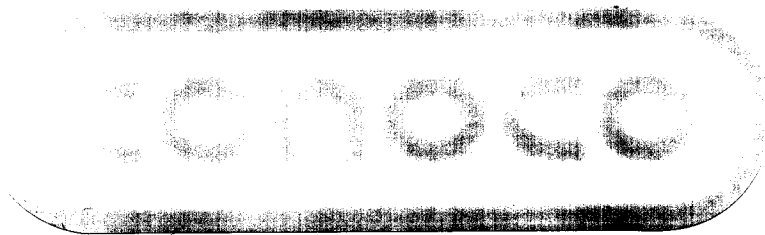


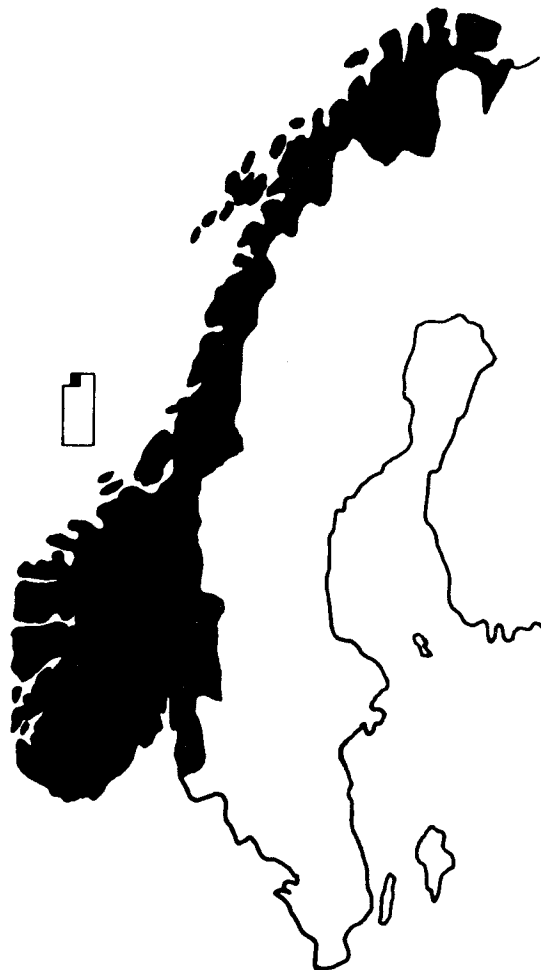
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CONOCO NORWAY INC.

LICENSE PL 095
FINAL WELL REPORT
WELL 6507/7-9



T.WATTS
M.JAGNEAUX
S.NÆSHEIM

JANUARY 1988

FINAL WELL REPORT FOR 6507/7-9

APPROVALS

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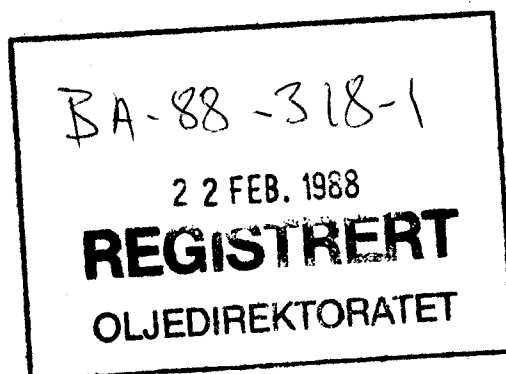
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WELL 6507/7-9 FINAL WELL REPORT

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1 WELL SUMMARY

1.1 Exploration, Evaluation And Operations Summary

1.2 Regional Location Map

1.3 Well Data Summary

1 WELL SUMMARY

1.1 Exploration, Evaluation And Operations Summary

License 095 was awarded to the Conoco/Statoil/Arco/Tenneco group in 1984 with Conoco Norway as operator. Well 6507/7-9 situated on License PL095, was spudded at 05:30 hrs on the 4th August 1987, with the semisubmersible drilling rig "Treasure Hunter".

Well 6507/7-9 was plugged and abandoned at 07:00 hrs on the 9th August 1987 and Treasure Hunter was towed to Kristiansund where it was demobilized at 17:16 hrs on the 10th August 1987.

The well was drilled to test the presence of shallow gas at the proposed location of the Heidrun production platform.

The Heidrun Field is located in offshore waters approximately 190 km west of the Norwegian Coast (figure 1.2). The block 6507/7 lies on the western flank of a series of NNE-SSW trending faults which separate the Trondelag platform and the Voring Basin. The Heidrun Field is formed by south plunging fault blocks tilted by Late Jurassic - Early Cretaceous tensional tectonics.

The top Tertiary was encountered at 610m RKB. No indication of overpressured shallow gas was found.

The well reached a total depth of 850m RKB in rocks of Tertiary age in 2 days from spud and 5 days from the uptake of the rig. A further 4 days were used to run logs, plug and abandon the well.

This gave a total of 9 days from the uptake to the demobilization the rig in Kristiansund.

