth mMDB RT	Depth mTVDS S	Mud Hydrostatic (psia)		Formation Pressure (psia)	Comment
				Before	After		
2A	1	3712.0	3693.1.1	6370.0	6367.7	-	Pressure drop
“	2	3712.0	3693.1.1	6370.0	6367.7	-	Tight
“	3	3742.0	3723.0	6419.1	6418.9	-	Dry test
“	4	3750.0	3731.0	6434.9	6435.1	5745.4	Good Test
“	5	3754.0	3735.0	6441.8	6441.5	5835.3	Tight
“	6	3761.0	3741.9	6454.2	6454.0	5732.7	Good Test
“	7	3764.0	3744.9	6458.6	6460.3	-	Supercharged
“	8	3770.0	3750.9	6469.8	6471.2	-	Tight
“	9	3833.0	3813.6	6577.2	6577.6	5792.7	Tight
	10	3837.0	387.6	-	6586.6	5815.0	
“	11	3849.0	3829.6	6604.8	6404.8	-	Supercharged
“	12	3865.0	3845.5	6634.1	6629.7	5863.4	Tight?
“	13	3878.0	3858.4	6656.2	6654.6	5856.7	Tight?
“	14	3889.0	3869.4	6672.6	6675.0	5947.2	Tight?
“	15	3649.5	3630.8	6263.9	6262.9	5419.9	Tight-no stabilisation
“	16	3650.0	3631.3	6263.9	6262.9	5420.1	Tight-no stabilisation
2B	1	3653.2	3634.5	-	6328.2	5423.7	Sample
2A	17	3655.0	3636.3	6273.4	6271.7	5424.6	Good(no stabilisation)
“	18	3660.0	3641.3	6279.9	6280.6	-	Lost seal
“	19	3660.5	3641.8	6283.1	6282.9	5429.7	Good Test
“	20	3665.0	3646.2	6290.8	6290.9	5433.8	Good Test
2B	2	3668.0	3649.2	-	6320.0	5436.4	Sample
2A	21	3670	3651.2	6297.5	6298.1	5438.3	Good Test
“	22	3675.0	3656.2	6306.5	6307.2	5442.8	Tight-no stabilisation
“	23	3680.0	3661.2	6314.8	6315.5	5448.1	Tight-no stabilisation
“	24	3685.0	3666.2	6323.9	6324.8	5452.7	Tight-no stabilisation
“	25	3690.0	3671.1	6333.6	6332.3	5456.3	Tight-no stabilisation
“	26	3692.0	3673.1	6335.6	6335.8	5458.5	Tight
“	27	3694.0	3675.1	6338.7	6340.1	-	Tight-no stabilisation

	SKARV 4 – 6507/5-5 COMPLETION REPORT	Page: 181 of 202
Chapter: 8	FORMATION EVALUATION	Date: 03/05/02 Rev: 0

Run	Test	Depth mMDB RT	Depth mTVDS S	Mud Hydrostatic (psia)		Formation Pressure (psia)	Comment
				Before	After		
“	28	3696	3677.1	6343.0	6342.8	5461.9	Good Test
“	29	3696.5	3677.7	-	6339.9	5462.5	Good Test
“	30	3698.0	3697.1	6345.6	6346.2	-	Tight - no seal
“	31	3698.5	3679.6	6345.5	6343.8	5464.8	Good Test
“	32	3700	3681.1	6348.4	6348.3	5466.2	Tight - no seal
“	33	3701.5	3682.6	6350.5	6350.5	-	Tight - lost seal
2B	3	3701.8	3682.9	-	6348.8	5468.9	Unsuccessful sample
2A	34	3702.0	3683.1	6351.0	6351.6	-	Tight - lost seal
“	35	3702.5	3683.6	6351.8	6351.9	5468.8	Good Test
2B	4	3702.5	3683.6	-	6351.1	5473.2	Tight
2A	36	3704.0	3685.1	6355.9	6356.1	5546.5	Tight
“	37	3705.5	3686.6	6357.8	6358.0	-	Tight
“	38	3706.0	3687.1	6358.3	6357.9	-	Dry test
2B	5	3707.2	3688.3	-	6357.2	5579.6	Tight
2A	39	3707.5	3688.6	6360.2	6360.9	-	Dry test
“	40	3707.5	3688.6	6359.8	6361.2	5597.6	Good Test
“	41	3708.0	3689.1	6361.9	6362.9	-	Tight
2B	6	3708.2	3689.3	-	6359.1	5555.8	Tight
2A	42	3708.3	3689.4	6361.3	6360.3	5571.6	Good Test
“	43	3709.5	3690.6	6364.2	6364.4	5613.9	Tight
“	44	3710.0	3691.1	6365.6	6365.6	-	Tight
“	45	3710.2	3691.3	6365.5	6366.0	-	Dry test

8.3 Lithology

Chrono/Lithostratigraphy		Tops			
		Depth	Depth	Depth	Thickness
		mMDBRT	mTVDBRT	mTVDSS	m
Middle Miocene - Recent	Nordland Group				
	Quaternary	393.0	393.0	375.0	472,7
	Naust Fm	865.7	865.6	847.6	527,9
	Kai Fm	1393.6	1393.4	1375.4	495.3
Late Palaeocene – Late Oligocene	Hordaland Group				
	Brygge Fm	1888.9	1888.7	1870.7	132.8



Chrono/Lithostratigraphy		Tops			
		Depth	Depth	Depth	Thickness
		mMDBRT	mTVDBRT	mTVDSS	m
Late Campanian - Late Palaeocene	Rogaland Group				
	Tare Fm	2021.7	2021.5	2003.5	41.2
	Tang Fm	2062.9	2062.7	2044.7	44.3
Coniacian – Late Campanian	Shetland Group				
	Springar Fm	2107.2	2107.0	2089.0	73.9
	Nise Fm	2181.1	2180.9	2162.9	375.0
	Kvitnos Fm	2556.2	2555.9	2537.9	197.7
Coniacian - Late Aptian	Cromer Knoll Group				
	Lysing Fm	2753.9	2753.6	2735.6	2.8
	Lange Fm	2756.7	2756.4	2738.4	570.0
	Lyr Fm.	3326.7	3326.4	3308.4	12.1
Late- middle Kimmeridgian – late/latest early Bajocian	Viking Group				
	Spekk Fm	3338.8	3338.5	3320.5	32.6
	Melke Fm	3371.5	3371.1	3353.1	276.4
Aalenian	Fangst Group				
	Garn Fm	3648.2	3647.5	3629.5	74.6
	Not Fm	3723.0	3722.1	3704.1	18.4
	Ile Fm	3741.5	3740.5	3722.5	31.9
Late/Middle Toarcian – early Plensbachian	Båt Group				
	Ror Fm	3773.4	3772.4	3754.4	57.2
	Tilje Fm	3831.0	3829.6	3811.6	93.6
	Åre Fm	3925.2	3923.2	3905.2	
	TD	3950.0	3948.0	3930.0	

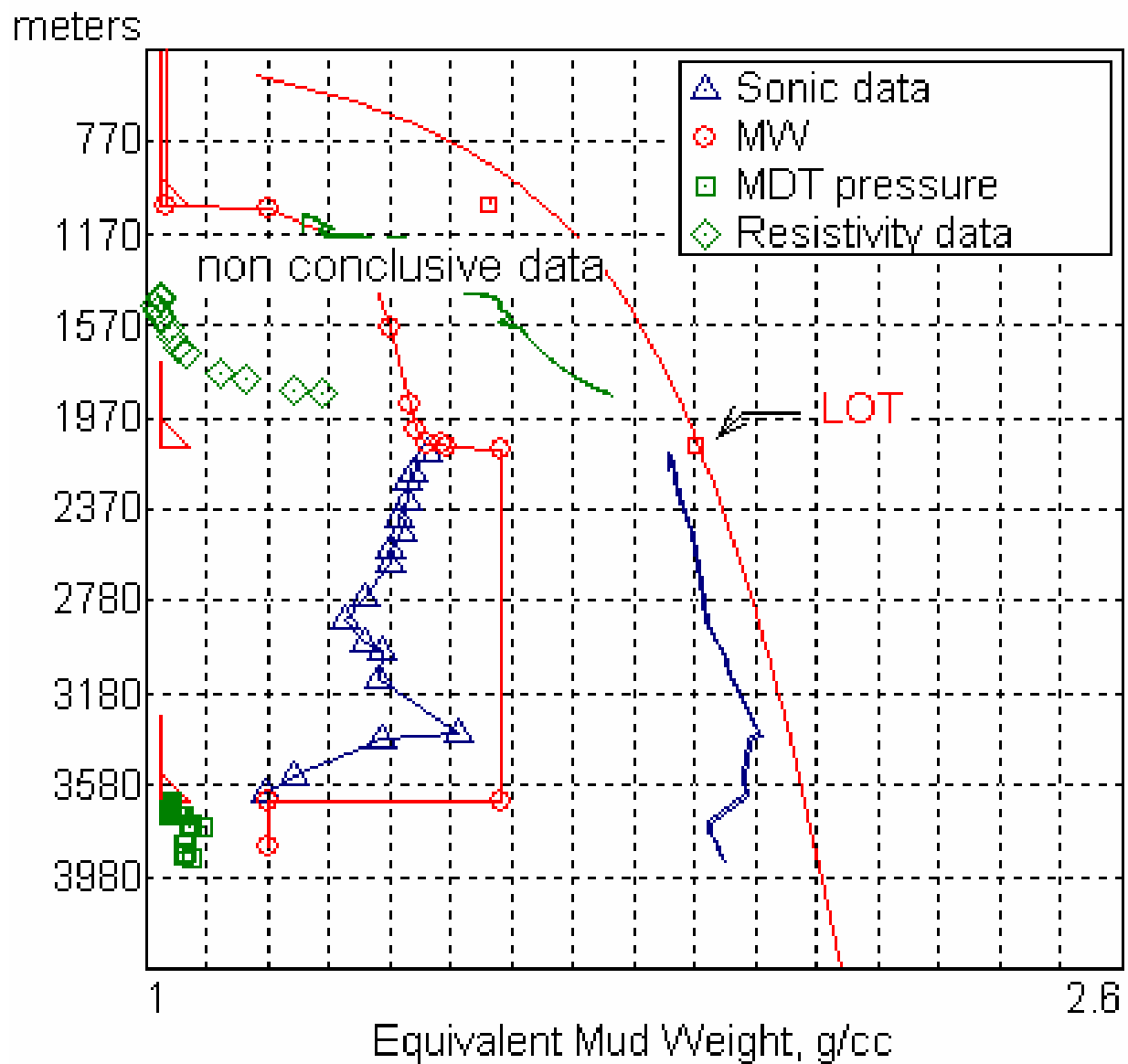
	SKARV 4 – 6507/5-5 COMPLETION REPORT	Page: 183 of 202
Chapter: 8	FORMATION EVALUATION	Date: 03/05/02 Rev: 0

8.4 Marker Horizon

Marker Horizon	Forecast			Actual		
	Depth	Seismic	Error Bar	Depth	Checkshot	Error
	m TVDSS	TWT msec	m	m TVDSS	TWT Msec	m
Sea Bed	375	506	+/- 2	375		-
Nordland Group						
Naust Fm	704	840	+/- 5	847.6		143.6
Kai Fm	1361	1425	+/- 15	1375.4	1425	14.4
Hordaland Group						
Brygge Fm	1794	1856	+/- 20	1870.7	1890	96.0
Rogaland Group						
Tare Fm						
Tang Fm	2024	2061	+/- 20	2044.7	2054	20.7
Shetland Group						
Springar Fm						
Nise Fm						
Kvitnos Fm						
Cromer Knoll Group						
Lysing Fm	2770	2659	+/- 25	2735.6	2633	-34.4
Lange sst	3098	2893	+/- 25			
Viking Group						
Spekk Fm	3332	3054	+/- 30	3320.5	3038	-11.5
Melke Fm	3350					
Fangst Group						
Garn Fm	3694	3284	+/- 30	3629.5	3227	-64.5
Not Fm	3767					
Ile Fm	3801					
Båt Group						
Ror Fm	3828					
Tilje Fm	3891	3378	+/- 35	3811.6	3314	-79.4

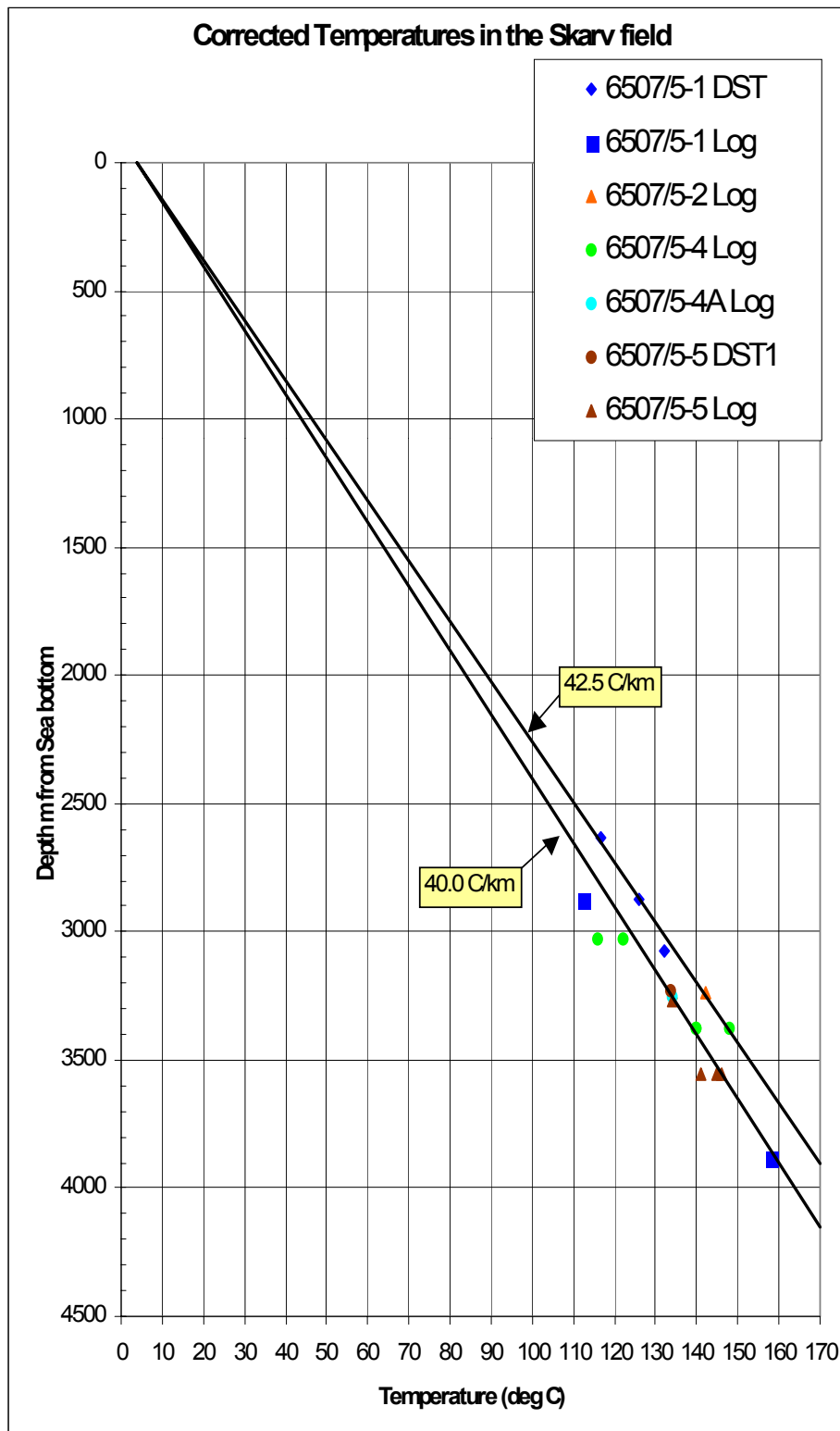
	SKARV 4 – 6507/5-5 COMPLETION REPORT	Page: 184 of 202
Chapter: 8	FORMATION EVALUATION	Date: 03/05/02 Rev: 0

8.5 Formation pressure plot



	SKARV 4 – 6507/5-5 COMPLETION REPORT	Page: 185 of 202
Chapter: 8	FORMATION EVALUATION	Date: 03/05/02 Rev: 0

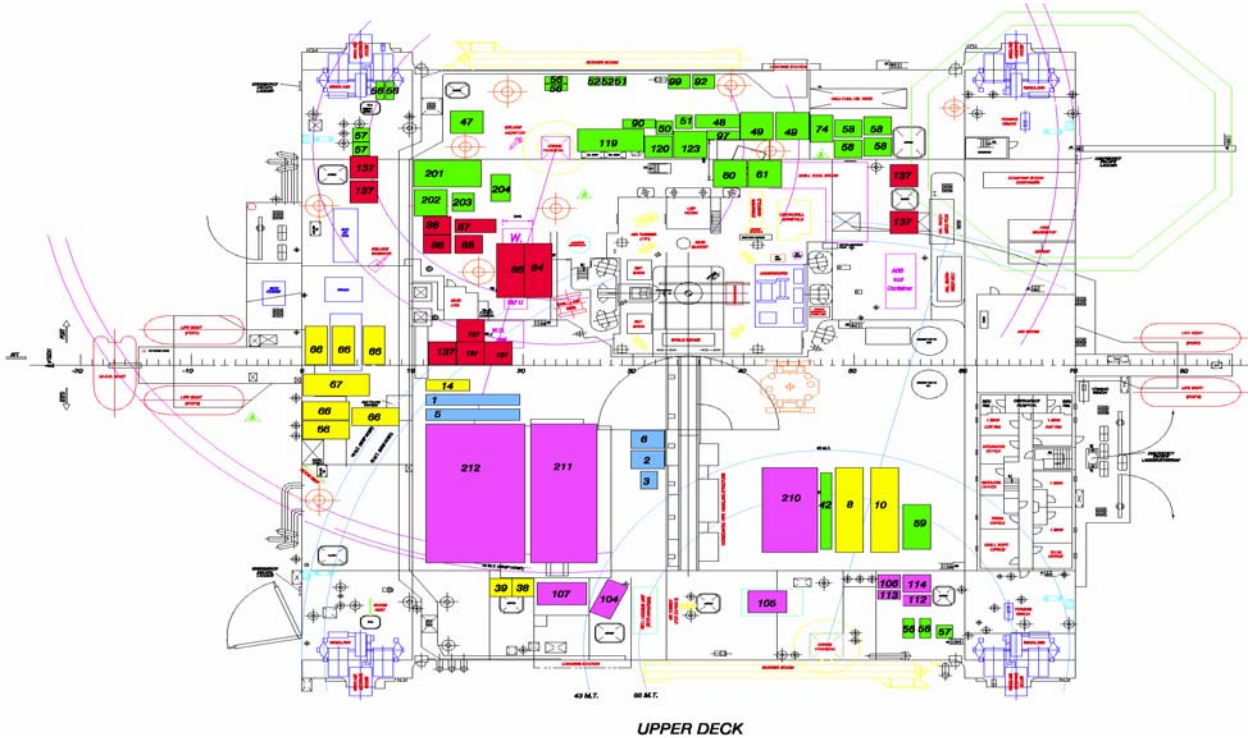
8.6 Temperature plot





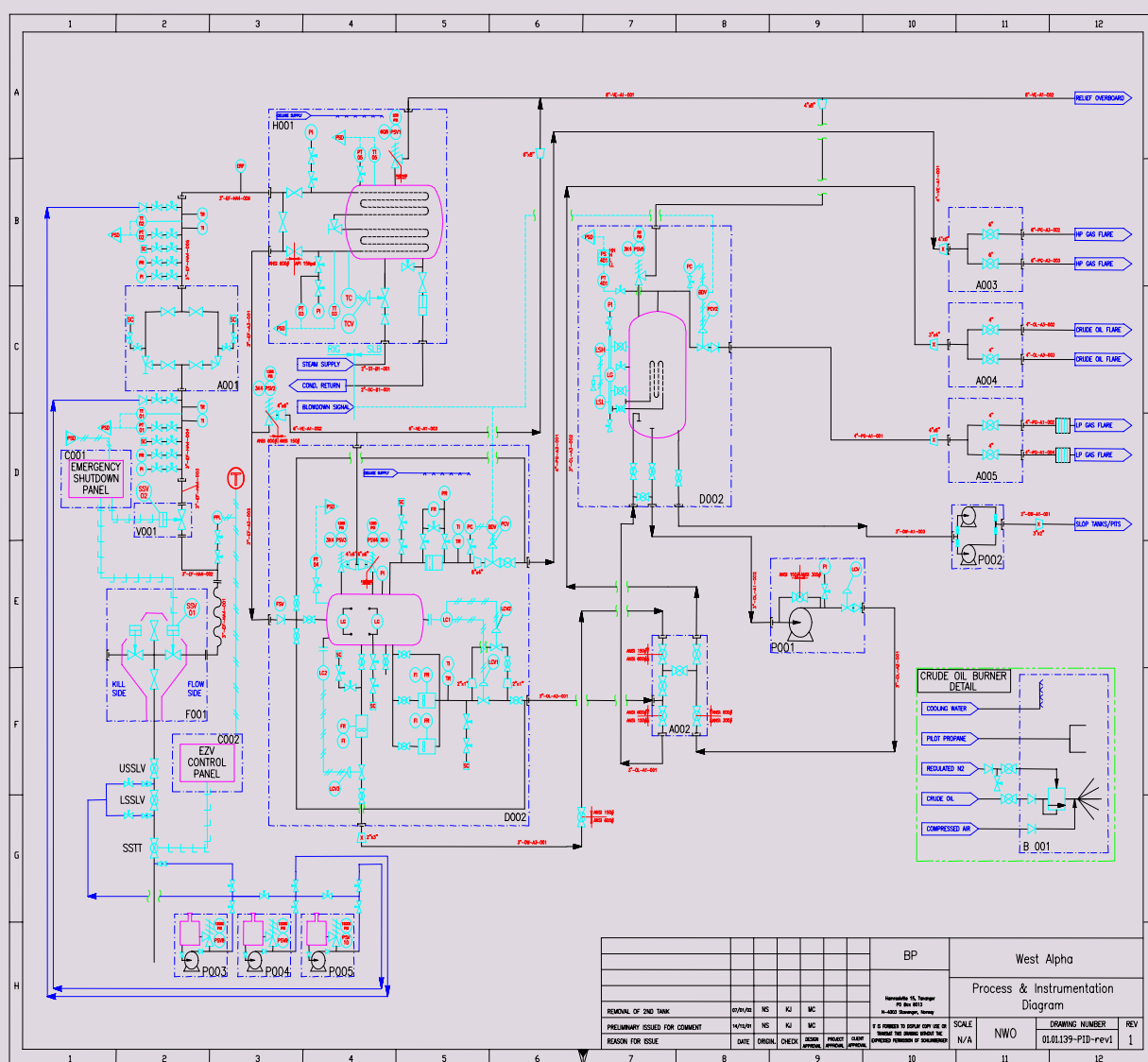
8.7 DST test

8.7.1 Deck Layout



1	P Basket perforating guns	Schl. TCP	74	container for below items	Schm. 3rd p 75	205
2	TCP Workshop container	Schl. TCP	84	Sampling, Gas/Liquid-Bottles	Oilphase	NB., Bays now empty
3	TCP Explosives container	Schl. TCP	86	Sampling lab w/Analytical Equip	Oilphase	
5	Dst Basket containing:	Schl. DST	87	4 m3 tanks for Stock Tank Oil	Oilphase	210
6	Dst Workshop container	Schl. DST	88	Basket w/ IATA Drums	Oilphase	Drill pipe c210 joints
8	4 1/2" PH-4 tubing	Weatherford	90	Skid - Containing :	Metrol	211
10	3 1/2" PH-6 tubing	Weatherford	92	Metrol container:	Metrol	Riser joints non-floatation
14	Basket for item 15 to 36	Weatherford	97	Skid - Containing :	Metrol	
38	Tong w/3 1/2",4 1/2",5" jaws	Weatherford	99	Metrol container:	Metrol	
39	tong,w/3 1/2",4 1/2",5" jaws	Weatherford	104	Wireline K-winch	Smedvig	
40	45 ft x 350 ton Elevator Bails	Weatherford	105	Tool container	Smedvig	
42	Sub Sea Basket containing	Schl. WT	106	Pressure test pump	Smedvig	
47	Workshop	Schl. WT	107	Pressure control:-	Smedvig	
48	Pipework basket	Schl. WT	112	Wireline drum box	Smedvig	
49	Equipment containers	Schl. WT	113	Grease injection skid	Smedvig	
50	ESD Panel for wing valve	Schl. WT	114	Wireline BOP Control unit	Smedvig	
51	Chemical Injection Pump	Schl. WT	119	Data Acquisition/ Lab cabin	Schm. ELS	
52	Chemical Injection Pump	Schl. WT	120	Equipment below items	Schm. ELS	
56	Propane Rack(each)	Schl. WT	121	Sand Detection System	Schm. ELS	
57	Nitrogen Racks(each).	Schl. WT	122	E-ESD System	Schm. ELS	
58	Slop Tanks	Schl. WT	123	Equipment below items	Schm. ELS	
59	Flowhead in basket	Schl. WT	130	Equipment below items	Maersk	
60	Coflexip basket (2 x 3" 10K)	Schl. WT	137	Brine pallets, 8 containers	Baroid	
61	Coflexip basket (2 x 2" 10K)	Schl. WT	201	Separator & Heater		
66	Air Compressors27m3/	Scan Tech	202	Surge Tank		
67	Basket connection hoses (air)	Scan Tech	203	Transfer pump		
72	4 m3 tanks Methanol	Schm. 3rd p	204	Choke Manifold		
73	4 m3 tanks Glycol	Schm. 3rd p				

8.7.2 Surface Equipment



8.7.3 Landing String

Sketch	Description	Top Connection	Bottom Connection	ID (inch)	OD (inch)	Length (m)	Depth (m)	
	Top Sub	6 1/2" Otis Acme Quick Union BOX	5" SA PIN	3.06	5.00	0.90	-11.05	
	10K Flowhead, with manual swab. Hydraulic flow valve and kill valve	5" SA BOX	5" SA BOX	3.06	N/A	0.95	-10.15	
	Swivel	5" SA PIN	5" SA PIN	3.06	N/A	0.86	-9.20	
	Manual Mastervalue	5" SA BOX	6 1/2" SA BOX	3.06	N/A	0.84	-8.34	
	X-Over	6 1/2" SA PIN	4 1/2" PH-4 PIN	3.06	9.50	0.50	-7.50	
	4 1/2" PH-4 Tubing	4 1/2" PH-4 BOX	4 1/2" PH-4 PIN	3.92	5.00	7.00	-7.00	
	RKB DATUM. All lengths below RKB to bottom of tool. All lengths above to top of tool.							0.00
	4 1/2" PH-4 Tubing	4 1/2" PH-4 BOX	4 1/2" PH-4 PIN	3.92	5.00	24.00	24.00	
	X-Over	4 1/2" PH-4 BOX	4 1/2" PH-4 PIN	3.00	5.70	0.30	24.30	
	Upper Lubricator Valve	5" SA BOX	5" SA BOX	3.00	8.25	1.53	25.83	
	X-Over	5" SA PIN	5" SA PIN	3.00	5.00	0.60	26.43	
	Lower Lubricator Valve	5" SA BOX	5" SA BOX	3.00	8.25	1.53	27.96	
	X-Over	5" SA PIN	4 1/2" PH-4 PIN	3.00	5.70	0.50	28.46	
	4 1/2" PH-4 Tubing	5" CS BOX	4 1/2" PH-4 PIN	3.92	5.00	354.33	382.79	
	X-Over	4 1/2" PH-4 BOX	5" SA PIN	3.00	5.70	0.29	383.08	
	UPPER CENTRALISER	5" SA BOX	5" SA BOX	3.00	17.00	0.81	383.89	
	SHEAR SUB	5"SA PIN	N/A	3.00	5.00	1.59	385.48	
	15K Sen-Tree	N/A	5" SA BOX	3.00	16.10	1.34	386.82	
	5 1/2" OD Slick Joint	5" S.A PIN	5" S.A PIN	3.00	5.50	2.16	388.98	
	Adjustable Fluted Hanger to hang off point - HOP	5" SA BOX	5" SA PIN	3.00	6.50	1.16	390.14	
Below HOP to top of x-over	N/A	N/A	3.00	6.50	0.92	391.06		
X-Over	5" SA BOX	3 1/2" PH-6 PIN	3.00	6.50	0.36	391.42		

Note: All tool dimensions will be measured on the rig prior to the tools being run. The Drawing shall then be updated.



