BP AMOCO NORGE AS
6507/5-4
STENA DEE

GEOLOGICAL AND PETROLEUM ENGINEERING COMPLETION REPORT

6507/5-4

NORWEGIAN SEA

NORWAY

Inge H. H. Eikelmann

October 2001

GCR APPROVAL

PROSPECT: SKARV

TARGET: LOWER TO MIDDLE JURASSIC GARN, ILE AND TILJE FORMATIONS.

LOCATION ID:

DATE: OCTOBER 2001

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Indexing Information

Country(s):	**NORWAY**
Situation:	Offshore
Region(s):	Norwegian Sea
Well name(s):	6507/5-4

Regional Reports:

Well report subject code:	Geological Completion Report W28.38
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Subjects:

Well Summary

Geology/Lithology

Pore Pressure/Fracture Gradient

Wireline Operations

CONTEXT, WELL OBJECTIVE AND RESULT

Technical Well Objective

Main technical objective of well 6507/5-4 was to determine the presence or absence of any hydrocarbon column in the Jurassic Garn, Ile and Tilje formations. In the Skarv C segment, highest priority was to test the "Garn oil model". In the discovery case the objective was to gather the data required to allow confident oil reserves estimates. High risk secondary targets were the Cretaceous Lysing and Lange Formations.

Timing:

The well was drilled with the rig Stena Dee. The rig was on contract from 2nd February 2001 (19:00 hrs) and arrived on location 7th Feb (11:30hrs). Spud was 10th February (06:00hrs). The well was plugged back and sidetracked on 17th April to appraise the Garn down-dip oil leg.

Well Result

Well 6507/5-4 successfully completed a logging program across Cretaceous secondary targets in the 12.25" hole, and a logging and coring programme of the primary Jurassic targets in 8.5" hole. Oil and gas were discovered in the primary Garn reservoir target while Ile and Tilje were water-wet. In addition, oil and condensate were discovered in poor quality Cretaceous Lange sands. The thin Lysing Formation was tight without shows.

Previous Drilling

Block 6507/6 was previously operated by Saga in the PL123 Licence. Two exploration wells were drilled by Saga in the period 1986 to 1991: 6507/6-1 and 6507/6-2. Both wells were plugged and abandoned as dry wells with shows. The Amoco operated exploration well 6507/5-1 well was completed in 1998 and was suspended as an oil and gas discovery in the Jurassic and Cretaceous. The Jurassic discovery was named Skarv and the Cretaceous discovery Gråsel. In 1999, well 6507/5-2 was drilled by BP Amoco to appraise Skarv. The well was plugged and abandoned as a gas well. The Snadd structure was explored by the 6507/5-3 well in June 2000 and plugged and abandoned as a gas discovery.

Regional Setting

The Skarv structure is a Jurassic tilted fault block located to the west of the Nordland Ridge at the eastern edge of the Dønna Terrace. Play concept is similar to the existing fields in the Mid Norway area e.g. Heidrun, Norne and Smørbukk. The main structural events to create these traps occurred during Mid-Late Jurassic rifting.

Mapping and Trap Definition

The Skarv structure is mapped on the ANO9701 3D survey, with recent fault map updates from the reprocessing fast track cube (PL212 seisworks project). The structure is a tilted fault block bounded to the Northwest by a major normal fault down-throwing to the Northwest. The remaining part of the structure is dip-closed. Skarv is split into three main segments, A, B and C, by two normal faults, which trend northwest - Southeast. Well 6507/5-4 is located in segment C.

Seismic quality over Skarv is of fair to good quality. The Jurassic targets can be tied and mapped with high confidence, but a relative large uncertainty is attached to the depth conversion. Amplitude anomalies are identified and show good structural conformance over the three fault segments of Skarv. The seismic is not of sufficient quality to enable hydrocarbon phase prediction. In addition to the Jurassic primary targets, relatively high risk secondary targets have been identified in the Cretaceous Lysing and Lange Formations.

Reservoir

The main reservoir target in the 6507/5-4 well was the Lower and Middle Jurassic sandstones of the Fangst and Båt Groups (Garn, Ile and Tilje Formations). The Top Garn reflector was tied to the 6507/6-2, 6507/5-1 and 6507/5-2 wells and was easily mapped across the prospect area. The top Tilje reflector was mapped with less confidence. The reservoirs are widely distributed across the basin. The greatest resources were expected to be contained within the high quality Garn Formation, with a smaller contribution from the poor – moderate quality Ile and Tilje Formations.

1 WELL DATA SUMMARY

1.1 GENERAL DATA

Well Name	6507/5-4	
Status	Plugged and Abandoned for a sidetrack, Oil & Gas Discovery	
Licence	PL 212	
Operator	BP Amoco	30.00%
Partners	Statoil	30.00%
	Enterprise	25.00%
	Mobil	15.00%

Surface Location		**TD Location**	
Latitude	65° 41’ 44.773” N	**Latitude**	65° 41’ 45.51” N
Longitude	07° 34’ 13.618” E	**Longitude**	07° 34’ 11.37” E
Grid	7 286 930.74 mN 434 346.75 mE	**Grid**	7 286 954.30 mN 434 318.55 mE

Projection	UTM 32N; Common Meridian 09° E
Spheroid	ED 50, 1924 International
Seismic Location	Inline: 1157, Xline: 1865 (Surface location) (Survey AN09701M)

Offset from Nearest Wells	BP Amoco well 6507/5-2: 3.9 kms North-east	Amoco well 6507/5-1: 6.5 kms North-east	Saga well 6507/6-2: 7.3 kms North-east
Drilling Rig:	Stena Dee	**Rig Type:**	Semi-submersible.
RTE	25 m MSL	**Total Depth**	3812 mBRT
Depth Datum	RT	**Loggers Depth**	3820.0 mBRT
Water Depth	421 m	**Maximum Inclination**	6.70° @ 3801.0 mBRT
Rig on Contract	2nd February 2001	**Spud Date**	10th February 2001
TD Date	29th March 2001	**Rig Released:**	04th April 2001 (commence sidetrack 6507/5-4A)
Report Number	W28.38		
Authors	Inge H. H. Eikelmann		

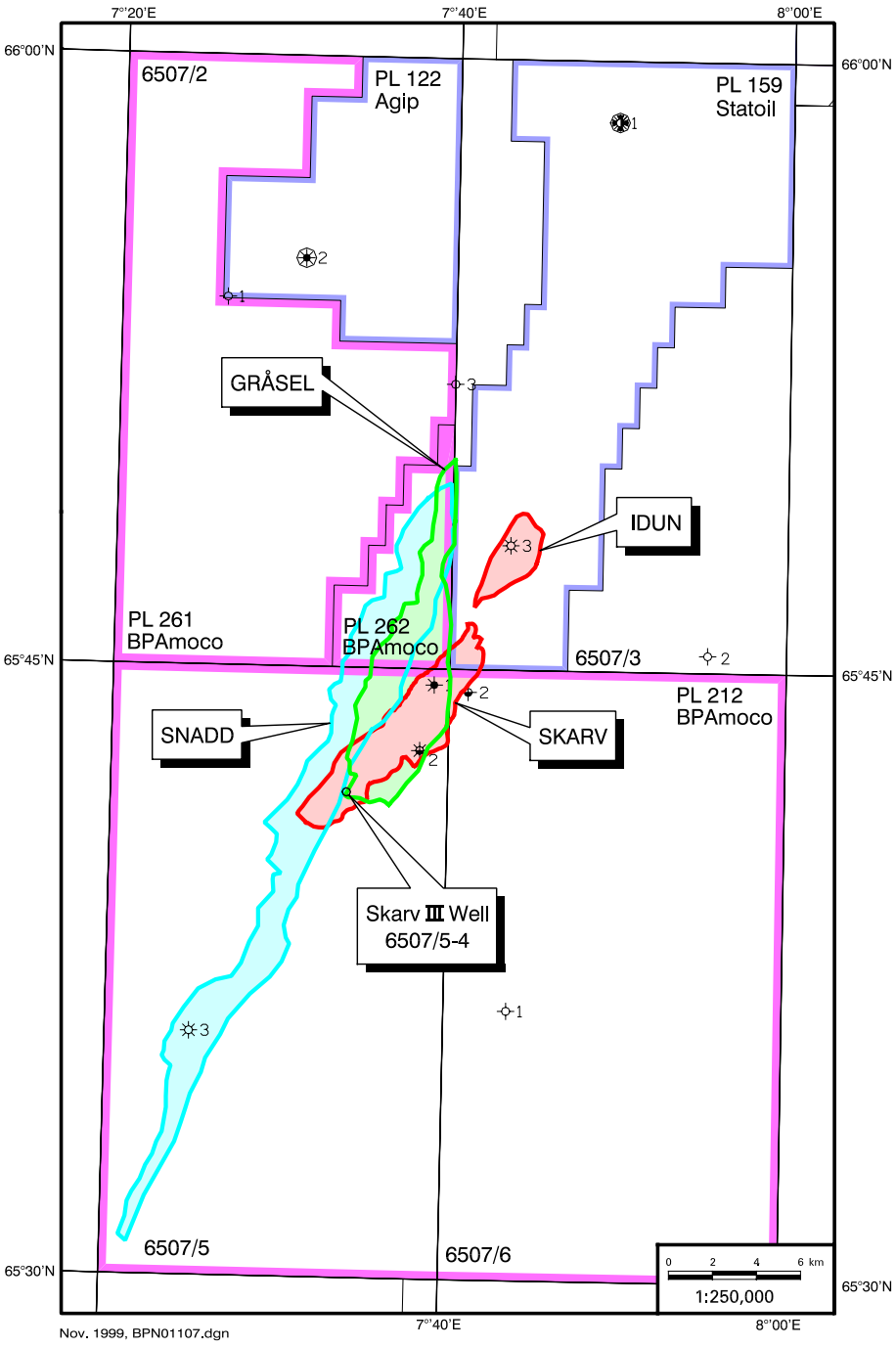

Figure 1: Location Map

1.2 STRATIGRAPHY

Chrono/Lithostratigraphy		Tops			
		Depth	**Depth**	**Depth**	**Thickness**
		MD mBRT	mTVDBRT	mTVDSS	m
Late Miocene – Recent	**Nordland Group**				
	Quaternary	446	446	421	199.8
	Naust Fm	645.8	645.8	620.8	752.3
	Kai Fm	1398.2	1398.1	1373.1	420.7
Early Eocene – Late Oligocene	**Hordaland Group**				
	Brygge Fm	1818.9	1818.8	1793.8	183.1
Late Paleocene	**Rogaland Group**				
	Tare Fm	2002.0	2001.9	1976.9	45.2
	Tang Fm	2047.2	2047.1	2022.1	30.0
Coniacian – Late Campanian	**Shetland Group**				
	Springar Fm	2102.0	2101.9	2076.9	84.1
	Nise Fm	2186.0	2186.0	2161.0	390.0
	Kvitnos Fm	2576.3	2576.2	2551.2	211.2
Late Aptian – Late Turonian	**Cromer Knoll Group**				
	Lysing m	2787.5	2787.4	2762.4	5.5
	Lange Fm	2793.0	2792.9	2767.9	259.5
	Upper intra Lange Sandstone	3052.5	3052.4	3027.4	66.7
	Upper intra Lange Sst. base	3119.2	3119.1	3094.1	
	Lower intra Lange Sandstone	3210.0	3209.8	3184.8	36.0
	Lower intra Lange Sst. base	3246.0	3245.8	3220.8	
	Lyr Fm	3364.0	3364.0	3339.0	6.3
Latest Early, Late Bajocian – Late Bajocian/Early Bathonian	**Viking Group**				
	Melke Fm	3370.5	3370.3	3345.3	142.4
Middle/Late Toarcian – Aalenian	**Fangst Group**				
	Garn Fm	3513.0	3512.7	3487.7	67.9
	Not Fm	3580.9	3580.6	3555.6	28.3
	Ile Fm	3609.2	3608.9	3583.9	22.6
Early Pliensbachian – Middle/Late Toarcian	**Båt Group**				
	Ror Fm	3631.9	3631.5	3606.5	54.6
	Tilje Fm	3686.5	3686.1	3661.1	86.7
	Åre Fm	3773.5	3772.8	3747.8	

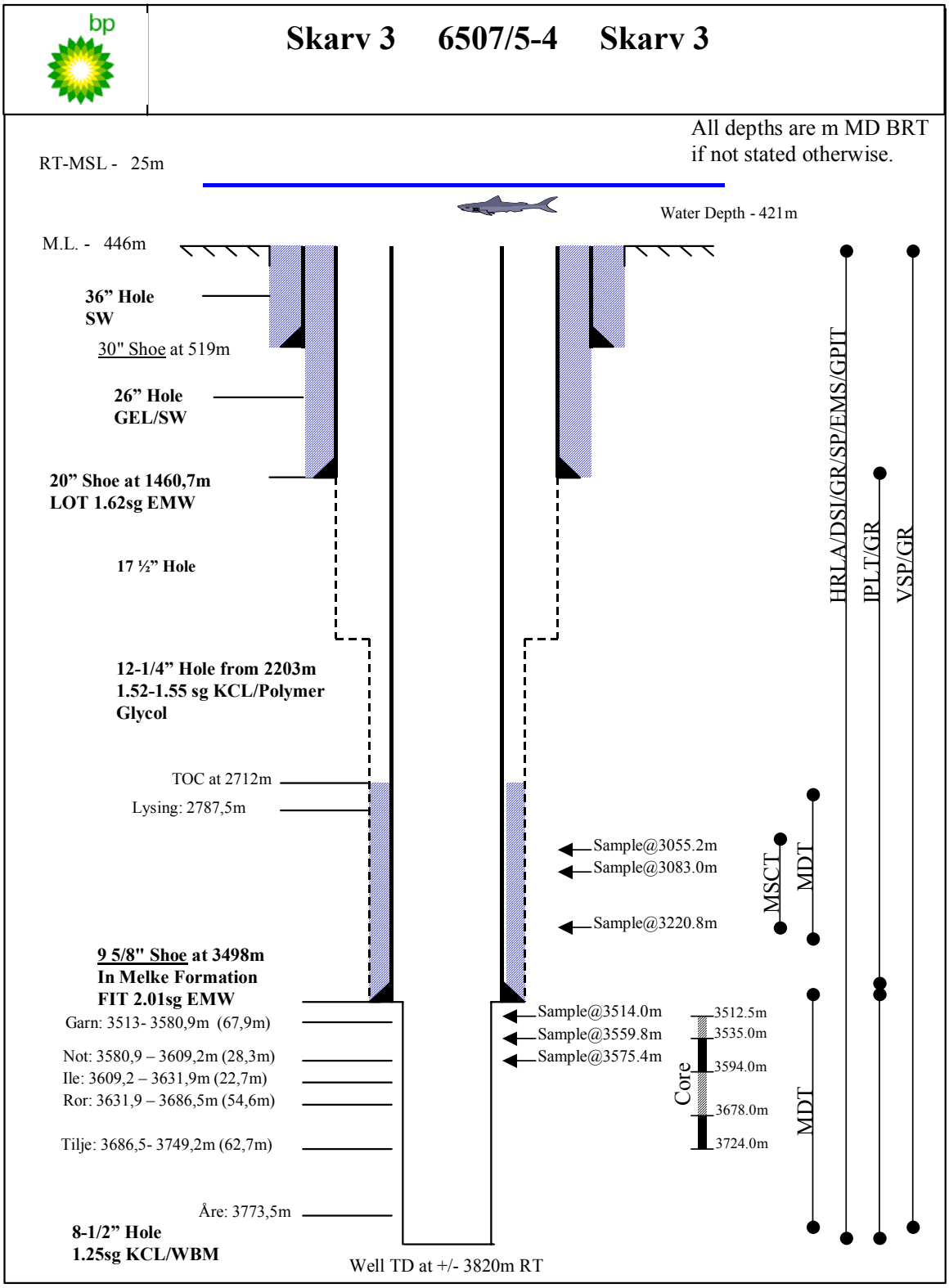

Figure 2. Well summary

1.3 CASING

Casing Size	Section TD mBRT	Casing Depth mBRT	Test Depth mBRT	Lithology	Formation	Comments
30”	522.0	519.0	-	Mudstone	Undifferentiated Quaternary	Surface conductor. No LOT
20”	1466.0	1460.66	1469.0	Mudstone	Kai Formation	LOT: 1.62sg EMW Tested with 1.40sg mud and 710 psi applied surface pressure.
9 5/8”	3501.0	3494.2	3501.5	Mudstone	Melke Formation	FIT: 2.01sg EMW. Tested with 1.25 sg mud and 3800 psi applied surface pressure.

1.4 CORES

1.4.1 SUMMARY

Core Number	Cut		Recovered		Percent Recovery	Remarks
	From	To	From	To		
1 (59m inner barrel)	3512.50	3535.00	3512.50	3534.86	99.4 %	Bit pulled due to low rate of penetration and unreactive torque. Jammed off after 22.36m core. Found swivel backed off. Garn Fm. Sandstone and Siltstone, ROP avg. 3.15 m/hrs
2 (59m inner barrel)	3535	3594	3535	3594	100 %	Not Fm. Sandstone/Siltstone/ Mudstone, ROP avg. 14.80 m/hrs
3 (86m inner barrel)	3594	3678	3594	3678	100 %	Ile Fm. Sandstone/Siltstone/ Mudstone, ROP avg. 16 m/hrs
4 (59m inner barrel)	3678	3724	3678	3723.5	98.91 %	Bit pulled due to low rate of penetration and unreactive torque after 46m core cut. Tilje Fm. Sandstone/Siltstone Mudstone, ROP avg. 17.62 m/hrs

1.4.2 CORE SHIFTS

Core	Drilled Depth		Shifted to loggers Depth		Shift	Remarks
Number	**From**	**To**	**From**	**To**	**Applied**	
1	3512.50	3535.00	3519.358	3541.858	+ 6.86	
2	3535	3594	3541.858	3600.553	+ 6.55	
3	3594	3678	3600.553	3685.772	+7.77	Due to gas expansion, core was extruded from the core barrels, causing problems with depth control when cutting the cores offshore and also in some instances extruded core pieces being replaced in the incorrect position.
4	3678	3724	3685.772	3731.010	+7.01	

1.4.3 CORE DESCRIPTION SHEETS

Well Number:	**6507/5-4**	**Core Number:**	1						
Date:	24.03.01	**Core diameter**	4½"						
Coring Witness:	Ed Linaker / Alan Williams								
Cored interval:	3512.5m **to** 3535.0m	**Hole size:**	8½"						
Recovered length	22.36m	**Percentage recovery**	99.4%						
Chip Depth	**Lithology and shows**		**∅**			**Shows**			
			P	**F**	**G**	**T**	**P**	**F**	**G**
3512.5	**SANDSTONE**: clear, colourless, translucent to slightly frosted, off white to pale grey, dominantly fine to medium grained quartz, angular to rare subrounded, subelongate to subspherical, moderately well sorted, well consolidated silica cement aggregate, non calcareous, no matrix, abundant intergranular anhedral pyrite, trace oil stain, rare trace carbonaceous material, pyritised argillaceous bands frosted sand, weak petroleum odour, **SHOWS** no direct/cut fluorescence, weak slow blooming bluish white crush cut fluorescence, good to very good visible porosity.			X	X				
3513	**SANDSTONE**: clear, colourless, commonly translucent to frosted pale grey, trace very pale yellow brown, very fine to coarse grained, generally medium grained, subangular to subrounded, subspherical, very well consolidated silica cement, common secondary silica cement to anhedral overgrowths, common anhedral pyrite (pyritised organic material, common brown stain, trace calcite cement, **SHOWS** no direct/cut fluorescence, blue white residual ring.		X	X	X				
3514	**SANDSTONE**: translucent off white to pale grey, common medium to dark brown mottled stain, trace clear, colourless, very fine to medium grained, generally fine grading to medium grained, angular to rare subrounded, subelongate to subspherical, poor to moderately sorted, dominantly very well consolidated silica cement, minor secondary silica cement, non calcareous, no matrix, abundant brown organic stain with common pyrite and hard carbonaceous/lithic fragments micaceous in places, good visible porosity, **SHOWS** no direct fluorescence, slow blooming cut fluorescence			X	X				
3515	**SANDSTONE**: clear, colourless, translucent pale grey, dominantly fine to medium grained, angular to rare subrounded, subelongate to subspherical, moderately sorted, very well consolidated silica cement, non calcareous, no matrix, abundant intergranular pyrite, muscovite mica, rare pale brown organic stain, fresh to frosted quartz, moderate to good inferred porosity, trace carbonaceous specks, **SHOWS** no direct/cut fluorescence, weak slow blooming bluish white crush cut fluorescence.		X	X	X				
3516	**SANDSTONE**: clear, colourless, translucent pale grey, dominantly fine to medium grained, rare frosted coarse quartz grains, angular to rare subrounded, subelongate to subspherical, moderately sorted, very well consolidated silica cement, non calcareous, no matrix, abundant intergranular pyrite, muscovite mica, rare pale brown organic stain, fresh to frosted quartz, trace loose quartz, good visible porosity, trace carbonaceous specks, **SHOWS** no direct/cut fluorescence, weak slow blooming bluish white crush cut fluorescence, trace milky white residue			X	X	X			

Well Number:	**6507/5-4**	**Core Number:**	1
Date:	24.03.01	**Core diameter**	4½"

Coring Witness:	Ed Linaker / Alan Williams									
Cored interval:	3512.5m **to** 3535.0m	**Hole size:**	8½"							
Recovered length	22.36m	**Percentage recovery**	99.4%							
Chip Depth	**Lithology and shows**		**∅**			**Shows**				
			P	**F**	**G**	**T**	**P**	**F**	**G**	
3517	**SANDSTONE**: translucent pale grey to white, occasionally clear colourless, trace very pale yellow to brown, very fine to medium grained, dominantly fine grading to medium, angular to rare subrounded, elongate to subspherical, moderately sorted, very well consolidated, strong silica cement, non calcareous, trace matrix (silica), common anhedral pyrite, (pyritised organic material), trace muscovite mica, rare trace black carbonaceous specks, rare pale brown mottled appearance, **SHOWS** no direct/cut fluorescence, milky residue, moderate visible porosity.			X		X				
3518	**SANDSTONE**: translucent pale grey to white, occasionally clear colourless, trace very pale yel to brown, very fine to medium grained, dominantly fine grading to medium, angular to rare subrounded, elongate to subspherical, moderately sorted, very well consolidated, strong silica cement, minor secondary cementation, non calcareous, trace matrix (silica), common anhedral pyrite, (pyritised organic material), trace muscovite mica, rare trace black carbonaceous specks, rare pale brown mottled appearance, moderate visible porosity. With brown "lignitic" masses 1.9mm wide heavily pyritic, common black pyritic bituminous material, **SHOWS** no direct, slow milky white blooming cut fluorescence, blue white residual ring.			X		X				
3519	**SANDSTONE**: clear, colourless, translucent to frosted pale grey, off white, very fine to medium grained, generally fine to medium grained, angular to subrounded, subelongate to subspherical, moderately sorted, very well consolidated silica cement, non calcareous, no visible matrix, common intergranular anhedral pyrite, patchy red brown organic stain, trace black carbonaceous specks, good visible porosity, **SHOWS** no direct fluorescence, streaming fast bluish milky cut fluorescence, blue white residual ring.				X	X				
3520	**SANDSTONE**: clear, colourless, translucent, pale grey to off white, frosted in places, very pale brown in places (organic stain), very fine to medium grained, generally fine grading to medium grained, angular to subrounded, subelongate to subspherical, very well consolidated with silica cement, secondary cementation, non calcareous, no matrix, abundant pyritised organic material – anhedral and intergranular, common muscovite mica, clean fresh quartz, poor visible porosity. **SHOWS** no direct fluorescence, streaming milky white blooming cut fluorescence, bright blue white residual ring.		X			X				
3521	**SANDSTONE**: clear, colourless, translucent, pale grey to off white, frosted in places, very pale brown in places (organic stain), very fine to medium grained, generally fine grading to medium grained, angular to subrounded, subelongate to subspherical, very well consolidated with silica cement, secondary cementation, non calcareous, common silica matrix, abundant pyritised organic material – anhedral and intergranular, common muscovite mica, clean fresh quartz, very poor visible porosity. **SHOWS** no direct fluorescence, moderately fast milky white blooming cut fluorescence, bright blue white residual ring.		X			X				

Well Number:	**6507/5-4**	**Core Number:**	1
Date:	24.03.01	**Core diameter**	4½"

Coring Witness:	Ed Linaker / Alan Williams		
Cored interval:	3512.5m **to** 3535.0m	**Hole size:**	8½"
Recovered length	22.36m	**Percentage recovery**	99.4%

Chip Depth	**Lithology and shows**	**∅**			**Shows**			
		P	**F**	**G**	**T**	**P**	**F**	**G**
3522	**SANDSTONE**: clear, colourless, translucent off white to pale grey, rare very pale yellow brown, very fine to coarse grained, predominantly fine to medium grained, angular to rare subrounded, subelongate to subspherical, moderately sorted, very well consolidated, silica cement, rare trace to non calcareous, no matrix, common intergranular pyrite, trace muscovite, rare light brown oil staining, moderate petroleum odour **SHOWS** no direct fluorescence, milky white fast cut fluorescence, bluish white residual ring.		X		X	X		
3523	**SANDSTONE**: clear, colourless, generally translucent off white to pale grey, very pale translucent yellow brown in places, very fine to medium grained, predominantly fine to medium grained, subangular, subelongate to subspherical, moderately well sorted, very well consolidated strong silica cement, non calcareous, no matrix, grain supported, common anhedral intergranular pyrite, trace dark brown to black carbonaceous material, trace lithic fragments, occasional brown organic/oil stain, weak to moderate petroleum odour, occasional frosted quartz, good to very good visible porosity, **SHOWS** no shows			X				
3524	**SANDSTONE**: clear, colourless, generally translucent off white to pale grey, very pale translucent yellow brown in places, very fine to medium grained, predominantly fine to medium grained, subangular, subelongate to subspherical, moderately well sorted, very well consolidated strong silica cement, non calcareous, no matrix, grain supported, common anhedral intergranular pyrite, trace dark brown to black carbonaceous material, trace lithic fragments, occasional brown organic/oil stain, weak to moderate petroleum odour, occasional frosted quartz, moderate visible porosity, **SHOWS** no direct fluorescence, weak milky white blooming cut fluorescence, bright bluish white residual ring.		X		X			
3525	**SANDSTONE**: clear, colourless, translucent, pale grey to off white, very fine to medium grained, predominantly very fine to fine grained, angular to subangular, elongate to subspherical, poor to moderately sorted, very well consolidated, silica cement, non calcareous, trace silica matrix, grain supported, abundant pyritised organic material to anhedral pyrite, common muscovite mica, rare very pale brown orange stain, common pyrite bands and organic staining in places, poor to very poor visible porosity, **SHOWS** no direct fluorescence, milky white slow blooming cut fluorescence, bluish white residual ring.	X			X			

Well Number:	**6507/5-4**	**Core Number:**	1
Date:	24.03.01	**Core diameter**	4½"
Coring Witness:	Ed Linaker / Alan Williams		
Cored interval:	3512.5m **to** 3535.0m	**Hole size:**	8½"