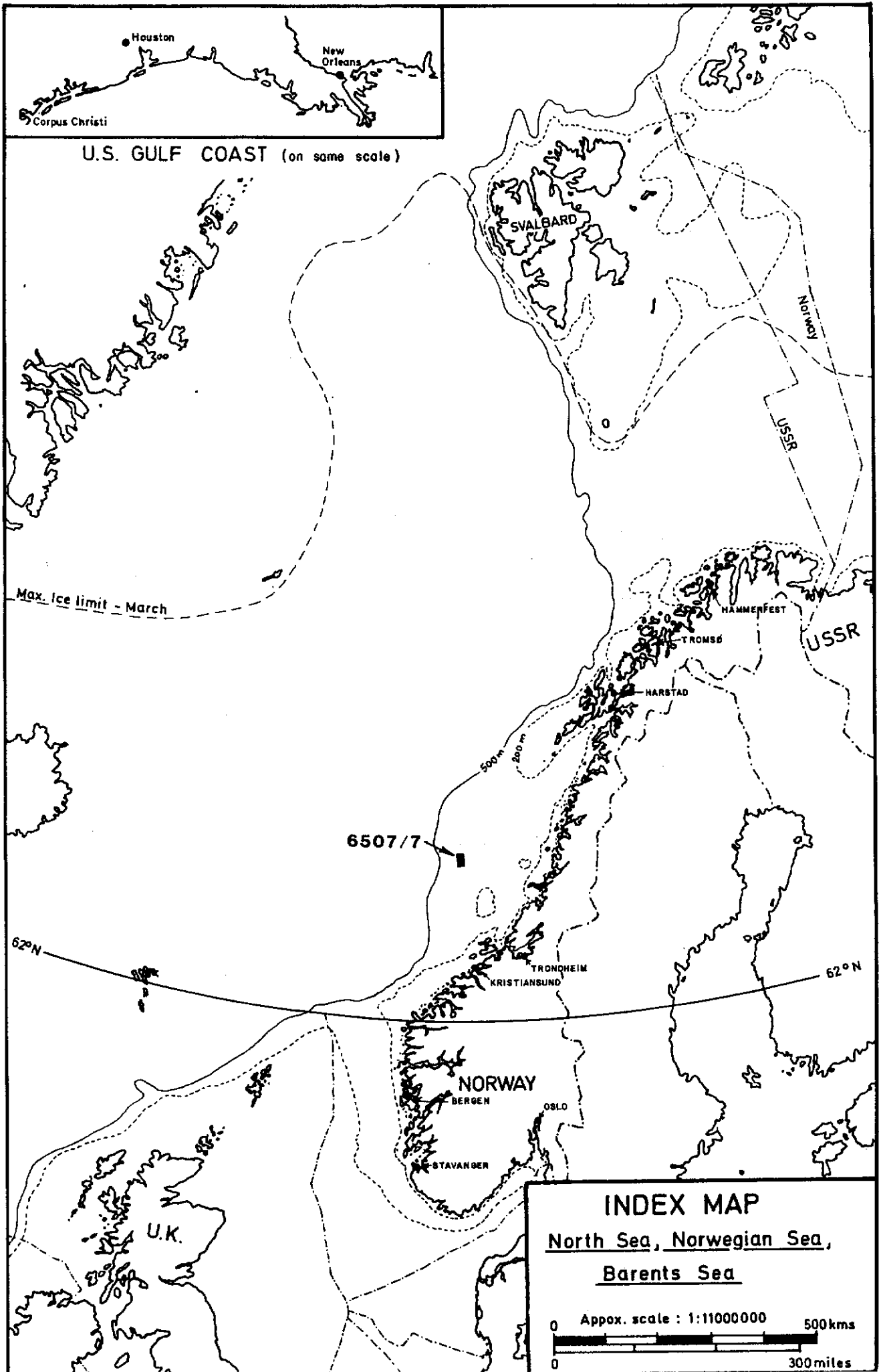
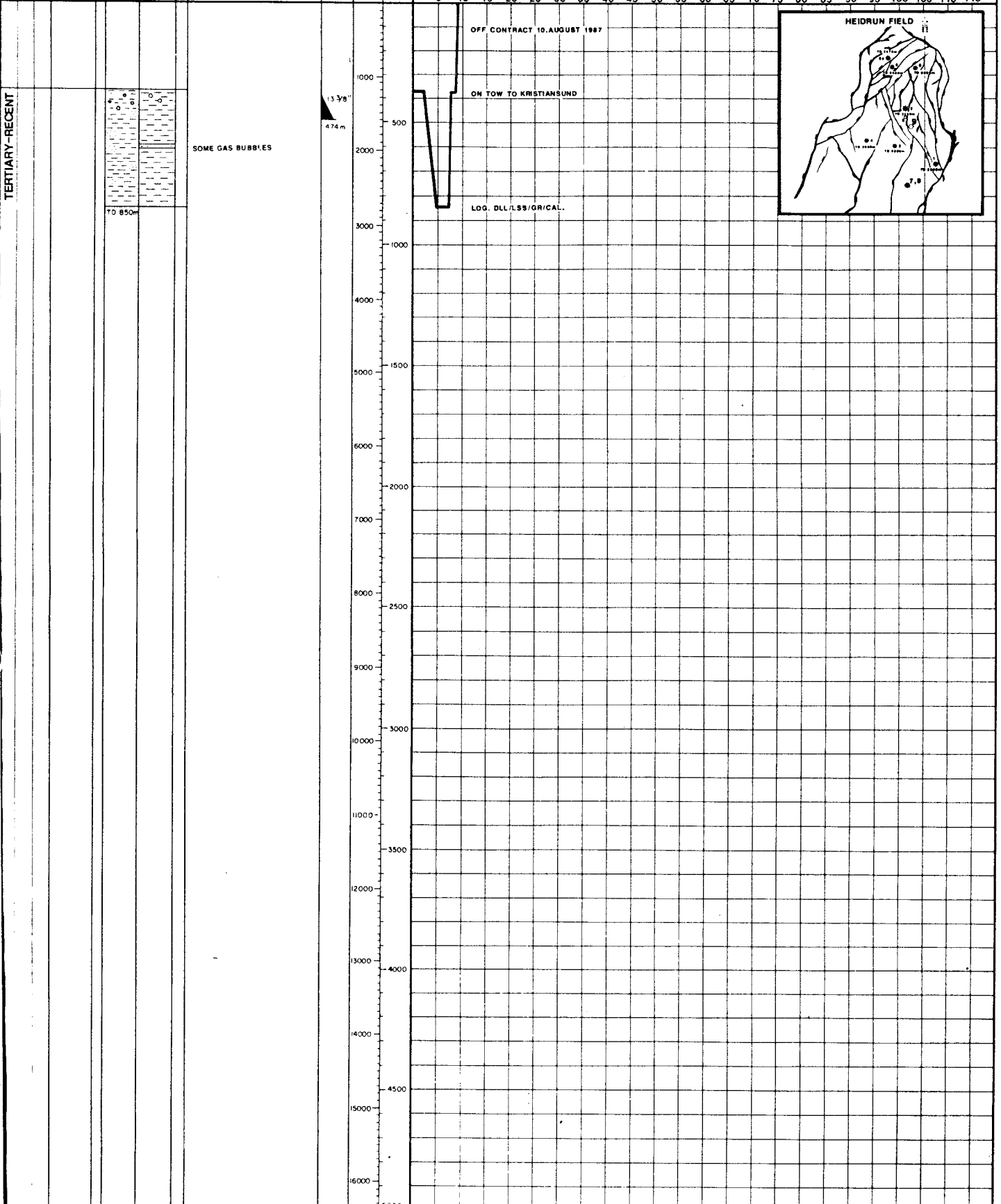