8.7.4 DST String

SKARV-4 DST/TCP Packer set (Final)						Schlumberger	
Outer Diam. (in)	Inner Diam. (in)	Length (m)	Depth (Top Tool Jt) (m)	Top connection	Bottom connection	Assembly	Description
4.500	2.548	As req			3 1/2" PH6		Updated: 03-Feb-2002
4.500	2.548	0.48	3400.10	3 1/2" PH6	3 1/2" IF		3.5" 15.8# PH-6 Tubing Weatherford
							X-Over Weatherford
5.000	2.250	8.97	3400.58	3 1/2" IF	3 1/2" IF		Slip Joint Open, 1.58 meter stroke
5.000	2.250	8.88	3409.55	3 1/2" IF	3 1/2" IF		Slip Joint Open, 1.58 meter stroke
5.000	2.250	7.38	3418.43	3 1/2" IF	3 1/2" IF		Slip Joint Closed, 1.58 meter stroke
5.000	2.250	7.37	3425.81	3 1/2" IF	3 1/2" IF		Slip Joint Closed, 1.58 meter stroke
4.500	2.548	0.34	3433.18	3 1/2" IF	3 1/2" PH6		X-Over Weatherford
4.750	2.250	134.48	3433.52	3 1/2" PH6	3 1/2" PH6		4 3/4 Drill Collar, 5 stand Weatherford
5.000	2.250	1.38	3568.00	3 1/2" PH6	3 1/2" PH6		SHRV, Annulus Operated Reversing Valve
5.000	2.250	0.64	3569.38	3 1/2" PH6	3 1/2" PH6		RA- Sub, Radioactive Marker Sub
4.750	2.250	26.81	3570.02	3 1/2" PH6	3 1/2" PH6		4 3/4 Drill Collar, 1 stand Weatherford
5.000	2.250	6.23	3596.83	3 1/2" PH6	3 1/2" PH6		IRDV, Tester Valve and Reversing Valve
5.000	2.250	3.30	3603.06	3 1/2" PH6	3 1/2" PH6		DGA, Gauge Carrier with 4 gauges, sampling point: 3605.53m md
5.500	2.250	2.88	3606.36	3 1/2" PH6	3 1/2" PH6		Metrol Initiator, Sampling point: 2607.52m md
5.000	2.250	1.76	3609.24	3 1/2" PH6	3 1/2" IF		TFTV, Tubing Fill & Tester Valve
5.000	2.250	1.98	3611.00	3 1/2" IF	3 1/2" IF		Hydraulic Jar, closed, 0.28m stroke
5.000	2.250	0.52	3612.98	3 1/2" IF	3 1/2" IF		Safety Joint
5.967	2.250	4.64	3613.50	3 1/2" IF	2 7/8 EUE		7" Retrievable Packer w/ HHD
3.680	2.440	0.64	3618.14	2 7/8 EUE	2 7/8 EUE		2 7/8 Long Slot Debris Sub
4.500	2.548	0.33	3618.78	2 7/8 EUE	3 1/2" IF		X-Over Weatherford
5.000	2.250	3.32	3619.11	3 1/2" IF	3 1/2" IF		DGA, Gauge Carrier with 4 gauges, sampling point: 3621.57m md
5.000	2.250	0.42	3622.42	3 1/2" IF	5" N-VAM		X-Over Metrol
5.400	2.250	16.08	3622.84	5" N-VAM	5" N-VAM		Metrol Carrier with 4 x Oilphase BHS, Sampling point top: 3629.42m md Sampling point bottom: 3624.29m md
4.500	2.250	0.60	3638.92	5" N-VAM	2 7/8 EUE		X-Over Metrol
3.680	2.440	0.53	3639.52	2 7/8 EUE	2 7/8 EUE		2 7/8 Long Slot Debris Sub
3.680	NA/2.44	4.35	3640.05	2 7/8 EUE	2 7/8 EUE		SBS HDF-DA firing heads
3.680	NA/2.44	0.94	3644.40	Mod API	Mod API		SXAR, Automatic Gun Drop
4.500	N/A	2.67	3645.34	Mod API	Mod API		4 1/2" Safety Spacer
4.500	N/A	55.00	3648.00	Mod API	Mod API		4 1/2" TCP Guns w / UJ4505 - 5spf - HMX)
4.500	N/A	0.21	3703.00	Stub Acme	N/A		Bull Nose
Client: BP Well Name: 6507/5-5 SKARV Rig: West Alpha Cpy Rep.: Colin Black						Perf Interval m: 55.00 Length of fish m: 61.32 BHP/ SHIT: 6170psi / 128degC Liner Size : 7" 29#/ft	
						HDF Op Press: 5400psi SHRV Op Press: 4200psi IRDV Rupture disc: 3200psi TFTV Op Press: 900psi	

	SKARV 4 – 6507/5-5 COMPLETION REPORT		Page: 190 of 202
Chapter: 8	FORMATION EVALUATION	Date: 03/05/02	Rev: 0

8.7.5 Test Results Summary

Flow Rate, duration and cumulative production

Flow Period	Duration Hrs	Oil Rate bbls/day (average)	Cumulative Oil flowed bbls	Gas Rate mmcf/d	Cumulative Gas flowed mmcf
Post perforation build up	0.66	0	0	0	0
Clean up flow	7.27	6,000	1,817	5.9	1.78
Initial Build up	11.62	0	1,817	0	1.78
Main Flow	14.07	5880	5,264	5.8	5.18
Main Build up	29.90	0	5,264	0	5.18

	SKARV 4 – 6507/5-5 COMPLETION REPORT		Page: 191 of 202
Chapter: 9	APPENDIX	Date: 03/05/02	Rev: 0

9 APPENDIX

- ☐ Skarv 4 End of Well Review Record
- ☐ Slide Presentation
- ☐ Baroid Mud Summary
- ☐ Smith Bit Summary
- ☐ Nodeco Failure Report
- ☐ Dril-Quip Failure Report

	SKARV 4 – 6507/5-5 COMPLETION REPORT	Page: 192 of 202
Chapter: 9	APPENDIX	Date: 03/05/02 Rev: 0

□ SKARV 4 END OF WELL REVIEW RECORD

Well Name : Skarv 4		PU: Mid Norway	BU: Norway 26/2/02
WELL OBJECTIVES SCORE CARD			
Strategic Objective 1 Identify fluid type in the B segment of the Skarv Structure.		All data necessary to do this was collected	
Strategic Objective 2 Evaluate hydrocarbon potential of cretaceous.		<i>No cretaceous pay was encountered</i>	
Strategic Objective 3 Deliver well objectives with world class operational performance and full compliance with BP NPD regs.		<i>Full compliance with policy and regs. Performance assessed as 2Q in days per 10K</i>	
Strategic Objective 4 Protect reputation of PL212 license.		<i>Reputation was maintained</i>	
Primary Objective 1		Gather the necessary data to evaluate hydrocarbon potential in the full Jurassic section. <i>This was achieved – full data set obtained</i>	
Primary Objective 2		Definition of the fluid type in the Garn formation. <i>This was achieved by MDT and by DST</i>	
Scope Change		The rig demobilisation was not included in the original scope of the well project.	
Overall Well Delivery		<i>Overall describe how the team view the success level for delivery of objectives</i> <i>From a data acquisition criteria – all achieved.</i>	
METRICS SCORE CARD			
\$/Boe – N/A		<i>Description of degree of success vs predetermined criteria or appropriate benchmarks</i>	
Days/10k ft		Planned 33 days per 10K.(P50) Achieved 36. Main problems related to re-spud and well integrity issues with liner running tool..	
Days/Completion – N/A		<i>Description of degree of success vs predetermined criteria or appropriate benchmarks.</i> Liner running and test carried out. Planned 16 days . Actual 24 days. 9 5/8" casing leak after liner ran.	

Chapter:
9

APPENDIX

Date:
03/05/02Rev:
0

DAFWF/Spills	<i>Targetted zero on DAFWF, HIPOs, Spills and dropped objects. Achieved all HSE objectives. Commitment to safe operation from all team.</i>		
AFE	<i>Dry hole AFE 201 mm Nok Actual dry hole cost 272 mm Nok Test AFE 40.6 mm Nok Actual Estimated 39.0 mm Nok Remedial cost of 9 5/8" went against dry hole not test. Leak 9 days , Running tool 2.5 days, WOW 5.5, Respod 4 days. Scope change 4 days (for demob)</i>	 +/- 25%  +/- 10%  +/- 5%	
Overall Metrics			

	SKARV 4 – 6507/5-5 COMPLETION REPORT	Page: 194 of 202
Chapter: 9	APPENDIX	Date: 03/05/02 Rev: 0

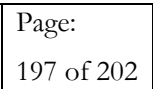
WHAT WENT WELL?- HIGHLIGHTS		
Title	Details	Lesson Learned and Value
Excellent HSE performance	Commitment of whole team to deliver a safe operation. Built a well specific action plan. A known safe rig was used. Rig contractor has a good reputation	Action plan focused attention on the well itself.
OBM usage	Able to use OBM on this well as rig was felt able to handle safely. Previous well did not use a rig which could do this . OBM delivered operational improvement.	Can get real value from using an environmentally sound drilling unit.
Rig operations performance	Excellent performance achieved from rig contractor-limited wasted time.	3 year contract – continuity. Rig superintendent was technical limit coach.
Drilling optimisation	Used 1 bit per section – first time ever. Continuous development with bit manufacturer. Good LWD reliability- ran them according to required parameters	Used bit optimization planning offshore.- involved drillers etc in what was expected. Listened to LWD operators offshore.
Coring	Cut and recovered 81 metre core.	Used experienced core hands and involved drillers.
Well test	Completed safely and within. budget	DST was planned to comprehensive detail with service sector. Planners executed it.
P and A	Cut number of runs from 4 to 2 using combined tools (Drill Quip wellhead tools and cutting tools) Outcome of technical limit sessions. P and A was extensively planned	Time to take on board a technical limit suggestion and carry it through. Don't ignore the P and A section in the overall execution plan.
Planning time	Short planning time offset by using competent and experienced personnel and copy previous proven design	Don't do it unless you have to- it only worked because of having a known rig, known well design , continuous and committed team.
Excellent recovery from unplanned events	Three trips(incidents) that could have become train wrecks but didn't . Process in place to ensure no shooting from the hip. STOP, THINK, REPLAN and look at consequence and risk. Team was maintained from planning throughout execution.	Its OK to stop and replan using the team.
No damage to Corals	Implemented a programme with all aspects of rig	Reputation maintained.
Crew changes during winter	Broeynesund is remote. Had strike and bad weather but still planned around it.	You can plan logistics. Committed to additional flight upfront.



Low WOW	Very stable rig. (West Alpha)	Must consider rig stability for winter ops.
Shared supply boat with Statoil	Saved 150,000 Nok per day	Got good agreement in place and understood.
Skip and ship	Paid premium for high quality skips with guaranteed availability. This was not an issue	Expenditure up front avoided delays and any environmental issue.
Documentation was excellent	Agreed what was to be used and then used it	Commitment from all team and leadership..
WHAT COULD HAVE GONE BETTER?		
Title	Details	Lesson Learned and Value
Dropper 30" conductor	Dropped while hanging off.	Risk of this occurring was not identified.
Surface hole problems led to respud	Hole collapsed after extended period of open hole.No cutting bed seen on sonar on last trip.	Consider more rat hole.
9 5/8" Running liner tool failure	Washout in tool- cement not circulated downhole. Used new tool on semi but didn't know it	QA and risk analysis on new tool implementation. Need to consider contractor performance as Nodeco have had problems in this area.
9 5/8" casing leak	Leak in casing while out of hole- well flowed . Evaluated flow and determined safe to run back in hole. Well had been displaced to low weight from brine. Casing was un-cemented due to running tool failure- exacerbated situation.	Sit down and plan response – could have ended up stripping to bottom with all attendant risk if hadn't planned properly. Still no knowledge as to why casing leak developed. Casing had previously tested with mud .
Did not use TITUS system on respud	Did not have TITUS on back up.	Conscious decision made as had 3 ½ top up pipe. Cost issue
Wellhead movement	It was suspected at beginning due to a suspected bad cement job. Turned out to be a bullseye reading issue.	Used BOP acoustic system to check movement-none.
Poor communication	Not enough bandwidth leading to delays in comms.	Rig intake process needs to identify comms issues. They matter.
Unable to backload	Shared boat issue relating to OBM storage and base facilities.	Consequence of bad weather.
Logistic coordination on rig	No DE so DS covering	DS should not be spending too much time on admin! DE training opportunity.
Flight schedule was planned but not adhered too	Additional strain on offshore logistics. Also had full crew change on Friday so helicopter was full	Everyone commits to a planned schedule. Try to plan for space on pre – weekend choppers.



Short time frame for planning	Cut back on previous assurance – reps straight to rig. Could also have planned out time a little better.	As per what went well. Put team under stress but it was delivered.
Not closing options earlier	Testing and sidetrack options held open too long causing cost and time issues.	Communicate clearly impact of these issues to sponsors and stakeholders.
FEELINGS OF THE TEAM		
Topic	Details	Actions/Response
Team Dynamics	Excellent team dynamics both offshore and onshore. Smedvig committed to tech limit and implemented offshore.	
Last well contract	Smedvig handled crew well. Open communication – advised no dismissals.	This is an issue that if it had not been handled could have had serious impact on HSE and efficiency.
Great performance	Unlucky with well integrity issues.	
FEL INDEX		
FEL Score at Define	Performance Quartile Achieved	Correlation with FEL Score
71%	2 nd quartile planned and achieved.	Yes
OVERALL WELL RATING		
OVERALL WELL RATING	<i>Conductor incident was 'one off' All well objectives were achieved safely. Cost over-run but key data was achieved which was essential to Skarv project.</i>	
PU ENDORSEMENT	<i>Review with Luke Keller 22.03.02. Main points:</i> • Excellent HSE performance. • Excellent effort by the team (Skarv, Drilling including contractors) • Some unfortunate events led to overall execution behind plan and budget (AFE) • Team responded very systematic on these events and avoided development of situations to "Train Wrecks"	



Rev: 0

Name	Position	e-mail
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[illegible]

Mike Jackson	TL DVA
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	SKARV 4 – 6507/5-5 COMPLETION REPORT		Page: 198 of 202
Chapter: 9	APPENDIX	Date: 03/05/02	Rev: 0

❑ **SLIDE PRESENTATION**

Skarv 4 Well Objectives and Results



Well Objectives :

Result

1. Achieve Data Acquisition requirements
2. Perform Safe operations
3. Conduct operations within AFE time and cost



Skarv 4 Project Timing



- Project Start 7th Sept.
- Estimated spud date 15th Oct.
- **25 working days to plan !!!!**
- Actual spud date 20th Nov. due to rig slippage.
- **FEL (Front End Loading index) Original 58% -> Final 71 %**

Summary Skarv 4 Project



<u>Operation</u>	<u>AFE</u>	<u>TL</u>	<u>Actual</u>
Vertical	56	39	72*
Liner	5	3	5
Test	11	8	10
Total	72	50	87

*Includes :

- Remedial work due to 9 5/8" casing leak (9,5 days)
- Scope change, rig demob (4 days)

Summary Skarv 4 Project



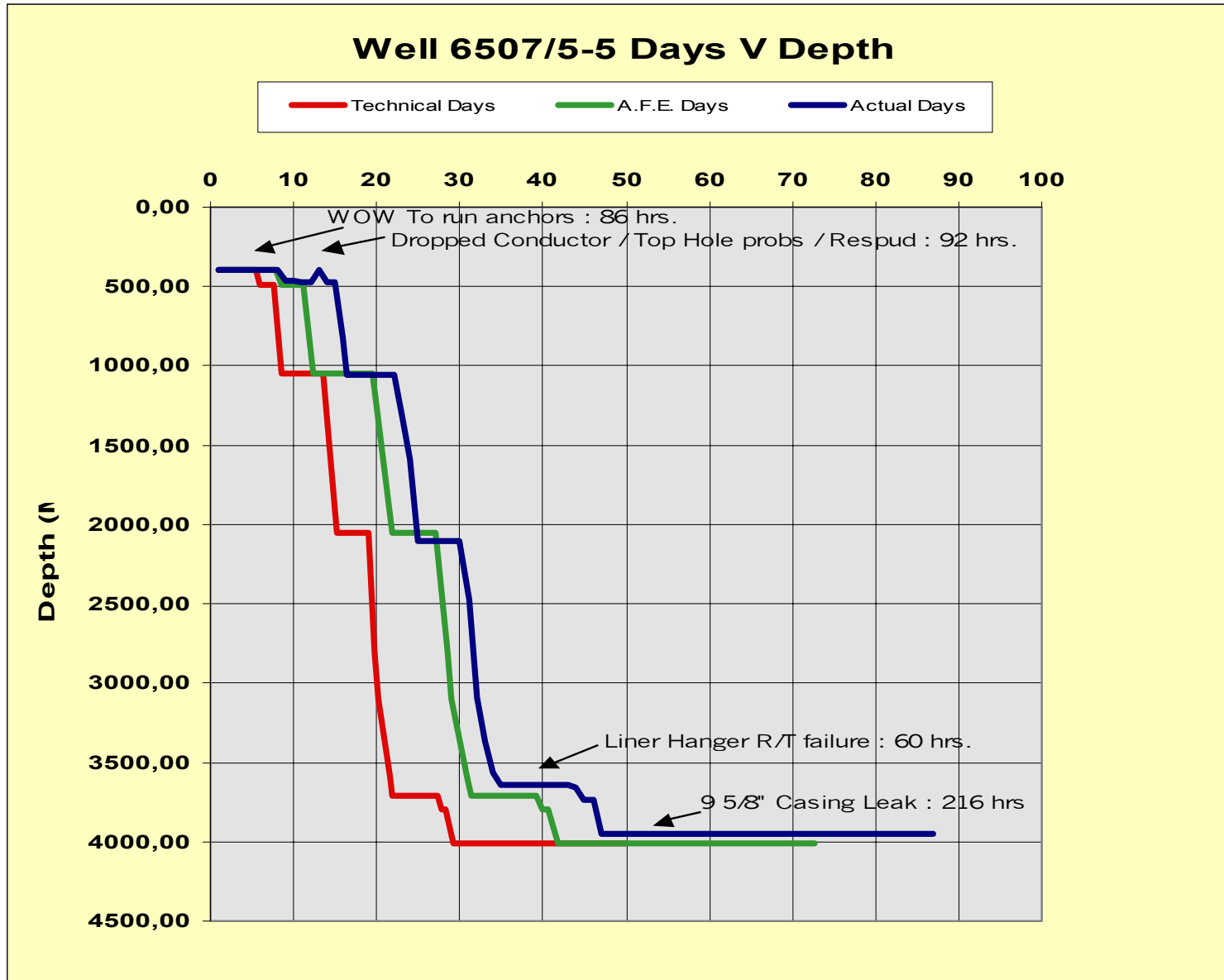
- Rig Demob. + 4 days (**Scope change**)
- Remedial work on 9 5/8" casing leak + 9,5 days
- 9 5/8" Liner hanger R/T failure + 2,5 days
- WOW + 5,5 days
- Top Hole problems / dropped conductor / respud + 4 days
- Other NPT + 4,3 Days

Skarv 4 Time Breakdown



➤ Key Data AFE 56 + 16 = 72 Days	TL	AFE	Actual	+/-
➤ Rig Move & Anchoring	5	7,2	7,2	0
➤ 36" @ 467 m & 30 Conductor	2,2	3,2	7,3	+ 4,1
➤ 26" @ 1051 m & 20" Casing & BOP's	5,2	7,2	7,3	+ 0,1
➤ 17 ½" @ 2100 m & 13 3/8" casing	5,5	7,8	6,4	- 1,4
➤ 12 ¼" @ 3645 m & 9 5/8" liner	7,3	10,4	13,9	+ 3,5
➤ Drill & Core & Log 8 ½" to 3950 m	7,2	10,3	8,5	-1,8
➤ Run 7" liner and cleanout	2,8	5	5	+ 0
➤ Remedial work on 9 5/8" leak	0	0	9,5	+ 9,5
➤ Perform Well Test	7,9	11	9,5	-1,5
➤ Plug and Abandon well	5,8	8,3	7,9	-0,4
➤ Anchor Handle	1,1	1,6	0,5	- 1,1
➤ Tow rig to Haugesund	0	0	4	+ 4
➤ TOTAL	50 D	72 D	87 D	+ 15 D

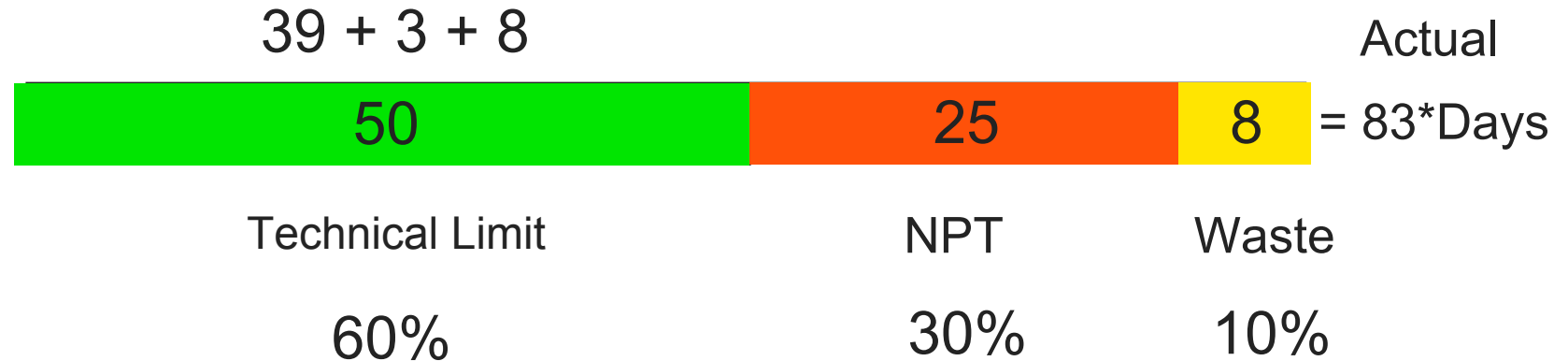
Skarv 4 Operational Performance



Summary Skarv 4 Project



Overall Performance



*Change of scope : Rig Demobilisation tow (4 days) -> 87 days total

Skarv 4 Cost Performance Summary

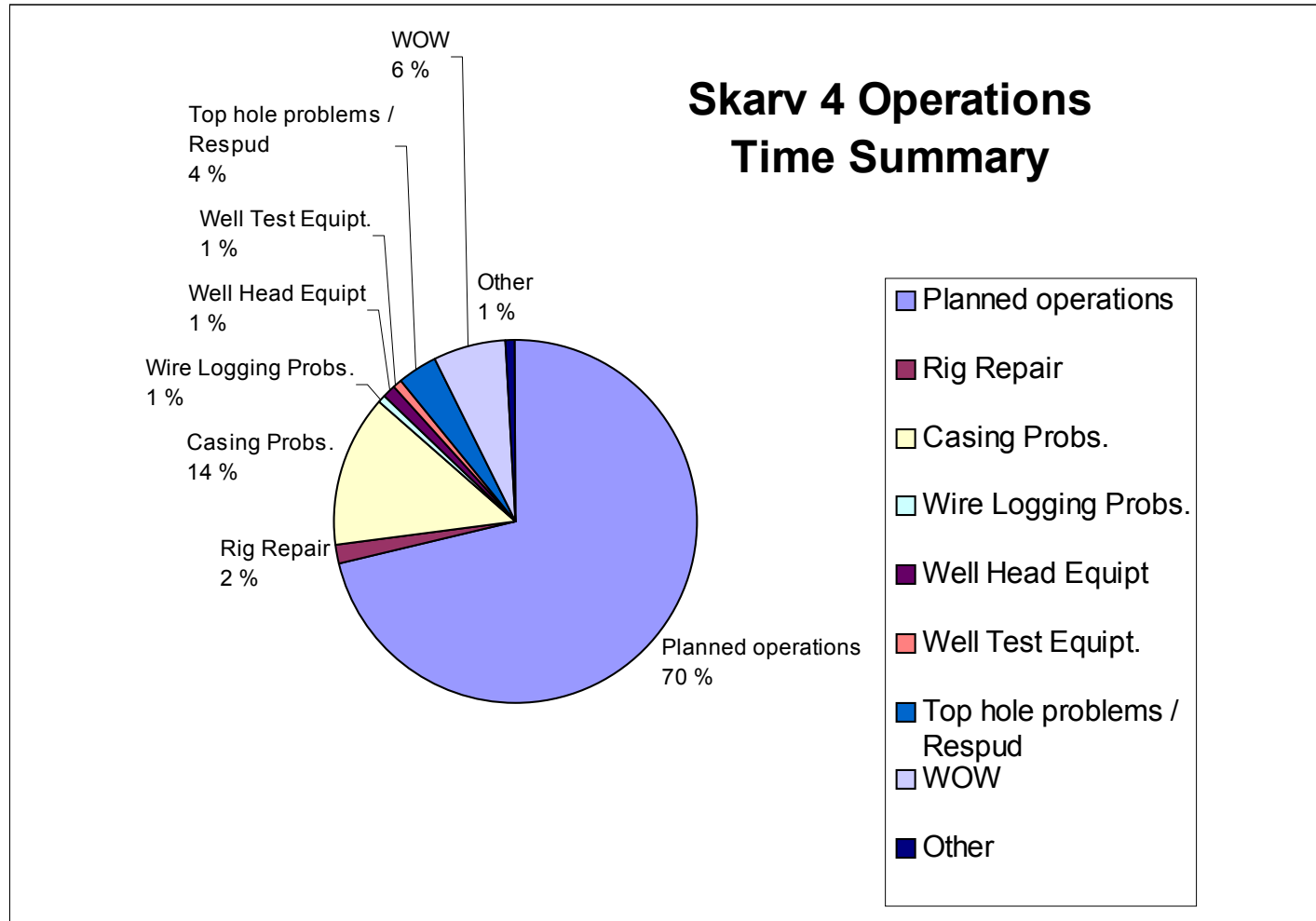


	<u>AFE</u>	<u>Actual</u>
➤ Vertical Well (incl remedial)*	198 mNok	271 mNok (+37%)
➤ Well Test	40,6 mNok	39 mNok (-4%)

* Excluding 7" liner installation @ BP Sole Cost

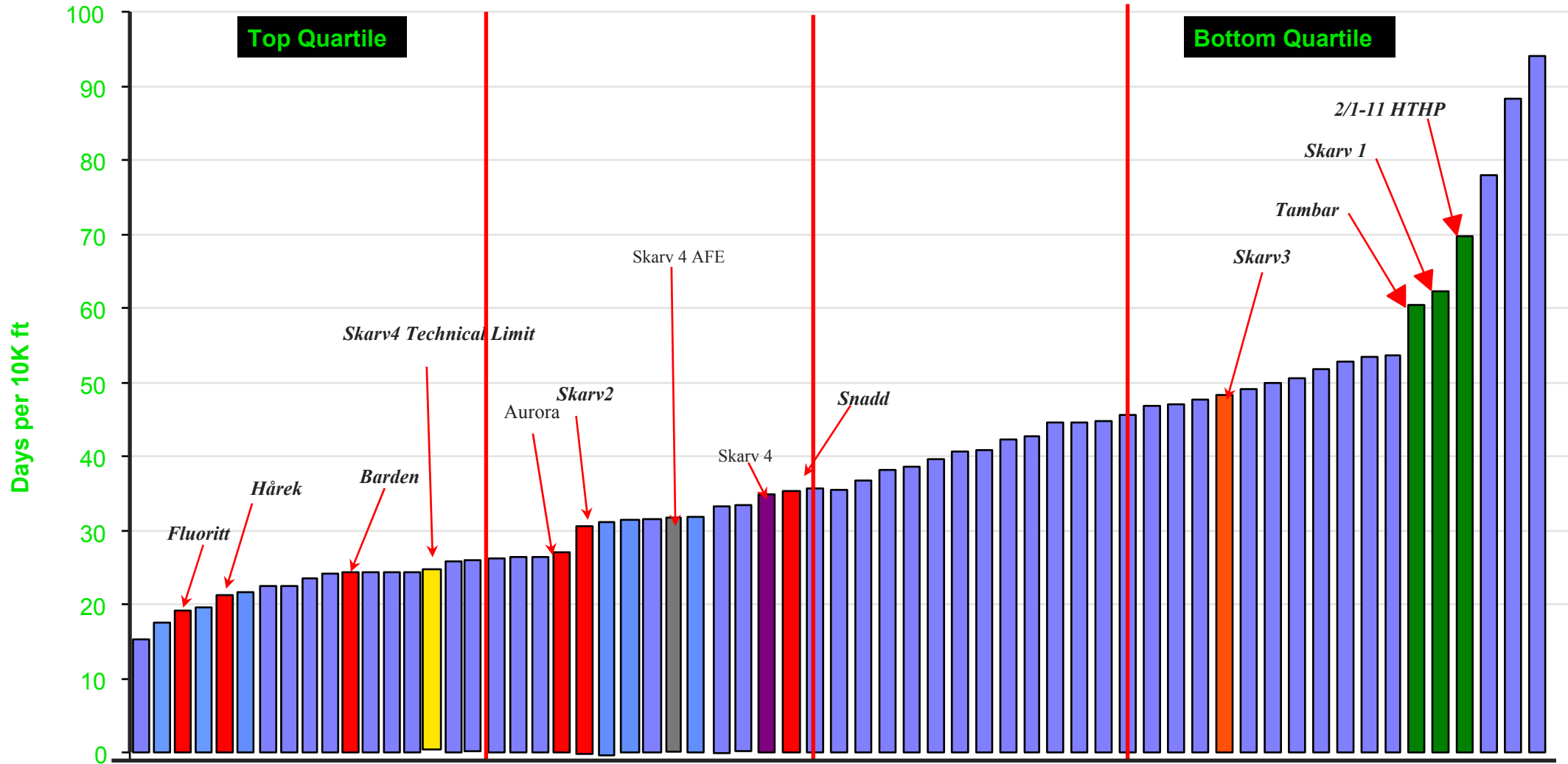
- Remedial cost 37mNok (9 5/8" casing leak) (19 % of AFE)
- Increased cost of boats 12mNok. (6% of AFE)
- Change of scope to cover demob. 12mNok (6% of AFE)
- Longer time on well + higher costs 12mNok (6% of AFE)

Skarv 4 Ops. Performance



Skarv 4 Benchmark Performance

UKCS / NOCS Days per 10K ft Semi-Sub



➤ Conclusions

1. Strong ops. Performance, but high NPT
2. Good well design
3. OBM correct choice for 12 1/4" section
4. Well integrity issues

Skarv 4 Ops. Highlights



- Excellent HSE performance
- Good rig operations performance
- 1 bit per section on all sections
- 81m core bbl cut and retrieved.
- No LWD failures resulting in trip.
- Well test operations completed successfully within budget.
- Well P/A 2 runs v's 4 runs

Skarv 4 Ops. Low Lights



- Dropped 30" conductor
- Surface hole problems / respud
- 9 5/8" Liner hanger Running tool failure
- 9 5/8" Casing leak

Skarv 4 Main Operations Lessons Learned



- West Alpha : Good Performing, Safe and extremely stable rig.
 - 6% WOW in middle of winter
- 30" dropped conductor *
- Risks not identified at any stage, 1st time ever happened
 - Excessive forces transmitted to locking dogs due to hang off arrangement
- Liner hanger running tool
 - Inadequate weight above liner running tool for new type of running tool
- 9 5/8" casing leak *
- Casing wear.
 - Unscrewed liner joint when drilling out 9 5/8" shoetrack.
 - Excessive temperature related forces on casing after circulating in cold brine.
 - Poorly made up casing connection or poor connection.