Recovered length	22.36m	Percentage recovery	99.4%						
Chip Depth	Lithology and shows		∅			Shows			
			P	F	G	T	P	F	G
3526	**SANDSTONE**: clear, colourless, translucent, pale grey to off white, with common brown organic staining, very fine to medium grained, predominantly very fine to fine grained, angular to subangular, elongate to subspherical, poor to moderately sorted, very well consolidated, strong silica cement, non calcareous, trace silica matrix, grain supported, abundant intergranular anhedral pyrite, common muscovite mica, rare very pale brown orange stain, common pyrite bands and organic staining in places, poor visible porosity, **SHOWS** no direct fluorescence, strong fast milky white blooming cut fluorescence, bluish white residual ring.		X			X	X		
3527	**SANDSTONE**: translucent pale yellow brown to pale grey, off white, clear, colourless, very fine to medium grained, dominantly fine to medium grained, trace coarse grained, angular to subrounded, subelongate to subspherical, poor to moderately sorted, very well consolidated, silica cement, hard, non calcareous, non to trace matrix, general organic staining through sample, occasional intergranular pyrite, clean sandstone, poor visible porosity, SHOWS no direct fluorescence, pale green to milky white moderately fast blooming cut fluorescence, pale bluish white residual ring.		X			X	X		
3528	**SANDSTONE**: translucent yellow brown, highly stained quartz, with abundant bituminous vienlets, dominantly very fine to medium grained, angular to rare subrounded, subspherical, moderately sorted, moderately consolidated, silica cement, non calcareous, non to trace matrix, abundant 1-4mm pyritised bitumen veimlets and lenses, brown to black, highly carbonaceous, trace pyrite, trace mica, poor visible porosity. **SHOWS** trace yellow direct fluorescence, fast streaming bluish white cut fluorescence, bluish white residual ring, very strong petroleum odour.		X				X		
3529	**SANDSTONE**: translucent pale grey to pale yellow brown, rare clear and colourless, silty to medium grained, dominantly fine to medium grained, angular to subrounded, subelongate, poorly sorted, very well consolidated with hard silica cement, non calcareous, common silica matrix, matrix supported in places, generally grain supported, rare clean quartz bands/veins, abundant oil stain on grains, common intergranular pyrite, common muscovite mica, very poor visible porosity. **SHOWS** no direct fluorescence, very fast/instant streaming/blooming milky white cut fluorescence.		X			X	X		
3530	**SANDSTONE:** translucent yellow brown to pale grey, occasionally clear and colourless, very fine to coarse grained, dominantly fine to medium grained, angular to rare subrounded, subelongate, poorly sorted, very well consolidated with hard silica cement, trace intergranular anhedral pyrite, rare carbonaceous specks, non calcareous, no matrix, abundant pale organic stain with moderate petroleum odour, bitumous streaks, poor visible porosity. **SHOWS** no direct fluorescence, streaming milky white cut fluorescence, bright bluish white residual ring.		X			X	X		

Well Number:	6507/5-4	Core Number:	1
Date:	24.03.01	Core diameter	4½”
Coring Witness:	Ed Linaker / Alan Williams		
Cored interval:	3512.5m **to** 3535.0m	Hole size:	8½”

Recovered length	22.36m	Percentage recovery	99.4%						
Chip Depth	Lithology and shows		∅			Shows			
			P	F	G	T	P	F	G
3531	**SANDSTONE**: translucent yellow brown to pale grey, occasionally clear and colourless, very fine to coarse grained, dominantly fine to medium grained, angular to rare subrounded, subelongate, poorly sorted, very well consolidated with hard silica cement, trace intergranular anhedral pyrite, rare carbonaceous specks, non calcareous, no matrix, abundant pale organic stain with moderate petroleum odour, bitumous streaks, poor visible porosity. **SHOWS** abundant bright yellow direct fluorescence, instant blooming milky white cut fluorescence, bright blue white residual ring.		X					X	X
3532	**SANDSTONE**: translucent, yellow brown to pale grey, clear colourless, very fine to granular grain, dominantly very fine to medium, angular to subrounded, subelongate to subspherical, very poorly sorted, well consolidated, silica cement, common intergranular anhedral pyrite, trace carbonaceous specks, mottled organic staining, mica, occasional secondary silica matrix, good to very good visible porosity, **SHOWS**: pale yellow green direct fluorescence, moderately fast milky white blooming cut fluorescence, pale bluish white residual ring.				X				X
3533	**SANDSTONE**: translucent, yellow brown to pale grey, clear colourless, very fine to granular grain, dominantly very fine to medium, becoming less granular, angular to subrounded, subelongate to subspherical, very poorly sorted, well consolidated, silica cement, common intergranular anhedral pyrite, trace carbonaceous specks, mottled organic staining, mica, occasional secondary silica matrix, good to very good visible porosity, **SHOWS** dull green direct fluorescence, instant blooming milky white cut fluorescence, pale bluish white residual ring				X				X
3534.5	**SANDSTONE**: translucent, yellow brown to pale grey, clear colourless, very fine to granular grain, dominantly very fine to medium, becoming less granular, angular to subrounded, subelongate to subspherical, very poorly sorted, well consolidated, silica cement, common intergranular anhedral pyrite, trace carbonaceous specks, mottled organic staining, mica, occasional secondary silica matrix, good to very good visible porosity, **SHOWS** dull green direct fluorescence, instant blooming milky white cut fluorescence, pale bluish white residual ring				X				X

Well Number:	6507/5-4	Core Number:	2
Date:	26.03.01	Core diameter	4½"
Logging Witness:	Ed Linaker / Alan Williams		
Cored interval:	3535m **to** 3594m	Hole size:	8½"
Recovered length	59.2m	Percentage recovery	100.3%

Chip Depth	Lithology and shows	∅			Shows			
		P	F	G	T	P	F	G
3535	**SANDSTONE:** translucent yellow-brown, rarely clear and colourless, pale grey to off white, very fine to medium, angular to subrounded, subelongate to subspherical, moderate sorting, moderate to well consolidated silica cemented aggregate, grain supported, non calcareous, no matrix, oil discolouration with dark brown mottled staining, common black carbonaceous specks, trace micaceous. Good visible porosity SHOWS: 80-90% bright yellow to gold direct fluorescence, instantaneous bluish milky white blooming cut, bright blue white ring residue. Very strong petroliferous odour.			X				X
3536	**SANDSTONE :** translucent yellow-brown, rarely clear and colourless, pale grey to orange, very fine to very coarse range, average fine to coarse, angular to rounded, elongate to spherical, very poorly sorted, very well consolidated silica cemented aggregate-very hard, secondary siliceous cement, non calcareous, no matrix, oil discolouration with dark brown mottled staining, common black carbonaceous specks, trace micaceous & pyritic, common organic/carbonaceous material. Very poor visible porosity. **SHOWS:** 90% bright yellow to gold direct fluorescence, instantaneous bluish milky white blooming cut, bright blue white ring residue. Very strong petroliferous odour.	X						X
3537	**SANDSTONE :** translucent yellow brown to brown orange, rarely clear and colourless to pale grey, very fine to very coarse, trace granular, angular to subrounded, subelongate to subspherical, very poorly sorted, very well consolidated siliceous cemented aggregate, non calcareous, secondary siliceous cement / overgrowths, common black organic / carbonaceous material, abundant oil staining, occasional lithic fragments, micaceous. Moderate to good visual porosity. **SHOWS:** 85% bright yellow to gold direct fluorescence, very fast bluish white streaming cut to fast blooming, bright bluish white ring residue. Very strong petroliferous odour.		X	X				X
3538	**SANDSTONE:** as per description for 3537m, identical shows and porosity.		X	X				X
3539	**SANDSTONE:** as per description for 3537m, improved sorting. Shows and porosity as per 3537m.		X	X				X
3540	**SANDSTONE:** translucent yellow orange brown, rarely pale grey to off white, clear, colourless, very fine to coarse, fine to medium average, angular to rarely subrounded, subelongate to subspherical, poorly sorted, very well consolidated silica cemented aggregate, non calcareous, secondary siliceous cement, traces of mica, carbonaceous material, lithic/mafic, abundant quartz discolouration with occasional dark brown, mottled staining, moderate to good visible porosity**. SHOWS:** bright yellow to gold direct fluorescence, very fast to instantaneous streaming bluish white cut, bluish white residual ring.		X					X

Well Number:	**6507/5-4**	**Core Number:**	2
Date:	26.03.01	**Core diameter**	4½"
Logging Witness:	Ed Linaker / Alan Williams		
Cored interval:	3535m to 3594m	**Hole size:**	8½"
Recovered length	59.2m	**Percentage recovery**	100.3%

Chip Depth	Lithology and shows	∅	Shows

		P	F	G	T	P	F	G
3541	SANDSTONE : translucent light yellow to golden brown, rarely clear and colourless to pale greyish white, very fine to medium, rarely coarse, angular to subrounded, subelongate to subspherical, poorly sorted with thin layers of medium-coarse subrounded grains, strong well consolidated primary and secondary siliceous cement, non calcareous, trace carbonaceous specks, muscovite, good visible porosity. SHOWS: 90% moderate yellow to golden direct fluorescence, instantaneous bright white to blue blooming cut grading to fast stream, white ring residue.			X				X
3542	SANDSTONE: as per description for 3541m with reduced poor visible porosity and common secondary siliceous cement.	X						X
3543	SANDSTONE: dominantly translucent yellow golden brown, occasionally clear and colourless to pale grey, very fine to medium, angular to subrounded, generally subspherical, poor to moderately sorted, well consolidated silica cemented aggregate-slightly friable in parts, no matrix, general quartz discolouration with mottled dark brown oil stains, trace black organic / carbonaceous material, moderate to good visible porosity. SHOWS: 80% moderately bright yellow to gold direct fluorescence, fast bluish white streaming cut, bright blue white ring residue. Strong petroliferous odour.		X					X
3544	SANDSTONE: translucent yellow orange brown, common clear and colourless, very fine to medium, occasionally coarse, subangular to angular, elongate to rarely subspherical, very poorly sorted, very well consolidated primary and secondary silica cemented aggregate, no matrix, grain supported, rare dark brown black organic material (bitumen/dead oil), mica & pyrite, poor visible porosity. SHOWS: yellow to gold direct fluorescence, moderately fast blue white streaming cut, blooming crush cut, moderate petroliferous odour.	X						X
3545	SANDSTONE: dominantly translucent yellow brown orange, com clear and colourless, very fine to medium, occasionally coarse, angular to subangular, subrounded in parts, subelongate to subrounded, poorly sorted, well consolidated siliceous cement, non calcareous, frosted quartz, intergranular pyrite, lithic and mica, poor to moderate visible porosity. SHOWS: 80-90% yellow to gold dull to commonly bright direct fluorescence, instantaneous blooming blue white cut, bright yellow white residual ring, strong petroliferous odour.	X	X					X
3546	SANDSTONE: as per description for 3545m, fine to coarse, dominantly medium, moderate to well sorted, rarely micaceous, moderate to good visible porosity. SHOWS: 80-90% yellow to gold dull to bright direct fluorescence, instantaneous blooming milky white cut, yellow white residual ring, strong petroliferous odour.		X					X

Well Number:	**6507/5-4**	**Core Number:**	2						
Date:	26.03.01	**Core diameter**	4½"						
Logging Witness:	Ed Linaker / Alan Williams								
Cored interval:	3535m **to** 3594m	**Hole size:**	8½"						
Recovered length	59.2m	**Percentage recovery**	100.3%						
Chip Depth	**Lithology and shows**		**∅**			**Shows**			
			P	**F**	**G**	**T**	**P**	**F**	**G**
3547	**SANDSTONE:** dominantly translucent yellow orange brown, rarely clear and colourless, very fine to medium, fine to medium average, subangular, subelongate to subspherical, moderately sorted, very well consolidated with siliceous cement, non calcareous, rarely slightly friable, frosted quartz in parts, micaceous with rare lithic fragments, poor to moderate visible porosity. **SHOWS:** dull to commonly bright yellow to gold direct fluorescence, fast to instantaneous milky bluish white cut, yellow to white ring residue, strong petroliferous odour.		X	X					X
3548	**SANDSTONE:** as per description for 3547m, fine to coarse range, predominantly medium to coarse grained, subangular to angular, moderately to well sorted, common carbonaceous specks, poor to moderate visible porosity. **SHOWS:** as per 3547m.		X	X					X
3549	**SANDSTONE:** as per description for 3547m.Occasional bituminous veining. Moderate to good visible porosity. **SHOWS:** as per 3547m.		X	X					X
3550	**SANDSTONE:** dominantly translucent yellow orange brown to rare greyish brown, rarely clear and colourless to trace pink, very fine to coarse, predominantly fine to medium, subangular, elongate to subspherical, moderately sorted, well consolidated, siliceous cement, non calcareous, no matrix, some frosted quartz, occasional carbonaceous specks and mica, poor to moderate visible porosity. **SHOWS:** dull to commonly bright yellow to gold direct fluorescence, fast to instantaneous milky bluish white cut, yellow to white ring residue, strong petroliferous odour.		X	X					X
3551	**SANDSTONE:** as per description for 3550m. **SHOWS:** 60-70% direct fluorescence as per 3550m.		X	X					X
3552	**SANDSTONE:** predominantly translucent to slight yellow brown orange, occasionally brown grey, clear and rose pink, very fine to coarse, fine to medium average, angular to subangular, subspherical, poor to moderately sorted, well consolidated with siliceous cement, non calcareous, no matrix, occasional carbonaceous and micaceous specks, lithic fragments, poor visible porosity. **SHOWS:** 60-70% dull to bright yellow to gold direct fluorescence, slow milky bluish white cut, yellow to white ring residue, strong petroliferous odour.		X						X
3553	**SANDSTONE:** as per description for 3552m, very fine to medium range, fine to medium average, moderately sorted, moderate to good visible porosity. **SHOWS:** 90-100% bright yellow to yellowish gold direct fluorescence, instantaneous blooming bluish milky white cut, strong hydrocarbon odour.			X	X				X
3554	**SANDSTONE:** as per description for 3554m, predominantly fine to medium grained, rarely coarse, moderately sorted, subspherical to subelongate, poor to occasionally moderate visible porosity. **SHOWS:** as per 3553m.		X	X					X

Well Number:	**6507/5-4**	**Core Number:**	2						
Date:	26.03.01	**Core diameter**	4½"						
Logging Witness:	Ed Linaker / Alan Williams								
Cored interval:	3535m **to** 3594m	**Hole size:**	8½"						
Recovered length	59.2m	**Percentage recovery**	100.3%						
Chip Depth	**Lithology and shows**		**∅**			**Shows**			
			P	**F**	**G**	**T**	**P**	**F**	**G**
3555	**SANDSTONE:** predominantly translucent yellow brown to greyish brown, occasionally clear and colourless, frosted in parts, fine to granular range, coarse average, subrounded to rounded, rarely subangular, subspherical to subelongate, moderate to well sorted, well consolidated with siliceous cement, poor to occasional moderate visible porosity. **SHOWS:** as for 3553m, instantaneous blooming bluish white cut, bright yellow white residual ring.		X	X					X
3556	**SANDSTONE:** translucent yellow orange to yellow brown, clear and colourless, frosted, fine to coarse, subangular to subrounded, subangular to subelongate, moderately sorted, hard siliceous cement, occasional lithic / carbonaceous / mica fragments, moderate to good visible porosity. **SHOWS:** 90-100% bright yellow to yellowish gold direct fluorescence, instantaneous blooming bluish milky white cut, strong hydrocarbon odour.			X	X				X
3557	**SANDSTONE:** as per description for 3556m, fine to medium grained, occasionally coarse, angular to subangular, secondary siliceous cementation. Moderate to very poor visible porosity. **SHOWS:** as per 3556m.		X	X					X
3558	**SANDSTONE:** as per description for 3556m, predominantly fine to medium, no secondary cement, poor to moderate visible porosity. **SHOWS:** 90% bright yellow to yellowish gold direct fluorescence, instantaneous blooming bluish milky white cut, bright yellow white residual ring, strong hydrocarbon odour.		X	X					X
3559	**SANDSTONE:** translucent yellow brown to dark yellow orange, clear & colourless in parts, rare very coarse frosted pale grey, very fine to medium, averaging fine, angular to subrounded, subelongate to subspherical, moderate to well sorted, well consolidated siliceous aggregate, abundant organic / carbonaceous specks, common mica, poor to moderate visual porosity. **SHOWS:** 90% bright yellow to yellowish gold direct fluorescence, instantaneous blooming bluish milky white cut, bright yellow white residual ring, strong hydrocarbon odour.		X	X					X
3560	**SANDSTONE:** as per description for 3559m, some secondary silica cementation / overgrowths. **SHOWS:** as per 3559m.		X	X					X
3561	**SANDSTONE:** as per description for 3559m, very fine to medium grained, generally fine, moderate to well sorted, mica, lithic fragments, rare carbonaceous specks, moderate to poor visible porosity. **SHOWS:** as per 3559m.		X	X					X
3562	**SANDSTONE:** as per description for 3559m, poor visible porosity. **SHOWS:** 90-100% bright yellow to gold direct fluorescence, bright very fast streaming to blooming bluish milky white cut, bright yellow white ring residue, strong hydrocarbon odour.		X						X

Well Number:	**6507/5-4**	**Core Number:**	2
Date:	26.03.01	**Core diameter**	4½"
Logging Witness:	Ed Linaker / Alan Williams		
Cored interval:	3535m **to** 3594m	**Hole size:**	8½"
Recovered length	59.2m	**Percentage recovery**	100.3%

Chip Depth	**Lithology and shows**	∅			**Shows**			
		P	**F**	**G**	**T**	**P**	**F**	**G**
3563	**SANDSTONE:** translucent moderate yellow brown to dark yellow orange, clear, colourless in parts, translucent greyish orange, very fine to medium, predominantly fine, angular to subrounded, subspherical, moderate to well sorted, well consolidated with siliceous cement, traces of lithic, carbonaceous specks and mica, frosted quartz and secondary overgrowths, poor to rarely moderate porosity. **SHOWS:** 90-100% bright yellow to yellow gold direct fluorescence, bright very fast streaming to blooming bluish milky white cut, bright yellow white ring residue, strong hydrocarbon odour.	X						X
3564	**SANDSTONE:** as per description for 3563m, trace to locally common mica, poor visible porosity. **SHOWS:** 90-100% bright yellow to gold direct fluorescence, bright very fast streaming to blooming bluish milky white cut, bright yellow white ring residue, strong hydrocarbon odour.	X						X
3565	**SANDSTONE:** translucent yellow brown to dark yellow orange, rarely clear to colourless, very fine to fine, subangular to subrounded, subspherical, moderately well sorted, well consolidated with siliceous cement, abundantly micaceous with carbonaceous specks, very poor visible porosity. **SHOWS:** 80% bright yellow direct fluorescence, instantaneous streaming milky white cut, bright yellow white ring residue, moderate hydrocarbon odour.	X						X
3566	**SANDSTONE:** as per description for 3565m with abundant mica, carbonaceous and bituminous material up to 2mm. **SHOWS :** 80% bright yellow direct fluorescence, instantaneous streaming milky white cut, bright yellow white ring residue, moderate hydrocarbon odour.	X						X
3567	**SANDSTONE:** as per description for 3565m with abundant mica, carbonaceous and bituminous material up to 1mm. **SHOWS:** 80% bright yellow direct fluorescence, instantaneous streaming milky white cut, bright yellow white ring residue, moderate hydrocarbon odour.	X						X
3568	**SANDSTONE:** translucent yellow brown to yellow orange, clear and colourless, very fine to medium, angular to subangular, subspherical, moderate to well sorted, siliceous cement, frosted quartz, common mica and rare carbonaceous specks, poor to moderate visible porosity. **SHOWS:** 90-100% bright yellow to yellow gold fluorescence, instantaneous streaming to blooming bluish milky white cut, bright white residual ring, strong hydrocarbon odour.	X	X					X
3569	**SANDSTONE:** as per description for 3568m, very fine to fine grained, very abundant mica and carbonaceous layers up to 1mm thickness. **SHOWS:** 80% direct fluorescence as per 3568m.	X	X				X	X
3570	**SANDSTONE:** as per description for 3568m. **SHOWS:** 80% bright yellow to yellow gold fluorescence, moderately fast blooming bluish milky white cut, bright white residual ring, strong odour.	X	X					X

Well Number:	**6507/5-4**	**Core Number:**	2

Date:	26.03.01	**Core diameter**	4½"						
Logging Witness:	Ed Linaker / Alan Williams								
Cored interval:	3535m **to** 3594m	**Hole size:**	8½"						
Recovered length	59.2m	**Percentage recovery**	100.3%						
Chip Depth	**Lithology and shows**		**Ø**			**Shows**			
			P	**F**	**G**	**T**	**P**	**F**	**G**
3571	**SANDSTONE:** as per description for 3568m.		X	X				X	X
3572	**SANDSTONE:** translucent moderate yellow brown to greyish brown, rarely clear and colourless, very fine to fine, angular to subangular, subspherical, moderate to well sorted, firm siliceous cement, micaceous, carbonaceous specks, poor to no visible porosity. **SHOWS:** 80% bright yellow to yellow gold direct fluorescence, fast bluish white blooming cut, bright yellow white residual ring, moderate hydrocarbon odour.		X						X
3573	**SILTSTONE:** dark grey to grey black, hard, very abundant mica, carbonaceous and bituminous, sandy in parts-very fine grained, no visible porosity. **SHOWS:** trace dull yellow direct fluorescence, moderately fast milky white cut, dull bluish white residual ring.					X			
3574	**SILTSTONE:** as per description for 3573m, commonly grading to very fine grained SANDSTONE. **SHOWS:** 20% dull to rarely bright yellow direct fluorescence in sands, moderately fast blooming milky white cut fluorescence, dull yellow white residual ring, slight hydrocarbon odour.							X	
3575	**SANDSTONE:** translucent to opaque yellow to greyish brown, very fine to fine grained, subangular, subspherical, moderately to well sorted, well consolidated with siliceous cement, trace calcareous, slightly friable, common carbonaceous specks, locally abundant mica, none to very poor visible porosity. **SHOWS:** 90-100% dull to bright yellow to yellow gold direct fluorescence, instantaneous bright bluish white streaming cut, bright yellow white residual ring, moderate hydrocarbon odour.		X						X
3576	**SANDSTONE:** as per description for 3575m, common mica, rare carbonaceous specks, occasionally clear and colourless to translucent pale yellow, very poor visible porosity. **SHOWS:** as per 3575m, yellow white to bluish white residual ring.		X						X
3577	**SILTY SANDSTONE:** as per descriptions for 3576m – sandstone and 3573m – siltstone. No to very poor visible porosity. **SHOWS:** 30% as per 3574m.		X					X	
3578	**SANDSTONE:** translucent to opaque pale yellow brown to greyish brown, occasionally clear and colourless, silty to fine grained, average very fine, subangular to subrounded, subspherical, moderately sorted, grading to SILTSTONE, highly abundant mica, occasional carbonaceous plant fragments, firm siliceous cement, trace calcareous, very poor to no visible porosity. **SHOWS:** spotty and banded 20-30% dull to occasionally bright yellow direct fluorescence, fast blooming milky white cut, bright bluish white residual ring, slight hydrocarbon odour.		X				X	X	
3579	**SILTY SANDSTONE:** as per description for 3578m with no to very poor visible porosity, trace calcareous cement. **SHOWS:** 30-40% moderate yellow green direct fluorescence, slow streaming blue milky white cut, bluish white to trace yellow ring residue.		X					X	X

Well Number:	**6507/5-4**	**Core Number:**	2
Date:	26.03.01	**Core diameter**	4½"
Logging Witness:	Ed Linaker / Alan Williams		

Cored interval:	3535m **to** 3594m	**Hole size:**	8½"						
Recovered length	59.2m	**Percentage recovery**	100.3%						
Chip Depth	**Lithology and shows**		**∅**			**Shows**			
			P	**F**	**G**	**T**	**P**	**F**	**G**
3580	**SILTY SANDSTONE:** as per description for 3578m, abundant muscovite mica, very poor to no visible porosity, thin oil stained / bituminous bands. **SHOWS:** 80% yellow to golden green direct fluorescence, moderately fast bluish white streaming cut, yellow green ring residue. Weak petroliferous odour.		X						X
3581	**SILTY SANDSTONE:** translucent yellow orange brown, grading opaque, rarely clear, colourless to off white, silty to fine grained, dominantly very fine, angular to rarely subrounded, subelongate to subspherical, moderately sorted, well consolidated silica cemented aggregate, trace calcareous, no matrix, secondary siliceous cement, common muscovite mica, carbonaceous specks, dark red brown traces of oil staining, tight, no visible porosity. **SHOWS:** 80-90% yellow golden direct fluorescence, fast bluish white stream cut, yellow to green ring residue. Weak petroliferous odour.							X	X
3582	**SANDSTONE:** as per description for 3581m. Grading to sandy SILTSTONE with abundant mica, generally clean. **SHOWS:** 5-10% faint yellow to green direct fluorescence, no significant cut, very weak petroleum odour.						X	X	
3583	**SANDY SILTSTONE:** grey to dark grey, rare grey brown, very well consolidated, silica cement, hard, blocky, no visible swelling, abundant muscovite mica, occasional pyritised plant remnants, trace red brown biotite, wispy bands 2-8mm thick of very fine orange to brown translucent quartz. SHOWS: trace yellow gold direct fluorescence, no significant cut, very weak petroleum odour.						X		
3584	**SILTSTONE :** as per description for 3583m, abundant muscovite mica, common biotite, with rare brown mottled oil stain and common carbonaceous specks, no visible porosity, trace SANDSTONE : as per description for 3581m **SHOWS**: only in SANDSTONE lamina/bands and as per shows description for 3583m.						X		
3585	**SILTSTONE:** as per description for 3583m, abundant muscovite/biotite mica, pyritised carbonaceous material in places with occasional bituminous (heavily altered), no visible porosity in Siltstone, very poor visible porosity in very fine sand bands. **SHOWS:** none in Siltstone, speckled dull yellow to gold direct fluorescence with slow bluish white streaming cut, pale yellow to bluish green ring residue. No odour.						X		
3586	**SANDY SILTSTONE:** as per description for 3583m.						X		
3587	**SANDY SILTSTONE:** dark greyish brown, hard, blocky, slightly friable in parts, abundantly micaceous (muscovite / biotite) with destruction of original texture, rare angular and clear silty quartz rarely grading to very fine SANDSTONE, common black carbonaceous / bituminous fragments with pyritic alteration, no visible porosity. **SHOWS:** None.								