Fig 1.3

CONOCO CONOCO NORWAY INC. WELL 6507/7-9 PROSPECT SHALLOW GAS PROBE STATUS AS OF D 03 M 02 Y 88

RIG : TREASURE HUNTER	LOCATION : LINE CO 87229 SP 35	LICENCE : PL 095	C.I.% : 26.7	W.I.% : 26.7
KB / WD : 25m/345m	COORDINATES : 65° 19' 31.55" N 07° 19' 03.95" E	OPERATOR : CONOCO		
SPUD DATE : 04 AUG. 1987	AFE COST (DRILLING) : \$ 946,500 GROSS, \$ 967,900 NET	PARTNERS : STATOIL	50	50
DAYS ON CONTR. : 9	(TESTING) : \$ GROSS, \$ NET	TENNECO	10	10
COMPL./STATUS : 09 AUG 87/P&A	COST TO DATE (DRILLING) : \$ 852,000 GROSS, \$ 511,200 NET	ARCO	10	10
PLANNED TD : 850m	(TESTING) : \$ GROSS, \$ NET	NORSK HYDRO/DNO	2.2/1.1	2.2/1.1

WELL DATA **DRILLING TIME CURVE (DAYS SINCE TAKEOVER)**



2 GENERAL INFORMATION

2.1 Location And General Well Information

2.2 Conoco Personnel

2.3 Vendors List

2.4 Communications And Logistics Summary

2. GENERAL INFORMATION

2.1 Location and General Well Information

Production License 095 was awarded in 1984 and covers block 6507/7 which is situated on the northern part of the Haltenbanken designated area, approximately 190 km west of the Norwegian coast.

Well Name : 6507/7-9 (Haltenbanken,
Norwegian Sea)

Classification : Appraisal (Shallow Gas Probe)

Group Members	Cost Interest	Working Interest
Conoco	26.7 %	26.7 %
Statoil	50 %	50 %
Arco	10 %	10 %
Tenneco	10 %	10 %
Norsk Hydro	2.2 %	2.2 %
DNO	1.1 %	1.1 %

Final LocationUTM

Latitude 65° 19' 31.55" N	Northing 7 245 951.2m
Longitude 07° 19' 03.95" E	Easting 421 641.1m

The well was located 40.9m in direction 198° azimuth from the intended location.

Nearest Well Control:	6507/7-2	1.6 km NNW
(distance/direction from	6507/8-1	2.1 km NE
6507/7-9)		

Drilling Rig/Contractor: Treasure Hunter/Wilh.
Wilhelmsen Ltd.

RKB - Sea level	: 25m
Water depth	: 345m
Total depth (RKB)	: 850m

Rig released to 6507/7-9:	1700 hrs,	2 August,	1987
Rig on location	: 1900 hrs,	2 August,	1987
Well spudded	: 0530 hrs,	4 August,	1987
T.D. Date	: 1100 hrs,	6 August,	1987
Rig off location	: 0700 hrs,	9 August,	1987
Rig off contract	: 1716 hrs,	10 August,	1987

Completion status: Plugged and abandoned

Casing Setting Depths: 13 3/8" at 474m RKB

Mud types: Seawater w/prehydrated gel sweeps to
850m RKB.

6507/7-9 - PERSONNEL

<u>POSITION</u>	<u>NAME</u>	<u>ASSIGNED</u>
Drilling Manager Supv. Drlg. Engr.	Darrell W. Pitchford Paul W. Heard	Conoco Norway Inc. Conoco Norway Inc.
Drilling Supvs. (Offshore)	William H. Banks Norman L. Mahurin	Conoco Norway Inc. PES, Houston
Asst. Drlg. Supvs. (Offshore)	Sigve Næsheim jr. Carl W. Sauer	Conoco Norway Inc. PES, Houston
Drilling Engineer (Onshore)	Michael J. Jagneaux	PES, Houston
Wellsite Geologists (Offshore)	Torgeir Vinje	Conoco Norway Inc.
Geologist (Onshore)	Ian Barron	Conoco Norway Inc.
Materials & Logistics Coord.	David Fister Freddy Hansen	Conoco Norway Inc. Conoco Norway Inc.
Offshore Personnel Coordinator	Petter Eiane	Conoco Norway Inc.
Base Coordinator (Kristiansund)	Geir Håland	Conoco Norway Inc.