	SKARV 4 – 6507/5-5 COMPLETION REPORT		Page: 199 of 202
Chapter: 9	APPENDIX	Date: 03/05/02	Rev: 0

□ **BAROID MUD SUMMARY**



Well: 6507/5-5 Skarv 4
Operator: BP Norway

Conclusions & Recommendations

Conclusions and Recommendations BP Skarv 4

36" and 26" interval

Both these sections were drilled using seawater and bentonite hi-vis sweeps returns were to seafloor. The drilling fluid system performed as expected and there are no recommendations for these sections.

17 1/2" interval

This section was drilled using Baroids KCl/polymer/Glycol fluid system. The system was run as a dump and dilute mud and coped well with the reactive shale's drilled during this interval. It was found necessary to increase the KCl content to 140 kg/m³ from 1590m onwards. This would be the recommended KCl content for further wells in this area.

This mud was made up by diluting double strength pre-mix made up on shore with seawater. Using this method allowed the quick mixing of new mud and cut down on the amount of sacked material required on the rig site. It is recommended this practice be used for further wells.

Overall, the KCl/polymer/Glycol mud performed well and the system would be put forward again as the preferred drilling fluid option.

12 1/4" interval

This section was drilled using Baroids ENVIROMUL NAP fluid, In-conjunction with Baroids Total fluids Management system for handling all NAP generated drilling waste. The use of a NAP type drilling fluid proved the correct choice; this troublesome section was drilled without incident and in one bit run (a first for this interval). Another, highlight was the use of the drilling cutting bins (DCB's) supplied from Aberdeen for containing NAP waste (cutting, slops etc), they proved to be easy to use and good reports were received by the rig team.

Both the fluid and TFM systems worked as expected and there were no fluid related incidences during this interval, this overall package would be recommended again for this section.

8 1/2" interval

This section was drilled using Baroids KCl/polymer system. Again the interval went as planned with no drilling fluid related incidences. This fluid system would be recommended again for this interval.

Well clean up, completion and abandonment

The planned fluid for the completion and well test phase was NaCl. However, due to a well control issue caused by a leak in the 9 5/8" casing, the well had to be displaced to 1.50 SG NaBr brine. Although this was not planned and involved several more displacements, there were no completion fluid related incidences. The NaBr brine performed as expected and allowed repairs to be made on the casing leak.

After a drill stem test the well was killed using a cost effective weighted bentonite mud system, again without any drilling fluid related problems.



Well: 6507/5-5 Skarv 4
Operator: BP Norway

Interval Discussion

Interval No: 1
Bit Size: 36.000 in

Top of Interval: 392.0 m
Bottom of Interval: 473.0 m

36" hole section from 392m to 473m, 7days
Set 30" Conductor @ 473m
Drilling fluid Seawater and bentonite hi-vis sweeps

Objective

To drill the 36" section to a total depth of 473m and to run and set the 30" conductor.

Rig abstract/Summary

Before drilling commenced 100m³ of 1.80 SG kill mud was mixed as a contingency against shallow gas. The 36" section was drilled without incident using seawater and hi-vis sweeps, all returns were to seafloor. At section TD the well was displaced to 1.20 SG bentonite mud. The first attempt to run the 30" conductor was unsuccessful, this was due to 9m of boulder fill on the bottom. The hole was cleaned out and displaced to 1.60 SG bentonite mud. Upon re-running the conductor the hole could not be found, it was decided to move the rig 15m and re-drill the section. This was carried out and the conductor run and cemented without further incident.

Issues Discussion

Boulders encountered in the first attempt to run the 30" conductor.
In-ability to re-enter the hole with conductor after wiper trip.
An additional 240m³ of displacement mud was required to complete this section, this led to an increase over programmed cost.

Zero Defects Tracking

None to report

Maintenance Treatments

None, returns to seafloor

Solids Control Evaluation

None, returns to seafloor

Concentrations

Bentonite concentration maintained as per programme

Logistics

None.



Well: 6507/5-5 Skarv 4
Operator: BP Norway

Interval Discussion

Interval No: 1
Bit Size: 36.000 in

Top of Interval: 392.0 m
Bottom of Interval: 473.0 m

36" hole section from 392m to 473m, 7days
Set 30" Conductor @ 473m
Drilling fluid Seawater and bentonite hi-vis sweeps

Objective

To drill the 36" section to a total depth of 473m and to run and set the 30" conductor.

Rig abstract/Summary

Before drilling commenced 100m³ of 1.80 SG kill mud was mixed as a contingency against shallow gas. The 36" section was drilled without incident using seawater and hi-vis sweeps, all returns were to seafloor. At section TD the well was displaced to 1.20 SG bentonite mud. The first attempt to run the 30" conductor was unsuccessful, this was due to 9m of boulder fill on the bottom. The hole was cleaned out and displaced to 1.60 SG bentonite mud. Upon re-running the conductor the hole could not be found, it was decided to move the rig 15m and re-drill the section. This was carried out and the conductor run and cemented without further incident.

Issues Discussion

Boulders encountered in the first attempt to run the 30" conductor.
In-ability to re-enter the hole with conductor after wiper trip.
An additional 240m³ of displacement mud was required to complete this section, this led to an increase over programmed cost.

Zero Defects Tracking

None to report

Maintenance Treatments

None, returns to seafloor

Solids Control Evaluation

None, returns to seafloor

Concentrations

Bentonite concentration maintained as per programme

Logistics

None.



Well: 6507/5-5 Skarv 4
Operator: BP Norway

Interval Discussion

Well Testing

None.

HSE

There were no HSE or environmental incidences



Well: 6507/5-5 Skarv 4
Operator: BP Norway

Interval Discussion

Interval No: 2
Bit Size: 25.219 in

Top of Interval: 473.0 m
Bottom of Interval: 1060.0 m

26" hole section from 473m to 1060m, 4days
Set 20" Casing @ 1060m
Drilling fluid Seawater and bentonite hi-vis sweeps

Ojective

To drill the 26" section to a total depth of 1060m and to run and set the 20" casing.

Rig abstract/Summary

The 26" section was drilled without incident using seawater and hi-vis sweeps, all returns were to seafloor. At section TD the well was displaced to 1.20 SG bentonite mud.

The Hole was displaced to 1.20 SG bentonite mud and the 20" casing run and cemented as per programme.

Issues Discussion

The 20" casing had to be pumped through the 36" rat hole, this was due to the centralisers hanging up, no other issues were encountered once casing was past the rat hole.

Zero Defects Tracking

None to report

Maintenance Treatments

None, returns to seafloor

Solids Control Evaluation

None, returns to seafloor

Concentrations

Bentonite concentration maintained as per programme

Logistics

None.

Well Testing

None.



Well: 6507/5-5 Skarv 4
Operator: BP Norway

Interval Discussion

HSE

There were no HSE or environmental incidences



Well: 6507/5-5 Skarv 4
Operator: BP Norway

Interval Discussion

Interval No: 3
Bit Size: 17.500 in

Top of Interval: 1060.0 m
Bottom of Interval: 2106.0 m

17 1/2" hole section from 1060m to 2106m, 7days
Set 13 5/8" Casing @ 2100m
Drilling fluid KCl/Polymer/Glycol
Formations The reactive Tertiary shale's of the Nordland, Hordland and Rogaland.
Average ROP 22 m/hr

Objective

To drill the 17 1/2" section to a TD of 2100m, through the reactive Tertiary shale's in one bit run. Set 13 5/8" casing and achieve a leak off test, higher than 1.45 SG.

Rig abstract/Summary

Top of cement was tagged at 1025m and drilled out using seawater, the hole was then displaced to 1.20 SG KCl/Polymer/Glycol mud as per programme.
A LOT was carried out with an effective mud weight of 1.56 SG achieved, this allowed the section TD to be extended 76m to 2106m.
Drilling resumed as per programme, from 1300m to 1500m increasing levels of gas were detected and so the mud weight was increased to 1.40 SG to compensate. Shaker screen blinding occurred at 1590m, the screens were changed from 120 XR to 84 XR mesh, but this did not solve the problem, finally ROP had to be reduced. During this „sticky“ cuttings were also observed over the shakers, the KCl content was increased and maintained at 140 Kg/m³, which stopped the problem.
Drilling continued as per programmed, the mud weight was gradually increased as per weight up program to 1.50 SG at section TD. There were no problems with hole condition during the trip out. Casing was then run, again, with no problems. While circulating at 100 bar during B/U of casing, 38m³ of mud was lost to the formation. The circulating pressure was reduced to 76 bar and the losses stopped.
The casing was then successfully cemented.

Issues Discussion

Zero Defects Tracking

None to report, the KCl/Polymer/glycol mud performed as expected.

Maintenance Treatments

KCl/Polymer/Glycol mud was run as a dump and dilute system. No excessive treatments required.

Solids Control Evaluation

Four Thule VSM100 shakers were dressed with 84XR mesh screens. These were not upgraded due to high flow and penetration rates, this however, did not effect the mud properties.



Well: 6507/5-5 Skarv 4
Operator: BP Norway

Interval Discussion

Concentrations

KCl and Glycol concentrations were maintained throughout the section without problems.

Logistics

KCl/Polymer/glycol mud was shipped out as a double strength pre-mix, this greatly eased the logistic burden placed on the sack storage area.

Well Testing

None.

HSE

There were no HSE or environmental incidences during this section.



Well: 6507/5-5 Skarv 4
Operator: BP Norway

Interval Discussion

Interval No: 4
Bit Size: 12.250 in

Top of Interval: 2106.0 m
Bottom of Interval: 3643.0 m

12 1/4" hole section from 2106m to 3643m, 13days
Set 9 5/8" Casing @ 3653m
Drilling fluid ENVIROMUL
Formations Shetland, Cromer Knoll and Viking
Average ROP 14 m/hr

Objective

To drill the 12 1/4" section from 2106 to 3643m in one bit run and to set the 9 5/8" casing 5m above the pressure drop off zone in the Garn.

An additional objective was to have zero NAP (Non-aqueous phase, i.e., oil phase in an OBM)) discharges employing Baroids „Total Fluid Management" system to deal with NAP cuttings.

Rig abstract/Summary

Before drilling cement the well was displaced from KCL/Polymer to ENVIROMUL NAP. The displacement went as per programme with a good sharp interface. A pump malfunction half way through the displacement did not effect the programme.

The cement was tagged at 2073m, this and the rat hole were drilled without incident. New formation was drilled until section TD at 3643m, with no deviations from the drilling program. The first cement job resulted in 91m³ of ENVIROMUL being contaminated with green cement due to a downhole tool failure. The second remedial cement job went as per programme. There were no environmental discharges during the well. Baroids „total fluid management" plan dealt with all NAP cuttings, slops and contaminated mud.

Issues Discussion

91m³ of ENVIROMUL was badly contaminated due to a down-hole cement tool malfunction, the drilling fluid was shipped back to shore for disposal under Baroids TFM plan.

Zero Defects Tracking

None to report

Maintenance Treatments

Very minor treatments with ENVIROMUL pre-mix, EZ-Mul 2F

Solids Control Evaluation

Four Thule VSM100 shakers dressed with 84 XR mesh screens, as mud sheared and warmed up these were upgraded to a maximum screen size of 230 XR mesh. Later, increases in ROP led to the screens being downgraded to 210 mesh to cope with cuttings loading.



Well: 6507/5-5 Skarv 4
Operator: BP Norway

Interval Discussion

Concentrations

NAP / water ratio maintained as per programme, no concentration issues.

Logistics

TFM and skip and ship went well, with no environmental spills, management of 124 drill cuttings bins and 22 waste skips with NAP contaminated cuttings proceeded without incident. Approximately 0.24 mt/m drilled NAP cuttings waste was generated, this was exactly the programmed level.

Well Testing

None.

HSE

There were no HSE or environmental incidences during the drilling of this section. The 124 drill cuttings bins that were mobilised from Aberdeen were considered by the rig team, to deliver a HSE benefit over the conventional design. This was due to, the good condition of the bins, their smaller footprint size and general design. The bins were handled without incident.



Well: 6507/5-5 Skarv 4
Operator: BP Norway

Interval Discussion

Interval No: 5
Bit Size: 8.500 in

Top of Interval: 3643.0 m
Bottom of Interval: 3950.0 m

8 1/2" hole section from 3643m to 3949m, 13days
Set 7" liner @ 3949m
Drilling fluid KCl/Polymer
Formations
Average ROP 15.3 m/hr

Objective

To drill from the 9 5/8" liner shoe to TD at 3949m. To provide sufficient well-bore stability, to enable all data acquisition to be obtained and to run 7" liner without problems.

Rig abstract/Summary

This section was drilled as per programme, all objectives were met with the 7" liner set and cemented without incident.

Issues Discussion

The main issue in this section was the displacement and well bore clean up from 1.58 SG ENVIROMUL NAP to 1.20 SG KCl/polymer WBM. The displacement was thoroughly planned in advanced by the rig team and went very well, with no environmental spills and minimal interface generated.

Zero Defects Tracking

The KCl/polymer drilling fluid performed as per programmed. The pH was high throughout this section and the 10 min gel was lower than specifications, neither effected the drilling fluids performance.

Maintenance Treatments

The KCl/polymer was run as a dump and dilute system. However, only a small amount of pre-mix was required for this section.

Solids Control Evaluation

Four Thule VSM 100 shakers were used through this section. XR 84 mesh was employed at the start, this rose rapidly to XR 230 mesh after the mud had warmed up and sheared.

Concentrations

There were no deviations from programme. Drill water was used to build the drilling fluid at the request of the data acquisition team.

Logistics

Use of rig pontoon tank for storage of KCl/polymer fluid was a great help during the initial displacement.



Well: 6507/5-5 Skarv 4
Operator: BP Norway

Interval Discussion

Well Testing

The following logs were run:

1. DSI-HRLA-GR-EMS-SP
2. IPLT
3. MDT / GR
4. ZO-VSP/ GR

HSE

There were no HSE incidences during the drilling of this section.



Well: 6507/5-5 Skarv 4
Operator: BP Norway

Interval Discussion

Interval No: 6
Bit Size: 8.500 in

Top of Interval: 3950.0 m
Bottom of Interval: 3950.0 m

Completion and plug and abandonment

Drilling fluids

NaCl, NaBr, Weighted Bentonite abandonment mud.

Objective

To displace the well from 1.20 SG KCl/Polymer WBM to 1.20 SG NaCl brine, test flow the well and carry out a plug and abandonment program.

Rig abstract/Summary

The well was displaced to 1.20 SG NaCl brine as per programme. During POOH after a scraper run a leak in the 9 5/8" liner resulted in the well flowing. To prevent a well control issue the well was displaced to 1.50 SG NaBr brine, this successfully killed the well. A 7" scub liner was run (top at 2028m) which isolated the leak and allowed the well to be re-displaced to 1.20 NaCl brine. A drill stem test was carried out and the well then displaced to 1.50 SG bentonite abandonment mud, again without problems.

Issues Discussion

The main issue during this section was the unplanned use of 1.50 SG NaBr brine, this was to solve a well control problem due to a leak in the 9 5/8" liner.

Zero Defects Tracking

Both brines performed as expected

Maintenance Treatments

None required

Solids Control Evaluation

None required

Concentrations

None required

Logistics

There were no logistical issues, although, there was no planned use for NaBr brine in the drilling program, because of this the NaBr was sent out in two batches. Initially 300m³ was sent (this was all that could be mobilised at such short notice) this allowed the well to be killed. A second batch of 185m³ was then sent which allowed a full circulation system to be built.



Well: 6507/5-5 Skarv 4
Operator: BP Norway

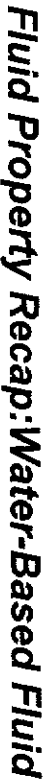
Interval Discussion

Well Testing

Drill stem test carried out.

HSE

There were no HSE incidences during the drilling of this section.



Well: 6507/5-5 Skarv 4
Operator: BP Norway

[illegible]



Fluid Property Recap: NAP-Based Fluid (API Titrations)

Well: 6507/5-5 Skarv 4
Operator: BP Norway

[illegible]



Fluid Property Recap: Water-Based Fluid

Well : 6507/5-Skarv 4
Operator: BP Norway

Date		Time		Depth		Temperature		Pressure		Density		Viscosity		Solids		pH		Surfactant		Foam		Other							
01/03/02	3.738.0	15	1.200	62	19	13	5	8	3.5	2	11.80	2.05	1.60	3.90	63.000	180	0.10	4.5	1.5	90.0	0.0	51	32	24	16	5	4		
01/04/02	3.736.0		1.200	62	19	13	5	9	3.5	2	10.80	1.55	1.20	3.20	67.000	180	0.10	4.6	1.0	90.0	0.0	51	32	24	16	5	4		
01/05/02	3.821.0	20	1.200	58	15	12	5	9	2.7	10.0	1	2	67.11.90	1.70	1.50	3.50	64.000	200	0.10	4.8	1.9	90.0	0.5	42	27	19	12	5	4
01/05/02	3.950.0	20	1.200	58	16	12	5	9	2.6		67.11.80	1.70	1.50	3.50	63.000	200	0.10	4.9	2.0	90.0	0.0	44	28	20	13	5	4		
01/06/02	3.950.0		1.200	60	15	13	5	9	2.6	2	67.11.80	1.70	1.50	3.50	63.000	200	0.10	4.9	2.0	90.0	0.5	43	28	20	13	5	4		
01/07/02	3.950.0		1.200	60	15	13	5	9	2.6	1	67.11.80	1.70	1.50	3.50	63.000	200	0.10	4.9	2.0	90.0	0.5	43	28	20	13	5	4		
01/08/02	3.950.0		1.200	60	15	13	5	9	2.6	1	67.11.80	1.70	1.50	3.50	63.000	200	0.10	4.9	2.0	90.0	0.5	43	28	20	13	5	4		
01/09/02	3.950.0		1.200	60	15	13	5	9	2.6	1	67.11.80	1.70	1.50	3.50	63.000	200	0.10	4.9	2.0	90.0	0.5	43	28	20	13	5	4		
01/10/02	3.950.0		1.200	60	14	14	5	9	2.6	1	67.11.80	1.70	1.50	3.50	63.000	200	0.10	4.9	2.0	90.0	0.5	42	28	20	13	5	4		
01/11/02	3.950.0		1.200	60	15	13	5	9	2.6	1	67.11.80	1.70	1.50	3.50	63.000	200	0.10	4.9	2.0	90.0	0.5	43	28	20	13	5	4		
01/12/02	3.889.0		1.200	58	15	13	5	9	2.5	10.0	1	2	67.11.80	1.70	1.50	3.50	63.000	200	0.10	4.9	2.0	90.0	0.5	43	28	20	13	5	4
01/13/02	3.852.0		1.200	0											0	0		0.0	0.0	88.0	0.0								
01/15/02	385.0		1.200	34	4	2					9.50				0	0		12.8	12.9	87.0	0.0	10	6						
01/16/02	3.532.0		1.200	34							9.50				0	0		7.8	2.9	92.0	0.0								



Fluid Program Exceptions Report

Well : 6507/5-5 Skarv 4
Operator: BP Norway

Report No	Date	Time	Depth m	Property Name	Units	Actual Value	Exception	Program Min	Program Max
010	12/06/01	23:00	1,060	Density	SG	1.040	Low	1.170	1.550
011	12/07/01	23:00	1,051	pH		10.50	High	9.00	10.00
012	12/08/01	23:00	1,060	pH	-	10.50	High	9.00	10.00
013	12/09/01	23:00	1,060	pH	-	10.50	High	9.00	10.00
014	12/10/01	23:00	1,060	pH	-	10.50	High	9.00	10.00
015	12/11/01	22:00	1,060	pH	-	10.50	High	9.00	10.00
016	12/12/01	15:45	1,085	pH	-	10.10	High	9.00	10.00
017	12/13/01	20:00	1,591	MBT	me/ml mud	16.0	High	7.0	5.0
018	12/14/01	04:00	1,591	MBT	me/ml mud	10.0	High	1.0	5.0
018	12/14/01	11:00	1,762	MBT	me/ml mud	10.0	High	1.0	5.0
018	12/14/01	16:40	1,910	MBT	me/ml mud	10.0	High	1.0	5.0
018	12/14/01	16:40	1,910	pH	-	8.80	Low	9.00	10.00
018	12/14/01	22:00	2,013	MBT	me/ml mud	10.0	High	1.0	5.0
019	12/15/01	05:00	2,106	pH	me/ml mud	8.90	Low	9.00	10.00
019	12/15/01	05:00	2,106	MBT	me/ml mud	10.0	High	1.0	5.0
019	12/15/01	11:00	2,106	pH	me/ml mud	8.60	Low	9.00	10.00
019	12/15/01	11:00	2,106	Gel, 10 minutes	lbs/100 ft2	30	High	5	20
019	12/15/01	17:00	2,106	MBT	me/ml mud	15.0	High	1.0	5.0
019	12/15/01	17:00	2,106	Gel, 10 minutes	lbs/100 ft2	29	High	5	20
019	12/15/01	17:00	2,106	MBT	me/ml mud	15.0	High	1.0	5.0
019	12/15/01	17:00	2,106	pH	-	8.70	Low	9.00	10.00
019	12/15/01	22:00	2,106	pH	-	8.90	Low	9.00	10.00
019	12/15/01	22:00	2,106	MBT	me/ml mud	10.0	High	1.0	5.0
019	12/15/01	22:00	2,106	Density	SG	1.580	High	1.170	1.550
020	12/16/01	16:00	2,106	MBT	me/ml mud	13.0	High	1.0	5.0
020	12/16/01	21:00	2,106	MBT	me/ml mud	13.0	High	1.0	5.0
020	12/16/01	21:00	2,106	pH	-	8.70	Low	9.00	10.00
021	12/17/01	21:00	2,106	MBT	me/ml mud	13.0	High	1.0	5.0
021	12/17/01	21:00	2,106	pH	-	8.60	Low	9.00	10.00
021	12/18/01	12:00	2,106	pH	-	8.60	Low	9.00	10.00
022	12/18/01	12:00	2,106	MBT	me/ml mud	13.0	High	1.0	5.0
023	12/19/01	23:30	2,106	Density	SG	1.580	High	1.170	1.550
024	12/20/01	05:00	2,106	Density	SG	1.580	High	1.170	1.550
024	12/20/01	17:00	2,184	Density	SG	1.580	High	1.580	2.000
024	12/20/01	21:00	2,332	Density	SG	1.580	High	1.580	2.000
025	12/21/01	05:00	2,680	Density	SG	1.580	High	1.580	2.000
027	12/23/01	05:00	3,400	Density	SG	1.580	High	1.580	2.000
027	12/23/01	14:00	3,469	Density	SG	1.580	High	1.580	2.000
027	12/23/01	21:30	3,540	Density	SG	1.580	High	1.580	2.000
028	12/24/01	05:00	3,600	Density	SG	1.580	High	1.580	2.000
028	12/24/01	21:30	3,643	Density	SG	1.580	High	1.580	2.000
029	12/25/01	06:00	3,643	Density	SG	1.580	High	1.580	2.000



Fluid Program Exceptions Report

Well : 6507/5-5 Skarv 4
Operator: BP Norway

Report No	Date	Time	Depth m	Property Name	Units	Actual Value	Exception	Program Min	Program Max
029	12/25/01	20:00	3.643	Density	SG	1.580	High	1.580	2.000
030	12/26/01	16:00	3.643	Density	SG	1.580	High	1.580	2.000
031	12/27/01	15:00	3.643	Density	SG	1.580	High	1.580	2.000
033	12/29/01	20:00	3.643	Density	SG	1.570	Low	1.580	2.000
034	12/30/01	22:00	3.643	Density	SG	1.580	High	1.580	2.000
035	12/31/01	22:15	3.643	Density	SG	1.580	High	1.580	2.000
036	01/01/02	21:00	3.643	Density	SG	1.580	High	1.580	2.000
037	01/02/02	16:00	3.657	Gel, 10 minutes	lbs/100 ft2	8	Low	9	19
037	01/02/02	16:00	3.657	pH		11.80	High	8.50	9.50
037	01/02/02	22:00	3.657	Gel, 10 seconds	lbs/100 ft2	4	Low	7	13
037	01/02/02	22:00	3.657	pH		11.70	High	8.50	9.50
037	01/02/02	22:00	3.657	Gel, 10 minutes	lbs/100 ft2	8	Low	9	19
037	01/02/02	22:00	3.657	Gel, 10 seconds	lbs/100 ft2	4	Low	7	13
038	01/03/02	21:30	3.736	Potassium Chloride	kg/m3	146.00	High	128.00	143.00
038	01/03/02	21:30	3.736	pH		11.30	High	8.50	9.50
038	01/03/02	21:30	3.736	Gel, 10 seconds	lbs/100 ft2	5	Low	7	13
039	01/04/02	20:00	3.736	pH		10.80	High	8.50	9.50
039	01/04/02	20:00	3.736	Gel, 10 seconds	lbs/100 ft2	5	Low	7	13
040	01/05/02	10:20	3.821	Gel, 10 seconds	lbs/100 ft2	5	Low	7	13
040	01/05/02	23:45	3.950	pH		11.80	High	8.50	9.50
040	01/05/02	23:45	3.950	Gel, 10 seconds	lbs/100 ft2	5	Low	7	13
041	01/06/02	21:30	3.950	pH		11.80	High	8.50	9.50
041	01/06/02	21:30	3.950	Gel, 10 seconds	lbs/100 ft2	5	Low	7	13
042	01/07/02	21:30	3.950	pH		11.80	High	8.50	9.50
042	01/07/02	21:30	3.950	Gel, 10 seconds	lbs/100 ft2	5	Low	7	13
043	01/08/02	22:00	3.950	pH		11.80	High	8.50	9.50
043	01/08/02	22:00	3.950	Gel, 10 seconds	lbs/100 ft2	5	Low	7	13
044	01/09/02	22:00	3.950	Gel, 10 seconds	lbs/100 ft2	5	Low	7	13
044	01/09/02	22:00	3.950	pH		11.80	High	8.50	9.50
045	01/10/02	22:00	3.950	Gel, 10 seconds	lbs/100 ft2	5	Low	7	13
045	01/10/02	22:00	3.950	pH		11.80	High	8.50	9.50
046	01/11/02	22:00	3.950	Gel, 10 seconds	lbs/100 ft2	5	Low	7	13
046	01/11/02	22:00	3.950	pH		11.80	High	8.50	9.50
047	01/12/02	22:00	3.939	Gel, 10 seconds	lbs/100 ft2	5	Low	7	13
047	01/12/02	22:00	3.939	pH		11.80	High	8.50	9.50
050	01/15/02	13:00	3.65	Funne Viscosity	sec/cf	34	Low	100	200
050	01/15/02	13:00	3.65	pH		9.50	Low	10.00	11.00
051	01/16/02	20:00	3.532	Density	SG	1.200	Low	1.580	2.000



Well: 6507/5-5 Skarv 4
Operator: BP Norway

Operations Log Recap

For report #001A on 27/Nov/2001	Operation at depth(m) 383
Activity	Drilling
Rig Activity	Rig on location , set out anchors. Rig up and make up pipe, make up 36 " hole opener drilling assembly to spud well.
Fluid Treatments	Mixing Kill mud and spud mud.
For report #002A on 28/Nov/2001	Operation at depth(m) 471
Activity	Drilling
Rig Activity	Spud in well, sweep hole with high vis. sweeps as required.
Fluid Treatments	Mixed spud mud and displacement mud as required.
For report #003A on 29/Nov/2001	Operation at depth(m) 471
Activity	Run casing and cement
Rig Activity	Displaced hole to 1.20 S.G. mud and P.O.O.H. lay down hole opener .W.O.W. Rig up and run 30" conductor and guide base on drill pipe.
Fluid Treatments	Mixing prehydrated Bentonite, mixed more Kill mud to give 96 m3 at 1.80 S.G.
For report #004A on 30/Nov/2001	Operation at depth(m) 474
Activity	Fishing
Rig Activity	Pulled conductor out as 4 m. stick up, hung off in moon pool. Run in hole with 36" hole opener, cleaned out hole and drilled 3 m. extra. Displaced hole to 1.60 S.G. mud and performed wiper trip, ran back to bottom, displaced again. P.O.O.H., Conductor broke loose and fell to sea bed, embedded 19 m. into sea bed, rig up fishing equipment and run in hole to fish.
Fluid Treatments	Mixing prehydrated Bentonite, mixed 2 x 60m3 displacement mud at 1.60 S.G. Displaced hole twice, before and after wiper trip.
For report #005A on 01/Dec/2001	Operation at depth(m) 474
Activity	Run casing and cement
Rig Activity	Fishing for conductor, latched on and pulled out of hole, laid down. Picked up hole opener assembly, ran in hole ,hole in good shape no fill, displaced hole to 1.60 S.G. mud and P.O.O.H. made up new conductor string and run in hole.
Fluid Treatments	Mixing new Kill mud to 1.80 S.G., Mixing new prehydrated Bentonite, mixed and displaced hole with 60 m3 Displacement mud at 1.60 S.G. No fill when back on bottom.
For report #006A on 02/Dec/2001	Operation at depth(m) 474
Activity	Tripping
Rig Activity	Tried to find 36" hole to run 30 " conductor, could not find. Pull out conductor and lay down. Pick up 36" drilling assembly to re-spud well, move rig to new position, run assembly to drill new hole.
Fluid Treatments	Completed mixing prehydrated gel and Kill mud at 1.80 S.G. 15 mt. bentonite shipping losses, BALDER VIKING loaded with 75 mt. only delivered on to rig 60 mt., when queried ,none left on board.
For report #007A on 03/Dec/2001	Operation at depth(m) 474
Activity	Run casing and cement
Rig Activity	Drilled 36 " hole down to 471 m., 17.5" hole to 474 m., circulated hole clean and displaced to 1.40 S.G. mud, wiper trip to sea bed, wait 30 mins. ran back to bottom, no fill. Displaced hole to 1.40 S.G. again, pulled out of hole, rig up to run conductor.
Fluid Treatments	Mixed 2 x 60 m3 displacement mud at 1.40 S.G. while drilling pumping Hi-vis pills at each connection, and midway. Wiper trip to seabed ,waited 30 mins. ran back in and displaced hole to 1.40 .S.G. mud again. Re-mixing Kill mud and prehydrated gel.
For report #008A on 04/Dec/2001	Operation at depth(m) 474
Activity	Tripping
Rig Activity	Ran 30 " conductor to setting depth at 466.5 m., swept hole with 16 m3 Hi-vis mud, then seawater. Cemented successfully as per programme. nWaited on cement with running string in tension. Backed off running tool and P.O.O.H. Make up 26 " drilling assembly and run in hole.
Fluid Treatments	Re-mix ed Kill mud, 100 m3 @ 1.80 s.g., Mixed rest of prehydrated bentonite.
For report #009A on 05/Dec/2001	Operation at depth(m) 822
Activity	Drilling
Rig Activity	Run in hole , tag cement drill out float, shoe and rathole, cement hard. Drill ahead to T.D., no shallow gas detected.
Fluid Treatments	Using prehydrated bentonite mud mixed with seawater to give spud mud to use for Hi-vis sweeps, flocculated with lime, to give viscosities over 100 secs. Mixing prehydrated bentonite when reserve pit empty.
For report #010A on 06/Dec/2001	Operation at depth(m) 1060
Activity	Run casing and cement
Rig Activity	Drilled to 1060 m., cleaned hole, displaced hole to 1.20 S.G. mud and P.O.O.H. to run 20 " casing, hole in good shape, so no wiper trip. Rig up and prepare to run casing.
Fluid Treatments	Mixing spud mud as required, at T.D. @ 1060 M., circulated hole clean with Hi-vis sweeps, displaced open hole to 1.20 S.G. Displacement mud.