Well Number:	**6507/5-4**	**Core Number:**	2
Date:	26.03.01	**Core diameter**	4½"
Logging Witness:	Ed Linaker / Alan Williams		
Cored interval:	3535m **to** 3594m	**Hole size:**	8½"

Recovered length	59.2m	Percentage recovery	100.3%						
Chip Depth	Lithology and shows		∅			Shows			
			P	F	G	T	P	F	G
3588	**SILTSTONE :** dark greyish black to greyish brown, hard, blocky to subfissile, flaky in parts, very siliceous matrix / none calcareous with abundant muscovite mica, occasional carbonaceous specks & red feldspar flagments, abundant angular grey to translucent carbonaceous / bituminous fragments with pyrite alteration, no visible porosity. **SHOWS :** None.								
3589	**SILTSTONE :** as per description for 3588m, traces of translucent yellow orange brown angular silty quartz, siliceous matrix, abundant muscovite, no visible porosity. **SHOWS :** None.								
3590	**SILTSTONE :** as per description for 3588m.								
3591	**SANDY SILTSTONE :** light to dark greyish brown, orange brown, pale grey to black, hard, blocky, occasionally friable with brittle break, homogenous, dull to slightly silky lustre, abundant muscovite mica, biotite and partially altered carbonaceous fragments, micropyritic, oil migration bands and dead oil stains, rare angular orange brown silty quartz with primary and secondary siliceous cemented aggregate, no visible porosity. **SHOWS :** None.								
3592	**SILTSTONE :** as per description for 3591m, dark greyish black, becoming finer grained, no visible porosity. **SHOWS :** None.								
3593	**SILTSTONE :** dark grey, very hard, blocky, rare subfissile with brittle & flaky break, non calcareous, abundant muscovite mica, occasional biotite, altered organic / carbonaceous material to mica / pyrite, no visible swelling, common secondary siliceous matrix, no silty quartz, no visible porosity. **SHOWS :** None.								
3594.2	**SILTSTONE :** as per description for 3593m.								

Well Number:	6507/5-4	Core Number :	3
Date:	26.03.01	Core diameter :	4½”
Logging Witness:	Ed Linaker / Alan Williams		

Cored interval:	3594m **to** 3678m	**Hole size :**	8½"						
Recovered length	87m	**Percentage recovery**	100+%						
	Lithology and shows		∅			**Shows**			
			P	**F**	**G**	**T**	**P**	**F**	**G**
3594	**SILTSTONE :** dark grey, very hard, blocky, rare subfissile with brittle & flaky break, non calcareous, abundant muscovite mica, occasional biotite, altered organic / carbonaceous material to mica / pyrite, no visible swelling, common secondary siliceous matrix, no silty quartz, no visible porosity. **SHOWS :** None.								
3595, 3596	Core slippage inside sleeve, unable to chip.								
3597, 3598, 3599, 3600	**MUDSTONE :** very dark grey black, hard to very hard, blocky, rarely flaky with angular break, indurated in parts, non calcareous, no visible swelling, abundant carbonaceous material, micromicaceous, traces of silty, clear and angular quartz, generally homogenous, matt lustre, no visible porosity. **SHOWS :** None.								
3601, 3602, 3603	**SILTSTONE, grading to SILTY MUDSTONE :** olive brown, grey brown, orange brown, dark brown, very hard, blocky, well consolidated, abundant translucent grey brown, angular silty quartz with strong siliceous cement, secondary siliceous matrix, abundant mica, glauconitic, carbonaceous wisps and thin laminae, no pyritic, no sand, no visible porosity. **SHOWS :** None.								
3604	**SILTY MUDSTONE :** dark grey to olive black, very hard, blocky, generally homogenous, matt lustre, non calcareous, no visible swelling, rarely subplaty, angular break, abundant micromica, carbonaceous specks, also wispy bands & layers (microlaminae) upto 1mm thick of pale orange brown, silty quartz, angular to subrounded, subspherical, poor to moderately sorted (grading to very fine **SANDSTONE** in parts), moderate siliceous cemented aggregate, non calcareous, minor siliceous matrix, rare glauconitic quartz, very poor visible porosity. **SHOWS :** dull yellow green direct fluorescence on all silty sandstone, moderately fast bluish white milky streaming cut, blue white residual ring.		X					X	
3605	**SILTSTONE,** grading to **SILTY SANDSTONE :** abundant microlamination and wispy bands of heavily micaceous and organic material with dead oil and bituminous dark brown to black staining, mottled, very poor to no visible porosity. **SHOWS :** dull to moderately bright yellow green direct fluorescence, slow to moderate blue white streaming cut, pale bluish white residual ring.		X					X	
3606, 3607	**SANDSTONE :** translucent to opaque yellow brown orange, occasionally clear and colourless, smokey grey; silty to very fine, angular to subangular, subspherical, moderately to well sorted, strong siliceous cemented aggregate with common secondary siliceous matrix, non calcareous, micromicaceous, traces of glauconite, carbonaceous specks, thin 1mm laminae of dark greyish black micaceous and bituminous **SILTSTONE**, organic in parts, very poor to no visible porosity. **SHOWS :** dull to moderately bright yellow green direct fluorescence, moderately fast bluish white streaming cut with bluish green residual ring.		X					X	

Well Number:	**6507/5-4**	**Core Number:**	3						
Date:	26.03.01	**Core diameter**	4½"						
Logging Witness:	Ed Linaker / Alan Williams								
Cored interval:	3594m **to** 3678m	**Hole size:**	8½"						
Recovered length	87m	**Percentage recovery**	100+%						
	Lithology and shows		**∅**			**Shows**			
			P	**F**	**G**	**T**	**P**	**F**	**G**
3608, 3609, 3610	**SANDY SILTSTONE :** translucent orange grey brown with dark grey bituminous / dead oil stained laminae, mottled in parts, very hard, blocky, siliceous matrix, non calcareous, abundant muscovite / biotite, dull to silky lustre in parts, rare angular orange brown silty quartz, no visible swelling, angular break, none to very poor visible porosity. **SHOWS :** 20-50% dull yellow green direct fluorescence, slow bluish white streaming cut, very pale bluish green residual ring.		X				X	X	
3611	**SANDSTONE :** translucent orange, grey, brown, pale to smokey grey to off white in parts, medium to coarse, rarely very coarse, subangular to subrounded, subelongate to subspherical, well sorted, very strong siliceous cement aggregate with abundant secondary cement / matrix, non calcareous, matrix supported, common glauconitic quartz, rarely micaceous and carbonaceous specks, very poor visible porosity. **SHOWS :** speckled moderately bright yellow green direct fluorescence, moderately fast bluish white streaming cut, yellow green residual ring, weak petroliferous odour.		X					X	X
3612, 3613, 3614, 3615	**SANDSTONE,** grading to **SILTSTONE :** medium to dark greyish brown, occasionally orange brown, rarely clear, colourless to off white, pale yellow, silty to very fine, angular to rarely subrounded, subspherical, moderately to well sorted, moderately consolidated siliceously cemented aggregate, trace calcareous, occasional secondary siliceous matrix, generally clean with rare mica & mottled dark brown to black carbonaceous patches, bituminous in parts, grading to SILSTONE in parts, poor visible porosity. **SHOWS :** 80-90% dull yellow green direct fluorescence, fast bluish white streaming cut, yellow green residual ring. Weak petroliferous odour.		X						X
3616, 3617	**SANDSTONE :** grey brown, translucent orange, greyish brown, silty to very fine, angular to subangular, subelongate to subspherical, moderately to well sorted, strong siliceously cemented aggregate, grain supported, trace secondary matrix, clean, trace micaceous and carbonaceous, dark brown to black bituminous lenses / laminae, poor visible porosity. **SHOWS :** 80-100% very dull green to yellow direct fluorescence, moderate bluish white streaming cut, bluish green residual ring.		X						X
3618	**SANDSTONE :** translucent to opaque orange brown to orange grey, common mottled green (glauconite), grading to grey, silty to coarse, very fine to medium, rarely coarse, angular to subrounded, subspherical, very poorly sorted, strong well consolidated siliceously cemented aggregate with common secondary siliceous matrix, slightly calcareous, abundant medium to coarse glauconitic quartz, rarely micaceous, slightly mottled dark brown organic staining, poor to very poor visible porosity. **SHOWS :** 20% moderate yellow green direct fluorescence, slow moderately bright streaming cut, yellow green residual ring.		X					X	

Well Number:	**6507/5-4**	**Core Number:**	3
Date:	26.03.01	**Core diameter**	4½"

Logging Witness:	Ed Linaker / Alan Williams		
Cored interval:	3594m **to** 3678m	**Hole size:**	8½"
Recovered length	87m	**Percentage recovery**	100+%

	Lithology and shows	∅			**Shows**			
		P	**F**	**G**	**T**	**P**	**F**	**G**
3619, 3620, 3621	**SILTY SANDSTONE :** tranlucent to opaque orange brown grey, grey to off white in parts, silty to very fine, occasionally fine, angular to subangular, subelongate to subspherical, moderate to well sorted, strong siliceously cemented aggregate, trace calcareous, no matrix, grain supported, micromicaceous, trace glauconitic, mottled dark grey organic / dead oil bands and lenses, very poor visible porosity. **SHOWS :** 60-90% dull green to yellow gold direct fluorescence, moderately fast bluish white streaming cut, greenish yellow residual ring, weak petroliferous odour.	X						X
3622, 3623, 3624	**SILTY SANDSTONE :** translucent beige, greyish brown, dark grey in parts, silty to very fine, angular to subangular, subspherical, moderately to well sorted, strong moderate to well consolidated siliceously cemented aggregate, rarely friable in parts, abundant secondary siliceous matrix, trace calcareous, common dark grey to black dead oil banding, poor visible porosity. **SHOWS :** 80% dull green gold yellow direct fluorescence, slow streaming bluish white cut, green yellow residual ring.	X						X
3625	**SILTY SANDSTONE :** beige, grey brown, greyish orange, silty to very fine, angular to subangular, rarely subrounded, subelongate to subspherical, moderate to well sorted, firm siliceous cement, abundant secondary siliceous cement / matrix, trace calcareous, slightly friable in parts, rare glauconite, grading to sandy **SILTSTONE** with abundant muscovite, banded dark grey dead oil staining, very poor to poor visible porosity. **SHOWS :** moderately bright 60% slow steaming bluish white cut, yellow green residual ring.	X						X
3626, 3627, 3628	**SILTSTONE :** dark grey brown to grey black, hard, blocky, occasionally slightly flaky, angular to crumbly break, homogenous, dull, non calcareous, no visible swelling, siliceous matrix, abundant dark grey to black dead oil staining, abundant muscovite, common bands angular silty to rarely very fine quartz with shows, common carbonaceous specks. **SHOWS :** 0-10% dull yellow green direct fluorescence from sandstone, weak bluish white streaming cut, pale green residual ring,	X			X	X	X	
3629	**PYRITISED WOOD :** dark golden brown, hard, flaky texture, generally well consolidated, non calcareous, pyritised fibrous wood / palnt remenents.							
3630, 3631, 3632, 3633	**SILTY MUDSTONE :** dark greyish brown to black, very hard, blocky, homogenous, dull, angular break, common pyritised shell fragements and veinlets, microfossil bands, common very fine glauconitic angular quartz, siliceous matrix, non calcareous, no visible swelling, micromicaceous, grading to **MUDSTONE** with depth, no visible porosity. **SHOWS :** None.							
3634, 3635, 3636	**SILTSTONE :** predominantly dark grey to greyish black, hard, blocky, no visible swelling, abundant micromicaceous, common off white to pale grey translucent silt to very fine quartz, grading to **MUDSTONE**, no to very poor visible porosity. **SHOWS :** None.							

Well Number:	**6507/5-4**	**Core Number:**	3
Date:	26.03.01	**Core diameter**	4½"
Logging Witness:	Ed Linaker / Alan Williams		

Cored interval:	3594m **to** 3678m	**Hole size:**	8½"						
Recovered length	87m	**Percentage recovery**	100+%						
	Lithology and shows		∅			**Shows**			
			P	**F**	**G**	**T**	**P**	**F**	**G**
3637, 3638, 3639	**MUDSTONE :** dark grey to greyish black, hard, blcoky, no visible swelling, common to abundant micromicas, locally abundant translucent to pale grey, silt to very fine quartz, common carbonaceous specks, no to occasionally very poor visible porosity. **SHOWS :** None.								
3640, 3641, 3642	**SILTSTONE :** grey, dark grey to greyish black, hard, blocky, no visible swelling, abundant muscovite and biotite, common off white to pale grey translucent silt to very fine quartz, grading to **MUDSTONE**, no to very poor visible porosity. **SHOWS :** None.								
3643, 3644, 3645, 3646, 3647, 3648	**SILTY MUDSTONE :** dark grey to grey black, hard, blocky, no visible swelling, non calcareous, siliceous matrix, homogenous, dull, abundantly micromicaceous, traces of silty angular quartz, rare carbonaceous specks, no visible porosity. **SHOWS :** None.								
3649, 3650, 3651, 3652, 3653, 3654	**SILTSTONE :** dark grey to black, very hard, blocky, indurated, non calcareous, no visible swelling, homogenous, dull, common to abundant micromica, carbonaceous specks, occasional subplanar lenses of silty, angular, pale grey to clear quartz, tight siliceous cement, traces of oil staining. **SHOWS :** None.								
3655, 3656, 3657, 3658, 3659, 3660	**SILTSTONE :** dark grey to black, very hard, blocky, indurated, non calcareous, no visible swelling, homogenous, dull to matt lustre, micromicaceous, traces of carbonaceous specks and angular pale grey to translucent off white silty quartz, siliceous matrix, no visible porosity. **SHOWS :** None.								
3661, 3662, 3663, 3664, 3665, 3666	**SILTSTONE :** dark grey to black, very hard, blocky, non calcareous, no visible swelling, homogenous, dull, abundantly micromicaceous, rare angular to subrounded silty quartz, traces of brown mottled oil staining, strong siliceous matrix, no visible porosity. **SHOWS :** None.								
3667, 3668, 3669, 3670,	**SILTSTONE :** dark grey to black, very hard, blocky, indurated, non calcareous, no visible swelling, homogenous, dull to matt lustre, micromicaceous, common silty quartz, siliceous matrix, slightly flaky in parts, no visible porosity. **SHOWS :** None.								
3671, 3672, 3673, 3674, 3675	**SILTSTONE :** dark grey black, hard, blocky to trace flaky, homogenous, matt lustre, non calcareous, no visible swelling, micromicaceous, trace carbonaceous specks, traces of orange brown oil staining, no visible porosity. **SHOWS :** None.								
3676, 3677, 3678	**SILTY MUDSTONE :** dark grey black, rare dark greyish brown, very hard, blocky, rarely subplaty, indurated, homogenous, dull, non calcareous, no visible swelling, abundantly micromicaceous, rare silty quartz, grading to **SILTSTONE**, no visible porosity. **SHOWS :** None.								
3679, 3680	**SILTSTONE :** greyish brown to dark greyish black, hard, blocky, flaky, non calcareous, no visible swelling, moderately strong siliceous matrix, abundant micromica (muscovite), common translucent pale grey to greyish brown silty to very fine matrix supported quartz aggregate, commonly associated with glauconite and mica, very poor to poor visible porosity. **SHOWS :** None.		X						

Well Number:	**6507/5-4**	**Core Number:**	3
Date:	26.03.01	**Core diameter**	4½"
Logging Witness:	Ed Linaker / Alan Williams		

Cored interval:	3594m **to** 3678m	**Hole size:**	8½"						
Recovered length	87m	**Percentage recovery**	100+%						
	Lithology and shows		∅			**Shows**			
			P	**F**	**G**	**T**	**P**	**F**	**G**
3681	**SANDSTONE :** translucent brown, greyish brown, orange brown black in parts, silty to fine, rarely medium, trace coarse, angular to rarely subrounded, subelongate, subspherical, very poorly sorted, strong well consolidated siliceously cemented aggregate, common secondary overgrowths / matrix, non calcareous, abundant dark grey to black dead oil quartz staining, common mica, abundant pyritised alteration of organics / bitumin, very poor visible porosity. **SHOWS :** 50% speckled dull yellow green direct fluorescence, fast streaming to blooming bluish milky white cut with bluish white to green residual ring.		X					X	X

Well Number:	**6507/5-4**	**Core Number :**	4
Date:	28.03.01	**Core diameter :**	4½"
Logging Witness:	Ed Linaker / Alan Williams		
Cored interval:	3678m **to** 3724m	**Hole size :**	8½"

Recovered length	45.5m	Percentage recovery	98.9%						
	Lithology and shows		∅			Shows			
			P	F	G	T	P	F	G
3678, 3679	**SILTSTONE :** bituminous and micaceous, no visible porosity. **SHOWS :** None.								
3680	Unable to chip, due to gas expansion disrupting core.								
3681	**SANDSTONE :** clear, colourless, translucent to opaque pale orange grey brown, very fine to medium, generally fine to medium, rarely frosted, angular to subangular, subelongate to subspherical, poor to moderately sorted, moderately consolidated siliceously cemented aggregate with abundant secondary siliceous cement / matrix, matrix supported, friable to crumbly in parts, glauconitic quartz, grey brown to brown organic stain-material, trace micaceous, poor to moderate visible porosity. **SHOWS :** 100% dull yellow green direct fluorescence, moderately fast bluish white streaming to blooming cut with yellow green residual ring.		X	X					X
3682	**SANDSTONE :** fine to medium, moderate visible porosity. **SHOWS :** 90% dull dark green direct fluorescence, slow bluish white streaming cut, green white ring residue.			X					X
3683	**SANDSTONE :** clear, colourless, translucent to opaque grey, greyish brown, orange brown, very fine to medium, trace coarse, fine to medium average, angular to subangular, subspherical, poor to moderately sorted, moderate siliceously cemented aggregate and abundant secondary matrix, rarely friable in parts, bands and patches of dark grey to black dead oil / bitumin coated grains, trace micaceous, trace glauconitic, poor to moderate visible porosity. **SHOWS:** 50% very dull olive green yellow direct fluorescence, moderately fast bluish white streaming cut with bluish white residual ring.		X	X				X	X
3684	Unable to chip, due to gas expansion disrupting core.								
3685	**SANDSTONE:** very fine, very poor visible porosity. **SHOWS:** 50% moderately bright yellow green gold direct fluorescence, slow streaming bluish white cut, yellow green ring residual ring.		X						X
3686	**SANDSTONE:** translucent greyish brown, orange brown, smokey grey to off white, occasionally clear, colourless, dominantly very fine, subangular to rarely subrounded, subspherical, well sorted, very well consolidated silica cemented aggregate with rare secondary cement / matrix, grain supported, non calcareous, abundant muscovite, trace carbonaceous specks, rare orange to dark brown organic staining, bituminous patches, poor to moderate visible porosity. **SHOWS:** 100% dull green to greenish yellow direct fluorescence, fast bluish white streaming cut with bluish white residual ring.		X	X					X
3687	**SANDSTONE:** abundant dead oil / bitumen, very poor visible porosity. **SHOWS:** 10% yellow green direct fluorescence, weak and slow bluish white streaming cut, yellow green ring residue.		X				X	X	
3688	**SANDSTONE:** very fine, grading to granular in parts, poor visible porosity. **SHOWS:** 80% bright yellow green direct fluorescence, moderate bluish white streaming cut, greenish white residual ring.		X						X

Well Number:	6507/5-4	Core Number :	4
Date:	28.03.01	Core diameter :	4½”
Logging Witness:	Ed Linaker / Alan Williams		
Cored interval:	3678m **to** 3724m	Hole size :	8½”

Recovered length	45.5m	Percentage recovery	98.9%						
	Lithology and shows		∅			Shows			
			P	F	G	T	P	F	G
3689	**SANDSTONE with CONGLOMERATE:** clear, colourless to translucent greyish brown, orange brown, smokey grey to opaque white, silty to medium, generally very fine to fine with conglomeratic granules and pebbles up to 4cm diameter, angular to subrounded, subelongate to subspherical, very poorly sorted, very hard and silicified aggregate with secondary cement / matrix, grain supported, trace micaceous and bituminous specks, abundant bands and fracture infill of dead oil / bitumen, trace rose quartz, none to very poor visible porosity. **SHOWS:** 40-50% bright yellow green direct fluorescence, bluish white moderately fast streaming cut with bluish white residual ring.		X					X	X
3690	**SANDSTONE:** very fine, very poor to poor visible porosity. **SHOWS:** 100% bright yellow to pale gold direct fluorescence, slow streaming bluish white cut, greenish white residual ring.		X						X
3691	Unable to chip, due to gas expansion disrupting core.								
3692	**SANDSTONE:** translucent to opaque orange brown, pale grey brown, rarely off white, clear and colourless, very fine to very coarse, angular to rounded, subelongate to subspherical, very poorly sorted, very strong silica cemented aggregate with abundant matrix, frosted to fresh / fragmented quartz, traces of carbonaceous specks with general grain discolouration from liquid migration, no grain alignment, rare bitumen lenses, moderately good visible porosity. **SHOWS:** 50% dull, 30% bright speckled yellow green direct fluorescence, moderately fast bluish white streaming cut, yellow white residual ring.				X				X
3693	SANDSTONE: very fine, poor to moderate visible porosity. SHOWS: 100% dull pale green gold direct fluorescence, moderately fast bluish white streaming cut, green white ring residue.		X	X					X
3694	Unable to chip, due to gas expansion disrupting core.								
3695	**SANDSTONE :** translucent to opaque orange brown to rare grey to off white, smokey, clear, colourless, dominantly very fine, angular to rare subrounded, subelongate to subspherical, well sorted, very well cemented aggregate with trace white (kaolinite) matrix, non calcareous, rare friable, micaceous with dead oil/bitumen fracture infill material degraded to mica, general oil migration quartz discolouration, moderate visible porosity. **SHOWS:** 80-90% dull green to green yellow direct fluorescence, moderate slow blue white streaming cut, yellow white residual ring.			X					X
3696	**SANDSTONE:** very fine grained, poor visible porosity, **SHOWS:** 100% dull pale green to gold direct fluorescence, moderately fast blue white streaming cut, green yellow residual ring.		X						X

Well Number:	6507/5-4	Core Number:	4
Date:	28.03.01	Core diameter :	4½”
Logging Witness:	Ed Linaker / Alan Williams		
Cored interval:	3678m **to** 3724m	Hole size:	8½”
Recovered length	45.5m	Percentage recovery	98.9%

	Lithology and shows	∅			Shows			
		P	F	G	T	P	F	G
3697	**SANDSTONE:** very fine grained, very poor visible porosity. **SHOWS:** 80% dull pale green to gold to yellow direct fluorescence, moderately fast to fast blue white streaming cut green to white residual ring.	X						X
3698	**SANDSTONE:** clear, colourless to translucent orange grey brown to off white, dominantly very fine grained, grading to silty quartz in places, angular to subrounded, subspherical, well sorted, strong silica cement aggregate, with secondary silica matrix, non calcareous, grain supported, bitumen/dead oil patches, micromicaceous, general quartz discolourization to oil stain, poor to moderate visible porosity. **SHOWS:** 70-80% bright green to yellow direct fluorescence, moderately slow blue white streaming cut, yellow white residual ring.	X	X					X
3699	**SANDSTONE:** very fine to fine grained, rare medium grained, poor visible porosity. **SHOWS:** 80% dull pale green to gold direct fluorescence, moderately slow blue white streaming, green white residual ring.	X						X
3700	**SANDSTONE:** very fine grained, poor visible porosity. **SHOWS:** 60% dull pale green to gold direct fluorescence, slow streaming blue white cut, green to white residual ring.	X						X
3701	**SILTSTONE** with very fine grained **SANDSTONE** lenses**:** dark grey to brown with pale grey to off white sand lenses, hard, blocky to subplatey, flaky, non calcareous, no visible swelling, abundant dead oil/bituminous contamination of silt matrix, very micaceous, occasional disseminated pyrite lenses of silty to very fine angular grey quartz, no visible porosity, no shows.							
3702	**SANDSTONE:** very fine grained, abundant biotite. **SHOWS:** 70% bright yellow to gold direct fluorescence, fast blue white streaming cut fluorescence, green to white residual ring.	X						X
3703	**SANDSTONE:** very fine grained, abundant biotite. **SHOWS:** 95+% moderate yellow to gold direct fluorescence, fast blue white streaming cut fluorescence, green to white residual ring.	X						X
3704	**SANDSTONE:** dominantly clear, colourless to translucent grey to off white, rare translucent orange brown, predominantly very fine grained, angular to subrounded, subspherical, well sorted, strong silica cement aggregate, with trace matrix, non calcareous, generally clean, common mica and carbonaceous specks, rare orange to brown stain, moderate to poor visible porosity. **SHOWS:** 90% dull to moderate yellow to green direct fluorescence, moderate blue white, streaming cut, yellow white residual ring.	X	X					X
3705	**SANDSTONE:** fine to medium grained, poor to moderate visible porosity. **SHOWS:** 90% moderately bright yellow green direct fluorescence, fast blue white streaming cut, green to white residual ring.	X	X					X

Well Number:	**6507/5-4**	**Core Number:**	4
Date:	28.03.01	**Core diameter:**	4½”
Logging Witness:	Ed Linaker / Alan Williams		
Cored interval:	3678m **to** 3724m	**Hole size :**	8½”
Recovered length	45.5m	**Percentage recovery**	98.9%

	Lithology and shows	∅			Shows			
		P	F	G	T	P	F	G
3706	**SANDSTONE:** very fine grained, very poor visible porosity. **SHOWS:** 90% bright yellow to green direct fluorescence, very low blooming blue white streaming cut, green to white residual ring.	X						X
3707	**SANDSTONE:** translucent to opaque, beige to tan, grey to brown, orange brown, rare clear, colourless, grey, very fine to fine grained, angular to subrounded, subspherical, moderately to well sorted, fair silica cement aggregate, with common secondary silica matrix, non calcareous, trace mica, trace carbonaceous specks, abundant dead oil/bituminous fracture infill to decaying mica, rare anhedral pyrite nodules, kaolinite matrix?, very poor visible porosity. **SHOWS:** 20-30% bright yellow green direct fluorescence, moderately fast blue white streaming cut, yellow to white residual ring.	X					X	X
3708	**SANDSTONE:** very fine to rare fine, poor to moderate visible porosity. **SHOWS:** bright yellow green, direct fluorescence, moderately fast blue to white streaming cut, yellow to green residual ring.	X	X				X	
3709	**SANDSTONE:** very fine grained, abundant biotite, very poor visible porosity, no shows.	X						
3710	**SANDSTONE:** translucent to opaque, beige to brown, orange to grey to brown, rare clear and colourless, very fine to fine grained, angular to subrounded, subspherical, well sorted, strong silica cement aggregate to rare slightly friable, minor matrix, non calcareous, occasionally micaceous, common black carbonaceous material, common dark orange brown oil stain, abundant bitumen/dead oil fracture infill and banding, with mica and pyrite altered, poor to moderate visible porosity. **SHOWS:** 80 % bright yellow green direct fluorescence, moderate streaming blue white cut, yellow white residual ring.	X	X					X
3711	**SANDSTONE:** very fine grained, poor visible porosity. **SHOWS:** 10-20% bright yellow green direct fluorescence, moderate streaming blue white cut, yellow green residual ring.	X					X	
3712	**SANDSTONE:** very fine grained, poor visible porosity. **SHOWS:** 40% bright yellow green direct fluorescence, fast blue white streaming/blooming cut, green white residual ring.	X					X	X
3713	**SANDSTONE:** translucent to opaque, beige, tan, grey orange brown, dominantly very fine, angular to subangular, subelongate to subspherical, well sorted, moderately strong silica cement with secondary silica matrix, non calcareous, general grain discolouration, grain supported, micaceous and carbonaceous specks, common dead oil/bituminous bands/fracture infill, moderate to poor visible porosity. **SHOWS:** 40% bright yellow green direct fluorescence, slow to moderate multiple streaming blue white cut, yellow white residual ring.	X	X				X	X
3714	**SANDSTONE :** very fine grained, no visible porosity, no shows.	X				X	X	