6507/7-9VENDORS LIST

<u>SERVICE OR PRODUCT</u>	<u>COMPANY</u>
Supply Vessel "Mærsk Leader"	A.P. Møller 50, Esplanaden 1098 Copenhagen K Denmark
Supply Vessel "Skandi Alfa"	K/S A/S Austevoll Supply 5394 KOLBEINSVIK
Standby Boat "Sartor"	Nils Høyland Rederi 5395 STEINSLAND
Diving Services	Scan-Dive A/S Skogstøstraen 21 4000 STAVANGER
Mud Logging	Exploration Logging Norge P.O. Box 72 5061 KOKSTAD
Downhole Measurement While Drilling	Teleco Oilfield Co. P.O. Box 138 Norsea/Dusavik 4001 STAVANGER
Electric Logging and Wireline Service	Schlumberger P.O. Box 129 4051 SOLA
Cementing Services and Materials	Halliburton P.O. Box 67 4056 TANANGER
Casing Crew	Rig equipment and crews
Weather Forecasting	Værvarsling på Vestlandet Alleg. 70 5000 BERGEN

Communications Equipment

Oddstol/Televerket
Haugg. 12
6501 KRISTIANSUND N

Drilling Fluid

NL Baroid Norway
P.O. Box 143
4056 TANANGER

Bits

Smith

Helicopter Service

Helicopter Service A/S
4033 FORUS

Water

Vestbase A/S
P.O. Box 420
6501 KRISTIANSUND N

Fuel

Norske Shell
4056 TANANGER

6507/7-9COMMUNICATIONS AND LOGISTICS SUMMARY

The operations were coordinated from Conoco Norway's offices in Stavanger, Norway. A supporting base was established in Kristiansund, Norway, to provide optimum control over the equipment and materials destined for the rig, Treasure Hunter. The base in Kristiansund, called Vestbase, provided office, warehouse, and pipe yard space, as well as bulk storage facilities for barite and cement. Fuel, drill water, and potable water were also readily available in Kristiansund.

Transportation in support of 6507/7-9 was a multifaceted operation. Personnel movement to and from the rig was provided for by Sikorsky S-61N helicopters. The helicopters, operated by Helikopter Service, flew out of Kvernberget Airport in Kristiansund. Round trip flying time was approximately 2 1/2 hours, with three scheduled flights per week. Additional flights were easily arranged when needed to maintain drilling operations. Equipment and material movements to and from the rig were provided for by two AHTS vessels. Combined capacities of these vessels included:

- 1) 806 m² cargo deck area
- 2) 2316 m³ fuel
- 3) 1909 m³ fresh water / drill water
- 4) 20,420 cu.ft. bulk cement/barite
- 5) 2052 m³ oil spill recovery

The oil spill recovery capacity was a requirement for operating in the Haltenbanken area. Also, a standby-rescue vessel was stationed by the rig throughout the operation.

Transportation of personnel and material from Stavanger to Kristiansund was accomplished over air, land and sea routes. Scheduled commercial service was readily available, although separate charters were easily arranged. One way travel time ranged from 1 1/2 to 3 1/2 hours for air routes, 30 hours for land routes, and up to 4 days for coastal freight service.

Communications with the rig, Treasure Hunter, were excellent. Written messages were transmitted via telex or fax. Verbal communication was done mostly via satellite telephone system.

3 DRILLING DATA

3.1 Drilling Summary

3.2 Daily Operational Summary

3.3 Rig Time Distribution

3.4 Bit And Drillstring Data

3.5 Mud Data

3.6 Casing And Cementing Report

3.7 Direction Report

3.8 Final Anchor Report

3.1 Drilling Summary

3.1.1 Interval Operations Summary

3.1.2 Plug and Abandonment

3.1.3 Conclusions and Recommendations

WELL 6507/7-9INTERVAL OPERATIONS SUMMARY

The Wilh. Wilhelmsen Ltd. A/S rig, Treasure Hunter, was towed from well 6507/7-8 to the 6507/7-9 location in 2 hours. The rig arrived on location at 1900 hours on 2 August 1987. Anchor handling then commenced and seven of the eight anchors were set and pulltested to 161 kdaN in 8 1/2 hours without any problems. The rig was not able to get anchor no. 2 to hold. An attempt was made to pulltest no. 2 anchor to 152 kdaN, but after 5 minutes it slipped to 76 kdaN. However, D.N.V. granted approval to continue drilling with the seven anchors already set and tested.

The time required to move, set anchors and prepare to drill was 36 1/2 hours.

17 1/2" Hole/13 3/8" Casing

The well was spudded on 4 August 1987 at 0530 hours. The conductor hole was drilled with a 17 1/2" bit from sea bottom at 370m RKB to 474m RKB (104m) with an average ROP of 8 m/hr. Boulder beds were drilled from 380m RKB to 382m RKB and 400m RKB to 409m RKB without any significant torquing problems. The hole was displaced with 1.14 g/cm³ mud and 13 3/8" casing was run and set at 474m RKB. The PGB angle was measured at 3/4° to 1°. A total of 22 hours were spent on the 17 1/2" hole/13 3/8" casing interval, with 13 hours spent on drilling.

12 1/4" Hole to Total Depth

The 12 1/4" hole was control drilled without a riser and surveyed with a Teleco MWD from 474m RKB to 850m RKB. The 376m of 12 1/4" hole were drilled in 25 hours with an average ROP of 15.0 m/hr. The 12 1/4" hole was displaced with 1.14 g/cm³ mud. A wiper trip was then performed to the 13 3/8" casing shoe before the hole was displaced with 1.20 g/cm³ mud before rigging up to log. A suite of DLL/LSS/GR/CAL logs was run from 847m RKB to 368m RKB. From the sonic log, the top of the cement behind the 13 3/8" casing was estimated to be at 428m.

The 12 1/4" hole was control drilled with an average ROP of 15 m/hr, however, the ROP was reduced to less than 10 m/hr through seismic detected shallow gas anomalies at 505m, 558m, 609m, 708m, and 762m RKB. Gas bubbles were observed from the wellhead when drilling the anomaly at 609m RKB and continued while drilling from 609m RKB to 611.5m RKB; however, the gas decreased to minimal bubbles when seawater was circulated bottoms up to the seabed. The shallow gas anomaly at 609m RKB was later confirmed by the Teleco MWD log which indicated a clean sand with low apparent resistivity from 600m to 610m

RKB. Gas bubbles were also detected when the hole was circulated bottoms up to make connections. Gas was not observed from the four additional shallow gas anomalies. After reaching TD at 850m RKB, a plume of silt with intermittent bubbles was observed while circulating the 12 1/4" hole with seawater. The hole was displaced with 1.14 g/cm³ mud and no flow was observed from the well.