Well: 6507/5-5 Skarv 4
Operator: BP Norway

Operations Log Recap

Report 101351 on 07/Dec/2001		Operation depth(m) 1060
Activity	Wait on cement	
Rig Activity	Run 20 " casing, some problems running through 30" shoe and rathole, could be centralizers hanging up ,pumped and worked way through, then run straight to setting depth @ 1051 m. with no problems. Circulated then cemented as per programme. Wait on cement.	
Fluid Treatments	When running casing, through 30" shoe took weight, pumped HI-vis sweeps, and pumped through. Cleaned reserve pits and bringing up KCL\Polymer\Gem GP premix to prepare mud for next section.	
Report 10134 on 08/Dec/2001		Operation depth(m) 1060
Activity	Wait on...weather	
Rig Activity	Waiting on weather, picking up pipe, making up new B.H.A., lay down old. Change liners on pumps to 6".	
Fluid Treatments	Preparing KCL\Polymer\Gem GP mud for the next section. Dress shakers with 84 mesh for displacement and first circulations.	
Report 101351 on 08/Dec/2001		Operation depth(m) 1060
Activity	Nipple up B.O.P.	
Rig Activity	Mking up B.H.A., preparing to run B.O.P. stack and riser.	
Fluid Treatments	Continue mixing KCL\Polymer\Gem GP mud for 17.5" section, receive KCL brine, barite and chems.	
Report 10134 on 10/Dec/2001		Operation depth(m) 1060
Activity	Nipple up B.O.P.	
Rig Activity	Running B.O.P. and riser.	
Fluid Treatments	Continue mixing KCL\Polymer\Gem GP mud at 1.20 S.G. for 17.5" section.	
Report 10135 on 11/Dec/2001		Operation depth(m) 1060
Activity	Rigging up for 17.5" section	
Rig Activity	Continued to rig up for 17.5" section. Making up new BHA and joining flowline and finished mixing the mud. Picked up pipe necessary for the next section and off loaded from supply boat.	
Fluid Treatments	Continued mixing KCL\Polymer\Gem GP mud at 1.2SG in preparation for the 17.5" section. Premix was diluted and brine and chemicals added to prepare mud for drilling out cement and displacing. Built 59M3 of new mud from Brine, water DEXTRID, BARAZAN, PAC L and Glycol as per mud programme specifications. Pre-treated the mud with Sodium Bicarbonate in readiness for cement drilling.	
Report 10134 on 12/Dec/2001		Operation depth(m) 1063
Activity	Drilling	
Rig Activity	Continued to run into hole with 17.5" drilling assembly. Tagged top of cement at 1025m. Continued to drill out cement and displaced well to 1.2 SG mud and drilled on to 1063m. Circulated mud until 1.2 SG all round the system. Performed leak off test which gave a 1.58SG. Continued to drill ahead to 1311m. Currently drilling ahead.	
Fluid Treatments	Displaced well from seawater to 1.2SG KCL/Glycol\Polymer mud. Built 59m3 of new mud to maintain active volume. The mud was built to 1.16SG so it could be bled over to the active to maintain volume and system mud weight. The overall system is being maintained at 1.2 SG until 1400m whn the weight will be gradually increased to 1.4 SG.	
Report 10137 on 13/Dec/2001		Operation depth(m) 1053
Activity	Wait on repairs to the HV system.	
Rig Activity	Continued to drill ahead from 1311m to 1591mm. Well experienced high levels of gas whilst drilling, with sensors showing up to 40%. The mud pumps showed drops in pressure of up to 20 bar whilst gas in system. The mud weight was raised accordingly. Reduced the rate of penetration but maintained the flowrate as the shakers wouldnt handle the flow. Problems with the rig high voltage system meant drilling had to stop. Pulled back inside shoe whilst problem rectified. Currently inside shoe circulating.	
Fluid Treatments	Continued to build KCL/Glycol mud to maintain volume and system properties. Whilst drilling 1.16 SG -1.2 SG mud is bled in to control the weight and 10 sx of BARAZAN was added to improve rheological profile of the system. Bulk bags of Potassium chloride were added to maintain the KCL concentration and to keep the cuttings as firm as possible. Weighted up system to 1.35 SG and to a maximum of 1.42SG as hole conditions dictated. Whilst high gas levels were being detected no gas cutting was observed with the mud weight.	



Well: 6507/5-5 Skarv 4
Operator: BP Norway

Operations Log Recap

08/12/01 15:00 - 15:00	
Issues	Very high ROP (80m/hr) was leading to masses of soft cuttings at the shakers which were clothed in 84 mesh screens. these screens could not cope with this volume and so were constantly blinded and whole mud was lost over the end of the screens. ROP was reduced to ~30m/hr and the screens were seen to cope with the cuttings volume far better.
08/12/01 15:00 - 15:00	
Activity	Drilling
Rig Activity	Ran back to bottom and continued drilling from 1591m to 2039m. There were some hard areas where the ROP dropped off markedly, these were thought to be limestone stringers. Currently drilling ahead.
Fluid Treatments	Continued to build new volume as needed to replace high losses over the shakers, due to blinding. Changed out 84 mesh screens for 120 mesh and when drilling the screens were seen not to cope and so 84's were put on. Big bags of KCI were added to increase and maintain the concentration of the salt in the system. Cuttings quality was seen to improve this may have been a combination of the salt concentration and formation. Mud weight was increased from 1.4 SG to 1.45 SG in line with the weight up schedule.
Issues	Very high ROP (80m/hr) was leading to masses of soft cuttings at the shakers which were clothed in 84 mesh screens. these screens could not cope with this volume and so were constantly blinded and whole mud was lost over the end of the screens. ROP was reduced to ~30m/hr and the screens were seen to cope with the cuttings volume far better.
08/12/01 15:00 - 15:00	
Activity	Tripping out of hole
Rig Activity	Continued to drill ahead from 2039m to TD at 2106m. Circulated two times bottoms up and the began pulling out. Pumped and pulled out to 1524m before Running back in hole to bottom to ease tight spots. Circulated and conditioned mud back to 1.5SG and continued pulling back to the shoe. Once inside the shoe bottoms up was circulated again and then the trip out continued to 659m at midnight. Currently pulling out of hole.
Fluid Treatments	continued to weight up the active to 1.5SG for 2100m. When TD was reached, circulated 2 times bottoms up to give a clean hole. When pulling there were some tight spots. Bit was pulled to 1524m and then run back to bottom. The mud weight had increased slightly to 1.51SG therefore ~50m ³ of fresh clean mud at 1.42 SG was bled into the mud whilst circulating bottoms up. This made the system 1.5SG. The mud checks for 1100hr and 1700hrs show the bottoms up mud as being thicker than the other active mud, and are not representative of the system as a whole.
Issues	Very high ROP (80m/hr) was leading to masses of soft cuttings at the shakers which were clothed in 84 mesh screens. these screens could not cope with this volume and so were constantly blinded and whole mud was lost over the end of the screens. ROP was reduced to ~30m/hr and the screens were seen to cope with the cuttings volume far better.
08/12/01 15:00 - 15:00	
Activity	Running 13 3/8" casing
Rig Activity	Continued to pull out of hole to surface. Rigged up for running 13 3/8" casing and continued to run the same. Currently running 13 3/8" casing as per programme.
Fluid Treatments	Received a further 190 m ³ of ENVIROMUL and 150m ³ of base oil from the supply boat, to supplement the 255 m ³ delivered 14/12/01. When the pits were cleaned and all lock down procedures had been followed, ENVIROMUL was loaded into 4 of the surface pits, giving a total of 446 m ³ of 1.58SG mud on board for the 12 1/4" section. Mud check 2 is of the new ENVIROMUL. Glycol charged off to square inventory at the end of the section. 1sack of BARAZAN was used by Halliburton cementer for cement spacer.
Losses & Gains	Losses on running casing are so far negligible
Issues	Very high ROP (80m/hr) was leading to masses of soft cuttings at the shakers which were clothed in 84 mesh screens. these screens could not cope with this volume and so were constantly blinded and whole mud was lost over the end of the screens. ROP was reduced to ~30m/hr and the screens were seen to cope with the cuttings volume far better.



Well: 6507/5-5 Skarv 4
Operator: BP Norway

Operations Log Recap

15/12/2001 to 17/Dec/2001 Operation at depth 2100m	
Activity	Rig up and rig down
Rig Activity	Continued to run 13 3/8" casing to casing shoe at 2100m. Pulled out with hang off tool which became stuck. When free continued to pull out of hole and rig down 17.5" equipment. Continued with pit cleaning schedule as per programme.
Fluid Treatments	When casing successfully run to bottom the well was circulated. Losses of 38m3 were observed over 50 minutes. when the stroke rate was reduced the loss rate stopped and 8m3 was seen to return. No further major losses were observed.
Losses & Gains	ran casing an lost approximately 30 m3 whilst circulating prior to running the cement job
Issues	Very high ROP (80m/hr) was leading to masses of soft cuttings at the shakers which were clothed in 84 mesh screens. these screens could not cope with this volume and so were constantly blinded and whole mud was lost over the end of the screens. ROP was reduced to ~30m/hr and the screens were seen to cope with the cuttings volume far better.
18/12/2001 to 19/Dec/2001 Operation at depth 2100m	
Activity	Testing MWD tool on surface.
Rig Activity	Continued to rig down 17.5" equipment and make rig ready for drilling 12.25" section. Continued pit cleaning. Currently amking up and testing 12.25" BHA.
Fluid Treatments	Continued to clean pits and fill with ENVIROMUL oil based mud when locked out.
Issues	Very high ROP (80m/hr) was leading to masses of soft cuttings at the shakers which were clothed in 84 mesh screens. these screens could not cope with this volume and so were constantly blinded and whole mud was lost over the end of the screens. ROP was reduced to ~30m/hr and the screens were seen to cope with the cuttings volume far better.
19/12/2001 to 19/Dec/2001 Operation at depth 2100m	
Activity	Reaming
Rig Activity	Ran with new 12 1/4" bottom hole assembly and tested tools. Picked up enough drillpipe for the next section. Ran to bottom and tagged cement at 2073m. Displaced well to OBM. Experienced some problems with the mud pumps which lead to inaccurate stroke counts. Ran displacement as per volumes and diverted fluid as per mud engineers instruction/plan. Circulated mud until 1.58SG all round the system and continued to ream cement.
Fluid Treatments	Preparations made to displace well to 1.58SG ENVIROMUL oil based mud. When ready to displace well pre job meeting was held on drillfloor with all participating parties. Displacement began with 10m3 water spacer and the chased with ENVIROMUL. Problems with pumps meant stroke counter was unreliable, therefore when 187m3 of OBM had been pumped the returns were diverted to a clean reserve pit and the flowline monitored for OBM and spacer. no spacer was seen, but there was a very clear boundary between the WBM and OBM. This was diverted into a dirty pit and when the electrical stability increased over 200 volts this was diverted to the Active pit to create a closed loop of circulating OBM. Approximately 20m3 of WBM was taken back to the clean pit, this has to be tested for oil content prior to discharge. There was approximately 11m3 of interface where the E.S (v) reading was below 200 volts. Charged off 208m3 of KCL/GEM/Polymer premix at 260.25 dollars. Which was delivered for the beginning of the 17.5" section and not charged off when used.
Issues	Very high ROP (80m/hr) was leading to masses of soft cuttings at the shakers which were clothed in 84 mesh screens. these screens could not cope with this volume and so were constantly blinded and whole mud was lost over the end of the screens. ROP was reduced to ~30m/hr and the screens were seen to cope with the cuttings volume far better.
20/12/2001 to 20/Dec/2001 Operation at depth 2479m	
Activity	Drilling
Rig Activity	Continued drilling from top of cement at 2073m to 2479 (373m new formation). Currently drilling ahead.
Fluid Treatments	No mud treatments today. Monitored weight and controlled such with additions when needed of lighter (1.42SG) mud. Monitored the oil water ratio and the Electrical Stability (v) to ascertain whether any water based mud contamination had occurred whilst displacing.



Well: 6507/5-5 Skarv 4
Operator: BP Norway

Operations Log Recap

Period: 02/12/2013 to 20/Dec/2013		Operation at depth (m) 2473
Issues	Very high ROP (80m/hr) was leading to masses of soft cuttings at the shakers which were clothed in 84 mesh screens. these screens could not cope with this volume and so were constantly blinded and whole mud was lost over the end of the screens. ROP was reduced to ~30m/hr and the screens were seen to cope with the cuttings volume far better.	
Period: 02/12/2013 to 19/Dec/2013		Operation at depth (m) 3090
Activity	Drilling	
Rig Activity	Continued to drill ahead from 2479m to 3090m. Drilled 611m of new hole. Rates of penetration varying due to limestone stringers. Continued with crane operations to remove filled skips from cuttings chute. Backloading them to boat when available.	
Fluid Treatments	Treated the mud with lime to maintain alkalinity of the system. Continued to maintain weight at 1.58 SG using solids control and lighter weight mud. Oil on cuttings figures were taken from bins at random and returned figures from 86 g/kg to 105 g/kg.	
Period: 02/12/2013 to 20/Dec/2013		Operation at depth (m) 3363
Activity	Drilling	
Rig Activity	Continued to drill ahead from 3090m to 3363m, with 273m of new hole drilled. The rate of penetration dropped due to differing formation. Crane operations still ongoing with the cuttings bins.	
Fluid Treatments	Added 4 drums of EZ-MUL NT to the active to increase the stability of the emulsion. Interface from the displacement was treated with 2 drums of EZ-MUL NT and base oil. This was bled into the active to control weight. When this volume was used, the same slug pit was utilized for building small batches of light mud using 7m3 1.58 SG of ENVIROMUL and 3m3 base oil & 5kg/m3 EZ-MUL NT. Skip usage fallen due to slower ROP but average weight of the skip has increased due to the level to which the bin can be filled. The average has risen from 3.6MT to 4.5MT an increase of 25%. The average oil on cutting has also increased to 119g/kg OOC.	
Losses & Gains	mud losses are contained within the cuttings bins, with no apparent losses to formation. and no losses overboard.	
Period: 02/12/2013 to 20/Dec/2013		Operation at depth (m) 3565
Activity	Drilling	
Rig Activity	Continued to drill ahead from 3363m to 3565m, a total of 202m. Cuttings bin crane movements are ongoing - but with lower rates of penetration the lifts have been fewer.	
Fluid Treatments	Continued to treat system with EZ-MUL NT and lime. Added 18sx DURATONE to maintain fluid loss. Rheological profile of the mud has reduced with the additions of the base oil (light premix) and the use of 230 mesh XR screens.	
Losses & Gains	Mud lost is on cuttings contained within cuttings bins, and slops pit.	
Period: 02/12/2013 to 20/Dec/2013		Operation at depth (m) 3643
Activity	Tripping out of hole	
Rig Activity	Continued to drill ahead from 3565m to 3643m, a total of 78m before reaching TD. All geological criteria fulfilled for picking TD albeit 64m higher than prognosed.	
Fluid Treatments	No mud treatments today. Continuing sampling of cuttings bins showed oil on cuttings retention remained low due at <120g/kg, actual figure 118.6 g/kg.	
Losses & Gains	Mud losses are attributed to cuttings in bins and whole mud losses to cuttings bins.	
Period: 02/12/2013 to 20/Dec/2013		Operation at depth (m) 3643
Activity	Wait on ice clearing	
Rig Activity	Continued with wiper trip and then pulled out to surface in preparation for the logging run. Waited on freeing the derrick of ice and compacted snow which posed a danger of a fallen object incident. A time out for safety was taken to mitigate the circumstances as much as possible.	
Fluid Treatments	No mud treatments today. Continued with pit cleaning as and when available in preparation for the cement job and next section. Changed shaker screens from 230 mesh to 165 mesh screens for breaking circulation during trip, when mud was thick and cold.	
Period: 02/12/2013 to 20/Dec/2013		Operation at depth (m) 3643
Activity	Rig up to run casing	



Well: 6507/5-5 Skarv 4
Operator: BP Norway

Operations Log Recap

For report #030A on 26/Dec/2001		Operation at depth(m) 3643
Rig Activity	rigged up Schlumberger and run in hole with DSI - ADLD wire line log. Start rigging up to run 9 5/8" casing.	
Fluid Treatments	No mud treatments today. Back loaded 36 m3 Enviromul to "Scandi stolmen", also back loaded 65 m3 slops. Continue to clean pits.	
For report #031A on 27/Dec/2001		Operation at depth(m) 3643
Activity	Run casing and cement	
Rig Activity	Continue to run 9 5/8" casing to 3300 meters.	
Fluid Treatments	No treatment to active system today. Continue cleaning pits. Start mixing brine in reserve pit no.5 (100 m3 at 240 kg./m3)	
For report #032A on 28/Dec/2001		Operation at depth(m) 3643
Activity	Tripping	
Rig Activity	Continue to run 9 5/8" liner to 3642 meters and set same. Performed cement job as per BP program. Started circulating large amount of spacer and cement in returns added fresh mud to active while taken heavy contaminated mud into slop pits (a total of 91 m3).Circulated hole clean and started pulling out. Evaluate failed cement job.	
Fluid Treatments	Continue mixing brine in reserve pit no.5 Excess ENVIROMUL was transferred down to O.B.M. tank through out day, from circulating and pumping cement and spacers. This clean mud was used as active mud, after taking out heavily contaminated mud from active to reserve pits used as slop pits for further evaluation and treatment.	
Losses & Gains	Cement and spacers leaked in to annulus and heavily contaminated the active ENVIROMUL, cause of incident under investigation. A total of 91 m3 diverted to slops.	
For report #033A on 29/Dec/2001		Operation at depth(m) 3643
Activity	Testing B.O.P.	
Rig Activity	Continue pulling out with liner hanger. Retrieved hanger observed washout in equalizing ports. Started testing BOP's.	
Fluid Treatments	Continue mixing brine. Added retarder to slops in reserve pit no.2 and 4 to avoid cement/mud mixture to setup.	
Losses & Gains	Reserve pit no.4 yesterday specified as slops shipped back to McFee Tide as ENVIROMUL 50/50 o/w Part of the OBM Mixture on board McFee Tide brought back on board to OBM tank on rig.	
For report #034A on 30/Dec/2001		Operation at depth(m) 3643
Activity	Tripping	
Rig Activity	Run in hole and drilled out wiper plug and shoe. Start pulling out of hole.	
Fluid Treatments	Continue mixing brine. Start mixing Kcl/polymer mud for next section so far mixed 158 m3.	
For report #035A on 31/Dec/2001		Operation at depth(m) 3643
Activity	Tripping	
Rig Activity	Continue pulling out of hole. Pick up 3 1/2" drill pipe and run in hole to 3643 m squeeze cement. Held pressure for four hour's. Start pulling out with cement stinger.	
Fluid Treatments	Continue mixing Kcl/polymer mud for next section. Preparing surface pits for Kcl/polymer fluid and for displacement spacer's.	
For report #036A on 01/Jan/2002		Operation at depth(m) 3643
Activity	Tripping	
Rig Activity	Continue pulling out of hole with cement stinger. Lay down 12 1/4" BHA . Slip and cut drill line. Make up and run in hole with 8 1/2" BHA.	
Fluid Treatments	Continue preparing surface pits for displacement.	
For report #037A on 02/Jan/2002		Operation at depth(m) 3657
Activity	Drilling	
Rig Activity	Continue run in hole with 8 1/2" bit . Tag cement at 3390 meters dressed of soft cement and start displace well to Kcl/polymer drilling fluid. Stop pumping after displacement to clean flow line.Continue drilling to 3657 meters. Circulated bottoms up and started pulling out to pick up coring assembly.	
Fluid Treatments	Continue prepare for displacement to kcl/polymer drilling fluid. Performed SJA and prejob meeting. Started displacement Pumped approx. 15 m3 followed by 9 m3 flush pill and 9 m3 hi vis pill. Sharp interface at surface most of base oil recovered in OBM fluid. Soap pill diverted to slop pit (+- 10 m3). At present mixing up more unweighted Kcl/polymer fluid to controle weight.	



Well: 6507/5-5 Skarv 4
Operator: BP Norway

Operations Log Recap

For report #038A on 03/Jan/2002	Operation at depth(m) 3736
Activity	Tripping
Rig Activity	Continue to P.O.O.H. Build up coring assembly and run in hole to 3655 m. Circulate bottoms up and cut core # 1 to 3736 m. Flow check and P.O.O.H.
Fluid Treatments	No treatment to active today.
For report #039A on 04/Jan/2002	Operation at depth(m) 3736
Activity	Reaming (MWD Logging)
Rig Activity	Continue pulling out with core # 1. Lay down coring assembly, 100% recovery. Pick up new 8 1/2 in. bit and run in hole to 9 5/8 in. shoe at 3642 m. to begin logging cored section with MWD tool.
Fluid Treatments	No treatment to active.
For report #040A on 05/Jan/2002	Operation at depth(m) 3950
Activity	Drilling
Rig Activity	Continue MWD logging open hole to 3736 meter. Drill 8 1/2" hole to 3950 meter circulated hole clean and pull out of hole.
Fluid Treatments	Added unweighted premix to control weight.
For report #041A on 06/Jan/2002	Operation at depth(m) 3950
Activity	Wire Line logs (Density log)
Rig Activity	Continue pulling out of the hole. Rig up Schlumberger and start logging.
Fluid Treatments	Flushing brine tank used for storage of water based drilling fluid prior to displace out OBM.
For report #042A on 07/Jan/2002	Operation at depth(m) 3950
Activity	Wire Line logs
Rig Activity	Continue to run MDT (density log)
Fluid Treatments	Flushed out and inspected pontoon brine tank,OK.
For report #043A on 08/Jan/2002	Operation at depth(m) 3950
Activity	Wire Line logs
Rig Activity	Continue logging
Fluid Treatments	No treatments to active system. Leak of seawater through faulty valve into 15 m3 KCL/Polymer reserve mud in Reserve Pit # 3, increase of 15 m3. Dumped pit , action taken to replace faulty valve.
For report #044A on 09/Jan/2002	Operation at depth(m) 3960
Activity	Rig up and run 7 in. Liner
Rig Activity	Finished running wire line logs. Started to run 7" liner, and had run to 396 meter at midnight.
Fluid Treatments	No mud treatment to active system.
For report #045A on 10/Jan/2002	Operation at depth(m) 3950
Activity	Wait on Weather
Rig Activity	Run 7 in. liner. Due to bad weather: 60 kt wind & 5 meter heave,suspend operations, pick up hang-off tool and hang off string at 1975 m. Wait on weather.
Fluid Treatments	No mud treatment to active. Transferred active mud from Act. Pit # 1, to Res. Pit # 4, so as to use pit for pumping seawater in case of disconnecting riser due to weather.
For report #046A on 11/Jan/2002	Operation at depth(m) 3950
Activity	Wait on...Weather
Rig Activity	Waiting on weather, which calmed down somewhat. Prepared for continuing to run liner, by releasing hanger tool.
Fluid Treatments	No mud treatments to active. Clean pits for receiving NaCL brine.
For report #047A on 12/Jan/2002	Operation at depth(m) 3950
Activity	Tripping
Rig Activity	Circulated and washed down 7 inch liner to 5 m. off bottom without problems. Pulled up 5 m and set it. Shoe at 3938.8 meter. Cemented the liner as per program and pulled out with the running string.
Fluid Treatments	Received 322 m3 NaCL brine at 1.20 Sg from Tor Viking. Expect some brine(maybe 25 m3 ?) to remain on board the boat. Circulated before pumping 7 m3 weighted spacer and then 8 m3 cement. Reverse circulated out excess cement. A mixture of mud and cement was dumped when it appeared at the shakers, probably containing 1 m3 pure cement.



Well: 6507/5-5 Skarv 4
Operator: BP Norway

Operations Log Recap

For report #047A on 12/Jan/2002		Operation at depth(m) 3950
Losses & Gains	Circ out cmt. Had to dump cmt and 11 m3 KCL-mud. NaCL 28 m3 transfer loss on the boat Tor Viking	
For report #048A on 13/Jan/2002		Operation at depth(m) 3950
Activity	Tripping	
Rig Activity	Finished pulling out running string for 7" liner. Ran in hole with 6" bit and scrapers to drill out cement and scrape inside 7"liner. Displaced the well to 1.20 Sg NaCL brine.	
Fluid Treatments	Displaced well to 1.20 Sg NaCL brine, by first pumping 15 m3 seawater spacer and a 9 m3 havis pill made of NaCL brine and Barazan, in front of the brine. The spacers in return were dumped at the surface, to sea. All KCL/polymer mud left in shaker pits etc. was dumped, and the pits cleaned.	
Losses & Gains	Used 11 m3 NaCL brine for havis spacer which was dumped to sea. Lost another 11 m3 to the sea while displacing.	
For report #049A on 14/Jan/2002		Operation at depth(m) 3950
Activity	Evaluate influx problem/ pressure testing	
Rig Activity	Pulled out with the scraper BHA. Pressure tested the 7" Liner. Discovered a leak which increased. Got an influx afterwards. Had to close the shear ram. Got a pressure build up to approximately 50 Bar. Pressure tested more to try to analyze and collect data, and to find out where the leak is located.	
Fluid Treatments	1.20 Sg NaCL brine in the hole, no treatment to it.	
Losses & Gains	Pressure tested 7" liner. Discovered a leak. Got an influx. Pressured up several times to try to analyze, get data and find out where the leak is and what kind of influx it is.	
For report #050A on 15/Jan/2002		Operation at depth(m) 3950
Activity	Circulating. Wait on boat w.brine	
Rig Activity	Tried to localize where the leak and influx comes from, by bleeding of pressure via the chokeline and circulating out. No fluid from the leak was identified as hydrocarbones or lighter than the 1.20 sg brine. The flow was low enough to run in hole with drillpipe, without the bag closed. This was done while waiting for a boat to come from Kristiansund, loaded with 1.50 sg sodium bromide brine to kill the well.	
Fluid Treatments	No treatment to the NaCL-brine.	
Losses & Gains	Lost 28 m3 while pumping in and out of leakage under constant over-pressure. Also dumped trip tank to sea several times, because the tank had to be emptied as quick as possible, due to measurements.	
For report #051A on 16/Jan/2002		Operation at depth(m) 3950
Activity	Prepare to displace to Na/Br brine	
Rig Activity	Continue trouble shooting to detect influx area. Run in hole to to of liner at 3532 m.	
Fluid Treatments	Received 272 m3 of Na/Br @ 1.50 sg. Hold Pre job meeting at drillfloor prior to displace the well to 1.50 Na/Br brine.	
For report #052A on 17/Jan/2002		Operation at depth(m) 3950
Activity	Cond. mud & Circ.	
Rig Activity	Displace hole to 1.5 sg sodium/Bromide brine. Displaced riser to 1.5 sodium bromide brine. Flow checked well. Displaced riser back to 1.2 sg sodium brine. Circulate hole through choke with 1.5 sg sodium/bromide brine.	
Fluid Treatments	Mixing 1.5 sg Bentonite mud for displacing the riser.	
For report #053A on 18/Jan/2002		Operation at depth(m) 3950
Activity	Run RTTS Packer	
Rig Activity	Displaced riser to 1.5 sg. bentonite mud left 20 m3 bromide brine at top of BOP's. Flow check ok. Pull out of hole. Run in hole with RTTS packer. Displaced riser to 1,5 sg bromide brine.	
Fluid Treatments	Received 175 m3 sodium/Bromide brine.	
For report #054A on 19/Jan/2002		Operation at depth(m) 3950
Activity	Tripping	
Rig Activity	Continue to run in hole with RTTS packer. Pressure test casing found leak to be between 2054 m and 2682 m. Pull out of hole with RTTS and run back in hole with 13 3/8" casing scraper to 2040 m. Worked scraper circulated bottoms up. Pull out of hole.	
For report #055A on 20/Jan/2002		Operation at depth(m) 3950
Activity	Run 7" Liner	
Rig Activity	Continue to pull out of hole with 13 3/8" casing scraper. Rig up and run in hole with 7" liner to 1509 m.	