Well Number:	**6507/5-4**	**Core Number:**	4
Date:	28.03.01	**Core diameter:**	4½"
Logging Witness:	Ed Linaker / Alan Williams		
Cored interval:	3678m **to** 3724m	**Hole size :**	8½"
Recovered length	45.5m	**Percentage recovery**	98.9%

	Lithology and shows	∅			Shows			
		P	F	G	T	P	F	G
3715	**SANDSTONE:** very fine to fine grained, occasionally silty, poor visible porosity. **SHOWS:** 20% bright yellow to gold direct fluorescence, moderate blue white streaming cut, yellow white residual ring	X				X	X	
3716	**SANDSTONE :** translucent to opaque, grey, grey brown, rare orange brown, very fine to rare fine grained, angular to subrounded, subspherical, well sorted, strong silica cement aggregate, abundant white silica matrix, micaceous, trace glauconite, carbonaceous specks, non calcareous, common bitumen/dead oil fracture infill, matrix supported aggregate, very poor to poor visible porosity. **SHOWS:** no direct fluorescence, trace blue white streaming cut (1 minor stream), no residual ring.	X				X		
3717	**SANDSTONE:** very fine grained, abundant biotite, very poor visible porosity. **SHOWS:** 80% bright yellow to green direct fluorescence, fast streaming blue white cut, blue white residual ring.	X						X
3718	**SANDSTONE:** very fine grained, very poor visible porosity, no shows.	X						
3719	**SANDSTONE:** translucent to opaque, grey to orange brown, smokey grey brown, very fine to rare fine grained, angular to rare subrounded, subelongate to subspherical, moderately sorted, moderately well consolidated with silica cement aggregate, with common silica matrix, non calcareous, trace mica and carbonaceous specks, common brown oil stain, abundant bitumen/dead oil decayed to mica (brown), poor to very poor visible porosity, no shows.	X						
3720	**SANDSTONE:** very fine grained, abundant secondary matrix, very poor visible to no porosity. **SHOWS:** 10% bright yellow to gold direct fluorescence, slow streaming blue white cut, yellow blue residual ring.	X					X	
3721	**SANDSTONE:** very fine to rare fine grained, poor to moderate visible porosity. SHOWS: 20% bright yellow gold direct fluorescence, moderate streaming blue white cut, blue white residual ring.	X					X	
3722	**SANDSTONE:** beige, tan, translucent orange brown, smokey grey to off white, dominantly very fine grained, angular to rare subrounded, subelongate to subspherical, moderately to well sorted, strong silica cement aggregate, non calcareous, abundant silica matrix, occasional dark brown organic stain, very poor to no visible porosity, no shows	X						
3723	**SANDSTONE:** very fine grained very poor visible porosity, no shows.	X						
3723.5	**SANDSTONE:** translucent to opaque, smokey grey to off white, pale yellow, dominantly very fine grained, angular to subangular, subspherical, well sorted, moderately consolidated silica cement aggregate, with no significant matrix, carbonaceous specks trace micromicaceous, generally clean with trace pale grey oil/bituminous patches, moderate to good visible porosity. **SHOWS:** 90-100% bright yellow green direct fluorescence, moderately fast streaming blue white cut, bright blue yellow residual ring.		X	X				X

1.5 SIDEWALL CORES

1.5.1 Summary

Core No.:	Depth mBRT	Rec. cm	Lithology and shows	∅			Shows			
				P	F	G	T	P	F	G
1	3129.9	2.5	**MUDSTONE:** grey black, olive grey, medium-dark grey, firm-moderately hard, micromicaceous, homogeneous. Formation; Lange							

2	3111.0	4.7	**MUDSTONE:** grey black, olive grey, medium-dark grey, firm-moderately hard, micromicaceous, homogeneous. With 2-3mm lamina of light grey-beige very fine grained **SANDSTONE**. Formation; Upper Intra Lange Sst.							
3	3101.7	3.7	**SANDSTONE:** very fine-fine grained, subangular-subrounded, subspherical, well sorted, abundant microcarbonaceous material, calcite cement, poor visible porosity, very slight hydrocarbon odour, very rare signs of gas bubble escape. Rare scattered blue-white to yellow-white fluorescent spots. Formation; Upper Intra Lange Sst.	X			X	X		
4	3089.9	3.8	**SANDSTONE:** very fine-fine grained, subangular-subrounded, subspherical, well sorted, microcarbonaceous, micromicaceous, calcite cement, rare green mineral patches (chlorite/ glauconite), moderate visible porosity. Rare pinpoint yellow-white fluorescent spots. Formation; Upper Intra Lange Sst.		X			X		
5	3083.4		Lost							
6	3074.4	1.8 +(see below)	**SANDSTONE:** predominantly fine-medium, occasionally very fine, subrounded, subspherical, well sorted, abundantly microcarbonaceous, micromicaceous, calcite cement, moderate visible porosity. Faint hydrocarbon odour. Moderate mottled yellow-white fluorescence. Formation; Upper Intra Lange Sst.		X			X	X	
7	3071.3	4.3 (+2.0, this piece may belong to the 3074.4 sample)	**SANDSTONE:** very fine-medium grained, mainly fine grained, subrounded, subspherical, well sorted, calcite cement, poor visible porosity, very microcarbonaceous, micromicaceous, possible lithic fragments, abundant green mineral patches. No hydrocarbon odour. Rare pinpoint yellow-white and patchy blue-white fluorescence. (NB. description refers to main 4.5cm length only) Formation; Upper Intra Lange Sst.	X			X	X		
8	3056.9	4.0	**SANDSTONE:** very fine-fine grained, subrounded, subspherical, well sorted, calcite cement, poor visible porosity, very microcarbonaceous, micromicaceous, possible lithic fragments. No hydrocarbon odour. Rare pinpoint yellow-white and patchy blue-white fluorescence. Formation; Upper Intra Lange Sst.	X			X	X		
9	3055.8	4.3	**SANDSTONE:** very fine to predominantly fine, rarely medium, subspherical, subrounded-subangular, well sorted, very micromicaceous, calcite cement, poor visible porosity. Slight hydrocarbon odour. Moderate pinpoint yellow-white and patchy blue-white fluorescence. Formation; Upper Intra Lange Sst.	X				X	X	

Core No.:	**Depth mBRT**	**Rec. cm**	**Lithology and shows**	**∅**			**Shows**			
				P	**F**	**G**	**T**	**P**	**F**	**G**
10	3046.8	5.0	**MUDSTONE:** grey black, olive grey-dark grey, firm, occasionally moderately hard, micromicaceous, locally silty, homogeneous. Formation; Lange.							
11	3028.9	4.4	**SANDSTONE:** very fine-fine grained,		X			X		

			subangular-subrounded, subspherical, well sorted, micromicaeous, locally microcarbonaceous, calcite cement, moderate visible porosity. Rare gas bubble escape. Weak to slight hydrocarbon odour. Patchy yellow-white to blue-white fluorescence. Formation; Lange.							
12	3245.4	4.3	**SANDSTONE:** very fine-fine grained, subangular, subspherical, well sorted, hard calcite cement, rarely micromicaceous, very poor to no visible porosity. No hydrocarbon odour. Very rare gas bubble escape. Rare pinpoint yellow-white fluorescence. Formation; Lower Intra Lange Sst.	X			X			
13	3244.4	5.0	**MUDSTONE:** grey black, olive black, firm, micromicaceous, micropyritic, slightly silty in places, homogeneous. Formation; Lower Intra Lange Sst.							
14	3240.5	2.5 (in 2 pieces, max length 1.3cm)	**SANDSTONE:** Very fine-fine grained, dominantly subrounded to rarely subangular, well sorted, microcarbonaceous, micromicaceous, lithic fragments (?), hard calcite cement. No visible porosity. No show/fluorescence. Formation; Lower Intra Lange Sst.	X						
15	3225.1	4.9	**SILTSTONE:** grading very fine **SANDSTONE** in parts. Dark grey-grey black, firm-moderately hard, micromicaceous, microcarbonaceous. No visible porosity. No shows/fluorescence. Formation; Lower Intra Lange Sst.	X						

Note: No cutting agent, or acid was added to plugs in order to avoid contamination of geochemical samples.
NB. All depths wireline depths in mBRT.

1.6 SHOWS

Interval (m BRT)	Lithology	Formation /sequence	Background Gas	Gas Show	Oil Show Description
3060 -3115	Sandstone	Lange	0.56%	1.70%	Poor shows - rare pinpoint bright

		Formation Upper Intra Lange Sst. (Gråsel)			yellow fluorescence, instant bright yellow-white cut fluorescence, weak yellow-white fluorescence residue.
3190 - 3238	Sandstone	Lange Formation Lower Intra Lange Sst.	0.56%	3.57%	Poor shows - rare moderate yellow fluorescence, very slow dull yellow blooming cut fluorescence, slow blooming dull yellow-white crush cut fluorescence, no residue.
3512-3530	Sandstone	Garn	0.95%	2.5%	Trace. No direct fluorescence, no cut fluorescence. Weak, slow blooming milky white to blue white crush cut fluorescence, trace milky white residue.
3531-3583	Sandstone	Garn, (and uppermost Not)	0.2%	4.55%	Good. Very pale to abundant spotted to general dull to bright golden yellow to greenish yellow direct fluorescence, dull to bright instantaneous bluish milky white cut, bluish white ring residue.
3583-3603	Silty Sandstone, siltstone, mudstone	Not	1.2%	2.6%	Very poor. No shows between 3588-3603.
3604-3628	Sandstone, silty sandstone	Ile (and Lowermost Not)	1.5%	1.8%	Fair-Good. Very pale to abundant spotted to general dull golden yellow to greenish yellow direct fluorescence, dull to bright slow bluish milky white streaming cut, trace of bluish white ring residue.
3629-3680	Siltsone, mudstone	Ror	0.8%	1.5%	None.
3681-3713	Sandstone	Tilje (and lowermost Ror)	1.7%	2.3%	Good. Dull yellow green direct fluorescence, moderately fast-fast bluish white streaming to blooming cut with yellow green residual ring.
3714-3723	Sandstone	Tilje	Gas Trap Failed	Gas Trap Failed	Fair-Good. Bright yellow to gold, occasionally green direct fluorescence, moderate blue white streaming cut, yellow white residual ring
3724-3812	Sandstone Interbedded with siltstone and mudstone	Tilje and Åre	0.5%	2.7%	Fair-poor. 2-3% speckled yellow green dull direct fluorescence, very slow streaming bluish white cut, no significant ring residue. Traces only towards the base.

1.7 TESTS

1.7.1 MDT Pressure Data

12 ¼" section Run 1 b 1

Test	Depth mMDBRT	Depth mTVDSS	Mud Hydrostatic (psia)	Formation Pressure	Comment

			Before	After	(psia)	
1	2787.97	2763,0	6160.04	6156.40	5395.6	Good test
2	2788.96	2764,0	6158.74	6157.26		Tight test
3	2790.08	2765,1	6160.78	6159.41		Tight test
4	2791.13	2766,2	6162.57	6160.91		Tight test
5	2929.25	2904,3	6470.79	6466.98	5817.0	Good test
6	3027.83	3002.9	6684.64	6679.10	6220.0	Tight? /Supercharged?
7	3028.54	3003.6	6679.60	6677.30	6202.3	Good test/Supercharged?
8	3029.3	3004,3	6679.11	6676.64		Tight test
9	3046.68	3021.7	6719.70	6719.90	6185.17	Good test
10	3055.45	3030.5	6738.30	6735.30	6214.75	Good test/probe problem
11	3056.63	3031.7	6737.90	6736.10	6214.47	Good test/probe problem
12	3057.93	3033.0	6739.10	6737.60	6219.20	Good test
13	3059.15	3034.1	6739.66	6737.40	6222.52	Good test
14	3071.15	3046.2	6770.90	6768.60	6230.93	Good test
15	3071.85	3046.8	6770.90	6765.30	6233.00	Overshot on 2 attempts
17	3074.04	3049.1	6771.20	6770.2	6234.85	Good test/rapid build-up
18	3074.86	3049.9	6771.80			Abandoned
19	3083.3	3058.3	6795.10	6791.60	6247.90	Good test
20	3084.13	3059,2	6793.50	6791.80	6249.88	Good test
21	3085.04	3060.1	6793.79	6792.73	6250.40	Good test
22	3089.84	3064.9	6806.89	6802.65	6261.65	Good test/long stabilisation.
23	3101.53	3076.6	6835.57	6830.75	6275.67	Good test/long stabilisation.
24	3102.94	3078.0	6834.21	6833.16	6275.95	Good test
25	3110.76	3085.8	6855.7	6850.63	6290.60	Good test/long stabilisation.
26	3117.95	3093.0	6871.33	6869.19		Tight test
27	3210.05	3185.1	7074.00	7077.44		Tight test
28	3211.85	3186.9	7081.34	7077.13	6822.60	Good test
29	3214.05	3189,1	7082.45	7079.90		Tight test
30	3217.37	3192,4	7088.53	7084.68		Tight test/aborted
31	3220.80	3195,8	7094.70	7091.61	6829.33	Good test
32	3225.05	3200,1	7102.91	7100.61		Tight test/aborted
33	3232.86	3207,9	7122.32	7120.59		Tight test/aborted
34	3235.0	3210.0	7126.22	7124.05		Tight test
35	3235.94	3211.0	7125.80	7121.90	6890.00	Aborted Supercharged
36	3239.96	3215.0	7133.36	7130.29	6891.44	Good test
37	3244.0	3219.0	7142.16	7137.41	6924.55	Good test/ Supercharged?
38	3244.7	3219.7	7138.75	7136.26	6912.00	Good test/slow build-up
39	3245.4	3220.4	7140.12	7136.97		Tight test/aborted
40	2791.0	2766.0	6142.55	6142.26		Tight test
41	2791.5	2766.5	6142.80	6142.80		Tight test
49	2790.8	2765.8	6140.76	6140.21		Tight test
51	2792.4	2767.4	6143.26	6142.21		Very slow build-up

8 ½" section Run 2 c 1

Test	Depth mMDBRT	Depth mTVDSS	Mud Hydrostatic (psia)		Formation Pressure (psia)	Comment
			Before	After		
1	3514	3488.7	6396.70	6397.3	5338.40	Good test
2	3516.2	3490.9	6403.3	6401.6	5338.81	Good test
3	3518.3	3493.0	6405.5	6405.8	5338.20	Supercharged, Inc DD by 10cc, better but not

						stable
4	3520.3	3520.3	6407.8	6407.83	5339.26	Good test
5	3522.6	3497.3	6411.5	6412.85	5340.14	Good test
6	3524.9	3499.6	6415.6	6415.9	5341.09	Good test
7	3530.1	3502.0	6420.5	6420.21	5342.74	Good test
8	3530.1	3504.8	6425.4	6425.8	5343.84	Good test
9	3532.3	3507.0	6429.8	6429.6	5344.90	Good test
10	3534.5	3509.2	6433.5	6433.6	5345.81	Supercharged, Repeat 10cc + 10cc DD - GOOD TEST
11	3536.1	3510.8	6435.6	6435.8	5346.47	Erratic 1st attempt, reset packer - GOOD TEST
12	3538	3512.7	6439.4	6440.05	5347.24	Good test
13	3539.9	3514.6	6442.01	6442.06	5348.10	Good test
14	3541.7	3516.4	6445.18	6445.43	5348.63	Good test
15	3543.2	3517.9	6448.52	6448.38	5350.02	Good test
16	3545.5	3520.2	6452.51	6452.68	5352.16	Good test
17	3547.7	3522.4	6455.89	6455.77	5354.07	Good test
18	3549.8	3524.5	6459.50	6459.34	5355.70	Good test
19	3553.0	3527.7	6466.09	6465.73	5358.82	Initially pressure wouldn't stabilise, reset probe - Good test
20	3556.0	3530.7	6470.95	6470.39	5361.33	Good test
21	3559.6	3534.3	6477.12	6476.89	5364.64	Good test
22	3562.6	3537.3	6483.07	6482.85	5367.36	Good test
23	3565.6	3540.3	6488.45	6488.39	5370.04	Pressure initially stable, then unstable reset probe - OK slight leak before probe retracted.
24	3567.4	3542.1	6491.41	6491.38	5371.91	Good test
25	3569.1	3543.8	6494.76	6494.53	5373.13	Good test
26	3574.8	3549.5	6505.04	6504.62	5378.59	Good test (Base Garn)
27	3582.7	3557.4	6519.46	6519.11	5387.34	Unstable, retracted and reset probe - Good test (Not Formation)
28	3610.7	3585.4	6570.08	6570.19	5423.71	Good test (Top Ile)
29	3615.7	3590.4	6579.33	6579.55	5431.35	Unstable, retracted and reset probe - Good test
30	3617.4	3592.1	6582.05	6582.55	5433.23	Unstable pressure, DD another 10cc, still unstable, retract and reset probe - OK.
31	3619.6	3594.3	6586.24	6586.96	5436.10	Unstable, retracted and reset probe - Good test
32	3621.6	3596.3	6590.55	-	5440.67	Unstable pressure, DD another 10cc, still unstable, retract and reset probe

Run 2 c 2

Test	**Depth mMDBRT**	**Depth mTVDSS**	**Mud Hydrostatic (psia)**		**Formation Pressure (psia)**	**Comment**
			Before	**After**		
33	3562.6	3537.3	6481.60	6481.60	5367.34	Calibration check - correlation within 0.02psi.
34	3567.4	3542.1	6491.00	6491.00	5371.58	Calibration check - Good
35	3572.0	3546.7	6499.90	6499.29	5376.35	Good test
36	3575.8	3550.5	6506.40	6506.38	5379.38	Good test

37	3582.7	3557.4	6519.00	6518.99	5387.16	Good test
38	3587.5	3562.2	6528.20	6527.44		Supercharged
39	3610.7	3585.4	6569.50	6569.40		Calibration check - 3.5PSI TOO HIGH
40	3619.6	3594.3	6586.30	6586.30	5436.14	Calibration check - Supercharged 3.5cc, retract & reset 10cc - Good test
41	3623.8	3598.5	6594.50	6594.30	5443.47	Good test
42	3625.7	3600.4	6597.60	6597.60	5445.04	Good test
43	3627.3	3602.0	6601.00	6600.50		Tight test (2.3cc + 1.3cc DD)
44	3629.0	3603.7	6604.70	6603.90		Tight test (1.3cc + 2.8cc DD)
45	3679.7	3654.3	6697.50	6696.90		Tight test (2.8cc DD)
46	3688.1	3662.7	6712.50	6712.20	5553.60	Good test
47	3690.3	3664.9	6715.70	6715.60	5556.72	Good test
48	3693.6	3668.2	6724.40	6723.60		Supercharged
49	3696.8	3671.4	6729.30	6728.00	5572.80	Good test
50	3698.9	3673.5	6732.40	6732.70	5576.90	Good test
51	3700.4	3675.0	6735.60	6735.20	5570.80	Good test - pressure low by 7-8psi.
52	3703.6	3678.2	6740.90	6740.90	5577.43	Good test
53	3706.7	3681.3	6747.90	6747.60		Supercharged (1.8cc + 1.3cc DD)
54	3711.5	3686.1	6755.90	6755.70	5586.40	Good test
55	3713.2	3687.8	6757.20	6759.20		LOST SEAL
56	3714.8	3689.4	6763.00	6762.70	5592.57	Good test
57	3718.1	3692.7	6768.70	6768.60		Supercharged (2.3cc DD)
58	3724.8	3699.4	6780.20	6781.30		Tight test (2.2cc DD) - very slow build
59	3727.7	3702.3	6786.50	6787.10	5624.40	Good test - 6 MINUTES BUILD UP TIME
60	3730.7	3705.3	6792.20	6791.80		Supercharged (2.9cc + 4.9cc DD)
61	3736.6	3711.1	6803.00	6803.90		Supercharged (3.7cc DD)
62	3738.3	3712.8	6806.00	6806.00	5648.70	Probably Supercharged (3.0cc + 2.2cc DD) 8 psi higher than expected
63	3740.7	3715.2	6809.60	6808.20	5653.80	Good test (4.9cc, slightly unstable)
64	3742.2	3716.7	6812.20	6213.30		Supercharged (2.6cc + 4.9cc DD)
65	3748.3	3722.8	6823.10	6824.89		Supercharged (3.0cc + 2.0cc DD)
66	3752.8	3727.3	6833.00	6832.80		Tight test
Test	**Depth mMDBRT**	**Depth mTVDSS**	**Mud Hydrostatic (psia)**		**Formation Pressure (psia)**	**Comment**
			Before	**After**		
67	3758.8	3733.3	6844.50	6844.50		Tight test (1.1cc)
68	3773.1	3747.5	6871.30	6870.70		Tight test (1.8cc)
69	3786.3	3760.6	6899.60	6897.60		GR Correlation (-0.8m correction), TIGHT (1.8cc)
70	3792.1	3766.4	6908.30	6907.10	6054.90	2.3cc + 1.1cc, Supercharged?

71	3811.5	3785.7	6945.40	6945.70	5884.10	20cc Vol, Pressure unstable, retract and reset probe - OK, Supercharged?

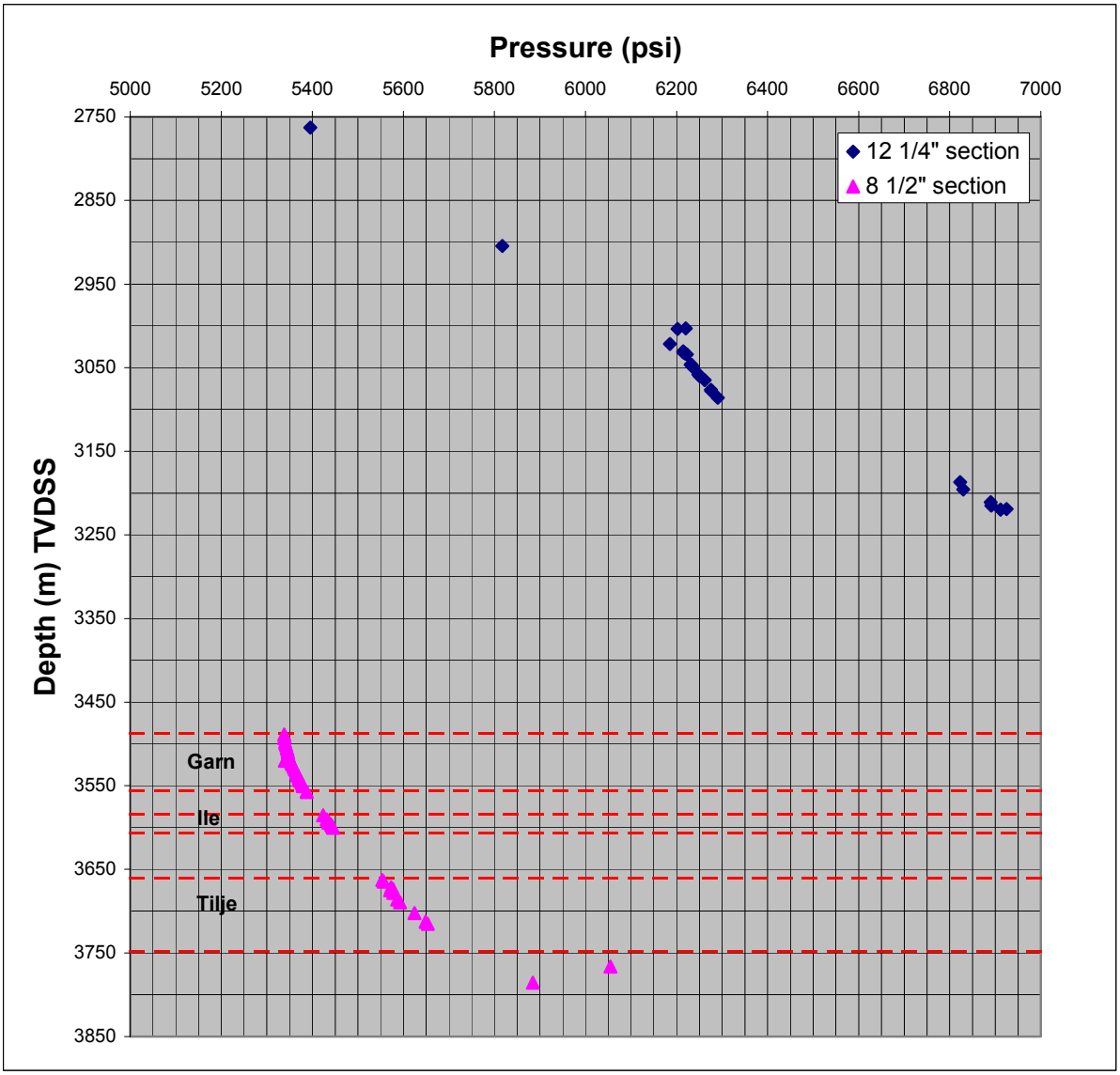

Figure 3: MDT Pressure Data

1.7.2 MDT Sampling Data

12 ¼" section

Tool Set	Depth mBRT	Depth mTVDSS	Mobility Md/cp	Hydrostatic psia	Initial Pressure psia	Flowing Pressure psia	Shutin Pressure psia	Volume cm^3	Comments
1	3055.2	3030.2	16.3	6738	6213.5	5550.0	8213.0	2 ¾ Gal	T 100.6 º C, dd 664
2	3055.2	3030.2	16.3	6738	6213.5	5770.0	6214.0	250	T 100.6 º C,

									dd 444
3	3055.2	3030.2	16.3	6738	6213.5	5740.0	6214.0	450	T 100.7 º C, dd 474
4	3055.2	3030.2	16.3	6738	6213.5	5670.0	6214.0	450	T 100.8 º C, dd 554
5	3055.2	3030.2	16.3	6738	6213.5	5740.0	6214.0	450	T 100.8 º C, dd 474
6	3055.2	3030.2	16.3	6738	6213.5	5860.0	8997.0	250	T 100.9 º C, dd 354
7	3083.0	3058	1393.	6795	6247.42	6240.0	8997.0	450	T 102.6 º C, dd 7
8	3083.0	3058	1393.2	6795	6247.42	6240.0	8997.0	450	T 102.9 º C, dd 7
9	3083.0	3058	1393.2	6795	6247.42	6240.0	9825.0	450	T 102.9 º C, dd 7
10	3220.8	3195.8	14.0	7094.7	6824.65	6100.0	6825.0	2 ¾ Gal	T 108.2 º C, dd 725
11	3220.8	3195.8	14.0	7094.7	6824.65	6460.0	8100.0	250	T 108.4 º C, dd 365
12	3220.8	3195.8	14.0	7094.7	6824.65	6390.0	10075.0	450	T 108.2 º C, dd 435
13	3220.8	3195.8	14.0	7094.7	6824.65	6400.0	10075.0	450	T 108.2 º C, dd 425
14	3220.8	3195.8	14.0	7094.7	6824.65	6400.0		450	T 108.2 º C, dd 425

8 ½" section

Tool Set	Depth mBRT	Depth mTVDSS	Mobility Md/cp	Hydrostatic psia	Initial Pressure psia	Flowing Pressure psia	Shutin Pressure psia	Volume cm^3	Comments
1	3559.8	3534.5	891	6476.0	5364,93	5359.0	8928.0	2 ¾ Gal	T 126.0 º C, dd 5.9
2	3559.8	3534.5	891	6476.0	5364,93	5359.0	6476.0	250	T 126.0 º C, dd 5.9
3	3559.8	3534.5	891	6476.0	5364,93	5359.0	9004.0	450	T 126.0 º C,

									dd 5.9
4	3559.8	3534.5	891	6476.0	5364,93	5359.0	9004.0	450	T 126.0 º C, dd 5.9
5	3559.8	3534.5	891	6476.0	5364,93	5359.0	6476.0	250	T 126.0 º C, dd 5.9
6	3582.7	3557.4	2058.7	6520.7	5389.7	3331.0			No sample
7	3514.0	3488.7	488.7	6391.7	5336.4	5327.5	6392.0	250	T 120.4 º C, dd 8.9
8	3514.0	3488.7	84.9	6393.5	5337.15	5325.0	10445.0	450	T 123.5 º C, dd 12.1
9	3514.0	3488.7	84.9	6393.5	5337.15	5326.0	9988.0	450	T 123.5º C, dd 11.1
10	3514.0	3488.7	84.9	6393.5	5337.15	5287.0	6394.0	250	T 123.7 º C, dd 50.1
11	3514.0	3488.7	84.9	6393.5	5337.15	5300.0	10749.0	1 Gal	T 123.8 º C, dd 37.1
12	3514.0	3488.7	84.9	6393.5	5337.15	5317.0	8617.0	2 ¾ Gal	T 124.0 º C, dd 20.1
13	3575.4	3550.1	143.8	6503.47	5379.4	4710	8727.0	450	T 128.6 º C, dd 669.4

1.7.3 DST Pressure Test Data

The well was plugged and abandoned, with a sidetrack 6507/5-4A drilled from 1480 mBRT.