A total of 44 hours were spent on the 12 1/4" hole interval, with 25 hours spent on drilling.

PLUG AND ABANDONMENT

The plug and abandonment operation began on 6 August 1987. Two balanced cement abandonment plugs were set from 848m to 622m and from 622m to 412m. The top cement plug was weight tested to 4 kdaN with the top of firm cement tagged at 444m. A third cement plug was set from 444m to 418m before the 13 3/8" casing was cut at 414m. A total of 38.93m of 13 3/8" casing plus the 13 3/8" x 20" X-O housing, 30" housing and P.G.B. were retrieved in one run. The T.G.B. was retrieved with a "J-tool" run on drillpipe and before pulling the T.G.B. to surface a seabed survey was performed with the diving "Mantis".

The rig was then deballasted and anchor recovery commenced at 1530 hours on 8 August 1987. The final anchor was bolstered at 0700 hours on 9 August 1987 and the rig departed location for demobilization in Kristiansund. The tow to Kristiansund required 25 1/2 hours.

An additional 9 hours were required to secure the rig in the harbor at Sterkoder Averøy. The rig went off contract when the fourth anchor was set on the seabed at 1716 hours on 10 August 1987. The M/V Skandi Alfa was contracted to Wilh. Wilhelmsen Ltd. to deploy the fifth and final anchor in the harbor (3 anchor chains were secured on land). A total of 3 1/2 days were required to plug and abandon the well, clear the location, and demobilize the rig to Kristiansund. The total time attributed to the well was 9 days.

CONCLUSIONS AND RECOMMENDATIONS

1. A site survey analysis of the 6507/7-9 well location detected five shallow gas anomalies at 505m, 558m, 609m, 708m, and 762m RKB. A shallow gas sand interval was drilled in the 6507/7-9 well from 600m to 610m RKB as predicted on the site survey analysis. Gas bubbles of a substantial quantity were detected while drilling the sand interval. However, after drilling the sand interval the volume of gas diminished and eventually ceased while circulating seawater around to the seabed. Gas bubbles in large quantities were also detected when the pumps were shut down to make connections. At 850m (TD), the well was circulated with seawater and a lengthy flow check performed. A continuous plume of silt with intermittent gas bubbles was observed coming from the well. The hole was displaced with 1.14 RD viscous mud and observed stable. Swabbing occurred on the wiper trip prior to running logs; however, only a moderate flow of gas bubbles was detected.

The quantity of gas bubbles observed in the 6507/7-9 well has not been observed on the other Heidrun wells.

In conclusion, shallow gas should not be a problem in drilling future wells for the Heidrun platform at this location. Well control was maintained following a lengthy flow check with seawater and after swabbing on the wiper trip prior to running logs. The ability to maintain well control as mentioned indicates the shallow gas sand is hydrostatically balanced with seawater.

However, caution should be exercised in drilling future wells in the area from a platform with a riser due to the probability of gas being returned to the surface. Steps should be taken to properly control the gas returned to the surface. It is also recommended to use a 1.08 to 1.14 RD drilling fluid to minimize the amount of connection gas and provide an adequate safety margin while drilling.

2. Boulder beds were encountered from 380m RKB to 382m RKB and 400m RKB to 409m RKB without any significant torquing problems while drilling the 17 1/2" conductor hole interval.

Several wells drilled in the Haltenbanken area have experienced severe torquing problems while drilling boulder beds in the 36" conductor hole interval. Therefore, caution should be taken while drilling the 36" conductor hole intervals for the Heidrun wells despite the minimal problems encountered in the 6507/7-9 well. It is recommended that Heidrun platform wells be spudded with a 17 1/2" pilot hole and then opened with a 17" bit and 26"/36" hole opening assembly. A 17 1/2"

pilot hole is recommended because of the additional weight per square inch and maneuverability available with the smaller 17 1/2" bit. The single 26"/36" hole opening assembly is recommended versus separate 26" and 36" hole opening runs in order to reduce drilling time. The 26"/36" hole opening assembly reduces the hole opening to one run and requires only one reentry into the 17 1/2" pilot hole.

3.2 Daily Operational Summary

6507/7-9 DAILY OPERATIONAL SUMMARY

<u>Date</u>	<u>Days</u>	<u>Depth Meter</u>	<u>Mud Weight g/cm³ (ppg)</u>	<u>Operation</u>
1987 2 August	1/0	-	-	Rig released f/6507/7-8 to 6507/7-9 at 1700 hours on 2 August. Rig towed to well location. Start anchor handling.
3 August	2/0	-	-	Finish laying anchors. Ballast rig. RIH and land TGB on seafloor at 370m RKB (3/4"). Run 13 3/8" casing and hang off same in moonpool. P/U 17 1/2" drilling BHA and RIH.
4 August	3/1	474m	1.03 (8.6)	Finish RIH to above TGB. Pull test anchor no. 2 (pull to 152 kdaN, slip to 76 kdaN). Unable to pull additional tension. Position rig. Stab 17 1/2" bit in TGB at 370m RKB. Observe w/SSTV. Drill f/370m to 474m (average ROP 8 m/hr). Circulate hole w/1.14 g/cm ³ mud. Drop single shot. Short trip to 370m (tight spot at 380m - 5-10 kdaN overpull). POOH and recover survey - misrun. Run 13 3/8" casing to top of TGB.
5 August	4/2	659m	1.03 (8.6)	Jump Mantis and guide 13 3/8" casing into hole. Land 13 3/8" casing w/float shoe at 474m. Cement 13 3/8" casing. POOH w/landing string. P/U 12 1/4" BHA and RIH. Tag cement at 466m. Drill cement f/466m to 474m. Control drill and survey w/Teleco MWD tool 12 1/4" hole for shallow

gas detection f/474m to 659m. (Average ROP = 13.2 m/hr, ROP was decreased to below 10 m/hr for the predicted anomalies at 505m, 558m, and 609m. Observed no gas until the anomaly at 609m. Drill and flow check one meter sections f/609m - 611m - gas decreased to minimal bubbles once bottoms up were at mudline. Flowcheck and observe for connection gas each kelly down below 609m. Each flow check and connection were also video taped after cutting an anomaly).