Well: 6507/5-5 Skarv 4
Operator: BP Norway

Operations Log Recap

For report #055A on 21/Jan/2002		Operation at depth(m) 3950
Activity	Testing B.O.P.	
Rig Activity	Continue to run 7"scrabble liner (top at 2028 m). Set and tested same OK. Pull out of hole with landing string. Start testing BOP's.	
Fluid Treatments	Prepare spacer for displacement to 1,2 sg. sodium brine.	
For report #057A on 22/Jan/2002		Operation at depth(m) 3950
Activity	Tripping	
Rig Activity	Sodium Bromide brine in the hole. Ran in hole with 3.5 inch cleanup string to 3874 meter. Will displace the hole to 1.20 SG sodium chloride brine.	
Fluid Treatments	Backloaded 91 m3 1.50 SG sodium bromide brine to Tor Viking 25 kg Barazan used in a havis sodium chloride brine spacer.	
For report #058A on 23/Jan/2002		Operation at depth(m) 3950
Activity	Tripping out	
Rig Activity	Displaced the well from Bromide brine to 1.20 SG sodium chloride brine in two steps. First below the riser, then flow checked well, then displaced the riser. Overdisplaced and dumped much NaCL brine, to ensure 1.20 SG all around. Backloaded 220 m3 Bromide brine at 1.46 SG to Tor Viking. Tripped out with cleanup string.	
Fluid Treatments	Displaced the well below the BOP to 1.20 SG, by pumping a 4 m3 NaCL havis spacer in front of NaCL brine,down the drill pipe and up the choke line, utilizing full volume control. Expected to see spots of influxed OBM in return, and when it appeared at the shakers, sand and cuttings was suddenly seen being sceneed out. 5 m3 OBM was taken via the trip tank to DCBs (skips for slops). The havis spacer was diverted to a slugpit and dumped. Overdisplaced much to ensure 1.20 SG in the well. Displaced the riser using 5 m3 havis in front of the NaCL brine. The last batch NaBr displaced out from the top of the riser, was contaminated with NaCL brine and was collected in a small pit and later diluted with drill water to 1.20 SG.	
For report #059A on 24/Jan/2002		Operation at depth(m) 3950
Activity	Drill Stem Test	
Rig Activity	Pick up hoses. P.U. cement stand. P.U. perforation guns. Ran in hole with guns. Run 3.5 inch pipe.	
Fluid Treatments	No treatment to the brine today. Inventory reconciled.	
For report #060A on 25/Jan/2002		Operation at depth(m) 3950
Activity	Drill Stem Test	
Rig Activity	Continued to run guns into hole on 3 1-2 d/p.	
Fluid Treatments	No brine treatments made today. Enviromul, base oil back loaded onto Tor Viking with some chemicals. One engineer released.	
For report #061A on 26/Jan/2002		Operation at depth(m) 3950
Activity	Drill Stem Test	
Rig Activity	Continued to rih with dst assembly. Correlated TCP guns and pulled out dummy fluted hanger. Identified that a piece of junk had entered the well. Held meeting on rig and with town - decision taken to continue to run in hole.	
Fluid Treatments	Building push pill and kill pill. Circulating sea water over the top of the well on the trip tank.	
For report #062A on 27/Jan/2002		Operation at depth(m) 3950
Activity	Drill Stem Test	
Rig Activity	Continued to run in hole with DST assembly.	
Fluid Treatments	Continued to build push and kill pills. Circ trip tank on sea water across well.	
For report #063A on 28/Jan/2002		Operation at depth(m) 3950
Activity	Drill Stem Test	
Rig Activity	DST activity plus flaring	
Fluid Treatments	Concluded building push and kill pills.	
For report #064A on 29/Jan/2002		Operation at depth(m) 3950
Activity	Drill Stem Test	
Rig Activity	Continued withwell testing\ flaring operations	
Fluid Treatments	Rec'd brine from skandi stoleman	



Well: 6507/5-5 Skarv 4
Operator: BP Norway

Operations Log Recap

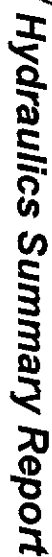
For report #065A on 30/Jan/2002		Operation at depth(m) 3950
Activity	Drill Stem Test	
Rig Activity	Continued with DST	
Fluid Treatments	Treated active and reserve pits with lime, to ensure pH above 9.5. Transferring reserve brine to surface	
For report #066A on 31/Jan/2002		Operation at depth(m) 3950
Activity	Tripping	
Rig Activity	Held tool box talk with regards to well kill operations on drill floor. After several attempts well was reverse circulated and tubing contents - hydrocarbons flared off. Lined up well to pump kill pill via cement unit. pumped 70 bbls of kill pill into string and displaced it with brine. Closed in the well and proceeded to follow bull heading procedure. Pressure increase was noted as soon as pill hit formation. Pressure was bled off and well monitored on t.tank - static. S-w in riser was circulated out to 1.2 sg nacl brine 20 m3. After several attempts well was circulated on brine, when kill pill returned to surface with small traces of hydrocarbons it was diverted to reserve 2 for storage.	
Fluid Treatments	Collected returned kill pill in res 2. Cleaning slug pits for cement spacers.	
For report #067A on 01/Feb/2002		Operation at depth(m) 3950
Activity	Tripping	
Rig Activity	POOH w- tubing	
Fluid Treatments	Building 1.5 sg wbm for displacement prior to cutting 13 3/8 ths csg later. Cleaning-preparing slug pits to build cement spacer and phg.	
For report #068A on 02/Feb/2002		Operation at depth(m) 3950
Activity	Tripping	
Rig Activity	Set ezsv on w-line. R\down w-line. Displaced riser to s-w in evident of unlatching. L-out d/p wow	
For report #069A on 03/Feb/2002		Operation at depth(m) 3950
Activity	Tripping	
Rig Activity	L\out pipe, wow. Plug m\up cement stinger. RIH w\ stinger.	
Fluid Treatments	Built cement spacers in slug 1 and 2. Re-displaced riser to brine.	
For report #070A on 04/Feb/2002		Operation at depth(m) 3950
Activity	Tripping	
Rig Activity	RIH w\ cement stinger. Stung into ezsv at 3,641 ft. Attempted to inject fluid to establish injectivity rates - no go - formation tight. Pulled above packer and set cement on top. Pulled above packer and reverses circulated out string contents, diverted any contamination to slops pits - no cement observed. Pressure tested csg. D\placed 18 m3 of slops to well and continued to POOH.	
Fluid Treatments	Concluded building cement spacer. Built 100 bbls phg bentonite mud to 1.5 sg. Pumped slops away after cement job. Added 1 ppb hec to 1.5 sg mud for later displacement. Broke down and packed away mud lab equipment for b-load.	
For report #071A on 05/Feb/2002		Operation at depth(m) 3950
Activity	Tripping	
Rig Activity	RIH, set ezsv @ 2018 m , good evidence of shear coming off the packer. Pumped 40 bbls 1.56 sg spacer, 54 bbls cmt, displaced with 4.9 bbls spacer and 122 bbls brine to balance plug. Pulled back three stds. Pressure tested csg to 1,000 psi above LOT. Displaced 40 m3 slops to well. POOH.	
Fluid Treatments	Building remainder of 1.5 sg mud required for final displacement. No cement observed in returned fluid from reverse circulation. B-loaded mud lab kit, soda ash, ezmul, baracor 95, hec.	
For report #072A on 06/Feb/2002		Operation at depth(m) 3950
Activity	Tripping	
Rig Activity	Continued to POOH and l\out d\pipe on trip out. R\ up ezsv to set in 13 3/8 ths. 1st attempt to set at 643 -failed miss fire. Re-run plug set. POOH with w-line and r-down same. RIH with casing cutting assembly to 633m .	



Well: 6507/5-5 Skarv 4
Operator: BP Norway

Operations Log Recap

Date	Operations Log Recap
Fluid Treatments	Concluded building 1.5 sg mud. Charged off remaining barite\bentonite as blown off. (tomorrow)



Well: 6507/5-5 Skarv 4
Operator: BP Norway

[illegible]



Hydraulics Summary Report

Well: 6507/5-5 Skarv 4
Operator: BP Norway

[illegible]

	SKARV 4 – 6507/5-5 COMPLETION REPORT		Page: 200 of 202
Chapter: 9	APPENDIX	Date: 03/05/02	Rev: 0

□ **SMITH BIT SUMMARY**

Final tops 6507/5-5

Top of Formation	Measured depth (MD) m	TVDSS m
Seabed	393.0	375.0
Naust	865.7	847.6
Kai	1393.6	1375.4
Brygge	1888.9	1870.7
Tare	2021.7	2003.5
Tang	2062.9	2044.7
Springar	2107.2	2089.0
Nise	2181.1	2162.9
Kvitnos	2556.2	2537.9
Lysing	2753.9	2735.6
Lange	2756.7	2738.4
Lyr	3326.7	3308.4
Spekk	3338.8	3320.5
Melke	3371.5	3353.1
Garn	3648.2	3629.5
Garn A res zone	3648.2	3629.5
Garn B res zone	3670.2	3651.4
Garn C res zone	3692.2	3673.4
Garn D res zone	3702.8	3683.9
Not	3723.0	3704.1
Ile	3741.5	3722.5
Ror	3773.5	3754.4
Tilje	3831.0	3811.6
JS2	3901.6	3881.9
Åre	3925.0	3905.2
TD	3950.0	3930.0

* Please note that the Tare, Tang Springar (in particular) and Garn B tops are uncertain (depths from Geolog).

** Please note that the TVDSS are read from OpenWorks

Created: 22-Jan-02 TRO

Modified

Well Details

Operator BP	Well name / Nbr 6507/05-05	Country NOR
Well direction VERTICAL	Field name SKARV	Contractor SMEDVIG
Block 6507	Land/Offshore OFFSHORE	Rig/Platform WEST ALPHA

Bit make SEC	Bit size (Inches) 26	Bit Type SS80J4	Serial Numer 737607#1
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IADC code 415X	Jets (32nds) 18S x 2 20S x 2
Bit class TCI	T.F.A. (in2) 1.11

Run Details

Depth in (m) 471	WOB lo (tonne) 3	WOB hi (tonne) 10	Bit Pres (psi) 1057	Geological Age TERTIARY	Formation NORDLAND (589')	Lithology Codes MU
Depth out (m) 1060	RPM low 50	RPM high 120	Bit HSI 1.38			
Interval (m) 589	Flowrate (lpm) 4500		Jet Vel (m/s) 105			
Hours 51.75	Pump Pres (psi) 2600		Shoe? N			
ROP (m/hr) 11.4	Run date 04/25/2001		Run rating AVERAGE			
KREVS 264	WR 47		TE 145			

IADC Dull Grade									
I	O	D	L	B1	B2	B3	G	O	R
1	1	NO	A	E	E	E	IN	NO	TD

BHA/Directional Details

Drive type ROTARY	Motor RPM 0	Bend Angle 	Inc in 0.8	Inc out 2	Build (deg/30 m) 0.06	Rotating % 100	Rot ROP (m/hr) 11.38
Motor type 	Lobe Config 	Max DLS 0.42	Azi in 59.7	Azi out 352.2	Walk (deg/30 m) 15.14	Sliding % 	SL ROP (m/hr)
BHA Design 							

Mud details

Mud name 	Mud type SEA WATER	Mud wt (SG) 1.20
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Run Comments

Well Details

Operator BP	Well name / Nbr 6507/05-05	Country NOR
Well direction VERTICAL	Field name SKARV	Contractor SMEDVIG
Block 6507	Land/Offshore OFFSHORE	Rig/Platform WEST ALPHA

Bit make STC	Bit size (Inches) 17.5	Bit Type MSDSSHQC	Serial Numer LK9161#2
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IADC code 115	Jets (32nds) 18M x 2 14S x 1 17D x 1
Bit class MILLED TOOTH	T.F.A. (in2) 0.95

Run Details

Depth in (m) 1127	WOB lo (tonne) 8	WOB hi (tonne) 22	Bit Pres (psi) 1310	Geological Age TERTIARY	Formation NORDLAND GRP (319')	Lithology Codes MU																														
Depth out (m) 2106	RPM low 80	RPM high 135	Bit HSI 3.23	TERTIARY	KAI (727')	MU																														
Interval (m) 979	Flowrate (lpm) 3850		Jet Vel (m/s) 104																																	
Hours 32	Pump Pres (psi) 3500		Shoe? Y																																	
ROP (m/hr) 30.6	Run date 04/25/2001		Run rating AVERAGE																																	
KREVS 206	WR 203		TE 390	<table border="1"> <thead> <tr> <th colspan="10">IADC Dull Grade</th> </tr> <tr> <th>I</th> <th>O</th> <th>D</th> <th>L</th> <th>B1</th> <th>B2</th> <th>B3</th> <th>G</th> <th>O</th> <th>R</th> </tr> </thead> <tbody> <tr> <td>3</td> <td>2</td> <td>CT</td> <td>A</td> <td>E</td> <td>E</td> <td>E</td> <td>IN</td> <td>WT</td> <td>TD</td> </tr> </tbody> </table>			IADC Dull Grade										I	O	D	L	B1	B2	B3	G	O	R	3	2	CT	A	E	E	E	IN	WT	TD
IADC Dull Grade																																				
I	O	D	L	B1	B2	B3	G	O	R																											
3	2	CT	A	E	E	E	IN	WT	TD																											

BHA/Directional Details

Drive type ROTARY	Motor RPM 0	Bend Angle	Inc in 2	Inc out 0.8	Build (deg/30 m) -0.04	Rotating %	Rot ROP (m/hr)
Motor type	Lobe Config	Max DLS 0.42	Azi in 352.2	Azi out 25.8	Walk (deg/30 m) -10.00	Sliding %	SL ROP (m/hr)
BHA Design							

Mud details

Mud name	Mud type SEA WATER	Mud wt (SG) 1.50
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Run Comments

Control drilled at 30-40 m/hr due to losses. Problems at 1590 m with blown circuite to the break. Pulled back to shoe, only able to rotate 10 RPM. Slight overpull. Stringers at 1866-1889m (Glaucanite), 1894.1898m, 2027-2029m (Chert). No problems encountered with on bottom balling with 3 X pumps and possible large center jet?

RunReport on 17.5" MSDSSHQC
Skarv 4 6507-5-5

Smith Bits recommended a milled tooth bit for this section, due to the relatively high risk of balling and for the best ROP potential. The bit recommended, features centre jet for effective cleaning in between the cones and to prevent sticky clay from accumulating.

To ensure the most efficient bit hydraulics, the nozzles were set up so that there was generated crossflow. Nozzles put in, was a 17/32 diffuser in centre, which was the biggest available, the rest was, one standard 14/32 nozzle, and two 18/32 Mini jets. Mini Jets help in increasing the flow speed closer to the ground, giving more efficient HSI.

Other features on bit were, self-sharpening cutters as they wear out, Diamond enhanced inserts on gauge, tungsten carbide inserts on heel row and flow-plus tubes.

The bit, used on a packed assembly, started in Nordland GP and ended in Kai formation, this was a total length of 979m. The lithology was mudstone.

Inclination was 2.0 Deg in and 0.8 Deg out.

The bit was control drilled in Nordland due to losses to formation. The ROP was restricted to 30-40 m/hr. At 1590m the circuit to the break failed, so had to pull back to shoe while fixing this.

When drilling Kai formation hard stringers were encountered at 1866-1889m. Those stringers were predominantly composed of Glauconite.

And just before shoe at 1894m, 1898m and from 2027-2029m there were stringers consisting of chert. This forced the drillers to use higher WOB and lower RPM to penetrate the formation. WOB 19.4 klbs and RPM 100 were used.

All three mud pumps were up and running, giving a good and steady flow. This minimized the risk of balling, because that can happen in minutes if the right conditions are met.

The nozzle configuration and the fact that over 35% of the flow went through the centre jet also helped in this matter.

Well Details

Operator BP	Well name / Nbr 6507/05-05	Country NOR
Well direction VERTICAL	Field name SKARV	Contractor SMEDVIG
Block 6507	Land/Offshore OFFSHORE	Rig/Platform WEST ALPHA

Bit make GEO	Bit size (Inches) 12.25	Bit Type S987BHPX	Serial Numer JR8801#1
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IADC code PDC	SPC	Jets (32nds) 16S x 9
Bit class PDC	Gauge length 3	T.F.A. (in2) 1.77

Run Details

Depth in (m) 2106	WOB lo (tonne) 6	WOB hi (tonne) 15	Bit Pres (psi) 352	Geological Age CRETACEOUS	Formation NISE (452')	Lithology Codes LS, MU
Depth out (m) 3643	RPM low 80	RPM high 180	Bit HSI 1.66	CRETACEOUS	KVITNOS (193')	LS, MU
Interval (m) 1537	Flowrate (lpm) 3600	Jet Vel (m/s) 53		LOWER CRETACEOUS	LANGE (305')	ST, SS, LS, MU
Hours 74	Pump Pres (psi) 4300	Shoe? Y		CRET-L	LANGE SS (233')	ST, SS
ROP (m/hr) 20.8	Run date 12/19/2001	Run rating ABOVE AVERAGE		CRET-L	LYR (48')	ST, LS, MU
KREVS 577	WR 245	TE 1090		JURA	SPEKK (34')	LS, MU
				JURA	MELKE (266')	LS, MU

IADC Dull Grade

I	O	D	L	B1	B2	B3	G	O	R
2	3	WT	S	X	X	X	IN	CT	TD

BHA/Directional Details

Drive type ROTARY	Motor RPM 0	Bend Angle	Inc in 0.6	Inc out 3.2	Build (deg/30 m) 0.05	Rotating % 46	Rot ROP (m/hr) 45.03
Motor type	Lobe Config	Max DLS 0.2	Azi in 275	Azi out 331	Walk (deg/30 m) 1.12	Sliding %	SL ROP (m/hr)
BHA Design							

Mud details

Mud name	Mud type OIL	Mud wt (SG) 1.58
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Run Comments

Bit supplied with the new Armorseal, no erosion compared to 45 hrs run with S91 on Skarv3. Problems encountered when drilling shoe, drilled for 8 hrs. Best parameters for drilling out the shoe, float equipment where 1000 l/min, 15 T WOB and 60-70 RPM. Had almost flat TQ respons before breaktrough, when breaktrough TQ up to 25 kftlbs. Drilled Nise, Kvitnos whitout any problems, instantaneous ROP of up to 200 m/hr. When drilling Limestone stringers ROP went down to 1 m/hr, and problems with stickslip where encountered. Forced to use high RPM and low WOB (180,6klbs). Dullgrade reflects use of high RPM with a dull of 3 on the shoulder. On bottom ROP was in average 46 m/hr, with conn. 21 m/hr.

Run Report on 12 ¼" S987BHPX
Skarv 4 6507-5-5

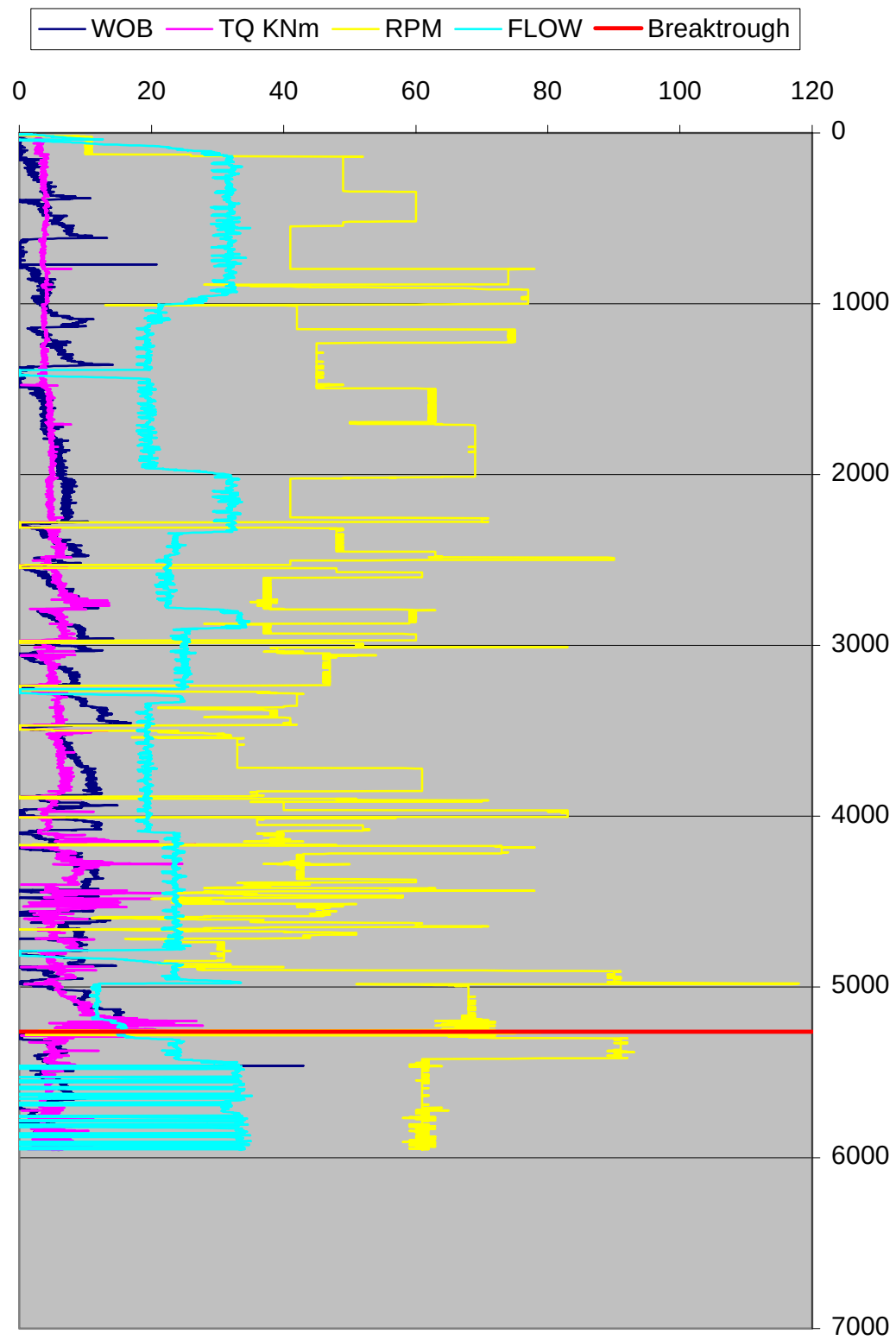
Smith Bits recommended a relatively new bit design with 5 blades and 22mm cutters for the 12 ¼" section, based on previous learnings from Skarv 3, where the same type of bit drilled the last 750 m to TD without any kind of problems. The Skarv 3 well was drilled with water-based mud, and an anti balling bit as this was needed to overcome the balling problems encountered when drilling the section. But, this also showed us that we probably could drill the entire 12 ¼" section in one run on the next Skarv well, with the very same type of bit, and modify the parameters through the sandy formation, to prevent erosion, and limit the wear on the cutters. On the last well there was clear signs of erosion on the bit body, probably from drilling the Lysing sands. Although the use of the OBM system on this well should alleviate any balling problems, the steel body bit drilled the harder portion of the well through the Lysing and Lange formation and was pulled 1-2-WT. As cutting structure wear was not an issue on the previous well, the aim was to increase ROP still further with a similar or lighter set design.

For this well Smith Bits chose the same type of bit, just that this had a feature called "ArmourSeal", which basically is hardfacing sprayed on the blades and also covering the cutters. This hardfacing seemed to work extremely well; there was no erosion what so ever on the bit body. This run was, in comparison, twice the hours, compared to the run on Skarv 3, where we saw some erosion on the shoulder of the bit.

Balling lessons learned from Skarv 3 with the WBM showed optimum performance with LOW H.S.I and high flow to create maximum fluid dispersion between the blades and reduce the risk of "cutting through" any potential packed off area with high fluid velocity. To take account for this, the bit chosen for this well featured extra nozzles, nine in the number. The nozzle size was 9 X 16/32 Series 60 N.

When drilling out the shoe, some problems were encountered, probably due to the high cutter diameter (22mm). Used 7-8 hrs to get the bit to bite in the plug. Best parameters for drilling out the shoe in the future will be low flow, high WOB, and low RPM. On this particular assembly it seemed like 1100 l/min of flow, 70 RPM and 15 klbs WOB made the cutters dig in to the plug.

Timebased parameters used to drill plug



After drill-out process, the S987BHPX began its run at 2107m into the Nise formation. This is a very soft and sticky formation, where several bits have been balling up in the past. Considerations about not spudding the bit once out of shoe were taken (read low WOB, high RPM). Continued drilling in to Kvitnos formation, with instantaneous ROP's up to 200 m/hr. When drilling limestone stringers ROP came down to 1 m/hr, and SS was generated. This forced the drillers to use high RPM (180) and low WOB (6 klbs). The formation contained more limestone than the prognoses, i.e more SS was generated than we were expecting. Lange and Lange SS formations were drilled with average ROP's of 43 m/hr, and instantaneous ROP's of up to 173 m/hr.

Lyr formation was drilled at 20 m/hr in average and the instantaneous was on its top around 40 m/hr. In the Spekk formation it softened up a little bit again, and average ROP was 30 m/hr and maximum was 60 m/hr. The Melke formation was drilled at an average of 15 m/hr, with maximum of 45 m/hr. The run was controlled in the end to find casing point.

At 3450m MD, in the Melke FM, the rig was ready to pull out of hole with this bit due to low ROP. After consultation with the drilling optimisation engineer from Smith, some points for consideration were generated, and composed in an email and sent to the rig. In all briefness collected below:

1. Trip time with average 150 m/hr in open hole and 600 m/hr in casing, will be from where we are now (3450m): 25 Hrs.
1.5-2 Hrs to change bit, plus additional time to check LWD, maybe also download it. Will give us a total of about 30 Hrs.
2. Let us say we are drilling the rest of the section, 250 m, with this bit and averages about 10 m/hr, the remaining section will be drilled in 25 Hrs!

Average ROP	10 m/hr	9 m/hr	8 m/hr	7 m/hr	6 m/hr	5 m/hr	4 m/hr
Hours to TD with current bit	25 hrs	27 hrs	31 hrs	35 hrs	41 hrs	50 hrs	62 hrs

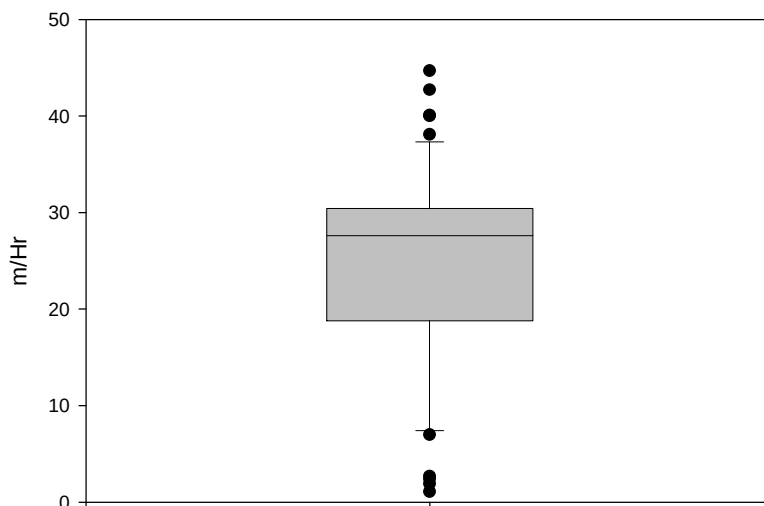
3. If we trip and get a sharp new bit in the hole, we will use (best case scenario) about 43 Hrs to TD, with connections. This is with average ROP's of 20 m/hr. So we are actually good for not tripping with average ROP's of down to 6 m/hr.
4. As the geologist said we are now in the base of a carbonate bed, so we have then been drilling the last stand pretty much with stringers. With average ROP's of 4-10 m/hr in the stringers this bit is not doing so very bad after all.
5. The new bit (MRS89), which is a rebuild and owned by the platform group, will probably have to be rebuilt for the platform group if used. And this will cost you guys about 36000\$ to do.
6. The new bit (MRS89) is a heavier set bit (6 blades 19mm) and will, in the shales drill slower, than the one in the ground right now. In hard carbonates it will probably drill something like this one, with potential for giving it some more WOB without SS, and also little bit higher ROP. Offsets shows us that the ROP's sometimes came down to below 1 m/hr in the hard carbonates, with all types of bits.
7. Since there is no indication of this bit not torquing up when giving it some WOB, the bit should be in good shape.
8. One of the objectives with this well was to drill the 12.25" section with one bit.

9. From the Skarv2 well they had 50 % of the ROP in between 10-20 m/hr, which gave a median of 13-14 m/hr, but with peaks up to 40 m/hr and down to below 1 m/hr. We do not necessary need peaks up to 40 m/hr to have a good average trough Melke!
10. I just do not want to do what they did on Tambar K6 you know, with pulling the bit for ROP (MRS89 came out green), and when they went in with the new bit (FM2961), the resistivity in the Limestone dropped from 10 Ohms down to 0.8 Ohms, whitin 1 m! So the bit that they pulled would probably have picked up on the ROP once it had drilled one more meter.
11. This all depends on what is left to drill, if 25 % of the formation left is stringers/carbonates, I think we are better of going with this bit, due to the increased ROP's which will be achieved in the shales compared to a heavier set bit. If the remaining formation contains 75 % stringers/carbonates I would probably lean more to where you want to go. Just because you will get a bigger operating window, regarding WOB, with a heavier set bit, and potentially get higher ROP.

From my point of view, it looks like we have had in the Melke FM (Top at 3372m MD) an average ROP of 37-38 m/hr, on bottom! This is the data from the mudlog.

We can from this mudlog see that we are about 10 m/hr better than the offset anyway, at least up to 3420m MD, with instantaneous ROP's of up to 46-47 m/hr.