1.8 TEMPERATURE PLOT

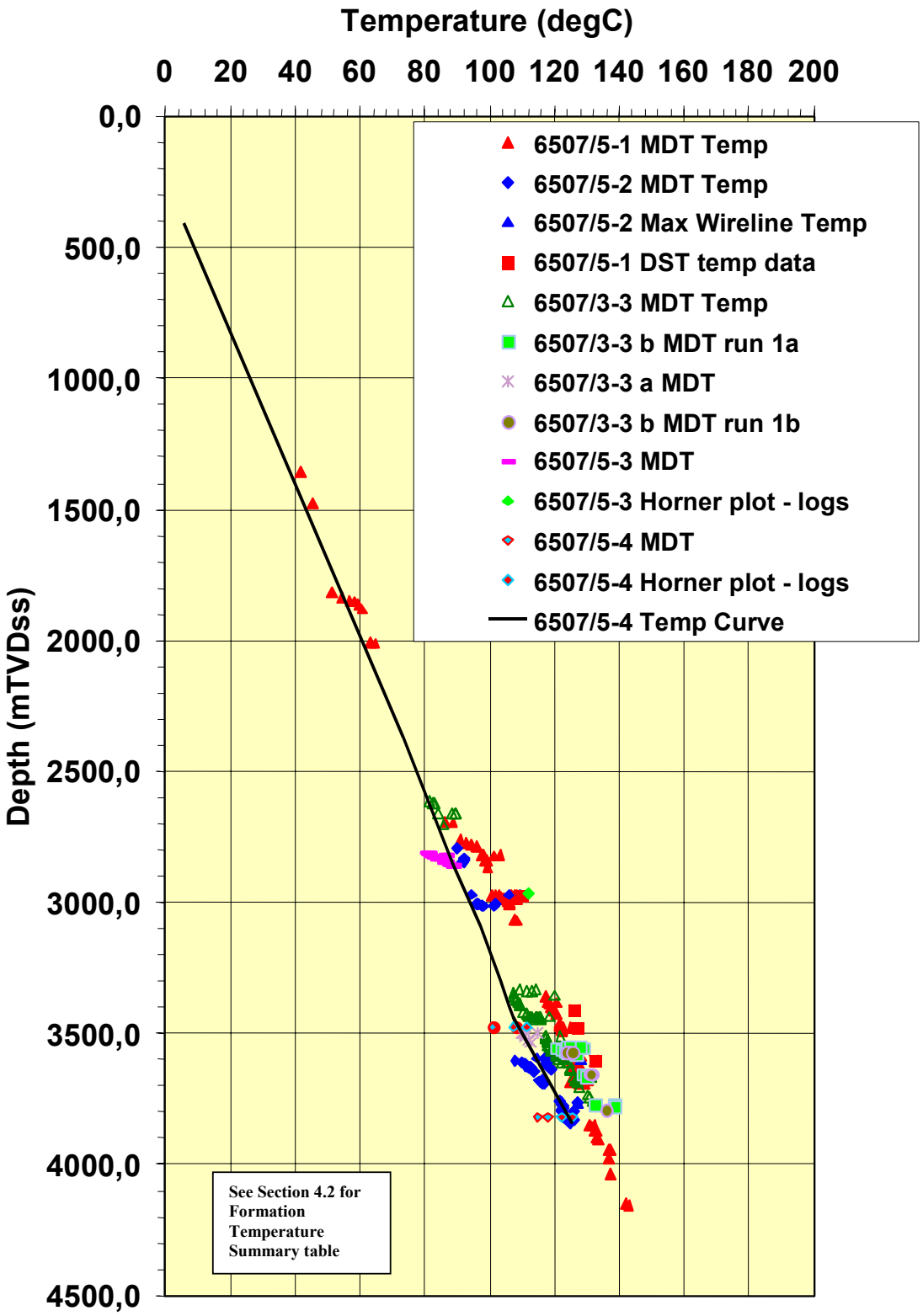

Figure 4: Temperature plot

1.9 VSP & CHECKSHOT

1.9.1 Summary

DEPTH	T/TIME	SHOT	STK	FILE	TIME	REMARKS
3460	1573	37-42	1	37	05:29	
3445	1568					
3430	1563	45-51	2	38	05:34	
3415	1559					
3400	1554	62-66	4	38	06:13	
3385	1549					
3370	1544	68-74	5	38	06:24	
3355	1540					
3346	1536	75-79	6	38	06:34	Base Cretaceous/Top Melke
3340	1534	82-87	7	38	06:45	
3325	1529					
3310	1524	89-95	8	38	06:54	
3295	1519					
3280	1515	98-102	9	38	07:01	
3265	1510					
3250	1505	104-111	10	38	07:10	
3246	1504	112-116	11	38	07:17	Base Gråsel
3235	1500	104-111	10	38	07:10	
3220	1495	119-123	12	38	07:24	
3205	1490					
3190	1485	124-129	13	38	07:32	
3175	1480					
3160	1475	137-141	14	38	07:41	
3145	1470					
3130	1465	143-148	15	38	07:49	
3115	1460					
3100	1455	152-156	16	38	08:03	
3085	1451					
3070	1446	159-163	17	38	08:12	

DEPTH	T/TIME	SHOT	STK	FILE	TIME	REMARKS
3055	1441					
3040	1435	164-172	18	38	08:23	
3025	1430					
3010	1424	176-181	19	38	08:38	
2995	1419					
2980	1414	184-188	20	38	08:45	
2965	1409					
2950	1403	189-195	21	38	08:52	
2935	1398					
2920	1393	197-201	22	38	08:59	
2905	1388					
2890	1382	209-213	23	38	09:11	
2875	1377					
2860	1371	217-222	24	38	09:20	
2845	1366					
2830	1358	229-234	25	38	09:30	60 Hz high cut filter applied
2815	1353					
2800	1349	236-240	26	38	09:39	
2793	1347	242-246	27	38	09:45	Base Lysing Formation
2785	1344	236-240	26	38	09:39	
2770	1336	249-254	28	38	09:54	
2755	1331					
2740	1326	256-261	29	38	10:06	
2725	1320					
2710	1316	263-268	30	38	10:14	
2695	1311					
2680	1304	271-276	31	38	10:22	
2665	1299					
2650	1292	283-290	32	38	10:32	
2635	1287					

DEPTH	T/TIME	SHOT	STK	FILE	TIME	REMARKS

2620	1280	294-300	33	38	10:43	
2605	1274					
2590	1268	301-305	34	38	10:48	
2575	1262					
2560	1256	311-316	35	38	10:57	
2545	1250					
2530	1243	318-322	36	38	11:05	
2515	1237					
2500	1230	324-329	37	38	11:12	
2485	1224					
2470	1218	331-335	38	38	11:18	
2455	1212					
2440	1204	338-343	39	38	11:25	90 Hz HCGF applied
2425	1198					
2410	1191	346-352	40	38	11:32	
2395	1185					
2380	1178	353-357	41	38	11:41	
2365	1172					
2350	1164	360-365	42	38	11:49	
2335	1159					
2320	1152	366-371	43	38	12:00	
2305	1145					
2290	1139	372-376	44	38	12:07	
2275	1132					
2260	1124	378-384	45	30	12:15	
2245	1118					
2230	1110	385-392	46	38	12:21	
2215	1095					
2200	1091	394-403	47	38	12:29	
2185	1084					
2170	1078	412-419	48	38	12:38	

DEPTH	T/TIME	SHOT	STK	FILE	TIME	REMARKS
2155	1078					
2140	1069	421-428	49	38	12:46	
2125	1063					
2110	1056	429-434	50	38	12:53	
2103	1050	437-443	51	38	13:02	
2095	1049	447-451	52	38	13:10	
2080	1042					
2065	1033	454-461	53	38	13:21	
2064	1032	463-467	54	38	13:27	
2050	1027					
2035	1020	469-473	55	38	13:36	
2020	1014					
2007	1006	474-478	56	38	13:55	
2005	1005	479-483	57	38	14:01	
1990	999					
1975	992	487-491	58	38	14:08	
1960	984					
1945	976	492-496	59	38	14:14	
1930	970					
1915	961	497-502	60	38	14:20	
1900	955	497-502	60	38	14:20	
1885	946	503-507	61	38	14:27	
1870	941					
1855	934	509-515	62	38	14:37	
1840	927					
1825	919	517-522	63	38	14:43	
1824	919	525-527	64	38	14:50	Top Brygge Formation
1810	914	517-522	63	38	14:43	
1795	906	528-532	65	38	14:57	
1780	901					
1765	893	533-537	66	38	15:04	

DEPTH	T/TIME	SHOT	STK	FILE	TIME	REMARKS
1750	887					
1735	880	538-542	67	38	15:11	
1720	875					
1705	867	544-549	68	38	15:19	
1690	861					
						END OF MAIN VSP
1600	816	552-554	69	39	15:29	CHECKSHOTS
1500	763	559-561	71	39	15:42	
1400	716	562-564	72	39	15:49	
1397	715	565-569	73	39	15:56	Top Kai Formation
1300	677	570-572	74	39	16:03	
1200	636	573-575	75	39	16:10	
1100	595	576-578	76	39	16:15	
1000	552	579-581	77	39	16:22	
900	506	582-584	78	39	16:29	
800	457	585-587	79	39	16:35	
700	408	588-590	80	39	16:40	
600	355	591-593	81	39	16:46	
500	305	594-596	82	39	16:53	

2 GEOLOGY

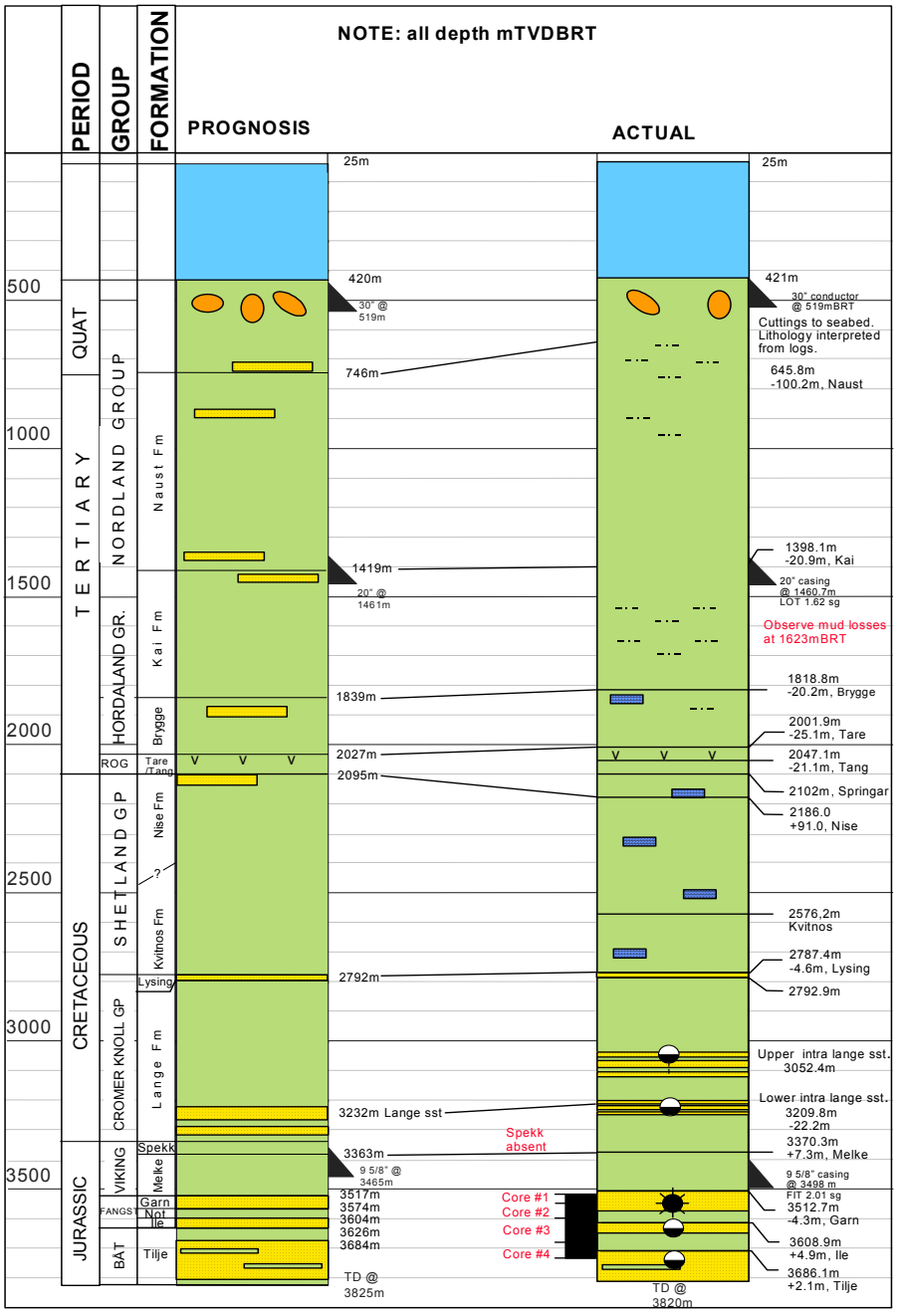

Figure 5: Prognosis versus Actual Stratigraphy

2.1 NORDLAND GROUP (446.0 – 1818.9 mBRT)

2.1.1 UNDIFFERENTIATED QUATERNARY (446.0 – 645.8.0 mBRT)

Top	446.0m BRT
Age	Undifferentiated Quaternary
Upper boundary pick	Seabed
Lithology and shows	-returns to seabed. Interpreted from drilling characteristics and logging response: -the upper section from seabed to 570mBRT is interpreted to contain mudstone with some boulders. -from 570mBRT unconsolidated mudstone and siltstone with some sandy interbeds.
Logging character	LWD: 9 ½" gamma and resistivity tool included in the 26" bottom hole assembly to optimise picking of the 20" casing setting depth. Wireline: Only GR logged inside casing in this section. Gamma ray: characterless and averages between 60 and 75 API. Resistivity: consistent around 1.5 ohm (slightly lower than average in short intervals).
Drilling characteristics	-36" hole was drilled from seabed to 522mBRT with the BHA optimised for drilling boulders which had been encountered in surrounding wells. -average ROP in the 36" hole was 9.6m/hr. -from 522m BRT this interval was drilled with a 26" BHA including LWD. -average ROP for this interval was 36.8. -there was no directional problems in this interval. -the Quaternary was drilled riserless using seawater and hi-vis sweeps and no gas measurements or cuttings were obtained.

2.1.2 NAUST FORMATION (645.8 - 1398.2 mBRT)

Top	645.8.0 mBRT
Age	Pliocene
Upper boundary pick	Slight decrease in resistivity from 2.0 to 1.5 ohm.
Lithology and shows	-drilled riserless with returns to seabed. -interpreted from drilling characteristics and logging response: mudstone sequence with rare sandstone interbeds.
Logging character	-LWD: 9 ½" gamma ray and resistivity tool - Wireline: Only GR logged inside casing in this section. -Gamma ray: fairly consistent around 75 API (+/- 10). -Resistivity: consistent between 1-2.5 ohm (slightly lower than average in the very top)
Drilling characteristics	-drilled with a 26" bit with an average penetration rates of 45 m/hr. -drilled riserless using seawater with hi-vis sweeps and no gas measurements or cuttings were obtained.

2.1.3 KAI FORMATION (1398.2 – 1818.9 mBRT)

Top	1398.2 mBRT
Age	Middle Miocene to Early Pliocene
Upper boundary pick	Slight drop in the resistivity from 2 to1.5 ohmm and a increasing GR from 75 to 80 API.
Lithology and shows	-upper 70m was drilled riserless with no returns to surface. -interpreted from drilling characteristics and logging response mudstone with interbeds of sand/siltstone. -26" casing was installed at 1460.7 mBRT and cuttings and gas were circulated to surface. - thick silty mudstone sequence with common siltstones and sandstones. Mudstone: generally light to medium green grey, grading to grey, moderately soft, subblocky to blocky, commonly sticky and amorphous, micromicaceous, occasional black carbonaceous specks, hygroturgid, grading to slightly calcareous siltstone with, traces of very fine, clear and angular quartz sand. Siltstone: pale grey to grey brown, moderately soft, subblocky to crumbly, calcareous matrix, grading to silty quartz: clear, colourless, translucent off white to pale grey, yellow, subangular to rarely subrounded, subelongate, no visible cement/matrix, occasional very fine sandstone. No shows.

Logging character	LWD: 9 ½" gamma ray and resistivity tool Wireline: GR logged inside casing from 1398.2 to 1460.7 mBRT. HRLA/DSI/GR/SP/EMS/GPIT and IPLT/GR logged from 1460.7 mBRT to base of formation. Gamma ray: Slightly decreasing from 105 API to an average of 90 API towards the base of the formation. Resistivity: consistent around 1.5 ohm (slightly lower than average in short intervals). Sonic: 140 μs/ft increasing from the middle of the formation towards the base from 140 to 150 μs/ft Neutron porosity: consistently over 0.65 PU in the top decreasing to 0.45 towards the base. Density: average of 2.15 g/cc slightly decreasing towards the base.
Drilling characteristics	Average ROP: 26" section was 23.8 m/hr 17 ½" section was 18.6 m/hr -17 ½" ROP reduced due to mud losses and bit balling problems. Gas readings from 1466m BRT: -drilled gas averages 1.7% -maximum of 4 % at 1477 mBRT. - Alkanes up to iC_5 were recorded. -at shoe (1460.7 mBRT) hole was displaced to 1.42 sg mud. -leak-off test at 1464 mBRT of 1.62sg EMW was obtained with 710 psi applied surface pressure. -increased the mud weight to 1.48 sg during the interval.

2.2 HORDALAND GROUP (1818.9 – 2002.0 mBRT)

2.2.1 BRYGGE FORMATION (1818.9 – 2002.0 mBRT)

Top	1818.9 mBRT
Age	Late Palaeocene to Late Oligocene
Upper boundary pick	Sharp decrease in density and corresponding increase in interval transit time. Change in lithology from more greyish mudstone (glauconitic) to more brownish silty mudstone.
Lithology and shows	Top: predominantly silty mudstone with interbedded mudstone and some minor limestone stringers and traces of sand. Middle: transition from silty mudstone to predominantly cleaner mudstone with minor limestone stringers. Base: predominantly mudstone where occasional tuffaceous mudstone beds occur. Traces of sand and limestone Silty mudstone: brown, green brown, greenish grey to grey, moderately soft becoming firmer with deep. Non to trace of calcareous matrix. Abundant glauconite nodules and carbonaceous speck. Mica throughout. Mudstones: predominantly grey to greenish grey, pale green, light greenish grey, greyish brown to yellow brown in the top, soft to moderate firm with traces of glauconite, pyrite, mica and carbonaceous material. Silty in parts. Tuffaceous towards the base. Sandstone stringers: clear to translucent, very fine to medium loose quartz grains. In the top abundant glauconite nodules. No shows were observed. Limestone: off white to common yellow brown pale cream, soft to moderate hard, generally seen as cryptocrystaline mudstone matrix. Abundant glauconite in part. Tuff: mottled light grey, white to off with, soft. No shows
Logging character	LWD: 9 ½" gamma ray and resistivity tool Wireline tool: HRLA/DSI/GR/SP/EMS/GPIT, IPLT/GR, VSP/GR. Gamma ray: averages 90-100 API in the top. Slightly decrease from the middle towards the base to approximately 80-90 API. Resistivity: less than 1.0 ohmm. Sonic: sharp increase to 140 μs/ft at the top. Increases from the middle towards the base to average values of 150-160 μs/ft. Neutron porosity: over 0.45 PU Density: less than 1.95 g/cc for much of the interval. Slightly increases towards the base
Drilling characteristics	Average ROP: 17 ½" section was 21.4 m/hr -ROP reduced due to bit balling problems. Gas readings : -drilled gas averages 0.25% -maximum of 0.6 % at 1896m BRT. - C_1, C_2 and C_3 were recorded throughout, with C_4 and C_5 in some narrow intervals. -continued to rise the mud weight to maximum 1.57 sg .

2.3 ROGALAND GROUP (2002.0 - 2102.0 mBRT)

2.3.1 TARE FORMATION (2002.0 – 2047.2 mBRT)

Top	2002.0 mBRT
Age	Late Palaeocene
Upper boundary pick	The Top Tare is picked at a slightly decrease in interval transit time corresponding to a slightly decrease in density and increase in resistivity.
Lithology and shows	The Tare Formation consists of mudstones which become tuffaceous towards the base. Mudstones: light bluish grey to grey, grey to dark grey, occasionally reddish brown. Traces glauconite, mica, pyrite and tuff through. Slightly to non calcareous. Tuff: metallic grey, purple grey, mottled, fine black specks. Occurs as thin stringers. No shows.
Logging character	Gamma ray: decreasing from top at averaging 90-100 API to 70-80 API towards the base before a spike at 115 API at the very base. Resistivity: slightly above 1.0 ohmm Sonic log: decreasing slightly towards the base from above 140 to below 140 μs/ft. The lowest value (115 μs/ft) was recorded at 2039m BRT –towards the base. Neutron porosity: averaging 0.47 PU Density: below 1.95 g/cc increasing to an average of 2.05 towards base.
Drilling characteristics	Average ROP: 15.9 m/hr -ROP reduced due to bit balling problems. Gas readings : -drilled gas averages 0.2% -maximum of 0.3 %. - C_1, C_2 and C_3 were recorded throughout, with C_4 and C_5 in some narrow intervals. -mud weight was maintained at 1.57 sg .

2.3.2 TANG FORMATION (2047.2 – 2102.0 mBRT)

Top	2047.2 mBRT
Age	Late Campanian to Late Palaeocene
Upper boundary pick	The Tang Formation is picked at a slight but distinct increase in interval transit time below the Tare Formation.
Lithology and shows	Mudstone grading to tuffaceous mudstone beds in the top part. Traces of sand grading to siltstone were observed towards the base. Limestone stringers were observed throughout the formation. Mudstones: green to greyish green, mottled dark green to greyish brown. Glauconitic as abundant nodules. Tuffaceous grading to Tuffaceous mudstones in top part. Limestone: white to off-white, pale grey to beige/cream. Moderate soft to firm. Often seen as cryptocrystaline mudstone matrix with poorly preserved grains. No shows.

Logging character	Gamma ray: average slight increase from 80 API at the top to 90 API towards the base of the formation. Resistivity: falls below 1.0 ohmm at the top and continues through the formation. Sonic log: over 140 μs/ft in the top part with an distinct increase to 160 μs/ft at 2079 mBRT. This increase falls back to the same values as in the top at the border to Nise Formation in the base. Neutron porosity: from 0.33 to above 0.45 PU. Density: averaging less than 1.95 g/cc in the top part with an increasing to 2.05 g/cc, corresponding to the sonic increase.
Drilling characteristics	Average ROP: 18.3 m/hr -ROP reduced due to bit balling problems. Gas readings : -drilled gas averages 0.2% -maximum of 0.3 %. - C_1, C_2 and C_3 were recorded throughout, with C_4 and C_5 in some narrow intervals. -mud weight was maintained at 1.57 sg .

2.4 SHETLAND GROUP (2102.0 - 2787.5 mBRT)

2.4.1 SPRINGAR FORMATION (2102.0 - 2186 mBRT)

Top	2102.0 mBRT
Age	Santonian to Campanian
Upper boundary pick	A subtle decrease in interval transit times corresponding to a increasing density. Also a slight increase in resistivity and a gamma peak is observed. No distinct colour change in the lithology is observed.
Lithology and shows	Homogenous sequence of mudstones with minor limestone stringers. Mudstone: predominantly grey, greenish. Moderate firm, with traces of disseminated pyrite, and glauconite. Predominantly non calcareous. Trace Limestone; white to off-white, pale grey to beige. Soft to firm, cryptocrystaline. No shows.
Logging character	Gamma ray: generally characterless around 90 to 100 API. Resistivity: less than 1.0 ohmm. Sonic: fairly stable at more than 140 μs/. Neutron:0.45 PU. Density: fairly stable at 2.10 g/cc.
Drilling characteristics	Average ROP: section was 15.0 m/hr. -ROP reduced due to bit balling problems. Gas readings from 2101.1m to 2203 mBRT: -drilled gas averages 0.22% -maximum of 0.3%. -C_1, C_2 and C_3 were recorded throughout, with C_4 in some narrow intervals. The interval was drilled with a mud weight of 1.57sg.