6 August	5/3	850m	1.03 (8.6)	<p>Drill and survey w/Teleco MWD 12 1/4" hole for shallow gas detection f/659m to 850m. (ROP was decreased to below 10 m/hr at predicted anomalies at 708m and 762m. Gas bubbles were detected while making connections with pumps off). Circ hole with seawater and displace hole w/1.14 g/cm³ mud. Wiper trip to 460m. (Hole was swabbing during the wiper trip, however, only moderate flow of gas bubbles was detected). Displace hole w/1.20 g/cm³ mud. POOH. R/U Schlumberger. Log run no. 1 (DLL/LSS/GR/CAL). TOC behind 13 3/8" casing at 428m. RIH w/OEDP.</p>
7 August	6/4	418m PBSD	1.03 (8.6)	<p>Finish RIH w/OEDP to 848m. Set cement plug f/848m to 622m. POOH to 622m. Set cement plug f/622 to 412m. POOH and L/D DP and BHA's. RIH w/12 1/4" bit and weight test cement plug w/4 kdaN (tag cement at 444m). Set cement plug f/444m to 418m. POOH. RIH with</p>

13 3/8" casing cutting assembly and cut 13 3/8" casing at 414m. POOH. RIH w/13 3/8" casing spear and retrieve PGB, 30" housing, 20" x 13 3/8" X-0 housing, and 13 3/8" casing stub.

8 August	7/5	418m PBTD	1.03 (8.6)	R/U and RIH to recover TGB. Conduct seabed survey. POOH and recover TGB. L/D DP. Deballast rig. Start recovering anchors at 1530 hours.
9 August	8/6	-	-	Finish recovering anchors. Rig departed location at 0700 hours. Tow to Kristiansund.
10 August	9/7	-	-	Rig under tow to Kristiansund. Arrive on location in Kristiansund at 0830 hours, 10 August. Position rig at Sterkoder Averøy and laid anchors no. 1 thru 8. Rig released at 1716 hours, 10 August 1987.

3.3 Rig Time Distribution

3.3.1 Rig Time Analysis - Drilling

3.3.2 Rig Time Analysis - P + A

3.3.3 Drilling Time Curve

6507/7-9RIG TIME ANALYSIS - DRILLING

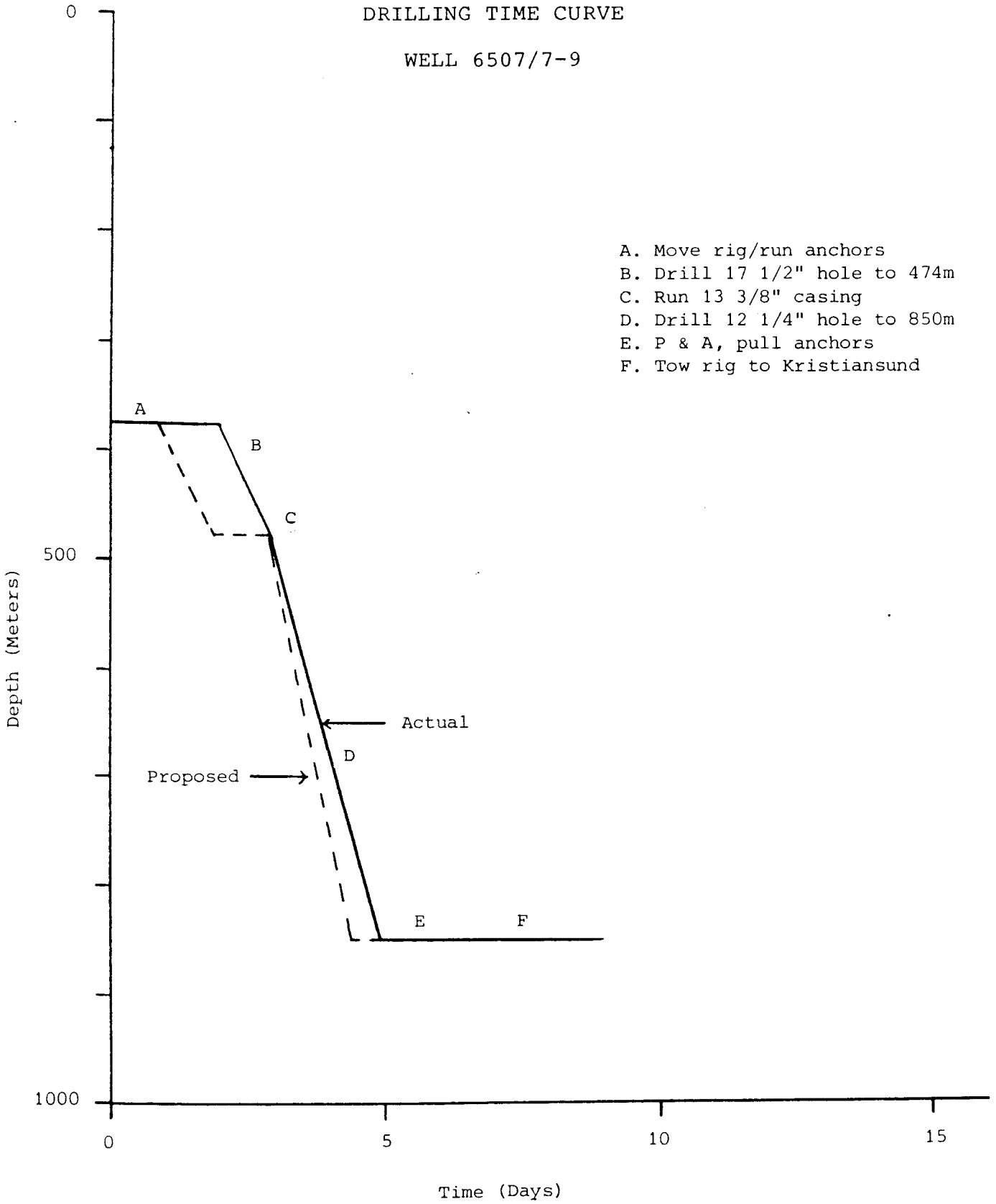
<u>Operation</u>	<u>Total time (Hours)</u>	<u>%</u>
Tripping	20.0	14.6
Drilling	38.0	27.7
Casing/Wellhead Equipment	11.0	8.0
Logging	5.5	4.0
Towing Rig To/From Location	27.5	20.1
Run Anchors/Position Rig*	29.5	21.5
Circulating	2.5	1.8
Cementing	0.5	0.4
Ream/Drill Cement	1.5	1.2
L/D, P/U Drillpipe, BHA	<u>1.0</u>	<u>0.7</u>
Total	137.0 hours	100.0 %