Instantaneous ROP in Melke FM



Regards,
Smith Drilling Optimisation Engineer

Formations drilled were as follows:

* Nise	452m	LS, MDST	}	Cretaceous
* Kvitnos	193m	LS, MDST		
* Lange	305m	SS, ST		
* Lange SS	233m	SS, ST		
* Lyr	48m	ST, LS	}	Jurassic
* Spekk	34m	LS, MDST		
* Melke	266m	LS, MDST		

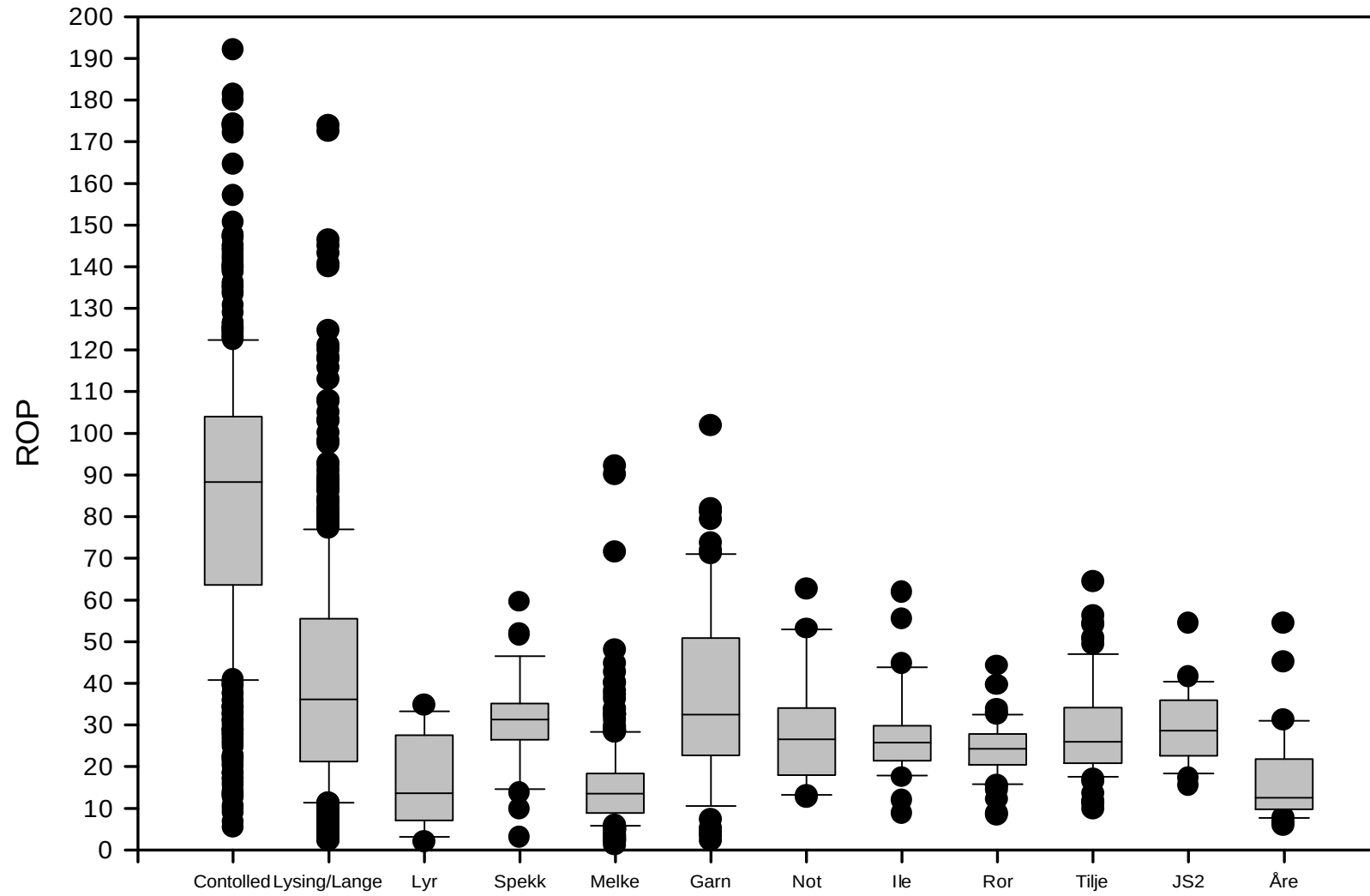
Sandstone and limestone stringers are detrimental to bit wear if being drilled with high RPM. Sandstone stringers are very abrasive, while limestone stringers generate heat build up and make small fragments of the cutter to chip of.

It was recommended to drill those stringers with as high WOB as possible and as low RPM as possible without inducing torsional and/or lateral vibrations, to achieve high penetration rate through those stringers to. But with such an aggressive bit this is difficult to do, so some SS was initiated and mitigated ASAP. The dullgrade reflects the fact that to mitigate SS, RPM is the best solution, due to the more worn cutters on shoulder.



This was the best run ever on this field. The same section has never been drilled with one bit before. With an average ROP of 45 m/hr on bottom and 21 m/hr with connections, this is now a benchmark on the Skarv field.

S987BHPX on Skarv 4



Well Details

Operator BP	Well name / Nbr 6507/05-05	Country NOR
Well direction VERTICAL	Field name SKARV	Contractor SMEDVIG
Block 6507	Land/Offshore OFFSHORE	Rig/Platform WEST ALPHA

Bit make STC	Bit size (Inches) 8.5	Bit Type SVH	Serial Numer LR3351#1
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IADC code 215	Jets (32nds) 18M x 2 12S x 1
Bit class MILLED TOOTH	T.F.A. (in2) 0.61

Run Details

Depth in (m) 3643	WOB lo (tonne) 0	WOB hi (tonne) 10	Bit Pres (psi) 517	Geological Age	Formation	Lithology Codes
Depth out (m) 3643	RPM low 60	RPM high 80	Bit HSI 2.11			
Interval (m) 0	Flowrate (lpm) 1500	Jet Vel (m/s) 64				
Hours 6	Pump Pres (psi) 1600	Shoe? Y				
ROP (m/hr) 0.0	Run date 12/31/2001	Run rating AVERAGE				
KREVS 25	WR 181	TE 65				

IADC Dull Grade

I	O	D	L	B1	B2	B3	G	O	R
1	1	NO	A	X	X	X	IN	NO	TD

BHA/Directional Details

Drive type ROTARY	Motor RPM 0	Bend Angle	Inc in	Inc out	Build (deg/30 m)	Rotating %	Rot ROP (m/hr)
Motor type	Lobe Config	Max DLS	Azi in	Azi out	Walk (deg/30 m)	Sliding %	SL ROP (m/hr)
BHA Design							

Mud details

Mud name	Mud type OIL	Mud wt (SG) 1.58
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Run Comments

Drilled junk from liner running tool, whiper plug, landing collar, float collar and shoe. Cement job failed, due to leak/failure of liner running tool sleeve.

Well Details

Operator BP	Well name / Nbr 6507/05-05	Country NOR
Well direction VERTICAL	Field name SKARV	Contractor SMEDVIG
Block 6507	Land/Offshore OFFSHORE	Rig/Platform WEST ALPHA

Bit make STC	Bit size (Inches) 8.5	Bit Type 15GFDG	Serial Numer MJ1200#1
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IADC code 447X	Jets (32nds) 18M x 2 12S x 1
Bit class TCI	T.F.A. (in2) 0.61

Run Details

Depth in (m) 3643	WOB lo (tonne) 4	WOB hi (tonne) 10	Bit Pres (psi) 1090	Geological Age MIDDLE JURASSIC	Formation GARN (12')	Lithology Codes SH, SS
Depth out (m) 3655	RPM low 100	RPM high 100	Bit HSI 7.40			
Interval (m) 12	Flowrate (lpm) 2500		Jet Vel (m/s) 106			
Hours 2	Pump Pres (psi) 3000		Shoe? N			
ROP (m/hr) 6.0	Run date 01/03/2001		Run rating AVERAGE			
KREVS 12	WR 181		TE 22			

IADC Dull Grade									
I	O	D	L	B1	B2	B3	G	O	R
1	1	NO	A	X	X	X	IN	NO	TD

BHA/Directional Details

Drive type ROTARY	Motor RPM 0	Bend Angle	Inc in	Inc out	Build (deg/30 m)	Rotating %	Rot ROP (m/hr)
Motor type	Lobe Config	Max DLS	Azi in	Azi out	Walk (deg/30 m)	Sliding %	SL ROP (m/hr)
BHA Design							

Mud details

Mud name	Mud type OIL	Mud wt (SG) 1.20
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Run Comments

Drilled to corepoint

Well Details

Operator BP	Well name / Nbr 6507/05-05	Country NOR
Well direction VERTICAL	Field name SKARV	Contractor SMEDVIG
Block 6507	Land/Offshore OFFSHORE	Rig/Platform WEST ALPHA

Bit make GEO	Bit size (Inches) 8.5	Bit Type M50	Serial Numer JQ8519#6
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IADC code PDC	SPC	Jets (32nds) 12S x 6
Bit class PDC	Gauge length 2.5	T.F.A. (in2) 0.66

Run Details

Depth in (m) 3736	WOB lo (tonne) 2	WOB hi (tonne) 6	Bit Pres (psi) 586	Geological Age LOWER JURASSIC	Formation ?RE (214')	Lithology Codes MU																														
Depth out (m) 3950	RPM low 100	RPM high 130	Bit HSI 3.18																																	
Interval (m) 214	Flowrate (lpm) 2000		Jet Vel (m/s) 78																																	
Hours 11	Pump Pres (psi) 3000		Shoe? N																																	
ROP (m/hr) 19.5	Run date 01/07/2002		Run rating AVERAGE																																	
KREVS 76	WR 119		TE 79	<table> <tr> <th colspan="10">IADC Dull Grade</th> </tr> <tr> <th>I</th><th>O</th><th>D</th><th>L</th><th>B1</th><th>B2</th><th>B3</th><th>G</th><th>O</th><th>R</th> </tr> <tr> <td>2</td><td>3</td><td>CT</td><td>S</td><td>X</td><td>X</td><td>X</td><td>IN</td><td>WT</td><td>TD</td> </tr> </table>			IADC Dull Grade										I	O	D	L	B1	B2	B3	G	O	R	2	3	CT	S	X	X	X	IN	WT	TD
IADC Dull Grade																																				
I	O	D	L	B1	B2	B3	G	O	R																											
2	3	CT	S	X	X	X	IN	WT	TD																											

BHA/Directional Details

Drive type ROTARY	Motor RPM 0	Bend Angle	Inc in 5.1	Inc out 6.6	Build (deg/30 m) 0.06	Rotating %	Rot ROP (m/hr)
Motor type	Lobe Config	Max DLS 0.49	Azi in 339	Azi out 340	Walk (deg/30 m) 0.04	Sliding %	SL ROP (m/hr)
BHA Design							

Mud details

Mud name KCL	Mud type WATER BASE MUD	Mud wt (SG) 1.20
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Run Comments

Reaming Tilje formation at 25-30 m/hr. Drilling ?re formation at 20 m/hr. Some SS seen in limestone stringers.

RunReport on 8.5" M50
Skarv 4 6507-5-5

This rerun PDC bit was picked up to drill the remaining section at a faster rate than the previous rockbit used to drill to corepoint. The bit started drilling new formation at 3736mMD after reaming the cored section at 25-30m/hr. Drilled the Åre formation at 20 m/hr to TD of the well.

When drilling new formation some stickslip was occasionally initiated in the densest formations.

The bit was a 6 bladed 13 mm cutter bit. It was a rerun from Gyda 2/01-A13 where it drilled 586 m in 4 runs.

ROCK BIT EVALUATION



SIZE	17 1/2"	TYPE	MSDSSHQC	SERIAL NO.	LK9161#2
CLIENT	BP	WELL	6507/05-05	RIG	W. ALPHA

COMMENTS

- Bearings/seals:** Cone #1 looser than other two. Cone #2 is tight. Cone #3 is tight, but feels it may have some fluid invasion in the bearing or there may be some seal nibbling. Total bit revolutions for all runs are 232 KREVS
- Cutting structure:** Gauge-Chipped teeth. Inner-Chipped teeth and self-sharpening wear. Heel-Minimal wear to chiseled heel. Cone Shell-Erosion to spear point and heel.
- Legbacks & Q-tubes:** In good condition. Some wear to Q-tubes on the outlet edge.

IADC DULL GRADING

Cutting Structure				Bearing/Seal			Gauge	Other	Reason Pulled
I	O	CH	L	# 1	# 2	# 3	G	O	R
3	2	CT	A	E	E	E	IN	SS,ER	TD

RECOMMENDATIONS

- ☒ Scrap ☐ Rerun
☐ Refurbish ☐ Teardown evaluation

Customer's Approval:

X: _____

BIT RUN PERFORMANCE & OPERATING PARAMETERS

Depth Out (m)	2106	Interval (m)	979	Rot. Hours	32	ROP (m/hr)	30.6
WOB (T)	8-22	RPM	80-135	Flow (LPM)	3850	KRevs.	206
Mud Wt (g/cc)	1.5	Pump BAR	241	Total Energy	389	Inc in/out	2/1



Engineer	Eric Leuenberger	Date	22/2/02	Gauge Ring Serial No.	7405
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PDC BIT EVALUATION



SIZE	12.25"	TYPE	S987BHPX	SERIAL NO.	JR8801
CLIENT	BP	WELL	6507/05-05	RIG	WEST ALPHA

IADC DULL GRADING									
Cutting Structure				Bearing/Seal			Gauge	Other	Reason Pulled
I	O	DC	L	# 1	# 2	# 3	G	O	RP
3	4	WT	S	X	X	X	IN	CT	TD

	Blade 1				Blade 2				Blade 3				Blade 4				Blade 5			
Cutter No	Cutter Size mm	Wear (0-8)	Major Wear	Minor Wear	Cutter Size mm	Wear (0-8)	Major Wear	Minor Wear	Cutter Size mm	Wear (0-8)	Major Wear	Minor Wear	Cutter Size mm	Wear (0-8)	Major Wear	Minor Wear	Cutter Size mm	Wear (0-8)	Major Wear	Minor Wear
1	19	2	CT										19	4	BT					
2	19	2	CT										19	8	BT	DL				
3	19	4	BT						19	4	CT	SP	19	2	CT					
4	22	0	WT		22	0	WT		22	3	CT		22	1	WT		22	1	WT	
5	22	1	WT		22	1	WT		22	3	CT	WT	22	8	DL	WT	22	8	DL	CT
6	22	3	WT	CT	22	4	WT	DL	22	3	WT	CT	22	3	WT	CT	22	8	CT	DL
7	22	2	WT	SP	22	2	WT		22	3	WT	CT	22	3	WT	CT	22	8	DL	WT
8	22	4	WT	SP	22	3	CT	WT	22	3	WT	CT	22	3	WT	CT	22	3	WT	CT
GT	16	-	DL		16	-	DL		16	-	WT		16	-	WT		16	-	WT	CT
BRC1	13	-	NO		13	-	BT		13	-	NO		13	-	NO		13	-	NO	

BIT RUN PERFORMANCE & OPERATING PARAMETERS							
Depth Out (m)	3643	Interval (m)	1537	Rot. Hours	74	ROP (m/hr)	20,8
WOB (T)	6-15	RPM	80-180	Flow (lpm)	3600	KRevs.	577
Mud Wt (SG)	1,58	Pump P Bar	296	Total Energy	1090	Inc in/out	0,6/3,2

COMMENTS

Cutters in cone of bit is chipped or broken. This can be a result of the difficulties when drilling out the shoe. Worn, chipped and spalled cutters on shoulder of bit is believed to be a result of high RPM in limestone stringers. The ArmorSeal coating has given the bit excellent protection against erosion. Bit is possible to re-build, but most of the cuttingstructure must be replaced.



Sii-Engineer Eirik Møgedal	Ref. No. SIN7586	Customer. decision Re-run ☐ Re-build ☐ Scrap ☐	Date	Customer Signature:
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PDC BIT EVALUATION



SIZE	12.25"	TYPE	S987BHPX	SERIAL NO.	JR8801
CLIENT	BP	WELL	6507/05-05	RIG	WEST ALPHA



Blade#1, Inner. Cutters in cone of bit is chipped and spalled indication possible damage when drilling out.



Blade#1, Outer. Cutters on shoulder of bit is worn, chipped and spalled indication that wear and impact damage while drilling the limestone stringers at high RPM.



Blade#5. Same as blade#1, but with delamination of cutters on shoulder.

Sii-Engineer Eirik Møgedal	Ref. No. SIN7586	Customer. decision Re-run ☐ Re-build ☐ Scrap ☐	Date	Customer Signature:
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SMITH BITS

IADC 115

MSDSSHQ

Size

17 1/2"

(445 mm)

Grade 70C+ Hardmetal	Minimises wear for higher ROP and longer tooth life.
Cutting Structure	Aggressive cutting structure maximises ROP in medium soft formations and maintains cutting structure integrity in formation changes.
Crowned roller Bearing	Capable of low to high speed downhole motor applications by even distribution of bearing loads, reducing bearing temperature.
High speed seal system	Provides maximum bearing protection in high speed applications.
Formations	Efficiently drills very soft low compressive strength unconsolidated formations such as clays, marls, soft shale, halite, gypsum and sand.
Q-tubes	High flow rate tubes, with realignment of flow toward the hole bottom for maximum hydraulic energy can be used to further enhance effective cross-flow hydraulics.

Bearing Type	Roller-Ball-Roller	WOB	15 to 50 klbs
Seal Type	O- Ring	RPM	50 to 280
Journal Angle	32.5°	Make up torque	28 - 32 Kft-lbs
Offset	0.375"	Bit Weight	250 Kg (Gross Approx)
Number of rows	7	Box Dimensions	47cm x 47cm x 70cm
Number of teeth	77	Nozzles	Series 100/ 105 STD jets / extended jets
Connection	7 5/8" Reg.		

M - For motor applications
S - Sealed Roller Bearing
DS - Soft to medium soft formation drilling

S - Self Sharpening
H - Heel row inserts
Q - Flow tube

SMITH TOOL

It is not recommended for this bit to be run with maximum RPM and WOB at the same time. This may compromise ROP while being detrimental to both cutting

structure and bearing life.



12-1/4" S987

(311.2 mm)

ER1161
IRDC: 5121

Design Specifications

Total Cutters:	37
Cutter Size:	22mm (7/8")
Face:	29
Gage:	8
Nozzles:	9 N60 Series
Junk Slot Area:	47.2
Gage Length:	3.0"
Gage Protection:	Options Available
Make-Up Length:	10.5" Overall: 15.4"
Bit Connection:	6-5/8" API Regular
Fishing Neck:	Diameter 7.88" / Length 2.46"

General Operating Parameters

Rotary Speed:	Suitable for PDM & Turbine
Weight-on-Bit:	6,000 - 32,000 lbs.
Flow Rate:	500 - 1,000 gpm
Hydraulic Horsepower:	1.0 - 5.0 hsi

Features

- 22mm Cutters
- Advanced Cutter Placement
- Spiral Blades & Pads
- Forced Balanced
- Asymmetric Blade Layout
- Hardface Gage Pads
- Armor Shield Hardfacing

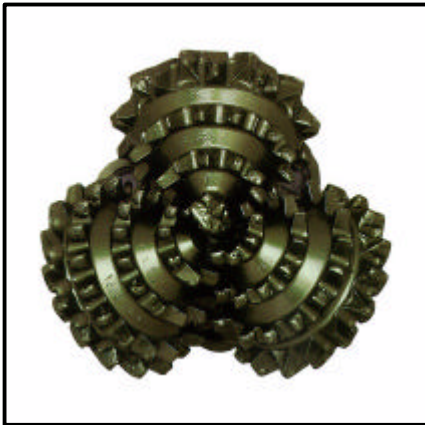
Drilling Application

The S987 is a steel body bit designed with stability enhancing features. Applications ranging from very soft to soft formations. Good for transitional and directional drilling.



Picture may display one or more of the available options





IADC 215

SVH

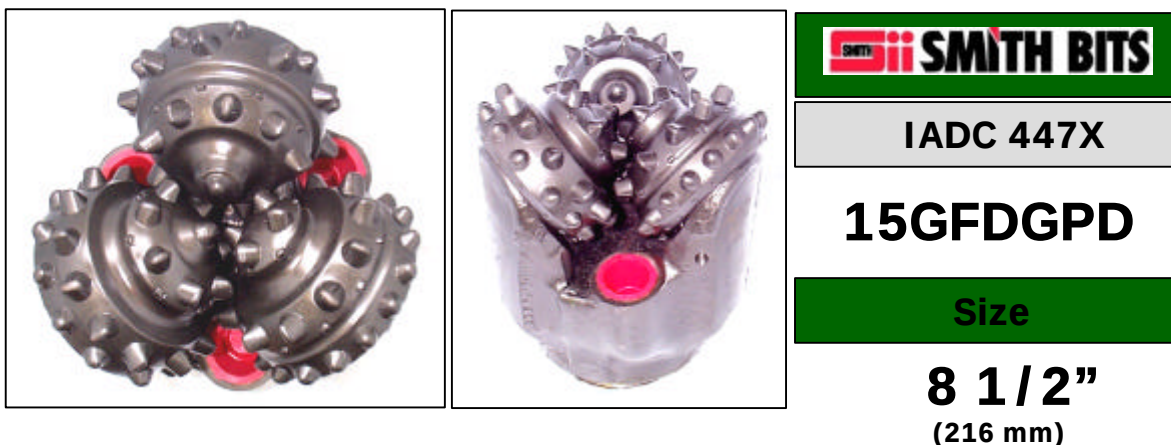
Size

8 1/2"
(216 mm)

Flat Heel Inserts	Helps maintain gauge.
Grade 70C Hardmetal	Minimises wear for higher ROP and longer tooth life.
Cutting Structure	Efficiently drills junk and shoe - tracks, as well as hard formations.
Sealed RBR Bearing	Roller-Ball-Roller, provides higher ROP capability than a journal bearing.
Application	Medium formations with abrasive stringers, such as well compacted shales, limestones, sandstones and anhydrites. Also used for shoe tracks and junk mill runs.

Bearing Type	Roller-Ball-Roller	WOB	10 to 45 klbs
Seal Type	O- Ring	RPM	50 to 160
Journal Angle	36°	Make up torque	12 - 16 Kft-lbs
Offset	0.125"	Bit Weight	40 Kg (Gross Approx)
Number of rows	10	Box Dimensions	40cm x 25cm x 25cm
Number of teeth	126	Nozzles	Series 95 Standard Jets.
Connection	4 1/2" Reg.		

*S - Sealed Roller Bearing
V - Medium, hard formation
cutting structure
H - Heel row inserts*



Twin Canted-Radial Seal	Outer canted seal has an abrasion resistant dynamic layer to combat the ingress of abrasive solids contained in the drilling fluid, which degrade bearing surfaces. The grease filled space between the inner and outer seals ensures lubrication on both sides of the inner seal. Dedicated compensation system, prevents damaging pressures occurring between the seals.
'Spinodal 2' Bearing	Constant materials research has resulted in the development of the 'Spinodal 2' friction bearing containing silver plated components to further lower the friction co-efficient while improving bearing load capacity and durability.
Diamond Chisel Gauge	Wear resistant diamond on these chisel shaped inserts allow for better point loading to improve steerability while improving overall aggressiveness to maximise ROP.

<table> <tr> <td>Bearing Type</td><td>Friction</td></tr> <tr> <td>Seal Type</td><td>Twin Canted-Radial</td></tr> <tr> <td>Journal Angle</td><td>32.5°</td></tr> <tr> <td>Offset</td><td>0.375"</td></tr> <tr> <td>Number of Rows</td><td>12</td></tr> <tr> <td>Number of Inserts</td><td>122</td></tr> <tr> <td>Connection</td><td>4 1/2" Reg.</td></tr> </table>	Bearing Type	Friction	Seal Type	Twin Canted-Radial	Journal Angle	32.5°	Offset	0.375"	Number of Rows	12	Number of Inserts	122	Connection	4 1/2" Reg.	<table> <tr> <td>WOB</td><td>10 to 55 klbs</td></tr> <tr> <td>RPM</td><td>50 to 280</td></tr> <tr> <td>Make up torque</td><td>12 - 16 Kft-lbs</td></tr> <tr> <td>Bit Weight</td><td>45 Kg (Gross Approx.)</td></tr> <tr> <td>Box Dimensions</td><td>40cm x 25cm x 25cm</td></tr> <tr> <td>Nozzles</td><td>Series 95/97,98,99 STD/Mini Jet</td></tr> </table>	WOB	10 to 55 klbs	RPM	50 to 280	Make up torque	12 - 16 Kft-lbs	Bit Weight	45 Kg (Gross Approx.)	Box Dimensions	40cm x 25cm x 25cm	Nozzles	Series 95/97,98,99 STD/Mini Jet
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15 - Soft to Medium Formation Cutting Structure G- 'Gemini' Twin Seal F- Sealed Journal Bearing D- Diamond Chisel Gauge G- Super D-Gun coating	PD- Diamond SRT in the back of the leg Standard Features OD-Diamond Heel Row
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It is not recommended for this bit to be run with maximum RPM and WOB at the same time. This may compromise ROP while being detrimental to both cutting structure and bearing life.

Design Specifications

Total Cutters	49
Cutter Size	13mm
Face Cutters	43 x 13mm
Gauge Cutters	6 x 13mm
Nozzles	6 x Series 60N
Maximum TFA	2.227 sq. ins.
Junk Slot Area	16.6 sq. ins.
Gauge Length	2.5"
Gauge Protection	PDC inserts + TSP triangles
Make-Up Length	1.04'
Bit Connection	4½" API Regular



Stability Features

Plural Cutter Placement
Load Balanced
Asymmetrical Blade Layout
Spiraled Blades and Gauge



Operating Parameters

Rotary Speed	Rotary, PDM or Turbine
WOB	5 - 35 klbs
Flow Rate	350 - 750 gpm
Hydraulic Horsepower	1.0 - 8.0 HSI

The M50PX is a medium set matrix body bit.
Full range of vibration reducing design features to prevent bit whirl.

HYD

WELL	Skarv 3
BIT	MX1
HOLE SIZE :	17.5
M.W. (PPG)	1.55
Flow ltrs	
Hrs Run	30.5
Flow GPM:	1050
	JETS
JET 1	16
JET 2	18
JET 3	18
JET 4	16
JET 5	0
JET 6	0
JET 7	0
JET 8	0
JET 9	0
JET 10	0
	0.89
J.V =	377.652
Pb =	197.377
HHP=	120.914
HSI =	0.503

Erosion Normalisation.

Equiv Fluid Distance

	JETS	TFA	FLOW	HHP	JV	IF	HSI	%	NOZZLE	GPN	Ft	m
JET 1	16	0.20	231.72	26.68	377.65	70.12	0.11	22.1	Centre	424,055	41,466,149	12,638,265
JET 2	18	0.25	293.28	33.77	377.65	88.74	0.14	27.9	Ext	536,695	41,466,149	12,638,265
JET 3	18	0.25	293.28	33.77	377.65	88.74	0.14	27.9	Ext	536,695	41,466,149	12,638,265
JET 4	16	0.20	231.72	26.68	377.65	70.12	0.11	22.1	Stan	424,055	41,466,149	12,638,265
JET 5	0	0.00	0.00	0.00	#DIV/0!	0.00	0.00	0.0		0	#DIV/0!	#DIV/0!
JET 6	0	0.00	0.00	0.00	#DIV/0!	0.00	0.00	0.0		0	#DIV/0!	#DIV/0!
JET 7	0	0.00	0.00	0.00	#DIV/0!	0.00	0.00	0.0		0	#DIV/0!	#DIV/0!
JET 8	0	0.00	0.00	0.00	#DIV/0!	0.00	0.00	0.0		0	#DIV/0!	#DIV/0!
JET 9	0	0.00	0.00	0.00	#DIV/0!	0.00	0.00	0.0		0	#DIV/0!	#DIV/0!
JET 10	0	0.00	0.00	0.00	#DIV/0!	0.00	0.00	0.0		0	#DIV/0!	#DIV/0!
		0.89	1050.00	120.91			0.50	100.0		1,921,500		

WELL	Skarv 4
BIT	MSDSSHC
HOLE SIZE :	17.5
M.W. (PPG)	1.44
Flow ltrs	
Hrs Run	36
Flow GPM:	1075
	JETS
JET 1	20
JET 2	18
JET 3	18
JET 4	14
JET 5	0
JET 6	0
JET 7	0
JET 8	0
JET 9	0
JET 10	0
	0.95
J.V =	360.536
Pb =	167.125
HHP=	104.819
HSI =	0.436

Erosion Normalisation.