2.4.2 NISE FORMATION (2186.0 – 2576.3 mBRT)

Top	2186.0 mBRT

Age	Late Santonian to Late Campanian
Upper boundary pick	A slightly decrease in interval transit times. corresponding to a slightly decreasing density in the top of the formation. No distinct colour change in the lithology is observed. Formation pick is best seen by using biosratigraphy.
Lithology and shows	Mudstones with limestone stringers throughout. Mudstone becoming more silty with depth and traces of sand observed in the base of the formation. Mudstone: grey, greenish grey to greyish brown to olive grey, becoming darker with depth. Generally firm, with traces of disseminated pyrite, carbonaceous fragments and glauconite. Predominantly non calcareous. More traces of silt towards base. Micro-laminations are seen throughout. Limestone: off with to pale yellow brown, yellowish brown, occasional translucent. Dolomitic in part. Sand: colourless, clear to translucent rare off-white. These are very fine to fine loose grains without cement. No shows.
Logging character	Gamma ray: generally characterless around 90 to 100 API, slightly decreasing to between 80 and 90 API. Resistivity: less than 1.0 ohmm slightly increasing to 1.5 ohmm with depth. Sonic: fairly stable at more than 140 µs/ft down to the area around 2200 mBRT, where it starts decreasing with depth to 125 µs/ft at base. Neutron: start decreasing slightly deeper than sonic log from above 0.45 PU to 0.33 PU at the base. Density: fairly stable above 2200 mBRT at 2.10 g/cc, increasing with depth to an average of 2.30 g/cc. -all show a subtle shift at this depth indicating that the formation is becoming more compacted with depth. -hole size change from 17 ½" to 12 ¼" at 2203 mBRT.
Drilling characteristics	Average ROP: 17 ½" section was 15.0 m/hr (down to 2203 mBRT) 12 ¼" section was 34.9 m/hr -17 ½" ROP reduced due to bit balling problems. Gas readings from 2101.1m to 2203 mBRT: -drilled gas averages 0.22% -maximum of 0.3%. -still very low/no total gas readings from 2403 to 2576.3 mBRT. -C_1, C_2 and C_3 were recorded throughout, with C_4 and C_5 in some narrow intervals. -gas trap failed from 2203 to 2403. -hole size change from 17 ½" to 12 ¼" at 2203 mBRT. The interval was drilled with a mud weight of 1.57sg.

2.4.3 KVITNOS FORMATION (2576.3 – 2787.5 mBRT)

Top	2576.3 mBRT

Age	Late/Middle Turonian to Late Santonian
Upper boundary pick	Formation is picked at the base of the high gamma spike that marks the base of the Nise Formation. Below the top the density log shows a slight increase from 2.30 g/cc to 2.35 g/cc and sonic log shows an decrease in interval transit time from 125 μs/ft to 120 μs/ft.
Lithology and shows	Thick mudstone sequence interbedded with limestone stringers, commonly dolomitic. Commonly silty, in part grading to argillaceous siltstone. Mudstones: grey to dark grey, olive grey to olive black, occasional greenish grey, predominantly firm with an predominantly dull earthy texture. Traces of mica, carbonaceous material and disseminated pyrite Commonly silty, in part grading to argillaceous siltstone. Traces of glauconite more common towards the base. Limestone: white to off white, pale orange brown to pale cream, light to medium grey towards the base. Firm to hard, microcrystalline and dolomitic in parts. At base grades to calcareous sandstone. No shows.
Logging character	Gamma ray: 110 API peak at top formation border else average at 90 API units. Resistivity: slight increase at formation border, increase slowly with depth from 1.5 to 2.0 ohmm. Sonic: decreasing slowly with depth from 125 μs/ft to 110 μs/ft at the base. Neutron log: decreases with depth from an average of 0.33 PU to 0.27 PU. Density log: displays occasional high density spikes corresponding to the presence of limestone in the formation. Slightly increasing average with depth from 2.35 g/cc to 2.45 g/cc.
Drilling characteristics	Average ROP: 6.9 m/hr -ROP reduced due to bit balling problems and fishing run. Gas readings from 2576.3m to 2684.0 mBRT: -not measurable Gas readings from 2684.0m to 2787.5 mBRT: -drilled gas averages 0.1% -maximum of 0.3% at 2785 mBRT. -C_1, C_2 and C_3 were recorded throughout, with C_4 and C_5 in some narrow intervals. -very low/no total gas readings from 2576.3 to 2684.0 mBRT. Mud weight was lowered to 1.55 sg in this interval.

2.5 CROMER KNOLL GROUP (2787.5 – 3370.5 mBRT)

2.5.1 LYSING FORMATION (2787.5 – 2793.0 mBRT)

Top	2787.5 mBRT
Age	Late/Middle Turonian
Upper boundary pick	The top of the Lysing Formation is picked at a distinct change in lithology from mudstone to sandstone. Gamma ray decreased from 90 API in the overlying Kvitnos Formation to 60 API. A negative drilling break was observed when drilling into the top of the formation.
Lithology and shows	The Lysing Formation comprises of calcareous sandstone. Sandstone: grey brown, off-white to medium grey, very fine to fine, rare medium, sub-angular to sub-rounded sand grains. Commonly cemented with calcite and with no visible porosity. Shows: no visual
Logging character	Gamma ray: rapid drop from 90 to 60 API. Resistivity: 3 ohmm in top and base with a 80 ohmm peak in the middle of the formation (approximate 2.5m below the top) - corresponding with a sonic/neutron/density spike. Sonic: drop from an average level of 115 μs/ft to 65 μs/ft seen as an negative peak in the middle of the formation. Neutron: negative peak from a average level of 0.21 to 0 PU in the middle of the formation. Density: 2.70 g/cc spike in the middle of the formation, from a 2.45 g/cc average level.
Drilling characteristics	Average ROP: 6.5 m/hr - On penetration of the Lysing Formation, ROP decreased to 1-2 m/hr. Gas readings: -drilled gas average 0.15% -maximum of 0.2%. -C_1, C_2 and C_3 were recorded throughout, with C_4 in some narrow intervals. Mud weight was maintained at 1.55sg.

2.5.2 LANGE FORMATION (2793.0 – 3370.5 mBRT)

Top	2793.0 mBRT
Age	Late Aptian to Late/Middle Turonian
Upper boundary pick	Change in lithology from sandstone to mudstone with corresponding increase in gamma and sonic values. Density/neutron shows wide positive separation.

Lithology and shows

Mudstone with occasional limestone stringers. Sandstone stringers observed in the middle part and towards the base. Two major sandstone packages occur within the Lange Formation, the Upper and Lower Intra Lange Sandstones, described separately.

Mudstone: medium grey to dark grey, greyish black, olive grey to dark olive grey, predominantly firm becoming harder with depth. Micromicaceous and generally non calcareous, but towards the base calcareous grading to marl in parts. Carbonaceous material and silt in parts. Traces of micropyrite seen throughout the formation.
Limestone: off-white to white, light moderate grey, yellow brown to pale orange brown, firm, microcrystalline and argillaceous, in parts grading to marl .
Sandstone (minor sands between 2915 – 3005 mBRT): grey to off-white rock flour , generally calcareous. Minor loose very fine to fine quartz grains.
Sandstone (minor sands between 3025 mBRT and top Upper Intra Lange sand): clear to translucent, colourless to light grey, occasional milky white. Fine to very coarse loose quartz grains.
Sandstone (minor sands between Upper and Lower Intra Lange sandstones): light grey, off-white, clear to translucent, very fine to fine quartz grains. Moderate to good calcareous cementing with poor visible porosity. Locally argillaceous and abundant mica and carbonaceous material.

Shows: moderate yellow fluorescence, very slow dull yellow blooming cut, slow blooming dull yellow to white crush cut and no residue.

Logging character

Gamma: values increased to an average of 105 API units. In the lower part of the formation an interval between 3246 mBRT and 3308 mBRT shows an decrease from 105 to 80 and back again.
Resistivity: average of 2.0 ohmm, with some small increases in the sandy parts. The interval between 3246 mBRT and 3308 mBRT shows an slight increase from 2.0 to above 2.0 ohmm and then back again.
Density: average of 2.45 g/cc with some minor spikes associated with calcareous intervals and some decreases associated with sandy intervals. The interval from 3246 mBRT to 3308 mBRT shows an slight increase from 2.45 g/cc to above 2.55 g/cc and then back again.
Neutron: averaging 0.30 PU with some spikes and decreases corresponding to those seen with the density. The interval from 3246 mBRT to 3308 mBRT shows an slight increase from 0.30 PU to above 0.21 PU and then back again.
Sonic: slightly decreased from an average of to 115 -110 µs/ft with some minor spikes corresponding to those seen with the density. The interval from 3246 mBRT to 3308 mBRT shows an slight decrease from 115 µs/ft to 95 µs/ft and then back again.

Drilling characteristics

Average ROP: 28.2 m/hr between 2793.0 – 3052.5 m BRT
25.8 m/hr between 3119.2 – 3210.0 mBRT
20.5 m/hr between 3246.0 – 3370.5 mBRT

Gas readings: -drilled gas averages of 0.7% between 2793.0 – 3052.5 mBRT.
-maximum of 2.3% at 2912.0.
-drilled gas averages of 0.5% between 3119.2 – 3210.0 mBRT.
-maximum of 2.7% at 3199.0.
-drilled gas averages of 0.4% between 3246.0 – 3370.5 mBRT.
-maximum of 0.7% at 3253.0 mBRT.
-C_1, C_2 , C_3 and C_4 were recorded throughout and C_5 below the first sandy intervals at 2916 mBRT.

Mud weight was maintained at 1.55sg.

2.5.3 UPPER INTRA LANGE SANDSTONE SEQUENCE (3052.5 – 3119.2 mBRT)

Top	3052.5 mBRT
Age	Turonian
Upper boundary pick	Change in lithology from mudstone to mudstone interbedded with sandstone. Decrease in gamma ray, density and sonic values correspond with increasing resistivity and neutron values.
Lithology and shows	Mudstone with sandstone interbeds and occasional limestone stringers. Mudstone: moderate dark grey, moderate dark olive grey, firm ,with an earthy texture. Non calcareous with traces of micropyrite. Limestone: off-white to pale yellow brown, commonly light grey, moderate hard, microcrystalline and slightly argillaceous in part. Commonly streaked with crushed mudstone. Sandstone (approximate 58% of total sequence): clear to translucent, occasionally opaque, colourless to light grey, milky white quartz grains. Predominantly fine to medium, commonly very fine, occasionally coarse grains. Traces of glauconite, fine to very coarse mica and fine black lustrous carbonaceous material. Rare calcareous cement. Shows: spotty to pinpoint bright yellow to white fluorescence, instant bright yellow to white cut, weak yellow to white residue.
Logging character	Gamma: decreases from average of 105 API units to an average of 85 API units corresponding to sandy intervals. Due to interbedded nature the values vary between 105 and 85 through the sequence. Resistivity: increases from average of 2.0 ohmm to values between 3 to 50 ohmm corresponding to sandy intervals. Due to interbedded nature the values vary through the sequence. Density: decreases from an average of 2.45 g/cc to an average of 2.30 g/cc associated with sandy intervals and back again. Due to interbedded nature the values vary through the sequence. Neutron: averaging 0.30 PU in intervals with mudstone and an average of 0.25 corresponding to interval with decreasing density (sandy intervals). Sonic: Due to interbedded nature the values vary between 110 and 70 µs/ft through the sequence. Spikes often corresponds to those seen with the density.
Drilling characteristics	Average ROP: 24.6 m/hr. Gas readings: -drilled gas average of 1.1% -maximum of 1.7% at 3070.0. -C_1, C_2 , C_3, C_4 and C_5 were recorded throughout. Mudweight was maintained at 1.55sg.

2.5.4 LOWER INTRA LANGE SANDSTONE SEQUENCE (GRÅSEL EQUIVALENT) (3210.0 – 3246.0m BRT)

Top	3210.0 mBRT
Age	Early Turonian
Upper boundary pick	Change in lithology from mudstone to mudstone with sandstone interbeds. Decrease in gamma ray, density and sonic values correspond with increasing resistivity and neutron values.

Lithology and shows	Mudstone with sandstone interbeds and occasional limestone stringers. Mudstone: medium grey, grey black, olive black, rare medium blue grey. Soft to firm Locally microcarbonaceous, non calcareous with traces of micropyrite. Limestone: off-white to pale yellow brown, commonly light grey, moderate hard, microcrystalline and slightly argillaceous in part. Commonly streaked with crushed mudstone. Sandstone (approximate 40% of total sequence): colourless to light grey, off-white quartz grains. Predominantly very fine to fine, rarely medium. Abundant micaceous and carbonaceous material. Slightly more calcareous cemented towards the base and poor visible porosity observed. Shows: moderately yellow fluorescence, very slow dull yellow blooming cut, slow blooming dull yellow to white crush, no residue.
Logging character	Gamma: decreases from average of 105 API units to an average of 80 to 85 API units corresponding to sandy intervals. Due to interbedded nature the values vary between 105 and 85 API throughout the sequence. Resistivity: increases from average of 2.0 ohmm to values between 2 to 30 ohmm corresponding to sandy intervals. Due to interbedded nature the values vary through the sequence. Density: decreases from an average of 2.45 g/cc to an average of 2.35 g/cc associated with sandy intervals and back again. Due to interbedded nature the values vary through the sequence. Neutron: averaging below 0.30 PU in intervals with mudstone and an average of 0.22 corresponding to interval with decreasing density (sandy intervals). Sonic: Due to interbedded nature the values vary between 120 and 70 µs/ft through the sequence. Spikes often corresponds to those seen with the density.
Drilling characteristics	Average ROP: 28.3 m/hr. Gas readings: -drilled gas averages of 1.0%. -maximum of 1.8% at 3210.0. -C_1, C_2 , C_3, C_4 and C_5 were recorded throughout. Mud weight was maintained at 1.55sg.

2.5.5 LYR FORMATION (3364.0 – 3370.5.0M BRT)

Top	3364.0 mBRT
Age	Late Aptian
Upper boundary pick	Increasing sonic values before a sudden drop at the base.
Lithology and shows	Mudstone with occasional limestone stringers. Mudstone: olive grey, grey black, medium dark grey. Firm to moderately hard. Locally carbonaceous, non to slightly calcareous. Traces of micropyrite. Limestone: white, light grey, firm to moderate hard, microcrystalline and very argillaceous in part. Shows: none.

Logging character	Gamma: average of 105 API units Resistivity: slightly increases from average of 2.0 ohmm to values between 2 to 3 ohmm at the base. Density: negative peak at the very top with a minimum value of 2.15 g/cc. Average of 2.45 g/cc Neutron: averaging below 0.30 PU. Negative peak corresponding with the negative density peak. Sonic: Increasing from an average of 105 to90 µs/ft before a sudden drop back at the base.
Drilling characteristics	Average ROP: 25.0 m/hr. Gas readings: -drilled gas averages of 0.95%. -maximum of 1.1% at 3366.0. -C_1, C_2 , C_3, C_4 and C_5 were recorded throughout. Mud weight was maintained at 1.55sg.

2.6 VIKING GROUP (3370.5 – 3513.0 mBRT)

2.6.1 MELKE FORMATION (3370.5 – 3513.0 mBRT)

Top	3370.5 mBRT
Age	Late/Middle Oxfordian to Middle Kimmeridgian
Upper boundary pick	Change in lithology from interbedded mudstone to mudstone with limestone stringers. Decrease in sonic velocity with corresponding decrease in density/increase in neutron log. The absence of the high gamma Spekk formation overlying the Melke made for a problematic pick using logs and cuttings at the wellsite. A definitive top Melke pick was provided from biostratigraphic evidence.
Lithology and shows	Mudstone with limestone stringers. Siltstone at the very base. Mudstone: medium dark grey, greyish black, olive grey to olive black. Firm to moderate hard. Generally non calcareous, silty and micromicaeous in parts. Limestone: yellow brown , white, off-white to light grey, firm to hard, locally argillaceous. Siltstone: medium dark grey, soft to moderately firm, sandy and non calcareous. Shows: none.
Logging character	Gamma: average of 110 API units, increasing to an average of 130 API units at the very base, corresponding to the silty interval at the base. Resistivity: average of 2 to 4 ohmm, with some spikes corresponding to calcareous intervals. Density: rapid increase to an average of 2.51 g/cc in the top of the formation. Slight increase at 3415 mBRT to 2.55 g/cc, corresponding with neutron and sonic log. No density data between 3475 and 3499 mBRT. Neutron: average of 0.27 PU. No neutron data between 3475 and 3499 mBRT. Slight decrease at 3415 mBRT to 0.24 PU, corresponding with density and sonic log. Sonic: average of 100 µs/ft. Slight decrease at 3415 mBRT to an average of 90 µs/ft, corresponding with density and neutron log.
Drilling characteristics	Average ROP: 17.2 m/hr. Gas readings: -drilled gas averages of 0.4%. -maximum of 1.4% at 3506.0. -C_1, C_2 , C_3, C_4 and C_5 were recorded throughout. Mud weight was maintained at 1.55sg.

2.7 FANGST GROUP (3513.0 – 3631.9 mBRT)

2.7.1 GARN FORMATION (3513.0 – 3580.9 mBRT)

Top	3513.0 mBRT
Age	Latest Bajocian/Early Bathonian to Early Callovian
Upper boundary pick	Change in lithology from siltstone to sandstone. Rapid decrease in gamma overlap of density – neutron curves.
Lithology and shows	Sandstone. Sandstone: clear, colourless, translucent off white, pale grey, dark grey, yellow brown, occasional rose pink, very fine to granular, predominantly fine to medium. Silica cemented, non calcareous, no matrix and trace carbonaceous material. Good visible porosity in the top and middle part. Shows: no direct fluorescence in the upper part, pale yellow green, dull to bright yellow to gold direct fluorescence in the middle and towards the base. Weak to moderate fast white blooming cut, pale bluish white residue. Brown organic/oil stain and petroleum odour.
Logging character	Gamma: rapid decrease at top of the formation to 45 API units. Increases with depth from 45 to 90 API units. At the base peaks increasing above 200 API is observed, associated with mica rich zones. Resistivity: increase rapidly at the top to above 100 ohmm. Decreases towards the base to above 10 ohmm. Density: decreases rapidly at the top to an average of 2.25 g/cc. Slightly increase with depth to 2.40 g/cc at the base. Neutron: decrease rapidly at the top to 0.12 PU. Increases with depth to 0.18 PU at the base of the formation. Sonic: average of 80 µs/ft.
Drilling characteristics	Average ROP: 11.5 m/hr. Cored interval #1: 4.5 m/hrs Cored interval #2: 16.2 m/hrs Gas readings: -drilled gas averages of 0.55%. -maximum of 1.7% at 3515.0m BRT -C_1, C_2, C_3, C_4 and C_5 were recorded throughout. -no gas readings between 3551 to 3581m BRT due to a gas trap failure. Mud weight was lowered to 1.25 sg before entering the reservoir section.

2.7.2 NOT FORMATION (3580.9 – 3609.2 mBRT)

Top	3580.9 mBRT
Age	Bajocian
Upper boundary pick	Change in lithology from sandstone to siltstone with corresponding increase in gamma and density values.

Lithology and shows	Siltstone with a sandstone interval at the top. Siltstone: dark grey, very hard and none calcareous. Abundant altering carbonaceous material to mica/pyrite. No visible porosity. Shows: None.
Logging character	Gamma: rapid increase at top of the formation to more than 200 API units. Average of 120 API, with some spikes above average. Decrease to 70 API at the very base. Resistivity: decrease with depth from above 10 ohmm to below 10 ohmm. at the base Density: increase at the top to an average of 2.55 g/cc. Neutron: average of 0.15 PU. Very slight increase with dept to 0.21 PU. Sonic: average of 75µs/ft. Very slight increase with depth to 80 µs/ft.
Drilling characteristics	Average ROP: 8 ½" was 14.1 m/hr. Cored interval #2: 18,2 m/hrs Cored interval #3: 10,3 m/hrs Gas readings: -drilled gas averages of 1.0%. -maximum of 2.0% at 3600.0m BRT -C_1, C_2, C_3, C_4 and C_5 were recorded throughout. -no gas readings between 3581 to 3595m BRT. Mud weight was maintained at 1.25 sg .

2.7.3 ILE FORMATION (3609.2 – 3631.9 mBRT)

Top	3609.2 mBRT
Age	Bajocian
Upper boundary pick	Change in lithology from siltstone to sandstone with corresponding decrease in gamma and density.
Lithology and shows	Sandstone with a thin siltstone interval in the very top. Sandstone: translucent to opaque yellow brown orange and smoky grey. Silty to very fine, strong siliceous aggregate, mica and traces of glauconite. Carbonaceous specks and thin dark greyish black micaceous and bituminous siltstone. Poor visible porosity. Shows: dull to moderate bright yellow green direct fluorescence, moderate bluish with streaming cut and blue green residual ring. .
Logging character	Gamma: decrease at top of the formation to 70 API units. Average of 70 API, except for a short interval in the top with an average of 100 API. Increase at the very base. Resistivity: vary between 2 and 10 ohmm except for at the top where it varies from 2 to 20 ohmm. Density: decrease at the top to an average of 2.45 g/cc, except for at the top where it is a interval with increased density corresponding with the gamma and the resistivity. Neutron: average of 0.15 PU. Sonic: average of 80 µs/ft.
Drilling characteristics	Average ROP: 16.9 m/hr. Cored interval #3: 16.9 m/hrs Gas readings: -drilled gas averages of 1.23%. -maximum of 1.8% at 3621.0 mBRT -C_1, C_2, C_3, C_4 and C_5 were recorded throughout. Mud weight was maintained at 1.25 sg .

2.8 BÅT GROUP (3631.9 – TD 3820.0 mBRT)

2.8.1 ROR FORMATION (3631.9 – 3686.5 mBRT)

Top	3631.9 mBRT
Age	Bajocian
Upper boundary pick	Change in lithology from sandstone to siltstone with corresponding increase in gamma and density values.

Lithology and shows	Siltstone with silty mudstone in the top part. Siltstone: dark greyish brown to black and very hard. Common pyritised shell fragments and veins, microfossil bands. Common very fine glauconite. Angular quartz, siliceous matrix, non calcareous, micromicaceous, grading to mudstone with depth, no visible porosity. Mudstone: dark grey to black, very hard, non calcareous, dull to matt lustre, micromicaceous, traces of carbonaceous specks, angular pale grey silty quartz in traces, siliceous matrix. Shows: none.
Logging character	Gamma: rapid increase at top of the formation to 130 API units corresponding to the more silty mudstone interval. Decrease to an average of 110 API in the more silty intervals. Resistivity: very stable at an average of 7 ohmm, except for at the top where it's slightly lower. Density: increase to an average of 2.55 g/cc, except for an interval at the top showing higher values than average, corresponding with the gamma and the resistivity. Neutron: average of 0.15 PU. Sonic: average of 75 μs/ft.
Drilling characteristics	Average ROP: 14.5 m/hr. Cored interval #3: 14.0 m/hrs Cored interval #4: 16.8 m/hrs Gas readings: -drilled gas averages of 0.72%. -maximum of 2.2% at 3681.0 mBRT -C_1, C_2, C_3, C_4 and C_5 were recorded throughout. Mud weight was maintained at 1.25 sg .

2.8.2 TILJE FORMATION (3686.5 – 3773.5 mBRT)

Top	3686.5 mBRT
Age	Aalenian
Upper boundary pick	Change in lithology from siltstone to sandstone corresponding to a drop in gamma, resistivity and density values. Neutron and sonic show a slight increase.

Lithology and shows	Sandstone in the top and middle part grading into siltstone and mudstone towards the base. Sandstone: clear, colourless, translucent to opaque pale orange grey brown, biege to brown, very fine to fine, very rarely medium, moderately to strong consolidated siliceous cemented aggregate with common secondary siliceous cement / matrix, glauconite, quartz, grey brown to brown organic stain-material, non calcareous to slightly calcareous in parts, poor to moderate visible porosity. Shows: varying between 5% to 70-100% dull to bright yellow green/gold direct fluorescence, moderately fast bluish white streaming to blooming cut with yellow green/dull blue white residual ring. Common dark orange brown oil stain, abundant bitumin/dead oil fracture infill and banding Mudstone: grey to greyish brown, firm, micromicaceous, microcarbonaceous specks, non calcareous, grading to Siltstone.
Logging character	Gamma: decrease at top from 110 API units to an average of 75 API. Values display a spiky nature with values varying between 50 and 130 API. Increasing average to 100-110 API towards the base Resistivity: decrease to between 1 and 10 ohmm with an average of 3 ohmm at the top and middle part. An increase to a steady level above 10 ohmm is seen towards the base. Density: shows a similar decrease and increase as the gamma and resistivity. Average of 2.40 g/cc at the top and middle part, increasing to 2.65 g/cc towards the base. Neutron: average of 0.15 PU at the top and middle part, increasing to 0.21 towards the base. Sonic: increases to an average level of 80 µs/ft.
Drilling characteristics	Average ROP: 20.6 m/hr. Cored interval #4: 24.6 m/hrs Gas readings: -drilled gas average of 0.67% in the interval 3686.5-3693 mBRT. -drilled gas average of 0.44% in the interval 3726-3773.5 mBRT. -maximum of 1.4% at 3687.0 mBRT -C_1, C_2, C_3, C_4 and C_5 were recorded throughout. -no gas readings between 3693 and 3726m BRT Mud weight was maintained at 1.25 sg.

2.8.3 ÅRE FORMATION (3773.5 – TD 3820 mBRT)

Top	3773.5 mBRT
Age	Aalenian
Upper boundary pick	High resistivity interval corresponding to increasing density and neutron.

Lithology and shows	Sandstone: clear, colourless, translucent pale grey to off white, very fine to fine, occasionally silty, moderately well consolidated with siliceous cement, trace pyritic, poor visible porosity. Shows: 1% good trace spotty yellow gold direct fluorescence, slow streaming bluish white cut, dull bluish white residual ring. Siltstone: pale grey to greyish brown, moderate firm to firm, generally siliceous and argillaceous matrix, rarely calcareous in parts, trace hygroturgid, abundant carbonaceous microlaminations, traces of mica & angular silty quartz with white rock flour, grading to silty Mudstone. Mudstone: dark brown, moderately soft to moderate firm, none to trace hygroturgid, non calcareous, generally homogenous & dull, banded and microlaminations of dark greyish brown carbonaceous material, grading to Siltstone.
Logging character	Gamma: rapid decrease at top of the formation to 60-70 API units corresponding to sandy interval. Spiky curve varying from 60 to 160 API. Resistivity: average of 10 ohmm with a spiky intervals from 3785 to 3792 mBRT showing values up to 90 ohmm. Density average of 2.65 g/cc in the top part, decreasing with depth to an average of 2.55 g/cc. Neutron: average of 0.25 PU in the top part decreasing to 0.15 PU with depth. Sonic: average of 80 µs/ft in the top decreasing slightly with dept to an average of 75µs/ft.
Drilling characteristics	Average ROP: 18.7 m/hr. Gas readings: -drilled gas averages of 0.41%. -maximum of 2.2% at 3776.0 mBRT -C_1, C_2, C_3, C_4 and C_5 were recorded throughout. Mud weight was maintained at 1.25 sg .

3.0 PORE PRESSURE AND FRACTURE GRADIENT

3.1 INTRODUCTION

A pore pressure evaluation has been undertaken for the 6507/5-4 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 and information acquired from pressure tests using MDT to refine the pore pressure estimation.

Summary of Work Processes

Data analysis for Pore Pressure
The direct pressure measurement data were used to calibrate the semi-quantitative indications from Corrected Drilling Exponent (Dxc), Sonic and Resistivity data

Drilling exponent:

The pore pressure from Dxc for 6507/5-4 was calibrated using the MDT values, and compares well with equivalents from sonic and resistivity, except for the section between 1800m and 2200m.

Sonic:

Sonic data was available from 1470m and a pore pressure dataset – 'PP dt e3' was created from the 'DT shale' dataset plus its NCT, calibrated with the MDT data.