* Also includes the time needed to anchor up the rig in the harbor outside Kristiansund.

6507/7-9RIG TIME ANALYSIS - P & A

<u>Operation</u>	<u>Total Time Hours</u>	<u>%</u>
Tripping	9.5	17.1
L/D BHA, Tbg., D.P.	10.5	18.9
Casing, Cut & Retrieve	10.5	18.9
Cementing	3.0	5.4
Diving	2.0	3.6
Pull Anchors / Deballast Rig	<u>20.0</u>	<u>36.1</u>
Total	55.5 hours	100.0 %

CONOCO NORWAY INC.
 DRILLING TIME CURVE
 WELL 6507/7-9



3.4 Bit and Drill String Data

3.4.1 Bit Record

3.4.2 Bottom Hole Assemblies

BOTTOM HOLE ASSEMBLY RECORD - WELL 6507/7-9

<u>BHA No.</u>	<u>Depth (m)</u>		<u>Bit No.</u>	<u>BHA</u>	<u>Comments</u>
	In	Out			
1	370	474	1	17 1/2" Bit, 9 1/2" DC, 17 1/2" Stab., 4 - 9 1/2" DC, X-0, 10 - 8" DC, X-0, 18 - HWDP.	Spudded well and drilling 17 1/2" conductor hole. Boulder beds encountered f/380 to 382m and 400m to 409m.
2	474	850	2	12 1/4" BIT, NB Stab., X-0 Teleco MWD, 12 1/4" Stab., 8" Monel DC 10 - 8" DC, Jars, 2 - 8" DC, X-0, 18 - HWDP.	Control drilled to TD for shallow gas detection.

3.5 Mud Data

3.5.1 Discussions, Conclusions and
Recommendations by Intervals

3.5.2 Material Consumption and Cost

3.5.3 Mud Properties Recap

NORSK PETROLEUM SERVICES A/S

OPERATING AREA Conoco Norway Inc.
6507/7-9

DISCUSSION

Well 6507/7-9 was spudded on 4 August 1987 and completed drilling on 6 August 1987. The 17 1/2" hole was drilled from 370 m (seabed) to 474 using seawater plus high viscosity prehydrated Bentonite sweeps on connections. At T.D. (474 m) the hole was filled with 1.15 SG mud. The 13 3/8" casing was run and cemented at 474 m.

The 12 1/4" phase was drilled from 474 m to 850 m with great care and attention being paid to the many potential shallow gas hazard zones. However, few drilling problems occurred and the well was T.D. at 850 m. At T.D., the hole was filled with 1.15 SG mud (high vis) before making a wiper trip to casing shoe (474 m). Ongoing back to bottom the hole was filled with 1.20 SG mud, before pulling out to run logs. A suite of logs were run without problems, and the well was plugged and abandoned.

The well was drilled as a test well for the potential platform location. The well verified the absence of potential shallow gas hazards.

MUD PROPERTY RECAP

DATE	DEPTH	DENSITY	VISCOSITY	FILTRATE		HY/HP IIII		pH	RHEOLOGY				FILTRATE ANALYSIS					RETORT ANALYSIS			CEC	OTHER			
				cake	30"/hr	500psi	30"/hr		PV	YP	10"	10'	Cl	Ca	Pf	Mf	Pm	Oil	Water	Corr. Solids		PPB			
1987 Aug.	feet metres	PPG/ Spc/ SG	secs	ccs	30"/hr	ccs	30"/hr		cp	lbs/100ft ²	gma/100cm ²	mg/litre	ppm					%	%	%	Bent. Eq.				
2		1.20	38																						
3		1.05	170																						
4		1.05	125																						
5		1.04	116																						
6		1.20	49																						
7																									

3.6 Casing and Cementing Report

CASING AND CEMENTING REPORT

WELL 6507/7-9 FIELD Heidrun CASING SIZE 13 3/8" SET AT 474 m
 DRILLERS TD 474 m LAST CASING SIZE - SET AT - m

JOINTS RECEIVED <u>11</u> OF <u>13 3/8"</u> WEIGHT <u>107.1</u> kg/m GRADE <u>N80</u> LENGTH <u>136.6</u> m.
AMOUNT USED <u>8</u> JTS LENGTH <u>97.87</u> m No. JTS FAIL RABBIT <u>-</u> No. JTS DAMAGED <u>-</u> (Including Shoe & Float Jts but not Hanger Pup)
+ 1 - 18 3/4" Housing Joint TOTAL REJECTED <u>-</u> TOTAL BACKLOADED <u>3</u>
JOINTS RECEIVED <u> </u> OF <u> </u> WEIGHT <u> </u> kg/m GRADE <u> </u> LENGTH <u> </u> m
AMOUNT USED <u> </u> JTS LENGTH <u> </u> m No. JTS FAIL RABBIT <u> </u> No. JTS DAMAGED <u> </u>
TOTAL REJECTED <u> </u> TOTAL BACKLOADED <u> </u>