Equiv Fluid Distance

	JETS	TFA	FLOW	HHP	JV	IF	HSI	%	NOZZLE	GPN	Ft	m
JET 1	20	0.31	345.66	33.70	360.54	104.59	0.14	32.2	Centre	632,556	46,725,412	14,241,211
JET 2	18	0.25	279.98	27.30	360.54	84.72	0.11	26.0	Ext	512,371	46,725,412	14,241,211
JET 3	18	0.25	279.98	27.30	360.54	84.72	0.11	26.0	Ext	512,371	46,725,412	14,241,211
JET 4	14	0.15	169.37	16.51	360.54	51.25	0.07	15.8	Stan	309,953	46,725,412	14,241,211
JET 5	0	0.00	0.00	0.00	#DIV/0!	0.00	0.00	0.0		0	#DIV/0!	#DIV/0!
JET 6	0	0.00	0.00	0.00	#DIV/0!	0.00	0.00	0.0		0	#DIV/0!	#DIV/0!
JET 7	0	0.00	0.00	0.00	#DIV/0!	0.00	0.00	0.0		0	#DIV/0!	#DIV/0!
JET 8	0	0.00	0.00	0.00	#DIV/0!	0.00	0.00	0.0		0	#DIV/0!	#DIV/0!
JET 9	0	0.00	0.00	0.00	#DIV/0!	0.00	0.00	0.0		0	#DIV/0!	#DIV/0!
JET 10	0	0.00	0.00	0.00	#DIV/0!	0.00	0.00	0.0		0	#DIV/0!	#DIV/0!
		0.95	1075.00	104.82			0.44	100.0		1,967,250		

OFFSET

WELL BIT HOLE SIZE : M.W. (PPG) Flow ltrs Hrs Run Flow GPM:	Skarv 3 S987PX 12.25 12.935 72.3 850	Erosion Normalisation. Equiv Fluid Distance										
	JETS	TFA	FLOW	HHP	JV (Ft/Min)	IF (Lbs)	HSI	%	NOZZLE	GPN	Ft	m
JET 1	14	0.15	94.44	25.72	201.04	126.96	0.22	11.1	Centre	409,700	52,326,441	15,948,321
JET 2	14	0.15	94.44	25.72	201.04	126.96	0.22	11.1	Ext	409,700	52,326,441	15,948,321
JET 3	14	0.15	94.44	25.72	201.04	126.96	0.22	11.1	Ext	409,700	52,326,441	15,948,321
JET 4	14	0.15	94.44	25.72	201.04	126.96	0.22	11.1	Stan	409,700	52,326,441	15,948,321
JET 5	14	0.15	94.44	25.72	201.04	126.96	0.22	11.1		409,700	52,326,441	15,948,321
JET 6	14	0.15	94.44	25.72	201.04	126.96	0.22	11.1		409,700	52,326,441	15,948,321
JET 7	14	0.15	94.44	25.72	201.04	126.96	0.22	11.1		409,700	52,326,441	15,948,321
JET 8	14	0.15	94.44	25.72	201.04	126.96	0.22	11.1		409,700	52,326,441	15,948,321
JET 9	14	0.15	94.44	25.72	201.04	126.96	0.22	11.1		409,700	52,326,441	15,948,321
JET 10	0	0.00	0.00	0.00	#DIV/0!	0.00	0.00	0.0		0	#DIV/0!	#DIV/0!
		1.35	850.00	231.48		1142.62	1.96	100.0		3,687,300		
J.V = Pb = HHP= HSI =	201.039 466.777 231.482 1.964											

WELL BIT HOLE SIZE : M.W. (PPG) Flow ltrs Hrs Run Flow GPM:	Skarv 4 S987PX 12.25 13.519 84.5 950	Erosion Normalisation. Equiv Fluid Distance										
	JETS	TFA	FLOW	HHP	JV (Ft/Min)	IF (Lbs)	HSI	%	NOZZLE	GPN	Ft	m
JET 1	16	0.20	105.56	22.00	172.03	126.90	0.19	11.1	Centre	457,900	52,331,164	15,949,760
JET 2	16	0.20	105.56	22.00	172.03	126.90	0.19	11.1	Ext	457,900	52,331,164	15,949,760
JET 3	16	0.20	105.56	22.00	172.03	126.90	0.19	11.1	Ext	457,900	52,331,164	15,949,760
JET 4	16	0.20	105.56	22.00	172.03	126.90	0.19	11.1	Stan	457,900	52,331,164	15,949,760
JET 5	16	0.20	105.56	22.00	172.03	126.90	0.19	11.1		457,900	52,331,164	15,949,760
JET 6	16	0.20	105.56	22.00	172.03	126.90	0.19	11.1		457,900	52,331,164	15,949,760
JET 7	16	0.20	105.56	22.00	172.03	126.90	0.19	11.1		457,900	52,331,164	15,949,760
JET 8	16	0.20	105.56	22.00	172.03	126.90	0.19	11.1		457,900	52,331,164	15,949,760
JET 9	16	0.20	105.56	22.00	172.03	126.90	0.19	11.1		457,900	52,331,164	15,949,760
JET 10	0	0.00	0.00	0.00	#DIV/0!	0.00	0.00	0.0		0	#DIV/0!	#DIV/0!
		1.77	950.00	197.99		1142.11	1.68	100.0		4,121,100		
J.V = Pb = HHP= HSI =	172.029 357.214 197.989 1.680											

Smith International, Inc

Computed by Win-Hyd version 1.0d
power law fluid model

Date: 24-Sep-01
File name: 084M50

Prepared for	BP Amoco Norske	Well name	Skarv 4
Contractor		Location	6507/5-5
Prepared by	Dale Codman	Legal Description	

	In	Out
Total Depth / True Vertical Depth (m)	3707 / 3707	4011 / 4011
Bit Size (in) / Description	8.5 PDC M50N	8.5 PDC M50N

MUD PROPERTIES	Mud Type	WBM	WBM
	Mud Weight (sg)	1.2	1.2
	Plastic Viscosity (cp)	25	25
	Yield Point (lb/100ft2)	20	20
	600 - 300 - 3 RPM Fann degrees	0 - 0 - 0	0 - 0 - 0

BORE	Bore Description	Internal Diameter (in)	Length (m)	Press. Loss (psi)	Flow Rate (gpm)	Length (m)	Press. Loss (psi)	Flow Rate (gpm)
	Drill Pipe	4.730	3454	1071	779.	3758	1117	759.
	Hevi-wate DP	3.380	110	151	779.	110	144	759.
	Drill Collar	2.810	9	29	779.	9	28	759.
	Jar	3.000	10	22	779.	10	22	759.
	Drill Collar	2.810	104	323	779.	104	310	759.
	Stabilizer	2.810	2	5	779.	2	5	759.
	Sub	2.810	1	2	779.	1	2	759.
	LWD/MWD	N/A	12	800	779.	12	800	759.
	Stabilizer	2.810	5	15	779.	5	15	759.

ANNULUS	Annular Description	OD (in)	Hole/Csg ID (in)	Length (m)	Ann. Vel. (m/min)	Crit. Vel. (m/min)	Chip Vel. (m/min)	Press. Loss (psi)	Length (m)	Ann. Vel. (m/min)	Crit. Vel. (m/min)	Chip Vel. (m/min)	Press. Loss (psi)
	Drill Pipe	5.500	12.620	2050	45	71	32	38	2050	44	71	31	38
	Drill Pipe	5.500	8.500	1404	138	107	126	259	1708	135	107	122	302
	Hevi-wate DP	5.500	8.500	110	138	107	126	20	110	135	107	122	19
	Drill Collar	6.750	8.500	9	218	137	205	7	9	212	137	199	7
	Jar	6.250	8.500	10	175	122	162	4	10	171	122	158	4
	Drill Collar	6.750	8.500	104	218	137	205	76	104	212	137	199	73
	Stabilizer	6.750	8.500	2	218	137	205	1	2	212	137	199	1
	Sub	6.750	8.500	1	218	137	205	0	1	212	137	199	0
	LWD/MWD	6.750	8.500	12	218	137	205	9	12	212	137	199	8
	Stabilizer	6.750	8.500	5	218	137	205	4	5	212	137	199	3

Smith International, Inc

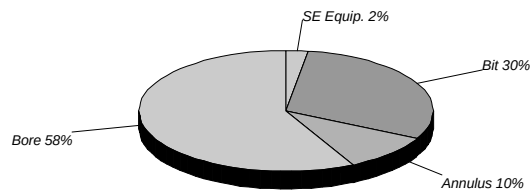
Computed by Win-Hyd version 1.0d
power law fluid model

Date: 24-Sep-01
File name: 084M50

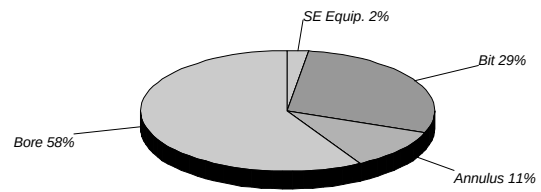
BIT HYDRAULICS	Bit Pressure Loss (psi)	1268 @ 779. (gpm)	1203 @ 759. (gpm)
	Bit Pressure Loss %	30	29
	Bit Jet Velocity (m/sec)	115	112
	Bit Hydraulic Energy (hp)	576	533
	Bit HSI	10.15	9.39
	Bit Impact Force (lbs)	1515	1438
	Bit Nozzles (32nd) TFA = .663	12, 12, 12, 12, 12, 12	12, 12, 12, 12, 12, 12
	Individual Nozzle % Flow	17, 17, 17, 17, 17, 17	17, 17, 17, 17, 17, 17
	Individual Nozzle Flow Rate (gpm)	130, 130, 130, 130, 130, 130	126, 126, 126, 126, 126, 126
	Mud Pump Power (hp)	1911	1858

PRESSURE LOSSES	Surface Equip Loss Case No. 3 (psi)	100	95
	Bore Pressure Loss (psi)	2419	2442
	Bit Pressure Loss (psi)	1268	1203
	Annular Pressure Loss (psi)	418	455
	Pump Pressure (psi)	4205	4196

In Pressure Loss Distribution



Out Pressure Loss Distribution



Lessons Learnt Log for Skarv4

1. Drilling out the float equipment can be difficult with such an aggressive bit as the S987 with 22mm cutters. The fact that they displaced to oilbased mud before/when drilling out float equipment could also have an impact on the performance, due to the lubricity of the mud on the rubber.
2. Technical Limit of the rig around 100 m/hr, skips went full and afraid of plugging the lines with cuttings.
3. Possible to drill this 12.25" section in one run.
4. Be patient regarding ROP's in limestone beds. The dullgrade on the S987 bit did **not** suggest that a pull was on its place.
5. 35% flow through center jet on 17.5" bit in such sticky formation as Nordland and Kai helps with crossflow and bit cleaning, which eventually will give you higher ROP allover.
6. Three pumps were running, minimizes the risk of balling due to the steady and high flow.
7. ArmourSeal hardfacing on steel bit very successful, no erosion seen on S987.
8. Kvitnos formation contained more limestone than prognoses.

	SKARV 4 – 6507/5-5 COMPLETION REPORT		Page: 201 of 202
Chapter: 9	APPENDIX	Date: 03/05/02	Rev: 0

❑ **NODECO FAILURE REPORT**



Nodeco Liner Hanger System

Final job summary

Company: BP

**Well: Skarv 4
West Alpha**

Job:

**9 5/8" BA Liner Hanger w/integrated
packer**

Job #: 80-6373
Date: January 18, 2002
Prepare by:

Tor Jostein Gudmestad
Account Leader WCS

Approval:

Leif A. Skivik
Business group Manager WCS

Research and Development Incident Report

9-5/8" x 13-3/8" Liner Analysis BP Well 6507/5-5 (Skarv 4) For BP NORWAY

Project #: CLSR525-019

Date: January 10, 2001

Engineer:

Abdolreza Gharesi
Design Engineer

Approval:

Mark J. Murray
R&D Manager

Job Summary:

On December 28 of 2001, Weatherford ran a 9-5/8" x 13-3/8" liner for BP Norway on their vertical appraisal well 6507/5-5 (Skarv 4). The liner hanger was run and set without incident according to the operating procedure. After setting and releasing from the liner hanger, the operator set 20,000# on the liner and attempted to shear the ball seat at 3,000 psi. The 'seat' seems to shear at 210 bar, about 10 Bar lower than the value it was pinned to. At same time when pressure built, the drillstring moved upwards, to again lower when seat 'shared'. Regardless of this, circulation was re-established and cementing operations were prepared. Circulation pressure were high bringing doubts that the ball seat was fully sheared. Continued pumping decreased the circulating pressure, giving the confidence to continue with the cementing job. The cementing job gave good indications of progressing properly except for no bump on the plugs after maximum allowable displacement. The operator P/U and set the packer as per the procedure. About this time the mud man reported contaminated returns, the operator P/U, circulated the long way out and POOH. The FJB Pressure Equalization Sleeve was washed out and the Ball Seat and dart found in the landing sub.

Analysis:

The major difference in this job compared to all of the previous jobs in the North Sea is that this set of tools were the BA Tools designed to have a larger ID for reduced ECD's and exceed 1MM lbs. tensile rating in the setting string. The standard tools have a 2-13/16" ID with a 100 mm OD Slick Joint. The BA tools have a 4.125" ID with a 141mm OD Slick Joint.

3 of 21

The Running Tool sees a net upward force from pressure applied to the ball seat weather it is in the plug or a landing collar. The RSM or a Drillable Cementing Bushing both provide less upward force to the running tool compared to what you would see with a packoff bushing. The force upward is acting against the cross-section provided by the OD and ID of the Slick Joint.

For a 100 mm stinger with a 3.939 OD & 2.797 ID, piston area is 6.0417 sq.in. @ 3,000 psi that generating 18,125# upward thrust.

For a 141 mm stinger with a 5.552 OD & 4.138 ID, piston area is 10.7613 sq.in. @ 3,000 psi that generates 32,283# of upward thrust. Drillpipe above the Slick Joint with a larger ID would decrease this effect. On this job the operator used the standard setdown weight during circulation, being inadequate to withstand the upward thrust from the Slick Joint. The movement of the drillpipe at surface when "the ball seat sheared" was most likely the Floating Junk Bonnet shifting the Pressure Equalization Sleeve. The circulation fluid was then diverted from downwards through the liner to the ports in the FJB and up in the 13 3/8" annulus.

Shifting of the Sleeve at a 3000 psi pressure-load probably ruined the seals, preventing the pressure integrity for the rest of the job.

The active heave-compensator, and the function of it, of course did not really help us either. With less downweight on the tool than the efficient piston area acting upwards at 3000 psi, string 'took off' and lifted immediately.

Lesson learnt- have more weight down on runningtool!

Conclusion:

The biggest culprit in this job was the lack of communication or lack of analysis of new tools that were introduced in a new area of operation. The operator followed the procedure, as he knew it without considering the effect of the larger diameters in the BA tools. The FJB Pressure Equalization Sleeve is designed to equalize the pressure across the FJB when POOH. At this stage, the pressure inside the DP would be low and can be increased if needed once the sleeve is moved to open position. The sleeve would then move back (spring loaded) to close position. In this case the internal pressure (3000) combined with uncontrolled movement, had washed out the seals after opening the sleeve, resulting in a leak path through the sleeve. Further circulation (during the cementing job) had washed out some sections of the sleeve and the cement was pumped through.

Action Items:

In consideration of the above conclusion, Weatherford needs to implement a policy of engineering and operations review of any new systems introduced in a new area of operation. Regardless of the success of a system in other areas of operation, a new system needs to be completely understood by all of the personnel associated with its use. A design layout of the tools showing all of the physical properties and anticipated forces should be reviewed. Also an operational review of the system checking against the operating procedure would alert of any changes to standard practice and also give the opportunity to consider contingency problems and procedures.

WCS Norway : Actions taken.

WCS Norway has taken action to prevent any reoccurrence of liner systems being proposed, delivered and run without a proper system review. The Design Review form (attached), Design Review (D.R), emphasize the familiarization of new equipment and tools. It requires a throughout verification that all operational aspects introduced with of the tool are looked into. It will also call for a system review of equipment given new applications.

WCS Norway is in the final stage of implementing an Access based information management system, also to be used in operations control. We strongly believe that this will improve quality control by standardizing the work process.

1. Appendix Table of Contents

Appendix A:	Field Job Report, Page: 6
Appendix B:	Field Operating Procedure, Page: 8
Appendix C:	BA Running Tool Assembly Layout, Page: 15
Appendix D:	Third Party Material Analyze Report, Page: 16
Appendix E:	Pictures, Page: 17
Appendix F:	Design Review (D.R.), Page: 19
Appendix G:	Listing of Equipment used: 21

APPENDIX A – Field Job Report

Date	Time	Sequence of events
19.12	20.00	Gaute / Endre arrived Brønnøysund
20.12		Stand by Brønnøysund
21.12	18.30	Arrived on rig. Located basket and equipment. Attended on evening meeting. Gaute day / Endre night.
22.12	07.15	Morning meeting. Checked delivery paper and measure sheet. Not allowed on deck during lifting operation. Attended on operation meeting and time planning. Gaute day / Endre night.
23.12	07.15 08.30 19.15 20.15	Morning meeting. Checked equipment, installed 5 x M10 shear pins in ball seat. Expected shear 3240Psi. Located B/U Float equipment. Evening meeting General safety meeting and safety meeting for service people. Gaute day / Endre night.
24.12	07.15 07.30 10.00 11.30 14.15 14.30 19.15	Morning meeting. Reached TD.Upwt 202ton,down wt 202 ton Torque readings taken at TD.10Rpm/3kNm,20RPM/4kNm,50RPM/5kNm BP decided to drill another 5 meter. New TD at 3643m 1.75 Alu Dropping ball loaded in ball release under supervision off BP rep. Evening meeting.
25.12	07.15 19.15	Morning meeting. Had to stay inside do to falling ice from derrick. Paper work Evening meeting
26.12	07.00 18.20 21.30	Morning meeting. Rig is logging, Rack back cmt head, and start run 95/8" liner. P/U Cementing head connected hosesand tried to rack the stand, but could not. Take cmt head down again brake off DP and laid cmt-head back on deck. Made up shoe track. Checked valves in FS and FC. Tube-locked connection in shoe track.
27.12	07.15 15.00 15.30 17.25 17.47 20.30 20.50	Morning meeting. BP decided to center the rig straight above the BOP Continue run liner. Picked up Liner hanger and made up PWP plug. Made up hanger to liner string and pulled to check connection of tool. Waited from 15.30 to 17.10. Rig down ESS tongs. Filled PBR with fresh water and removed transportation screw, while circulating one liner volume. At 50spm and 20Bar Lower the liner one stand down and took weights. ↓141 T / ↑ 141 T. Liner hanger lower through BOP at 370m. Had to use thrusters on rig to center over BOP. Float shoe at open hole at 2100m. ↓155 T / ↑156 T with 50spm 20 bar.
28.12	04.15	Drop setting ball, pump down with 450Lpm. Pressure up to 140bar.Observe shear indication (105bar/119bar) Set down appr.2 mtr ↓150 ton. Hanger was not set? Pull 2 mtr repeat same. Bleed of pressure P/U to hanger point press up to 160 bar wait 5 min and set do weight on Hanger. 85 ton on MD to confirm hanger set.
	06.15	P/U 5 ton to release running tool, 9 right hand turns. Start torque 4,8 kNm, steady 4,0 kNm,and peak 11,8 kNm. Used this torque value to confirm that tool was released.



Completion Systems

[illegible]

APPENDIX B – Field Operating Procedure

RUNNING PROCEDURE

FOR

**9 5/8" HEAVY DUTY PHR ROTATING LINER HANGER,
TSP PACKER
RSM PACK OFF
AND PWP SINGLE WIPER PLUG SYSTEM**

FOR HIGH DEVIATED/HORIZONTAL WELLS.

**RUNNING TOOL:
FLOATING JUNK BONNET
'R' WITH HYDRAULIC RELEASE.**

- ISSUE STATUS -

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REV	DATE	DESCRIPTION	PREP BY	AUTH BY

PREPARATIONS

1. **Use Procedure WIPER –1 on the last clean out trip out of hole; take torque, weight, and distance measurements according to Procedure.**
2. Take all relevant measurements - length, O.D.'s and I.D.'s.
3. Check Hanger shear pins against measuringsheet from the workshop.
Mark: Have 36 T. available to set Packer.
4. Check that Setting Ball goes through Liner Wiper Plug, also check compatibility between Liner Wiper Plug and casing, and D.P. darts with D.P.
5. Check ball seat in PWP releasing tool, 5-x M12 shear pins approx. 220 Bar.
6. Check the Top Drive Cementing Head, it is preloaded with dart from workshop.
7. Drift all D.P., pup joints and singles with a 2 3/4-in. drift.
8. **Ensure that any dart sub in the running string is removed.**
9. Note that maximum flow velocity over the packer element is 12 m/second.
10. **Discuss the importance of minimizing the time standing still during the installation of the Cmt.head at TD.**

RUNNING OF THE LINER

1. Run the Float/Rimer shoe and the number of casing joints for the shoe track, including the premade-up Landing Collar joint without ballseat.
R.I.H. with casing, filling approximately every 5 joints.
2. Pick up Hanger assembly, install Wiper Plug system and make up on Liner.
Leaving rotary manual slips set on liner joint, pick up approx. 1 meter to check that the setting tool and all connections are made up properly, if so pull slips.
3. Note liner weight. Pull bushing if the Hanger can be damaged going through rotary. Lower the Hanger assembly through rotary and set manual DP slips on the 5 1/2" lift nipple.
Do not set slips on the PBR.

10 of 21

Be careful to keep the hanger centered while lowering through rotary to avoid any damage to the piston, slips, e.t.c.

Circulate content of Liner if required, max. circ. pressure: 50% of the shear value of the Running Tool's hydraulic lock (See equipment check list). Fill the Floating Junk Bonnet slowly with drill water and remove the transportation bolts.

Lower the Hanger assembly through wellhead/B.O.P. without interruption i.e. avoid to make any D.P. connections with assy in this area.

Run in on HWDP + DP. Put D.P. Wiper on pipe while running in. Drift D.P. with min. 2 3/4" drift. Fill pipe regularly, maximum 10 stands without filling.

4. Take the free moving up and down weight before going into open hole. Continue running in hole with casing, filling approximately every 5 joints and fill completely when the last joint is in the slips.
5. If washing down or Liner rotation is required in open hole, do not slack off more than theoretical Liner weight and 80 T. of D.P. weight.
If circulation is required, max. Pressure 65 bar. or 50 % of the lowest rated release pressure of any equipment in liner assembly. See equipment checklist for values.

Contingency:

Tight hole – Work string down with weight.
Circulate and work string up/down.
Commence rotation, do not exceed m/u liner torque or Rng tool limitations. Use what is least.

6. Space out drill string to put the Cementing Head + 3 m. above rotary table when shoe is on bottom. Drift all pipes and singles picked up from pipe deck w/ _____" drift.
7. When running in open hole fill up each D.P. as much as possible without interrupting the smooth running of the Liner in the hole.
8. Lock the elevator and pick up the Cementing Head. Take the free moving up and down weight. Break circulation and wash down to T.D., not exceeding 65 bar/or 50 % of the lowest rated release pressure of any equipment in liner assembly. (See equipment checklist for values).
Tag bottom and mark pipe.
Pick up to the free moving up weight and measure out to the setting depth.
9. **Increase circulation rates slowly to max. 70% of the shear value of the Running tool's hydraulic lock. (See equipment checklist for values).
Reciprocate or rotate and condition hole as required. The surface torque must be limited to LINER MAKE UP TORQUE at the hanger point (as**

11 of 21

recorded during wiper trip) plus max. Casing make up torque or running tool torque limit, whichever is least.

Do not rotate and reciprocate at the same time.

10. When the circulation is completed, drop the Setting Ball from the ball launcher in the Cement Head. **(Note: If prolonged circulation is necessary (more than 1,5 bottoms up), the setting ball should be dropped and the hanger set prior to circulation at TD. This precaution will reduce chances of the ballseat to be damaged by washouts.**

Contingency:

Problem to land balls: Too much Dope inside DP, use a minimum of DOPE when making up running string connections.
Stop and start pumps.
Increase pumprate if possible.
Rotate string if possible.
Use back up ball.

11. Chase the ball by pumping 500 lpm. not exceeding 65 bar/or 50 % of the lowest rated release pressure of any equipment in the liner assembly. (See equipment checklist for values).
The Ball should land in approximately 30 min.
Watch the pressure gauge closely.
12. When the Ball lands, slow pumps and increase the pressure to 10 % above hanger setting pressure to set Liner Hanger and release the 'HR' lock. Shut off pumps, and slack off running string.
The Liner weight should be lost within 1.5 - 2 meters. When the Liner is hung off, set down 20 ton and mark pipe.
Bleed off pressure and pick up to leave 10 ton down on the running tool.
Release running tool with RH rotations (8) and note torque.
Release torque should be approx. +/- free torque at hanger depth, read from the wiper trip torque.

Contingency:

Hanger does not set –

Increase pressure in steps of 10 bar to set hanger, stop 20 bar under ballseat shear out value.

Lower string fast down to shock hydraulic mechanism in hanger.
Set hanger at TD.

Rng tool does not release -

Increase pressure in steps of 10 bar to shear the hydraulic lock. Retry to release tool between each time. Stop 20 bar under ballseat shear out value.

Work string with different weights.
Shock string by lowering down fast, use pressure.
Rotate string with pressure inside, 1 to 3 right hand turns.
Pull out of hole.
Continue with Cmt. job, bump wiper plug, pressure against bumped wiper plug.

13. Pick up to check that tool is free.
Pick up length must not exceed half the distance from the pick up sub to the RSM to check that tool is free.
If a integrated TSP packer is run/or a FJB, the pick up length to consider is half the distance from the packer actuator dogs to the top of PBR. Or half of the distance from the FJB equalization slots to the top of the PBR.
Use the distance that is shortest to check that tool is free.
If the tool is not released, put a slight overpull on the Liner and repeat the pressure activating as above in steps of 10% starting from the latest used activating pressure.
14. After the tool is released, set down 5-10 ton on the running tool and pressure up to + 190 bar to shear the ball seat.
15. With 5-10 ton. Weight set down on Liner. Establish circulation and rotation.
The surface torque must be limited to free torque at the hanger point (as recorded during wiper trip) plus casing make up Torque or running tool torque limit, whichever is least.
NB! The subsequent torque increase may be used as a Secondary indication of the running tool being released.
Line up to cementing unit and test lines.
16. Pump Spacer and cement as per program, and release D.P. dart, note flag indicator. Follow with spacer and displace cement at optimum rate.
Do not slow down pumps prior to releasing wiper plug (Theoretical shear +/- 69 bar, release of Wiper Plug should be noticeable.
Use only one system for displacing.
17. Slow down pumps to 300 lpm. Approx. 500 ltr before total displacement.
Bump the Liner Wiper Plug to 140 bar above final circulating pressure.

Contingency:

Wiper plug does not bump – Check previous displacement calculations
Use theoretical calculations only.
Measure the average ID of casing/liner before job to optimise the correct displacement figures.

18. When plug bumps, bleed off pressure and check for back flow through shoe.
At this point the liner may be pressure tested to **max. 345 bar diff. pressure.**

Contingency:

Back flow - Rebump wiper plug, remember to start counting pumpstroke when you have achieved the latest pumping pressure used before bump.
Wait on Cmt.

19. If an integrated TSP Packer is run pick up to the free moving up weight and measure out to bring the Packer setting dogs above the PBR.

With non-rotating Packer Actuator: Set down until weight is taken on the Liners PBR. 25 ton. down weight will shear the slips and set the Packer. The shear should be noticeable on weight indicator. If no shear is observed, additional weight should be set down (max. 50 T.) to ensure that the packer is set.

With rotating Packer Actuator: Set down weight until Packer Actuator dogs take weight on top of PBR.

Start rotation w/10 – 20 RPM.

Rotation will aid transfer of weight to the tool.

25 ton will set the packer. The shear may be noticeable on the weight indicator.

If no shear is observed another 10 ton may be set down to ensure that the packer is set.

Maximum weight without rotation: 25 ton.

Maximum weight with rotation: 35 ton.

Contingency:

TSP does not set – Not enough string weight available, have enough weight available.

Use rotating packer actuator if available.

20. Provided that the RSM has not been released by picking up to far, the packer may be tested at this point by pressuring up annulus

Contingency:

Leakage – Check that weight of liner + piston force does not exceed the strength of the csg when testing TSP packer.

Run back up BSP packer.

21. If wiper plug is bumped it is optional to pressure up between RSM Pack off and plug to 50 bar, this will give a pressure drop indicating retracking the RSM pack off

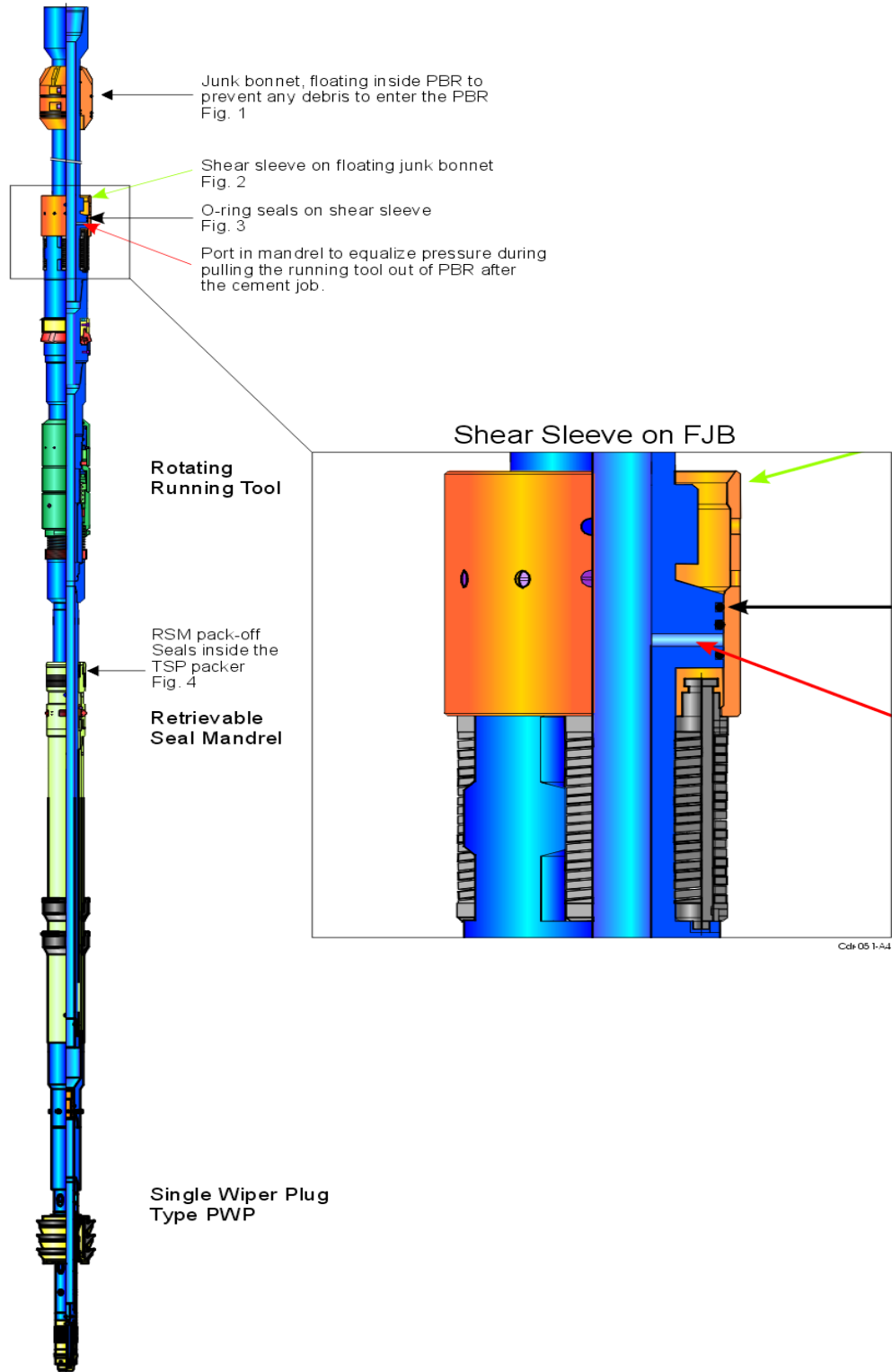
And additional circulation can be performed when pulling out of hole.

14 of 21

22. Pick up to bring the running tools out of the PBR and circulate the excess cement out of hole. While circulating move pipe regularly to break up cement between pipe and casing.
23. P.O.O.H.

APPENDIX C – Assembly Layout

Liner Hanger System with Hydraulic/Rotational
Release Running Tool



APPENDIX D – Third Party Material Analyze Report



Bodycote Materials Testing AS, Luramyveien 69, Postboks 1084, 4391 Sandnes, Norway
Tel: 51 70 96 60, Fax: 51 70 96 61

Test Certificate

WEATHERFORD NORGE AS
STOKKAMYRVEIEN 17
PO BOX 8023
4068 STAVANGER

REF No N200268 : Issue 1
Ord No to be supplied
Date Tested 22/01/02
Date Reported 22/01/02

Attn: Jarle Christensen

Item - 9.5" OD x 76mm ID Sleeve
HT C9349, LHN 23713-00

Specification - Not Applicable

Tensile Test - EN 10 002-1								
	Dimensions [mm]	Area [mm ²]	GL [mm]	0.20%PS [N/mm ²]	UTS [N/mm ²]	%EL	%RA	Comments
001:L/T Parent	5.00	19.64	25.00	922	1075	15.0	59.0	Nil

Charpy Test - EN 10 045-1							
	Position	Dimensions [mm]	Denomination	Test Temp [°C]	Energy Absorbed [Joules]	Average	Comments
002:L/T Parent	N/A	10x10x2V	N/A	-32.0	37, 34, 34	35	Nil

Hardness Test - ISO 6508-1				
	Method	Load	Results	Comments
003:Parent Hardness	Rockwell C	150kgf	32.0, 33.5, 33.0	Nil

Certificate Comments

Uncertainty budgets are available for the following tests:

- Charpy Test
- Hardness Test

This is an electronic copy. See original certificate for terms and conditions.