Resistivity:

The pore pressure curve calculated from the shale resistivity dataset for 6507/5-4, and calibrated using the MDT data, compares very well to the sonic equivalent.

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.

Caliper and Hole Condition:

The original wellbore is slightly overgauge almost all of the intervals covered by the caliper logs, with maximum hole gauge of about 15.6" in the 12.25" hole section at around 2600m.
Many instances of tight hole, drag and fill on bottom during trips and/or connections were gathered from reports and logs.

3.2 OVERBURDEN GRADIENT

An OBG curve had been created previously for the Dønna Terrace and used in the PP prognosis for this 6507/5-4 well. The RHOB from 6507/5-4 was used to calculate a new OBG, using an average sediment density of 2.25g/cc between seabed and top of good RHOB data at 1500mRKB. This new OBG compared well with the Dønna Terrace average OBG and is used for this PP evaluation.

3.3 PORE PRESSURE

Pore pressure indicators are calibrated using the good coverage of direct measurements, particularly in the Cretaceous. Main features of the final pore pressure profile are:

- Normal hydrostatic pressure from seabed to 1600mRKB.
- Steady increase in PP from 1600m to 1.48sg at 2300m, within the Shetland group.

- Measured pressure of 1.36sg in the Lysing Formation at top Cromer Knoll group represents the likely minimum pore pressure of the Cretaceous.

- Pressure increase from 1.36sg at 2780m to a maximum for the well of 1.55sg at 3350mRKB, in the base of the Cretaceous. The maximum pressure measured in the well is 1.50sg at 3244mRKB. However, the calibrated log responses from Sonic and Resisitivity indicate that shale porosity, and thus pore pressure, were higher in base Cretaceous than in the immediate vicinity of the Lange Sandstone, in which the 1.50sg pressure was measured. See figure 6.

- Pressure then drops from the top of Upper Jurassic Viking group. Experience puts the main decrease in the lower part of the Viking but here the sonic log indicates that the drop starts right at top of Viking, and continues throughout the Viking. The final PP curve tries to take account of both these features.

- Maximum measured pressure in Fangst group is 1.068sg at 3514mRKB.

3.4 FRACTURE GRADIENT

The final fracture gradient curve was calculated using the Pilkington method, in which the shallowest good LOT is used as a 'calibration' point. It represents in reality a minimum set of values for formation strength in the well, with the curve shifted to fit the LOT taken in 6507/5-4. The lost circulation incident at 1623mRKB is also shown on the FG curve.

This FG indicates minimum formation strengths of 1.43sg in the Kai Formation, 1.69sg in the top of Brygge Formation at 1819mRKB, and 1.94sg in the base of Cretaceous at around 3350m.

3.5 CONCLUSIONS

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

The pore pressure prognosed for the well before drilling is actually very similar to the final pressure profile, although the maximum prognosed pressure was expected at 1.49sg in the Lange formation, not in the base Cretaceous shale's. The difference between prognosed 1.49sg and actual 1.50sg in the Lange (c.100psi) is minimal, and could just be a function of the lack of detail at the pre-drill stage about expected Lange formation top depths, and the difference between prognosed and actual top Lange.

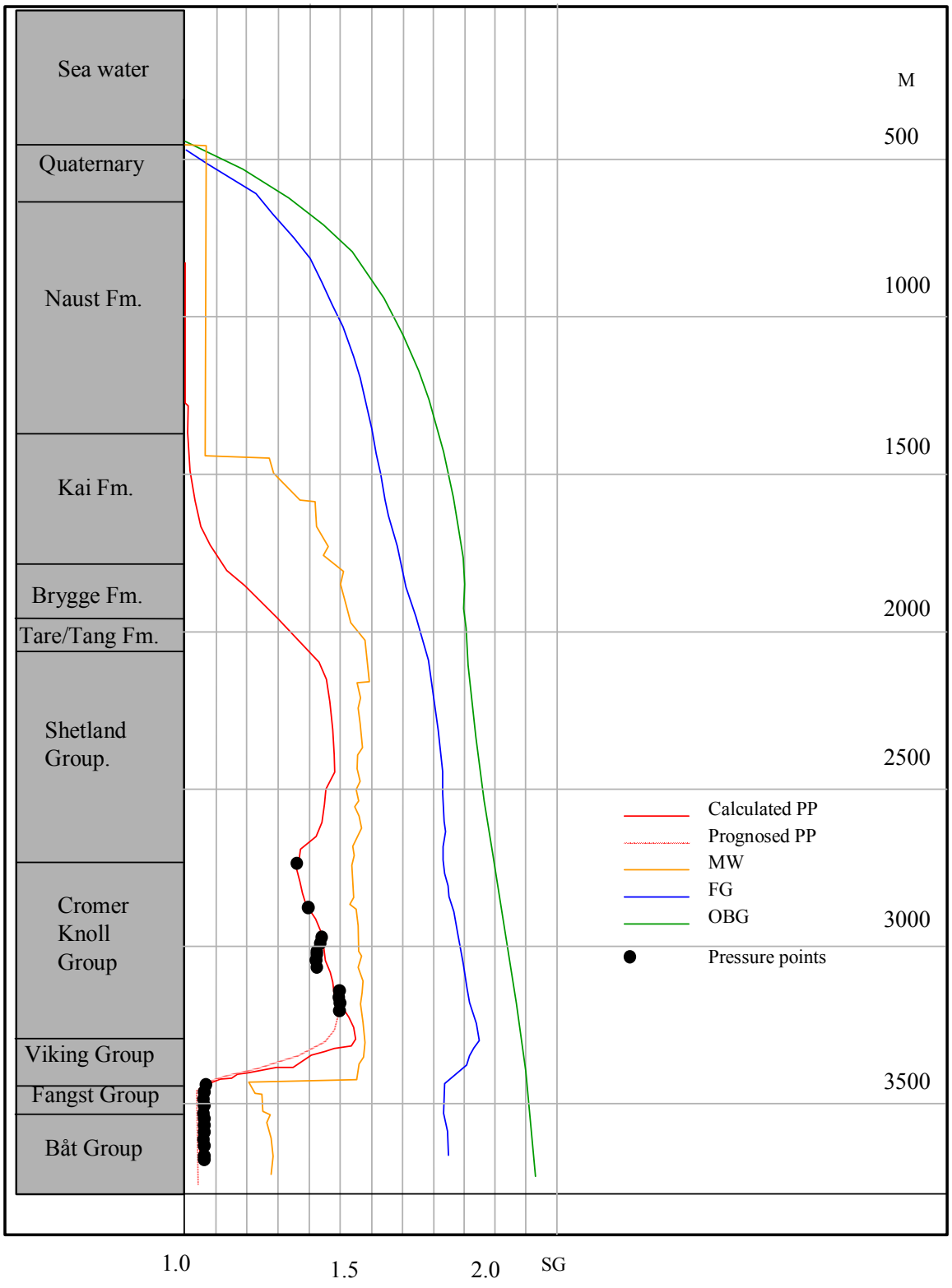

Figure 6: Formation Pressure Evaluation

4.0 FORMATION EVALUATION

4.1 WIRELINE LOGGING

12 ¼" Section

Run No.	Date	Tool String	Hole Size ins	Max Temp (°C)	Time since circ. (hrs:min)	Logged interval mBRT	Logged interval mBRT	Remarks
1a1	14/03/01	HRLA/ DSI/GR/ SP/EMS/ GPIT	12 ¼"	101	21:30	3475.5	0.0	Gamma ray logged to surface.
1b1	15/03/01	IPLT/GR	12 ¼"	108.3	34:20	3475.5	1460.7	
1c1	15/03/01	MDT/GR	12 ¼"	106.3	53:20	3245.4	2788.0	38 pretests, 23 good tests, 3 fluid samples.
1d1	17/03/01	VSP/GR	12 ¼"	111.0	80:55	3460.0	445.0	Checkshots only from 1700m BRT to seabed.
1e1	17/03/01	MSCT/GR	12 ¼"	110.0	100:20	3245.4	3028.9	Attempt 15, recover 14. Unable to power up hydraulic motor, pull out of hole.

8 ½" Section

Run No.	Date	Tool String	Hole Size ins	Max Temp (°C)	Time since circ. (hrs:min)	Logged interval mBRT	Logged interval mBRT	Remarks
2a1	29/03/01 - 30/03/01	HRLA/DSI/ GR/SP/EMS/ GPIT	8.5	118	13:45	3820	3300	Logged with DSI-GR for TOC –2712m
2b1	30/03/01	IPLT/GR	8.5	120	21:55	3820	3498	
2c1	30/03/01 - 31/03/01	MDT/GR	8.5	125.4	25:10	3514	3621.6	Hydraulic leak in probe module at 1st attempt. 32 Pretests, POOH due to tool failure on 2nd attempt.
2c2	31/03/01 - 01/04/01	MDT/GR	8.5	134.1	55:50	3562.6	3811.5	39 Pretests. No chambers.
2d1	01/04/01 - 02/04/01	VSP/GR	8.5	-	67:30	3810	3765	Hydrophone cable parted. Bad weather.
2c3	02/04/01	MDT/GR	8.5	-	85:35	3566.8	3582.7	Sampling run only.
2c4	02/04/01 - 03/04/01	MDT/GR	8.5	-	104:15	3514	3575.4	Sampling run only.
2d2	03/04/01 - 04/04/01	VSP/GR	8.5	-	128:00	3810	3350	

4.2 FORMATION TEMPERATURE SUMMARY TABLE

(see Figure 4 for temperature plot – Section 1.8)

Run	Loggers TD (mBRT)	Date/ Time on TD	Date/ Time of last circulation	Mud Density (sg)	Rm (Ohmm)	Rmf (Ohmm)	Rmc (Ohmm)	BHT (deg C)	Horner Corrected Temp. (deg C) and reliability of calculation
1a	3475.5	21:50 14/03/01	20:30 13/03/01	1.54	0.083 @ 14 deg C	0.061 @ 15 deg C	0.214 @ 15 deg C	101	111
1b	3475.5	06:50 15/03/01	20:30 13/03/01	1.54	0.083 @ 14 deg C	0.061 @ 15 deg C	0.214 @ 15 deg C	108	Good
2a	3820	06:40 30/03/01	14:30 29/03/01	1.29	0.066 @ 16 deg C	0.052 @ 17 deg C	0.065 @ 16 deg C	118	124
2b	3820	12:25 30/03/01	14:30 29/03/01	1.29	0.066 @ 16 deg C	0.052 @ 17 deg C	0.065 @ 16 deg C	120	Good

4.3 WIRELINE OPERATIONS SUMMARY

4.3.1 12 1/4" Cretaceous Logging

The hole was handed over to Schlumberger at 1200 on March 14th. Toolbox talks, rig up and run in hole with DSI-HRLA-EMS-GPIT-SP-GR. At 20" casing shoe, commenced insurance monopole and dipole logging into hole at 15:15. No problems getting across 17.5 –12.25 hole at 2200 mBRT. Complete downlog at 17:00. Tagged TD at 3475 mBRT– significantly shallow to drillers TD at 3488m. Pulled main log to casing shoe at 1460 mBRT at 20:10. Return to same shallower TD and commenced cross dipole log to 3130 mBRT at 23:15. Rigged down tool by 03:00 on March 15th. Logging took 15hrs versus planned of 11.5 hours.

At 03:00 rigged up IPLT-GR. Performed repeat log across Upper Lange sands (3120-3000 mBRT). Minor hang up at 3270 mBRT whilst trying to return to TD. Eventually return to same shallow section TD at 06:50. Complete main log at 10:30. Rigged down at 11:50. Logging took 8hrs 50mins versus planned of 8.5 hours

At 12:00 commence rig up of MDT-GR. MDT configuration was 2 probes; lower probe configured with H2S patches, then MRMS, OFA, pump, second MRMS and then 2 3/4 gal chambers. Commenced MDT pretests using non H2S upper probe at 2788 mBRT at 17:20 on March 15th. Took a total of 38 tests (15 tight and 23 good) to a maximum depth of 3245m at 01:50 on March 16th. The first sample depth of 3055.5 mBRT was reached at at 02:30. Poor flow rates eventually lead to moving to 3055.2 mBRT at 03:30. Sampling finished at 17:38 on March 16th.

A pre-test and a sample fluid analysis was performed at 3102.7 mBRT. This depth yielded an early oil indication but then cleaned up to 100% water after10ltrs pumped through, with a fluid resistivity of 0.022 Ohmm. An additional suite of pretests were made in the top of the Upper Lange and in the Lysing before the tool was pulled out of hole and rigged down at 01:50 on March 17th. The MDT sampling took 37hours and 50 minutes versus a planned 16 hours.

The VSP was rigged up at 01:50 on March 17th. The tool was a dual CSI tool. The tool commenced logging at 3465m, just shy of TD. A total of 140 levels were recorded up to 500 mBRT. From 1600 mBRT, only check shots were recorded. The tool was rigged down at 19:10 on March 17th. This run took 16hrs and 10minutes versus a planned of 17 hours.

The MSCT was then rigged up at 19:10 and run in hole. A total of 16 core samples were taken of which 15 were recovered, rather than the planned 25, due to an electrical short in the core piston motor. The tool was rigged down at 05:25 on March 18th. This run took a total of 10hrs and 15mins, against a planned 11 hours.

The hole was then handed back to Drilling at 05:25 on March 18th.

4.3.2 8 1/2" Jurassic Logging

The hole was handed over to Schlumberger at 23:50 on March 29th. After a toolbox talk, rigged up and run in hole with a DSI-HRLA-EMS-GPIT-SP-GR toolstring. The 9 5/8" casing shoe was reached at 03:40, March 30th. Commenced insurance downlog. Tagged TD at 3820 mBRT at 04:15. Commenced main uplog and logged back into casing, stopping logging at 3300 mBRT. Note that all DSI modes were firing simultaneously – monopole, two dipoles, crossed dipoles and Stoneley – causing a slight reduction in logging speed to 845m/hr. Commenced repeat from TD for an 80m interval. The tool string was back inside casing at 07:10. Restarted DSI to locate top of cement while pulling out, this was found at 2712 mBRT. Rigged down at 10:00 on March 30th. Logging took 10hrs 10mins versus planned of 7 hours 30 minutes.

At 10:00 on March 30th, rigged up IPLT-GR tools. Ran in hole and tagged TD at 12:25. Commenced main uplog, reaching the 9 5/8" casing at 13:05. Returned to TD and completed a repeat log by 13:25. Pulled the tool string out of hole and rigged down by 15:40. Logging took 5hrs 40mins versus planned time of 7 hours

At 15:40 commenced rig up of MDT-GR. There was a delay of 3 hours whilst the exact MDT sample bottle configuration was finalized to allow optimal sampling of the fluids in the Jurassic. The MDT configuration was different from that deployed on the 12 ¼" run. Major differences were that all the SPMCs were placed in the MRMS closest to the probe. This ensured that any samples taken with the H2S probe and non-reactive bottles had the least pipework to flow through. Furthermore, the standard pumpout module was replaced by a heavy duty low flow-rate pump. Otherwise the configuration was 2 probes, with the lower probe configured with H2S patches, then MRMS, OFA, pump-out module, then second MRMS and 2 3/4 gal chambers.

The tool was at the casing shoe, allowing the gauges to stabilise at 22:20. Commenced first pretests – unable to confirm that either of the probes were seating correctly on the formation wall. Pulled out the tools to surface and commenced investigation at 01:15 on March 31st. Determined that the main non H2S probe had a leaking 'O' ring; this probe was changed to a standard probe and the upper parts (GR, HYD, PC) of the MDT switched out.

At 04:15, the tool was redeployed and made a total of 31 points through Garn formation before power was lost to the tool at 14:00.

The MDT tool string was apparently working on surface, but changed out OFA and bottom samplers. Run in hole again at 19:30 and shallow tested at 200 mBRT – this determined that the OFA was not working anymore. Pulled out to replace the OFA. Discussion with town resulted in the MDT being slimmed down just to run pressure tests only. The tool commenced making repeat pressure measurements at 24:00. Pressure measurements were then made through the remaining formations. A total of 71 measurements were made. Pulled out with the pretest MDT toolstring at 07:30 on April 1st and the MDT was rigged down at 10:00.

At 10:00 on April 1st, commenced rigging up the VSP (CSAT tool). Problems with the toolhead meant that a delay in running in the hole occurred until 14:00. The heave compensation system also failed – wait for Stena to rig up a jury hydraulic compensation system. Finally ran in hole to 2420 mBRT – but found excessive tension when setting tool in casing at 15:20, indicating that the heave compensation was not adequate. Pulled out of hole and waited for Stena to rig up alternative heave compensation system. Once this was completed, ran in hole again and reached the casing shoe at 00:25 on April 2nd. Commenced first level in open hole and determined that the hydrophones are not functioning – damaged due to excessive weather. It was not possible to retrieve guns in the prevailing weather conditions, so pulled out the VSP tools and rigged down at 04:00 on April 2nd.

Rigged up MDT at 04:00. The MDT tool string used was a pressure and sampling string, as in the previous sampling attempt, except that the ECRD has been replaced with a conventional weak point. This reached the casing shoe at 08:50 and sampling commenced. It was planned that on this sampling run, all the PVT samples from the Garn oil and gas and some of the bulk for each of the phases would be used, leaving some PVT chambers to gather water from the Ile. Given the recent history of tool failure in this hole section, this sampling was an attempt to get as much as possible of the important Garn fluids. All sampling finished at 18:35 on April 3rd, but there were problems retracting the tool. There was insufficient pressure build up in the probe hydraulics. Therefore performed an emergency retract. Moved off depth and confirmed the tool was free. Pulled out of hole. Tool on surface and rigged down at 22:30 on April 3rd.

Commenced rig up of VSP (single CSAT tool) and ran in hole. By 23:15, tools had reached the casing shoe. Encountered problems with the guns (of the 3 guns deployed, only two were working). Ran in hole to TD,

discovering some 12 m of fill. Completed a 9 level overlap with previous run. Pulled out of hole and rigged down VSP at 07:40 on April 4th.

The well was handed back to Drilling at 07:40 on April 4th.

4.4 COMPARISION LOGGERS AND DRILLERS DEPTHS

Casing	Driller's Depth	Logger's depth
	mBRT	mBRT
30" Conductor	519.0	Not recorded
20" Casing	1460.66	1460.70
9 5/8" Casing	3494.2	3498
TD	3812	3820

4.5 TIME BREAKDOWN

Run No.	Date	Tool String	Logged interval		Opr. Time	Lost time
			mBRT	mBRT	(hrs:min)	(hrs:min)
12 ¼"						
1a1	14/03/00	HRLA/DSI/GR/SP/ EMS/GPIT	3475.5	0.0	15:00	0:00
1b1	15/03/00	IPLT/GR	3473.5	1460.7	8:50	0:00
1c1	15/03/00	MDT/GR/	3245.4	2788.0	37:50	0:00
1d1	17/03/00	VSP/GR	3460.0	445.0	16:20	0:00
1e1	17/03/00	MSCT/GR	3245.4	3028.9	10:15	0:55
8 ½"						
2a1	29.03.01	HRLA-DSI-GR-SP -EMS-GPIT	3820	3300	10:10	00:00
2b1	30.03.01	IPLT-GR	3820	3498	05:40	00:00
2c1	30.03.01	MDT-GR	3514	3621.6	30:40	14:55
2c2	31.03.01	MDT-GR	3562.6	3811.5	11:40	00:00
2d1	01.04.01	VSP-GR	3810	3765	18:05	03:15
2c3	02.04.01	MDT-GR	3566.8	3582.7	18:40	03:55
2c4	03.04.01	MDT-GR	3514.0	3575.4	23:45	01:15
2d2	03.04.01-04.04.01	VSP-GR	3810	3350	08:10	00:30

4.6 LWD LOGS RUN

Run No.	Tool String	Hole Size ins	Logged interval		Remarks
			mBRT	mBRT	
1	CWR/GR (Pathfinder)	26”	519.0	1466.0	Owing to the presence of boulders in the 36” hole section, no LWD tools were included in the bit run from 446 – 522 mBRT. Both realtime and memory data were collected in 26” hole to evaluate any potential shallow gas horizons and for selecting a competent lithology to set the 20” casing. Realtime log quality was as good as could be expected in 26” hole, however memory data was unavailable until four days after the section TD due to an corruption of the time stamp being applied to the depth records. Log quality was adversely affected by the large hole diameter, however, it did prove adequate.
2	CWR/GR (Pathfinder)	17 ½”	1466.0	2203.0	Critical requirement to have realtime LWD working in the 17 ½” hole section to select a competent lithology to set the 13 3/8” casing. While drilling the 20” casing shoe at 1460.7 mBRT, realtime resistivity failed.
3	MPR/GR (Baker Hughes Inteq)	17 ½” / 12 ¼”	1700.0	2412.0	To aid in planning the VSP programme, there was a need to clearly identify the pick for the top Brygge Formation. Due to the failure to obtain resistivity data in the 17 ½” hole this was not possible. It was therefore necessary to collect the data while running in with the 12 ¼” drilling assembly. Critical requirement to have realtime LWD working in the 12 ¼” hole section to select a competent lithology for setting the 9 5/8” casing. Due to the bit being balled, it was decided to pull out of hole at 2412 mBRT.
4	MPR/GR (Baker Hughes Inteq)	12 ¼”	2412.0	2630.0	Critical requirement to have realtime LWD working in the 12 ¼” hole section to select a competent lithology for setting the 9 5/8” casing. Due to bit balling the and low rates of penetration, the bit was pulled at 2630mBRT.
5	MPR/GR (Baker Hughes Inteq)	12 ¼”	2630.0	2684.0	Critical requirement to have realtime LWD working in the 12 ¼” hole section to select a competent lithology for setting the 9 5/8” casing. The bit was pulled at 2684mBRT due to low rates of penetration.

Run No.	Tool String	Hole Size ins	Logged interval		Remarks
			mBRT	mBRT	
6	MPR/GR (Baker Hughes Inteq)	12 ¼"	2684.0	2742.0	Critical requirement to have realtime LWD working in the 12 ¼" hole section to select a competent lithology for setting the 9 5/8" casing. The bit was pulled at 2742 mBRT to allow a BOP test to be performed.
7	MPR/GR (Baker Hughes Inteq)	12 ¼"	2742.0	3488.0	Critical requirement to have realtime LWD working in the 12 ¼" hole section to select a competent lithology for setting the 9 5/8" casing. The bit was pulled at 9 5/8" casing point.
8	MPR/GR (Baker Hughes Inteq)	12 ¼"	3488.0	3501.0	Drilled ahead to confirm correct casing point picked.
9	MPR/GR (Baker Hughes Inteq)	8 ½"	3501.0	3512.5	Critical requirement for working realtime LWD in the 8 ½" hole to pick core point. The bit was pulled at 3512.5 mBRT once the coring criteria as set out in the Data Acquisition Plan had been met.

REFERENCES

6507/5-4 Drilling Programme	BP Amoco, January 2001
6507/5-4 Data Acquisition Plan	BP Amoco, January 2001
A lithostratigraphic scheme for the Mesozoic and Cenozoic succession offshore mid- and northern Norway	NPD Bulletin No 4, Edited by Dalland, Worsley and Ofstad, Jan 1988
Final Pore Pressure Evaluation 6507/5-4 and –4A, Skarv 3	Eamonn Doyle Knowledge System Inc. September 2001

APPENDIX 1: FORECAST VERSUS ACTUAL STRATIGRAPHIC TOPS

Marker Horizon	Forecast			Actual		
	Depth	Seismic	Error Bar	Depth	Checkshot	Error
		TWT			TWT	
	mTVDSS	msec	m	mTVDSS	msec	m
Nordland Group						
Naust Fm				621		
Kai Fm	1394.0	1449	+/- 20	1373	1443.5	-21
Hordaland Group						
Brygge Fm	1814.0	1867	+/- 35	1794	1848	-20
Rogaland Group						
Tare Fm	2002.0	2034	+/- 35	1977	2023	-25
Tang Fm	2043.0	2070	+/- 35	2022.4	2063	-20.6
Shetland Group						
Springar Fm				2076.9		
Nise Fm	2070.0	2094	+/- 40	2077	2116	+7
Kvitnos Fm						
Cromer Knoll Group						
Lysing Fm	2767.0	2713	+/- 50	2762	2701	-5
Lange Fm (Lower	3207.0	3010	+/- 50	3221	3020	+14
Intra Lange Sandstone)						
Lyr FM				3339.0		
Viking Group						
Spekk Fm	3318.0	3085	+/- 60	-	-	-
Melke Fm	3338.0	3100	+/- 60	3345	3102	+7
Fangst Group						
Garn Fm	3492.0	3202	+/- 80	3488	3186	-4
Not Fm	3549.0			3556	3224	+7
Ile Fm	3579.0			3584	3239	+5
Båt Group						
Ror Fm	3601.0			3606	3250	+5
Tilje Fm	3659.0	3277	+/- 85	3661	3279	+2

APPENDIX 2: WIRELINE OPERATIONS TIME BREAKDOWN

12 ¼" Hole Section

Run Number	Time/ Date	Comments/Activities
1a 1	**14/03/01**	**HRLA-DSI-SP-GR-EMS-GPIT-ACTS**
	12:00	Tool Box talk on drill floor
	12:15	Rig up and check tools
	14:05	Wait on rig repairs to hose
	14:20	RIH to 100m. Activate compensator. Apply tide correction.
	14:30	RIH
	15:12	At 20" casing shoe. Tie in depth and prepare for downlog
	15:15	Start down log, DSI in lower dipole and monopole mode
	17:00	Tool takes weight, prepare for uplog while slowly pulling up. Apply 1.3 m stretch correction.
	17:06	RIH to tag bottom at 3475.5m (wireline depth)
	17:08	Open caliper and start main log up, DSI in monopole and upper and lower dipole mode
	19:00	At 2200m, continue uplog into 17 ½" hole
	20:00	At 20" shoe (1460m). Log into casing to 1400m.
	20:10	Stop main uplog. Close caliper.
	20:15	RIH for repeat section
	21:50	At 3470m, open caliper and start repeat uplog with DSI in monopole and crossed dipole mode.
	23:15	Repeat log complete at 3130m. Close caliper and POOH to 20" shoe.
	15/03/01	
	00:10	At 20" casing shoe, start GR log to surface through 20" casing.
	01:55	Tool at surface. Begin rig down run 1a1.
	03:00	Rig down complete.
		Total time run 1a1 = 15 hours 00 minutes
1b 1	**15/03/01**	**IPLT-GR -ACTS**
	03:00	Pick up IPLT-GR tool string.
	03:20	Tool box safety meeting
	03:30	Start tool string rig up
	04:00	Insert radio active sources and RIH
	04:35	Check APS minitron @ 1000 m
	04:55	Continue RIH
	05:00	At 20" shoe, start GR recording while RIH
	06:00	At 3150 m, open caliper and prepare for repeat section while pulling up
	06:10	Start repeat section at 3120 m
	06:25	Stop repeat at 3000m, close caliper and start RIH
	06:38	Tool hung up twice at 3270m, passed on third attempt
	06:42	Continue RIH
	06:50	Tag bottom. Open caliper and start main up-log.
	09:08	Transition into 17.5" hole with no problem, log to casing shoe
	10:30	Log into casing shoe. Close caliper, POOH to surface
	11:00	At surface, start rig down.
	11:15	Retrieve sources and continue rig down run 1b1
	11:50	Rig down complete.
		Total time run 1b1 = 8 hours 50 minutes
1c 1	**15/03/01**	**MDT-GR**
	12:00	Start rig up run 1c1 MDT-GR.
	13:05	Hold rig floor safety talk
	14:45	Pick up tools and surface check

Run Number	Time/ Date	Comments/Activities
	15:25	RIH
	16:00	Wait at shoe for temperature stabilisation
	16:20	RIH
	17:22	Start pretests at 2788m, taking tests on way down. Tool took minor weight at 3212m. Pretest use upper probe no. 2.
	16/03/01	
	01:50	Pretests completed at 3245.5m. Took 38 tests, 15 tight/aborted, 23 good tests. Start to pull up to 1st sample point
	02:00	Tool pulled tight at 3095m to max pull of 8350 lbs. Slacked off and tool hung up, unable to move down. Set and retracted probe-tool freed.
	02:12	Continue to pull up
	02:20	Make GR correlation pass, add 0.7 m
	02:30	On first sample depth at 3055.5m. Conduct pressure test.
	02:50	Start pumping out, poor flow rate. Pump out using lower probe no. 1 (H2S – oil sample planned)
	02:55	Stop pumping, move to 3055.8m. Conduct pressure test.
	03:05	Start pumping out, poor flow.
	03:30	Stop pumping, move to 3055.2m. Conduct pressure test.
	03:40	Start pumping out
	04: 30	Pump stalled , closed off tool to formation fluid, pumped mud through pump to verify function; pump OK.
	04:35	Continue pumping out from formation to clean up formation fluid.
	07:09	Start to fill 23/4 gal chamber, some signs of plugging
	08:55	Close chamber and continue to pump out
	09:38	Open SPMC N1
	09:40	Close SPMC N1 chamber
	09:45	Continue pumping out
	10:03	Open MPSR 1
	10:07	Close MPSR 1, continue pumping out
	10:29	Open MPSR 2
	10:32	Close MPSR 2, continue pumping out
	10:45	Open MPSR 3
	10:49	Close MPSR 3, continue pumping out
	11:11	Open SPMC 1
	11:14	Close SPMC 1
	11:22	RIH, correlating GR
	11:41	On station at 3083m
	11:59	Start pumping out
	12:22	Open MPSR 7
	12:24	Close MPSR 7
	12:46	Open MPSR 8
	12:48	Close MPSR 8 and continue pumping out
	13:58	Open MPSR 9
	14:00	Close MPSR 9
	14:06	RIH
	14:30	On station at 3220.8m
	14:40	Start pumping out
	16:15	Open MRSC 2 #24
	16:42	Close MRSC 2 #24
	16:51	Open SPMC-N #002
	16:59	Close SPMC-N #002
	17:06	Open MPSR # 769
	17:14	Close MPSR # 769
	17:21	Open MPSR # 927

Run Number	Time/ Date	Comments/Activities
	17:25	Close MPSR # 927
	17:31	Open MPSR # 784
	17:33	Close MPSR # 784
	17:38	Move offwall – no sticking
	17:41	POOH
	18:16	Set Probe at 3103m MD – Tight?
	18:27	Re-set probe at 3102.7m MD - Supercharged
	18:41	Started pumping to Fluid Analyser
	19:15	Stopped pumping at 9.36 litres –Water result (contaminated) with Res = 0.022Ωm
	19:22	Retracted probe and POOH to 3028m MD
	19:32	Set probe at 3028m MD and started pretest
	19:40	Start pumping to fluid analyser
	19:50	Re-set probe at 3028.6m MD and started pretest
	19:56	Started pumping to Fluid Analyser
	20:10	Retracted probe indeterminate result – with trace oil?
	20:11	POOH to Lysing Sand, check correlation on way up – OK
	20:44	Set probe at 2791m MD - Tight
	20:50	Set probe at 2791.5m MD - Tight
	20:58	Set probe at 2790.8m MD - Tight
	21:08	Set probe at 2792.4m MD – Very slow build up pretest aborted after 18 minutes
	21:25	POOH to surface
	23:10	At surface
	17.03.01	
	01:25	MDT Rig down Complete
	01:50	Laying down tools complete
		Total time run 1c1 = 37 hours 50 minutes
1d1	17.03.01	**VSP-GR**
	01:50	Picked up VSP toolstring
	02:55	Ran into hole 1000m MD
	03:35	Checked tools at 1000m MD
	03:55	Checks complete and continue to run into hole
	04:55	At 3120m MD and POOH for correlation pass (+2m correction)
	05:00	Continue to run into hole
	05:15	At 3465m MD and pull upto 3460m MD first shooting depth, and continue to shoot VSP log (did not try to tag bottom).
	17:00	Survey complete
	17:30	Tools at surface
	19:10	Rigged down VSP complete
		Total time run 1d1 = 16 hours 20 minutes
1e1	**17.03.01**	**MSCT-GR**
	19:10	Picked up MSCT toolstring
	19:35	Made up and tested tool
		Ran into hole with MSCT-GR
	21:05	At 1400m MD checked core arm operation – OK
	22:05	At 3151m MDstart correlation pass, hole sticky at 3137m MD (6500 lbs max pull- 2600 lbs overpull). Depth correction +4.8m)
	22:25	Run into hole to 3135m MD and pull up to first core depth in Upper Gråsel
	22:30	At 3129.9m MD, core head stalled got stuck in Mudstone, decided to skip biostrat cores until the more important Sand cores had been cut.

Run Number	Time/ Date	Comments/Activities
	22:38	At 3111m MD, cut core #2 from 22:39 to 22:45, corehead stalled a couple of times
	22:48	At 3107.7m MD cut core #3 from 22:49 to 22:51
	22:54	At 3089.9m MD cut core #4 from 22:55 to 22:56
	22:59	At 3083.4m MD cut core #5 from 23:00 to 23:15, corehead stalled occasionally
	23:18	At 3074.4m MD cut core #6 from 23:19 to 23:29, corehead stalled
	23:31	At 3071.3m MD cut core #7 from 23:32 to 23:43, corehead stalled
	23:47	At 3056.9m MD cut core #8 from 23:48 to 23:55
	23:57	At 3055.8m MD cut core #9 from 23:58 to 00:00
	18.03.01	
	00:03	At 3046.8m MD cut core #10 from 00:04 to 00:07, corehead stalled
	00:11	At 3028.9m MD cut core #11 from 00:12 to 00:13
	00:15	Ran into hole to 3260m MD
	00:23	Log up with GR for correlation check, hole sticky at 3250m MD (7000lbs max Tension) work free, continued correlation pass (correction +0.5m)
	00:51	At 3245.4m MD, when hydraulic motor turned on the kinetic piston was reading between 0.34 and1.02 inches instead of zero. Checked surface equipment and troubleshoot problem. Conclude that the tool is OK but the position indicators for the piston and core motor are not working properly. **40 minutes downtime.**
	01:31	Attempt to open arm at 3239m MD – OK retract. Decide to attempt to work around problem by using increase in Hydraulic motor pressure to indicate when coring is complete.
	01:50	At 3245.4m MD Put in extra marker in core barrel. Attempt to core. Cut core #12 from 02:00 to 02:03
	02:05	At 3244.4m MD cut core #13 from 02:06 to 02:10
	02:12	At 3240.5m MD cut core #14 from 02:14 to 02:16
	02:20	At 3225.1m MD cut core #15 from 02:21 to 02:23
	02:30	At 3221.1m MD. Short in system, unable to power up hydraulic motor, troubleshoot, change out surface system. Surface system OK. **15 minutes downtime.**
	02:45	POOH with MSCT-GR
	04:25	Tools at surface
	04:30	Unload core barrel (Recovery 14 of 15)
	04:45	Start rig down
	05:25	Rig down complete, rig floor handed back to Stena
		Total time run 1e1 = 10 hours 15 minutes (**Downtime 55 minutes**)

8 ½" Hole Section

Run Number	Time/ Date	Comments/Activities

Run Number	Time/ Date	Comments/Activities
2a 1	**29/03/01**	**HRLA-DSI-SP-GR-EMS-GPIT-ACTS**
	23:50	Tool Box talk on drill floor
		30/03/01
	00:00	Rigged up compensator and sheeves.
	00:55	Rigged up tools
	01:40	Check tools, set surface zero.
	02:05	RIH.
	02:10	Tool at 75m, tied up mudline on rigfloor
	02:30	Continued to RIH.
	03:40	At 3403m. Pickup weight 5500lbs, 4400lbs RIH from 3400m for GR correlation to 3489m. (add 3.5m)
	03:50	Start downlog pass with DSI in monopole and lower dipole at 4000 ft/hr, 7-8m deep compared to LWD, similar to 12¼" hole
	04:05	At 3780m stop downlog and pickup for stretch correction (1.6m stretched applied) and continued to RIH. At 1000 ft/hr.
	04:15	Tagged bottom at 3820m. Picked up and started Main uplog at 845 ft/hr.
	05:30	Continued to log up inside casing to 3300m. Check GR correlation (added 0.3m).
	06:15	RIH to do repeat section
	06:40	Tagged bottom and start 80m repeat section.
	07:10	Completed repeat section and POOH
	07:40	At 2750m logged up with DSI/GR (5000 ft/hr) to check TOC. TOC at 2712m.
	07:50	Continued to POOH.
	08:41	At 100m deactivate compensator.
	08:50	Tools at surface.
	09:45	Tools laid down on catwalk. Waiting on crane.
	10:00	Tools laid down.
		Total time run 2a1 = 10 hours 10 minutes
2b 1	**30/03/01**	**IPLT-GR -ACTS**
	10:00	Pick up IPLT-GR tool string.
	10:10	Tool box safety meeting
	10:25	Start tool string rig up
	10:30	Radio anouncement about radioative sources. Insert radio active sources.
	10:45	Power up and RIH.
	11:00	At 100m activated compensator and continued to RIH.
	12:20	At 3740m, activate minitron into standby mode and reduce running speed to 2000ft/hr.
	12:25	Tagged bottom and started main uplog at 1000ft/hr.
	13:05	At shoe finished mainlog and RIH for repeat section.
	13:15	At 3760m activated minitron into standby mode and slow to 2000 ft/hr.
	13:25	Tagged bottom and start (80m repeat section).
	13:35	Finished repeat and POOH.
	15:00	Tool on surface, sources out, complete post-run calibration checks.
	15:20	Start rigging tool down.
	15:40	Tool rig down complete.
		Total time run 2b1 = 5 hours 40 minutes
2c 1	**30/03/01**	**MDT-GR**
	15:40	Waiting on instructions from BP Norway on MDT configuration.
	16:30	Final change from BP Norway to tool configuration. Reconfigure tool.
	19:15	Start rigging up MDT.
	20:25	Commence surface tool checks.

Run Number	Time/ Date	Comments/Activities
	20:50	Check tool zero.
	20:55	Activate wave motion compensator.
	21:00	RIH. Add 3.5m to depth from GR correlation.
	22:15	3400m, commence GR correlation downlog @ 3500ft/hr. add 0.8m.
	22:20	Stabilise gauges at casing shoe.
	22:30	Pull back to 3400m to check depth correlation, log down and add +0.2m.
	22:45 **TT**	Tool at FIRST PRETEST DEPTH @ 3514m. Unable to confirm setting of MPRS 2 (upper, non-H2S) probe. Indications of insufficent hydraulic pressure, 1400psi instead of required 3000psi, also hydraulic motor revs too low at 1350rpm. Unable to set MPRS 1 (lower, H2S) probe, same problem.
	23:05 **TT**	Power down tool to perform precautionary emergency retraction of probes. Move tool down at 100ft/hr to check free movement. No recorded drag. Pick up tool, free movement.
	23:15 **TT**	Pull up into shoe to test probe setting, no improvement.
	23:30 **TT**	POOH at 5000ft/hr whilst consulting with Schlumberger Norway for advice.
	23:45 **TT**	POOH to surface.
31/03/01		
	01:15 **TT**	Tool on surface. Begin tool investigation, with normal probe operation seen at 500m and at surface. Precautionary replacement of HY, PC, GR and Telstatus components. Leaking "O" ring seal observed not holding pressure on MPRS 2 (upper, non-H2S, large diameter) probe. This replaced with standard diameter probe. Perform full surface tool test.
	04:15 **TT**	RIH.
	05:15 **TT**	Tool tested at 1000m – OK +3m correction applied.
	05:45 **TT**	Correlate down from 3420m at 6000 ft/hr to 3530m, +1.0m depth correction.
	05:55 **TT**	Pull back to 3460m ready to perform GR tie-in
	06:05 **TT**	Start GR correlation log – on depth.
	06:15	Tool at first Pretest depth. Continued to take pretests from 3514m to 3621.6m.
	13:57 **TT**	lost 50V power. No power to pump. Unable to take further pretests or samples
	14:11 **TT**	POOH to surface.
	16:15 **TT**	Tools at surface. Tool working? Decided to change out OFA/Pump/bottom bulk chamber/bottom multisampler (not the multisampler with Oilphase bottles).
	19:30 **TT**	Completed tool component replacements and surface tool checks. Intermittant error on OFA. RIH to 200m to investigate.
	20:15 **TT**	OFA reading mud/air mixture in error. POOH to replace.
	21:25	Run 2c3 MDT-GR ready to run. Reconfigure tool with pretest package only following consultation with BP Norway.
	22:00	Tool ready. Meeting with BP Norway to discuss running VSP, decision made to proceed with pretest run.
		Total time run 2c1 = 30 hours 40 minutes **(includes 14 hours 55 minutes TT)**
2c2	**31/03/01**	**MDT-GR**
	22:20	RIH with Run 2c2 MDT-GR to 3600m, applying 3.8m downward depth correction.
01/04/01		
	00:00	Pick up to 3475m, start GR correlation log @ 1100ft/hr, hang-up at casing shoe. Pick up and relog to 3572m at 1600ft/hr.
	00:25	Poor correlation. Repeat log from 3490m at 1200ft/hr. On-depth.
	00:35	Commence pretests from 3562.6m to 3811.5m.
	07:25	Completed pretest program. 39 pretests.
	07:30	POOH with Run 2c3 MDT-GR
	09:20	At 100m deactivate compensator.
	10:00	Rig down of tools complete.
		Total time run 2c2 = 11 hours 40 minutes
2d1	**01/04/01**	**VSP-GR**

Run Number	Time/ Date	Comments/Activities
	10:00	Start picking up tools
	10:15	Connect toolstring
	10:30 **TT**	Check cablehead – down on insulation
	10:45 **TT**	Head down on lines 1,2 and 3 – repair
	11:45 **TT**	Line 2 found to be burnt in head – build new rope socket.
	13:30 **TT**	Head in – check tools.
	13:45	Change extension arm on the CSAT.
	14:00	RIH to compensator depth at 80m
	14:05	Weak point on compensator broke. Wait on Stena. Decide to try to use hydraulic compensator, wait for hydraulic fluid to warm up.
	15:00	Activated hydraulic compensator and RIH to below BOP's – not good.
	15:20	RIH for second test of hydraulic compensator at 2420m – no go, cable head tension varying +/-600lbs.
	16:05 **LT**	POOH to surface and wait on Stena to attempt to rig up another compensation line using a rigfloor tugger line. Schlumberger use time to continue to troubleshoot MDT tool. Rig up 10T tugger for compensator line
	22:20	Rig up toolstring on surface.
	22:45	Activate rig compensator.
	22:55	RIH @ 4300ft/hr, +1.8m depth correction @ 2300m.
02/04/01	00:25	3450m, pick up cable tension 3600lbs, RIH @5200ft/hr into open hole.
	00:40	Commence up GR correlation log @ 1800ft/hr to 3750m. On-depth (rig heave at 3.3m). RIH.
	00:50	3810m FIRST LEVEL. Commence VSP program at 15m levels with 6 checkshots.
	01:15	4 levels completed, start 3750m shot. No signal from hydrophones, suspected short circuit in link following resisitivity tests.
	01:30	POOH to 3440m.
	01:35	BP RSA to discuss gun / hydrophone retrival.
	01:55	Commence crane operations to remove guns. Hydrophone cables parted due to adverse weather conditions (24hrs of high seas), umbilical cable (main signal line to Schlumberger cabin) has wrapped around supporting pennant wire and thus guns cannot be retrieved. Lashed guns / hydrophone to side of rig until weather drops enabling retrieval.
	02:30	POOH with CSAT to surface. Decision made to run with MDT sample chamber runs whilst repairing VSP assembly.
	02:35	Intermittant telemetry problems whilst pulling out, cable head problem. (T-bar connector inside cable head sheared which stressed electrical connectors between cable and tool).
	03:45	VSP-GR tool on surface.
	04:05	VSP-GR tool rig down complete.
		Total time run 2d1 = 18 hours 05 minutes **(includes 3 hours 15 minutes TT)**
2c3	**02/04/01**	**MDT-GR**
	04:05	Rig up MDT-GR for sample run. Replaced damaged cable head (see above, Schlumberger installed blue weak point**,** rated for 6700-7300lbs. Therefore maximum overpull to break wp could be 11100lbs at TD, inc. 3800lbs for the cable. Maximum safe overpull is 8,800lbs (75% of lower limit of weak point + cable). The original and damaged ECRD cable head was rated at 9700lbs, thus 1000lbs safe overpull margin has been lost. The Schlumberger cable can withstand 9750lbs (50% of integral strength) before anticipated deformation. This means that the cable could deform before the weak point breaks.
	06:45	Tools checked at surface.
	07:00	Set tool zero and RIH.
	07:05	At 100m set compensator.
	07:20	RIH.
	07:52	Stopped at 1552m, shackle on weaklink for compensator line had turned ..wait for Stena to fix.
	07:56	Continued to RIH.
	08:50	At 3450m. Picked up to take P/U tension 5400lbs.

Run Number	Time/ Date	Comments/Activities
	08:55	Start correlation log and RIH at 2000ft/hr (+3.8m correction). Picked up and checked – OK. Continued to check correlation down to first sample depth a further –0.5m correction made.
	09:30	At first prospective sample depth 3566.8m
	09:48	Start pumping
	11:40	After cleaning up at 3566.8m. decided to see if could get a better sample at 3559.8m. Minimum drawdown was 18 psi. Picked up to 3505m and recorrelate – no correction.
	12:03	On station at 3559.8m.
	12:07	Start pumping. Able to get much lower drawdown, but pump kept stalling, suspect a sticking valve in Large diameter probe. Decided to swap to other probe (standard probe).
	12:50	On station with standard probe.
	12:58	Start pumping
	13:20	Ready to sample Opened MRSC #100 (2 ¾ gal bulk tank)
	14:32	Closed MRSC #100 (4-6psi DD, 126°C, 8900 psi shutin pressure) and continue to pump.
	15:04	Open SPMC-N #58
	15:10	Closed SPMC-N #58 (4-6psi DD, 126°C, -) and continued to pump.
	15:24	Opened MPSR #73
	15:29	Closed MPSR #73 (4-6psi DD, 126°C, 9004 psi shutin pressure) and continued to pump.
	15:44	Opened MPSR #36
	15:49	Closed MPSR #36 (4-6psi DD, 126°C, 9004 psi shutin pressure) and continued to pump.
	16:05	Opened SPMC #121
	16:09	Closed SPMC #121 ((4-6psi DD, 126°C, -), pumping stopped.
	16:14	Bottle closed
	16:20	RIH to 3575.8m for water sample, check correlation (-0.2m correction). Low permeability, move on.
	16:35	Move to 3575.6m for water sample. Low permeability, move on.
	16:50 **TT**	RIH to 3582.7m for water sample & start pumping.
	19:20 **TT**	Ready to sample and prepared to open SPMC-N # 74. 50V auxilary power supply for solenoids and pump failed. Performed surface checks without success.
	19:50	POOH.
	21:25 **TT**	Toll on surface. Check cable head – OK. Tested individual tool modules in derrick following consultation with BP, identified short circuit within MRPO module.
	22:20	Commenced formal tool rig down.
	22:45	Tool rigged down.
		Total time run 2c3 = 18 hours 40 minutes **(includes 3 hours 55 minutes TT)**
2c4	**02/04/01**	**MDT-GR**
	22:45	Start removal of Run 2c3 bottles and reconfiguration to MRSC x 2 (bulk chambers) and MRMS x 2 (10 x 450cc and 2 x 250cc oilphase bottles) for Run 2c4.
03/04/01	03:00	Start building tool on rigfloor. Perform maintenance to isovalve in MRPS 1 (large diameter probe).
	05:00	RIH.
	05:10	At Compensator depth, activate compensator and continued to RIH.
	06:25	At 3455m take pick up tension and wait for tool acclimatization.
	06:40	RIH 3550m on correlation pass (+1.2m depth correction) and POOH to 3490m.
	06:54	RIH to check correlation – OK.
	07:02	At 3524.9m first prospective gas sample depth.
	07:15	Set probe
	07:20	Start pumping.
	07:30	Pump stalling, similar symptoms as last run with this probe (MRPS 1 –Large diameter probe). Cleaned upto >5% water, 30-40% oil and balance gas. Checked minimum achievable drawdown – 19-20 psi, need 8psi. Stopped pumping and retracted probe.
	08:00	Decided to move to 3520.3m
	08:10	Set probe.
	08:15	Start pumping. minimum drawdown achievable - 18-19psi, need 10.7psi.

Run Number	Time/ Date	Comments/Activities
	08:25	Stopped pumping
	08:30	Picked up to 3490m and RIH checking correlation (-0.2m depth correction).
	08:35	At 3514m
	08:38	Set probe.
	08:44	Start pumping. Minimum achievable drawdown - 8-9psi, need 13.7psi.
	09:25	Sample cleaned up.
	09:31	Opened MRMS 2 - SPMC-N #111. Flowing diff. Press 9 psi, 120.4°C
	09:35	Hold pressure
	09:39	Assumed bottle closed. Probe MRPS 1 (H2S probe), having filled the SPMC-N bottle for measuring H2S. Decided to swap to MRPS 2 as the pump was still stalling with MRPS 1.
	09:43	Stopped pumping and retract probe. Dropped down 2.4m (distance between probes)
	09:49	At 3514m with MRPS 2.
	09:55	Set probe.
	10:00	Started pumping.
	11:02	Opened MRMS 2 - MPSR #644. Flowing diff. Press. 12 psi, 123.5°C.
	11:11	Closed MPSR #644. Shutin pressure 10445 psi. Continued pumping.
	11:19	Opened MRMS 2 – MPSR #456. Flowing diff. Press. 10-11 psi, 123.5°C.
	11:28	Closed MPSR #456. Shutin pressure 9988 psi. Continued pumping. DD suddenly increased to 60 psi, tried to reduce it – unable. Checked with town – continue to sample regardless of DD
	11:49	Open MRMS 2 – SPMC #134. Flowing diff. Press. 50 psi, 123.7°C.
	11:57	Closed SPMC #134
	12:03	Accidentally retracted probe – still needed to take 2 ¾ gal sample. Reset probe and continued pumping. Clean up sample
	12:27	Opened MRSC (2) (which it wasn't realised until it was full was the 1 gal tank not, the 2 ¾ gal tank). #154. Flowing diff press. 0-40 psi, 123.8°C.
	13:18	Closed MRSC (2) #154. Shutin pressure 10749 psi. Continued pumping.
	13:23	Opened MRSC (1) #24 (2 ¾ gal). Flowing diff. Press. 18-20 psi, 123.8-124°C.
	16:02	Closed MRSC (1) #24. Shutin pressure 9000 psi
	16:04	Stopped pumping, retract probe.
	16:10	RIH to 3575.6m, Correlating on the way down – no depth correction.
	16:20	At 3575.6m
	16:22	Set probe, 8.8cc drawdown, tight very slow buildup, no good for sampling.
	16:28	At 3575.8m
	16:31	Set probe, 8.9cc drawdown, tight very slow buildup, no good for sampling.
	16:38	At 3576.0m. Set probe, 8.9cc drawdown, tight very slow buildup, no good for sampling.
	16:43	Pull upto 3569m and RIH to 3575.4m
	16:53	Set probe at 3575.4m.
	16:58	20cc drawdown – looks good for sampling.
	17:00	Start pumping.
	18:25	Ready to sample, DD and fluid composition appear stable. Open MRMS-1, MPSR #930.
	18:28	Closed bottle MPRS #930. (Flowing differential pressure 670psi, 128.6°C, 8727psi shut-in pressure).
	18:30	Stop pumping. 40664cc total pumped volume.
	18:35 TT	Attempt to retract probe, PS 2 non-H2S. Insufficient pressure developed to confirm operation (900psi generated, ~3000psi required). Hydraulic leak suspected.
	19:00 TT	RIH slowly to 3587m to confirm probe retraction. Tool free. Pull back inside casing shoe @ 3000ft/hr.
	19:10 TT	3454m. Schlumberger engineer calls base for additional technical assistance. Probe isolation tests commence. PS1 isolated, still only 920psi. PS2 isolated, upto 3000psi present momentarily, slightly unstable.
	19:30 TT	RIH to 3524.9m to perform check pretest using PS1 probe. Hydraulic pressure not holding, suspected leak on PS1 isovalve. Although pretests are possible, mud would be pumped through the OFA during sampling preventing phase determination and clean-up assessment.
	19:50	POOH. BP Norway decision made to cancel further MDT runs. VSP run will complete

Run Number	Time/ Date	Comments/Activities
		logging operations.
	21:10	Tool on surface, commence rig down.
	22:30	Rig down complete. Timing includes crane operations to clear tools from rig floor.
		Total time run 2c4 = 23 hours 45 minutes **(includes 1 hour 15 minutes TT)**
03/04/01	**2d2**	**VSP-GR**
	22:30	Commence rig up of CSAT and run 2d2. Deploy guns.
	23:00	RIH to 80m, attach compensator.
	23:15	RIH to casing shoe. Only one hydrophone rigged up, previous two were scrapped due to extreme weather damage. Only 2 guns operational, third gun failed during tests whilst running in. Open circuit detected on gun 3 solenoid. VSP can proceed with 9 overlap levels instead of 7.
04/04/01	00:45	Log down from 3438m.
	01:00	Tag bottom at 3809.6m. Start correlation GR log @ 1800ft/hr, +0.7m correction.
	01:10	RIH to 3807.3m, taking weight, picked up and ran back to bottom, again taking weight at 3807.3m. 12.7m fill on-bottom.
	01:20 TT	Select first level at 3085ft. No gun firing due to software communication problem. Swap out WSAN (computer / tool interface module) and reboot software onto second unit computer. Guns fired successfully.
	01:50	Commence levels from 3805ft, then 3795ft (synchronise with Run 2d1 firing program). TWT correlates within 1-2ms of Run 2d1 shot data. Good signal on vertical Z-axis, moderate raw data only on X and Y. Should improve with processing.
	05:20	3265m final survey level, correlation to 12¼" survey very close (½ms).
	05:25	VSP survey complete, POOH.
	06:45	Tools on surface.
	07:40	Rig down of Schlumberger wireline complete, floor to Stena.
		Total time run 2d2 = 8 hours 10 minutes **(includes 0 hour 30 minutes TT)**