Tested by K. SCHØYEN

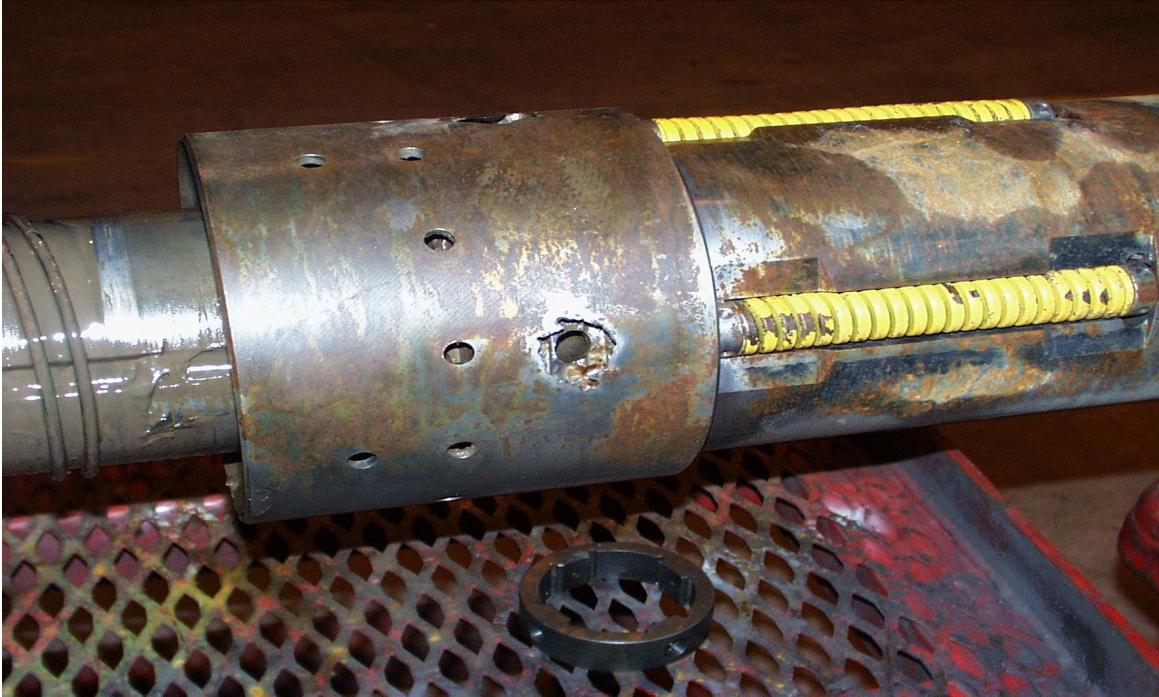


.....
For and on authority of
Bodycote Materials Testing AS

This certificate should not be reproduced other than in full, without the written approval of Bodycote Materials Testing Ltd.
These results pertain only to the item(s) tested as sampled by the client unless otherwise indicated.
Unless stated otherwise, testing will have been conducted to the version of any specification quoted, current at the date of test.

Page 1 of 1

APPENDIX E – Pictures



9 5/8" Floating Junk Bonnet BA
Washout in equalizer sleeve.



9 5/8" Floating Junk Bonnet BA.
Picture taken on West Alpha when tool on surface.

APPENDIX E – Pictures



Washout in equalizer sleeve.



Washout in all 4 port on 9 5/8" Floating Junk Bonnet BA.

Appendix F: Design Review (D.R.)

D.R. no.	Job no.	Customer	Installation	Well no.	Type rig	S.O.R.
SYSTEM DESCRIPTION SALES EQUIPMENT						
New equipment identified:				Yes	No	
Description:						
RNE:		PN:		Order date: 2002-01-17		
SYSTEM DESCRIPTION RENTAL TOOLS						
New equipment identified:				Yes	No	
Description:						
RNE:		PN:		Order date:		
New application for equipment:				Yes	No	
Description of new application:						
Proposed installation procedure no.:						
Equipment not previously used in Norway:						
Run History:						
Existing job reports:						
Procedures:						
Datasheets:						
If run history is not available, then this needs to be identified as a risk and the customer needs to be informed.						

Risks identified by customer:	Yes		No	
Any specific rig issues:	Yes		No	
Any specific well issues:	Yes		No	
Risks identified:	Yes		No	
Review meeting Notes:				
New Equipment identified in review:	Yes		No	
RNE:	PN:	Order date:		
Actions to be implemented:				
Attendees:				

Date for implementation:	Responsible:			
Date for next meeting:	Position: Account Leader			
System design reviewed by customer:	Yes		No	
System design approved:	Yes		No	
Position: Account Leader	Signature:			
Position: Operations Supervisor	Signature:			
Position: Sales&Operations Manager	Signature:			

Appendix G: Listing of Equipment used:

BP AMOCO

80-6373

Well: Skarv 4

Kontaktperson: Tor Jan Tjøstheim

Rig: West Alpha

9 5/8" 53.5# x 13 3/8" 72# Linerhanger

Matr: P-110

1800 psi shear for liner hanger og setting tool w/hydr. release

Threads: N-Vam

Sales equipment

Item	Qty.	Part #	Description
1.	2	20445	PBR 9 5/8" X 4475 mm P-110
2.	2	03278	Liner Top Packer 9 5/8" TSP x 13 3/8" 53,5/68-72# w/rsm and mec.lock mk.1 P-110 N.VAM
3.	2	03343	Liner Hanger 9 5/8" PHR X 13 3/8" 53.5/68-72# New VAM 53.5# API P-110
4.	2	ITM	9 5/8" 53,5# Csg. joint N.Vam box x pin P-110 L-4m
5.	2	10969	9 5/8" 53,5# P-110 N.Vam Landing collar for PWP
6.	2	22449	Wiper plug 9 5/8" PWP 53,5" w/ ballseat
7.	2	31237	Inner plug for PWP plug
8.	2	31694	Drill pipe dart 5 1/2" no. 2 for PWP

BSP PACKER

1.	1	20445	PBR 9 5/8" X x'4475mm P-110
2.	1	11011	Setting sleeve 9 5/8" 43.5-61.1# BDS P-110
3.	1	01599	Tie back packer 9 5/8" BSP X 13 3/8" 47-53.5/68-71# C-ring element H-nbr P-110

Rental tools

Item	Qty.	Part #	Description
1	2	Leies	Lift Nipple 5 1/2" FH 2000mm
2	2	Leies	X-over 5 1/2" FH box X 6 5/8" FH pin
3	2	03359	Junk Bonnet Floating BA 9 5/8" P-110
4	2	Leies	Lift Nipple 6 5/8" FH
5	2	03354	Packer Actuator 9 5/8" rotating (BA w/6 5/8" FH) P-110
6	2	03345	BA Setting tool 9 5/8" R w/hydraulic release up 6 5/8" FH.P-110
7	4	32363	Stinger 141mm 9 5/8"
8	2	32416	BA Pick-up sub
9	2	11645	RSM Pack off BA 9 5/8" 53.4# P-110
10	4	23824	Joint 7 5/8" pup 4625mm BA Running Tool SystemP-110
11	4	81275	Casing Coupling Special Clearance 7 5/8" BTC
12	2	03353	Pack off 9 5/8" 53,5" BA Lower
13	2	01256	Release tool 9 5/8" PWP single BA tool
14			BSP packer
15	1	20097	Lift Nipple 5" 1500mm Steel 110k
16	1	20248	Shear Bonnet 9 5/8" P-110
17	1	20092	Lift Nipple 5" 3200mm Steel 110k
18	1	10161	PBR Pack off 9 5/8" P-110
19	1	10082	Setting tool 9 5/8" S P-110
20	1		Basket

	SKARV 4 – 6507/5-5 COMPLETION REPORT		Page: 202 of 202
Chapter: 9	APPENDIX	Date: 03/05/02	Rev: 0

□ **DRIL-QUIP FAILURE REPORT**



30" Wellhead Housing and
Permanent Guidebase
BP (Norway)

DRIL-QUIP (EUROPE) Ltd.

ENGINEERING REPORT

FOR FPR 4-1193

REVISION NC

**30" WELLHEAD HOUSING AND
PERMANENT GUIDEBASE**

BP (NORWAY)

Written By: Alex Scott Date: 28/1/02
Approved By Engineering Manager: R. Emmerson Date: 28/1/02
Approved By Field Service Manager: GOS Date: 28/1/02
Approved By General Manager: J. E. C. Date: 28 JAN '02

CONTENTS

- 1.0 Introduction
- 2.0 Sequence of Events
- 3.0 Inspection Report
- 4.0 Discussion
- 5.0 Recommendations
- 6.0 Appendices:
 - Drawings
 - Photographs
 - Calculations

1.0 INTRODUCTION

On 30th November 2001, an incident occurred aboard the West Alpha rig operated by BP on well 6507/5-5 Norway. The incident occurred after an extended period of remedial work downhole, and concerned the separation of the 30" conductor string from a guidebase, which was supporting the string from the moonpool area.

This report outlines the problems encountered during this operation, details the causes, and highlights the steps that will be taken to prevent a recurrence.

2.0 SEQUENCE OF EVENTS

The rig started preparing to run the 30" conductor in the early hours of 29th November. However, by the time the third joint was being prepared, the weather conditions were still sufficiently poor to prevent them from actually running it. They eventually started running the 30" conductor in the late afternoon. The completed string, shoe joint, four joints of conductor, and the housing joint were run through the guidebase, and were then run to the seabed. Early next morning, with only 4m to go to TD, the string became stuck. An attempt to pump the string down failed, and the decision was made to retrieve to surface and re-drill the last 4m again. By 10am on the morning of the 30th, the PGB was chained to the BOP Transporter with the 30" string suspended from it. Within the hour, the transporter had been moved out of the moonpool area to allow the additional drilling to take place. During the time the 30" string was suspended below the transporter, the weather conditions deteriorated. The Dril-Quip service technician was called to start work again at 8.15pm. Initially, he repositioned the transporter over the moonpool, and as he went to prepare to go onto the transporter, at around 9pm, he heard a loud bang. Not seeing anything unusual, he climbed onto the transporter. He then heard a second bang, and witnessed the TITUS grout hose fly up from the PGB. His first thought was that the hose had been trapped between the guidebase and the transporter. However on looking below the transporter, he noticed that the 30" conductor was gone and that the conductor housing had parted from the guidebase.

The conductor was later located on the seabed by the ROV and recovered to surface using the 30" running tool. Back-up equipment was then used to complete the well program.

3.0 INSPECTION REPORT

The equipment involved is part of Dril-Quip's standard SS-15 Subsea Wellhead System. On the guidebase there are four dog segments, which are retained by an external ring, (drive sleeve), into the two grooves located on the OD of the 30" housing. When the 30" housing is run inside

the guidebase, the drive sleeve can be pushed down, which moves the dog segments inwards, across a taper, into these two grooves.

The equipment was returned to Aberdeen for full examination. The damage to both the 30" housing and the dog segments is a combination of shear and bearing. Additionally, the dog segments have each created a recess, over their entire length, where they bore against the drive sleeve.

The 30" housing was given the unique rental identity RW5054. It has an Engineering part number 852461-02 and a serial number AW7005-01.

The upper body of the 30" housing, which locks to the guidebase, is made from the low alloy steel AISI 4130 to our specification DQM-4130-0013. The mechanical properties of this grade require a hardness range of 248-331 HB, and minimum yield strength of 90,000psi. The forging used for this housing was tested as being 302 BHN and 126,000psi minimum yield. The housing was tested on its return to Aberdeen and the hardness values are recorded as 255-262 BHN.

The guidebase was given the identity RW5515. It has an Engineering part number 4-400724-02 and a serial number AW25172-02.

The dog segments are made from low alloy steel AISI 4140 to our specification DQM-4140-0014. The mechanical properties of this grade should give a hardness range of 277-321 HB, and minimum yield strength of 100,000psi. The dogs used on this particular guidebase were made in 2 batches, totaling 48 dogs. The hardness figures given are 285-302 BHN and 311 BHN. The yield strengths are quoted as 111,000psi and 109,000psi minimum yield. The hardness values measured on the returned guidebase are 293-311 BHN.

The drive sleeve body is made from low alloy steel EN10025:S355J2G3 to our specification DQM-0112. The minimum yield strength of this material should be 40,000psi. The material certificate quotes 403 N/mm², which equates to 58,450psi.

4.0 DISCUSSION

The weight of the conductor has been estimated as 113,000lbs (56½ tons). Allowing for a column of water sitting in the string, the estimated weight hanging off the guidebase increases to approximately 100 tons. The static load capacity of the dogs, based on the minimum yield figures above, can be calculated as 1.67 million lbs (approximately 840 tons). Additionally, the force required before bearing failure will occur has been calculated as 1.87 million lbs (approx. 940 tons).

When the decision was made to retrieve the 30" string and re-drill, there was an anticipated down time of 4½ hours. The 30" string fell away after some 11 hours sitting at the moonpool. During this time the weather conditions deteriorated. The wind speed increased from 6 knots to just under 50 knots. The swell dropped from 3.9m to 2.7m, and the wave height increased from 3.9m to 4.0m. There was, however, a significant change in the frequency of the waves. The wave frequency had been a constant 10 seconds from midnight until 3pm, but in the 6 hours before the failure, the period between waves dropped from 10 seconds to 6 seconds. Although there was no increase in the loads being transmitted into the string and the guidebase, the frequency with which the waves were pounding the string was increasing, producing more cyclic loading, leading to failure.

The guidebase was chained down to the transporter. The majority of the 30" string was still in the water (approx. 100m string, 18m air gap). This means that, at the moonpool, we have, effectively, a rigid connection between the guidebase and the transporter. At the other end of the string, the waves, the current and the swell are all acting on the conductor, pushing it around. But, because the top end is rigidly fixed, we have created a pendulum effect. This, in turn, must be responsible for the dynamic loading, which produced the excessive loads, which caused the 30" housing to fall.

The procedures followed and the actions taken were not responsible for the loss of the 30" string. Also, the method of supporting the guidebase at the moonpool was, in itself, not responsible. A combination of factors created the conditions that led to the dramatic failure.

It would be advisable, during poor weather, to leave the guidebase and conductor suspended from the 30" running tool, and bridge crane. This would eliminate the bending forces being applied through the dog segments and place any bending caused by the motion of the string into the drill pipe, which is much less susceptible to bending loads.

During the 8½ years this design of guidebase has been in use, there have been no incidents of this type involving the design of guidebase used here.

5.0 CONCLUSION

The 30" conductor parted from the guidebase as a result of dynamic bending loads being transmitted through the conductor/guidebase interface. These dynamic loads were produced by the poor weather and sea conditions acting on the conductor string.

6.0 RECOMMENDATIONS

It is recommended that when retrieved to surface, the guidebase be supported as close as possible around the conductor to minimize loading. (See Product Safety Awareness Notice No. 3 – issued 5th December 2001)

It is recommended that Service personnel visually inspect the guidebase/conductor periodically during poor weather and sea conditions for any signs of deterioration or movement of the conductor.

It is recommended that before a decision is made to hang off a conductor string at the moonpool, for an extended period, a full risk assessment be performed. This needs to include the type of conductor connectors being run, the type of wellhead to guidebase interface, the suitability of the B.O.P. cart or spider beams and the environmental conditions and duration of hang-off. If this assessment proves extended hang-off is feasible then as a minimum it is recommended the 30" running tool is installed into the conductor housing and the conductor is hung through a suitable sling arrangement to the bridge crane or similar. This will allow the conductor to swing in a controlled manner, minimizing bending through the guidebase/conductor interface.

7.0 APPENDICIES

Drawings:

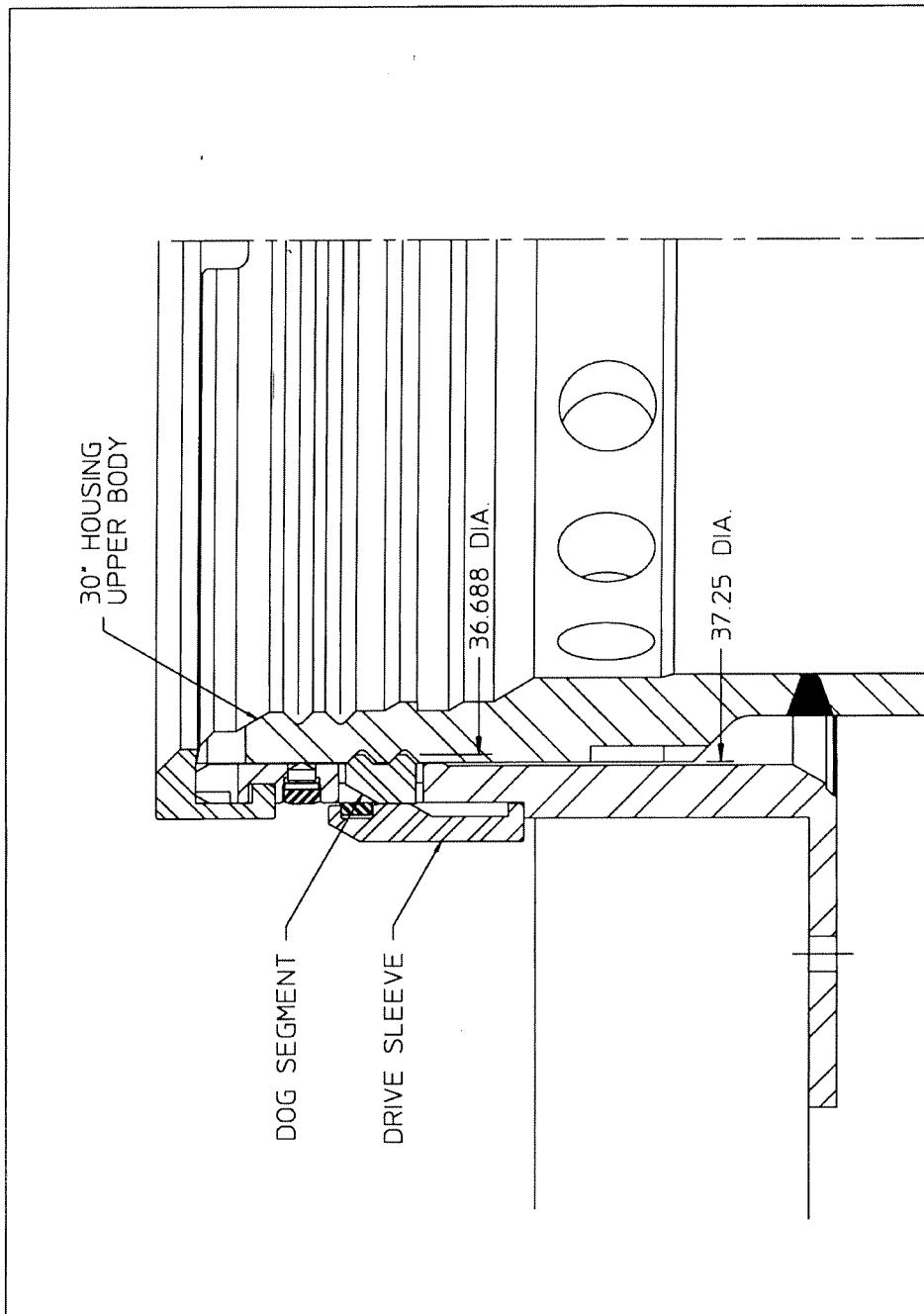
Sketch of interface
Dog segment – 4-499271
Drive sleeve – 4-499275

Photographs

Typical damage to 30" housing external profile
Typical damage to drive sleeve internal profile
End view of dog segments
Typical damage to face of dog segments

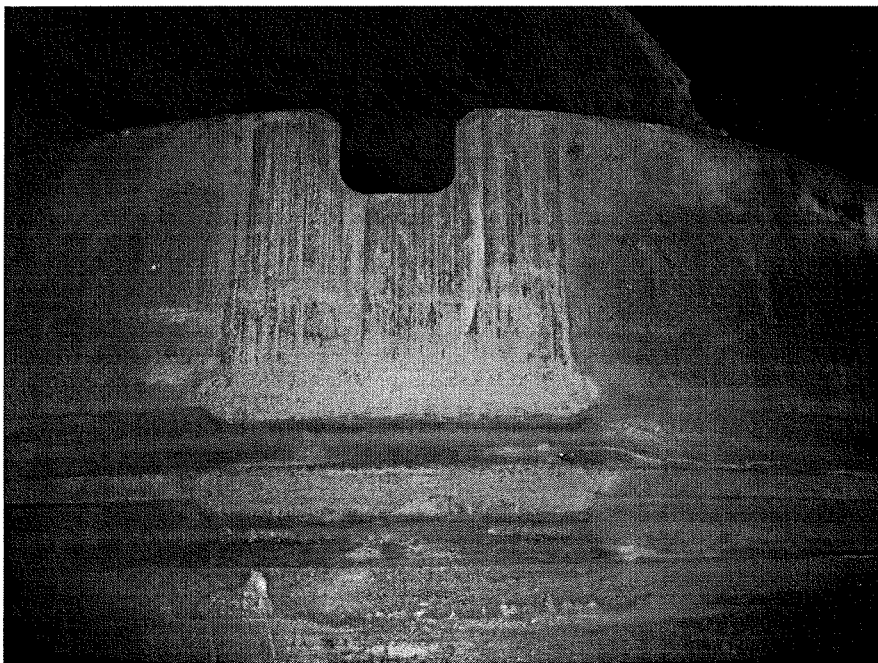
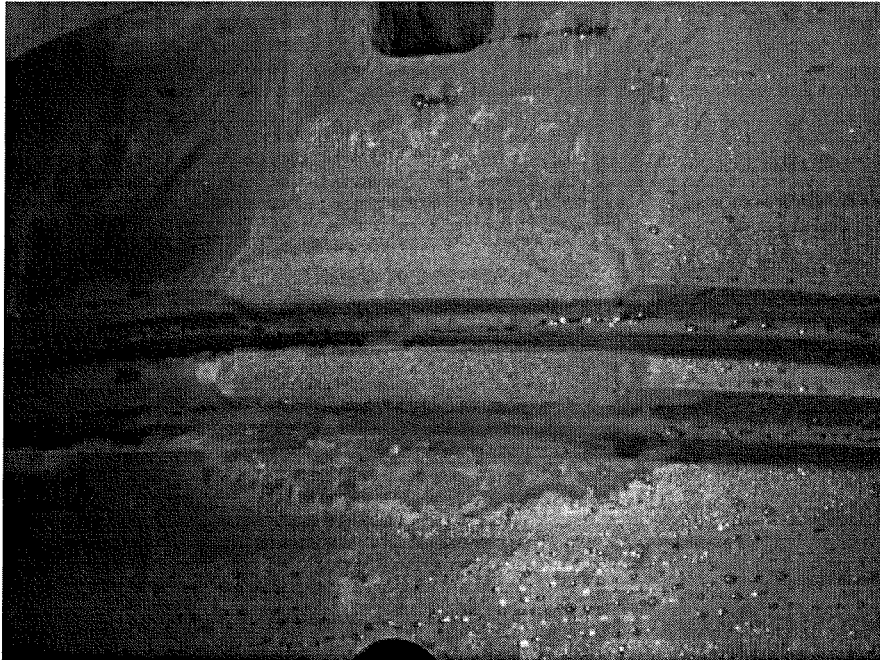
Calculations:

Weight of conductor string
Capacity of dog segments
Capacity of drive sleeve









Typical damage to 30" housing external profile



Typical damage to drive sleeve internal profile



End view of dog segments



Typical damage to face of dog segments

To estimate approximate weight of the 30" conductor string

Tally measurements are as follows:

Shoe Joint = 12.62m
Joint 1 = 12.22m
Joint 2 = 12.19m
Joint 3 = 12.18m
Joint 4 = 12.19m
Joint 5 = 12.24m
Joint 6 = 12.26m
Wellhead Joint = 13.43m

$d_o := 30\text{in}$ OD of conductor

$d_{i1} := 27\text{in}$ ID of conductor joint

$d_{i2} := 28\text{in}$ ID of intermediate joints

Weight of housing joint:

$l := 13.43\text{m}$ Length of joint

$\rho := .2836 \frac{\text{lb}}{\text{in}^3}$ Density of steel

$$W_{cj} := \frac{\pi}{4} (d_o^2 - d_{i1}^2) \cdot l \cdot \rho$$

$W_{cj} = 20139\text{lb}$ **Estimated weight of housing joint**

Weight of intermediate joints can be deestimated as follows:

$l_1 := 12.22\text{m}$ $l_2 := 12.19\text{m}$ $l_3 := 12.18\text{m}$

$l_4 := 12.19\text{m}$ $l_5 := 12.24\text{m}$ $l_6 := 12.26\text{m}$

$l_{sj} := 12.62\text{m}$

$$l_t := l_{sj} + l_1 + l_2 + l_3 + l_4 + l_5 + l_6 \quad \text{Total length of intermediate joints}$$

$$l_t = 85.9\text{m}$$

$$W_{ij} := \frac{\pi}{4} \cdot (d_o^2 - d_{i2}^2) \cdot l_t \cdot \rho$$

$$W_{ij} = 87380\text{lb} \quad \text{Estimated weight of intermediate joints}$$

Weight of water in pipe

$$V := \frac{\pi \cdot d_{i1}^2}{4} \cdot (l + l_t) \quad \text{Volume = Area times length}$$

$$V = 1.296 \times 10^3 \text{ ft}^3$$

$$\rho := .0361 \frac{\text{lb}}{\text{in}^3} \quad \text{Density of 'pure' water}$$

$$W_w := V \cdot \rho \cdot 1.03 \quad \text{Weight of sea water in pipe}$$

$$W_w = 83255\text{lb}$$

$$W_t := W_{cj} + W_{ij} + W_w \quad \text{Total estimated weight}$$

$$W_t := 1.05 W_t \quad \text{Add 5\% allowance}$$

$$W_t = 200312\text{lb} \quad \text{Estimated weight of 30" conductor string (negating buoyancy)}$$

$$W_t = 100.156\text{ton}$$

Capacity of dog segments

$d_1 := 37.25n$	OD of 30" housing
$d_2 := 36.688n$	ID of dog segments in running position
$l_d := 6in$	Length of dog segment
$h := .874in$	Height of shear plane (i.e. thickness of dog tooth at 37.25" dia
$n := 4$	Number of dogs
$f := 2$	Number of faces per dog
$\sigma_y := 100000 \frac{lb}{in^2}$	Minimum yield strength of dog segment
$SF := 0.4$	Shear Factor
$A_s := l_d \cdot h \cdot n \cdot f$	Shear Area
$A_s = 41.952in^2$	
$F_s := A_s \cdot \sigma_y \cdot SF$	
$F_s = 1.678 \times 10^6 lb$	Allowable load
$FoS_s := \frac{F_s}{W_t}$	
$FoS_s = 8.377$	Factor of Safety
$BF := 1.7$	Bearing Factor
$A_b := \frac{(d_1 - d_2)}{2} \cdot l_d$	Bearing Area
$A_b := A_b \cdot n \cdot f$	

$$A_b = 13.488 \text{ in}^2$$

$$F_b := A_b \cdot \sigma_y \cdot BF$$

$$F_b = 2.293 \times 10^6 \text{ lb} \quad \text{Allowable Load}$$

$$FoS_b := \frac{F_b}{W_t}$$

$$FoS_b = 11.447 \quad \text{Factor of Safety}$$

Half Angle Shear

$$\tau_{\max} = \frac{F}{\pi(D - w)w} \cdot \frac{\sin\left(\frac{\theta}{2}\right)^2}{\sin(\theta)}$$

where,

$$D := d_1$$

$$\theta := 45 \text{ deg}$$

$$w := \frac{(d_1 - d_2)}{2}$$

$$\tau_{\max} := \sigma_y$$

by transposing, we get,

$$F := -\tau_{\max} \pi \cdot (-D + w) \cdot w \cdot \frac{\sin(\theta)}{\sin\left(\frac{1}{2} \cdot \theta\right)^2} \quad (\text{transposition by MathCad})$$

$$F = 1.576 \times 10^7 \text{ lb} \quad \text{Half angle shear capacity of a complete ring}$$

However, the dog segments only support 4 x 6" of the 30" housing

$$c := \pi \cdot d_1 \quad \text{Working circumference}$$

$$c = 117.024 \text{ in}$$

$$l_d = 6 \text{ in} \quad \text{Length of dog}$$

$$n = 4 \quad \text{Number of dogs}$$

$$f = 2 \quad \text{Number of faces per dog}$$

$$F := \frac{F \cdot l_d \cdot n \cdot f}{c} \quad \text{Force applied is proportional between working circumference of one complete ring and actual length of the four dogs}$$

$$F = 6.463 \times 10^6 \text{ lb}$$

$$FoS_{ha} := \frac{F}{W_t}$$

$$FoS_{ha} = 32.267$$

Bearing capacity of drive sleeve/dog segment interface

$$l_d := 6.5 \text{ in} \quad \text{Length of dog segment bearing face}$$

$$h := 1.06 \text{ in} \quad \text{Height of interface between drive sleeve and dog segment}$$

$$\sigma_y := 40000 \frac{\text{lb}}{\text{in}^2} \quad \text{Yield strength of drive sleeve}$$

$$BF = 1.7 \quad \text{Bearing Factor}$$

$$n := 4 \quad \text{Number of dogs}$$

$$F_b := (l_d \cdot h) \cdot \sigma_y \cdot BF \cdot n$$

$$F_b = 1.874 \times 10^6 \text{ lb} \quad \text{Force required before bearing failure will occur}$$

$$F_b = 937.04 \text{ ton}$$