CASING DATA

No. OF PIECES	SIZE - WT - GRADE - TYPE THREAD	MAKE UP LENGTH	SETTING DEPTH
1	13 3/8" - 107.1 kg/m - N80 - BTC	13.57	474
	w/float shoe		
7	13 3/8" - 107.1 kg/m - N80 - BTC	84.30	460.43
1	18 3/4" wellhead housing w/20" x	7.93	376.13
	13 3/8" casing X-O, Vetco ALT-2		
	pin x BTC pin, mudline at 370m		
-	TOP OF <u>18 3/4" Housing</u> TO RKB		368.2m

CEMENTING DATA

SLURRY	CALCULATED TOP	CEMENT (MT & CLASS)	ADDITIVES (L/100 kg)					MIX WEIGHT (RD)	YIELD (L/100 kg)
			CaCl ₂						
Lead	420m	5.7 MT 'G'	4.70				1.92	75.7	

No. OF PLUGS USED - OPEN HOLE EXCESS 10 % CIRC. VOL 13.9 m³ CIRC TIME 10 MINS
 MIXING CEMENT 10 MINS. DISPLACE. TIME 12 MINS DISPLACE VOL 10.5 m³ RETURNS? Full
 DISPLACE. PUMP PRESS 6.8 BAR PLUG BUMP PRESS BAR VOL LOST - m³ FLOAT HOLD? Yes
 SPACERS 13.9 m³ Seawater
 CENTRALISERS USED: None SPACING

REMARKS

CEMENT COMPANY Halliburton DRILLING SUPERVISOR N.L. Mahurin
 CEMENTER Pat Brantley DRILLING ENGINEER C.W. Sauer DATE 5 Aug. 1987

3.7 Direction Report



Customer: CONOCO

Well: 6507/7-9

Field: HEIDRUN

Rig: TREASURE HUNTER

Date: 10 Aug 1987

Proposal: 0 ()
 Method of Calculation: Minimum Curvature
 Total magnetic correction: -3.70 degrees
 Tie on coordinates supplied by: CONOCO
 Location: TNO Job No: NOR 228

Directional Calculations

Page 1

No.	M.Depth	Azt	Inc	North	East	TVD	V.Sect	Dogleg
Tie-on	370.0	0.0	0.0	+0.0	+0.0	370.0	0.0	
1	491.0	329.9	2.1	+1.9	-1.1	491.0	1.9	.53
2	566.0	339.8	1.6	+4.1	-2.2	565.9	4.1	.24
3	652.0	352.8	1.7	+6.5	-2.7	651.9	6.5	.14
4	737.0	346.5	1.5	+8.8	-3.2	736.9	8.8	.10
5	823.0	343.3	1.3	+10.8	-3.7	822.8	10.8	.08
6	843.0	338.7	1.3	+11.3	-3.8	842.8	11.3	.16
	meters	deg	deg	meters	meters	meters	meters	d/30m

3.8 Final Anchor Report

3.8.1 Final Anchor Report

3.8.2 Final Anchor Pattern

CONOCO NORWAY INC.

FINAL ANCHOR REPORT

1. RIG: Treasure Hunter
2. DATE: 4 August 1987
3. WELL: 6507/7-9
4. LOCATION CO-ORDINATES: Final: 65° 19' 31.55" N, 07° 19' 03.95" E
5. SHIPS HEADING: 260° (True) UTM : Northing - 7 245 951.2 meters
Easting - 421 641.1 meters
6. WATER DEPTH: 345m
7. BOTTOM DATA:
8. SUPERVISORS (CONOCO): Mahurin/Sauer
9. SUPERVISORS (CONTRACTOR): Teige/Kristoffersen

10. ANCHOR NUMBER	1	2	3	4	5	6	7	8		
11. ANCHOR TYPE	TEM.	STEV.	STEV.	TEM.	TEM.	STEV.	STEV.	TEM.		
13. STARTED LAYING - DATE	15T	10T	10T	15T	15T	10T	10T	15T		
14. STARTED LAYING - TIME	2/8	2/8	3/8	2/8	2/8	2/8	2/8	2/8		
15. FINISHED LAYING - DATE	1925	2220	0245		2207	2256	2040	1922		
16. FINISHED LAYING - TIME	2/8	3/8	3/8	2/8	2/8	3/8	2/8	2/8		
17. LAY SHIP	2817	2310	0410	1854	2203	0224	2236	2035		
18. CHAIN/CABLE	A	A	B	Rig	A	B	B	B		
19. CHAIN/CABLE SIZE Diameter	K4	K4	K4	K4	K4	K4	K4	K4		
20. LENGTH	3"	3"	3"	3"	3"	3"	3"	3"		
21. STRIPPER/PENNANT BUOY N/A	1525m	1454m	1352m	1349m	1364m	1393m	1416m	1401m		
22. PENNANT LENGTH Chaser wire	61m	61m	61m	61m	61m	61m	61m	61m		
23. PENNANT BUOY N/A										
24. PRE TENSION	160T	160T	160T	160T	160T	160T	160T	160T		
25. WORKING TENSION	125T	80T	135T	95T	135T	90T	125T	135T		
26. ANCHOR HEADING	281	340	011	056	101	146	191	236		

Anchor Type:

Tem. : Temco

Stev.: Stevpris

Lay Ships:

A: Skandi Alfa

B: Maersk Leader

27. NO. PIGGY BACK ANCHORS
28. PIGGY BACK TYPE
29. STARTED LAYING - DATE
30. STARTED LAYING - TIME
31. FINISHED LAYING - DATE
32. FINISHED LAYING - TIME
33. LAY SHIP
34. CHAIN/CABLE
35. CHAIN/CABLE SIZE
36. LENGTH
37. ANCHOR CONNECTION
38. PENNANT LENGTH
39. PENNANT OWNER

Note: No piggy back anchors used.

--	--	--	--	--	--	--	--	--	--	--

Note:

Anchor No. 4 dropped by Rig at 1854 hours 2 August 1987.

Anchors No. 2, 4 and 6 rerun. Anchor No. 2 rerun 6 times, would not hold.

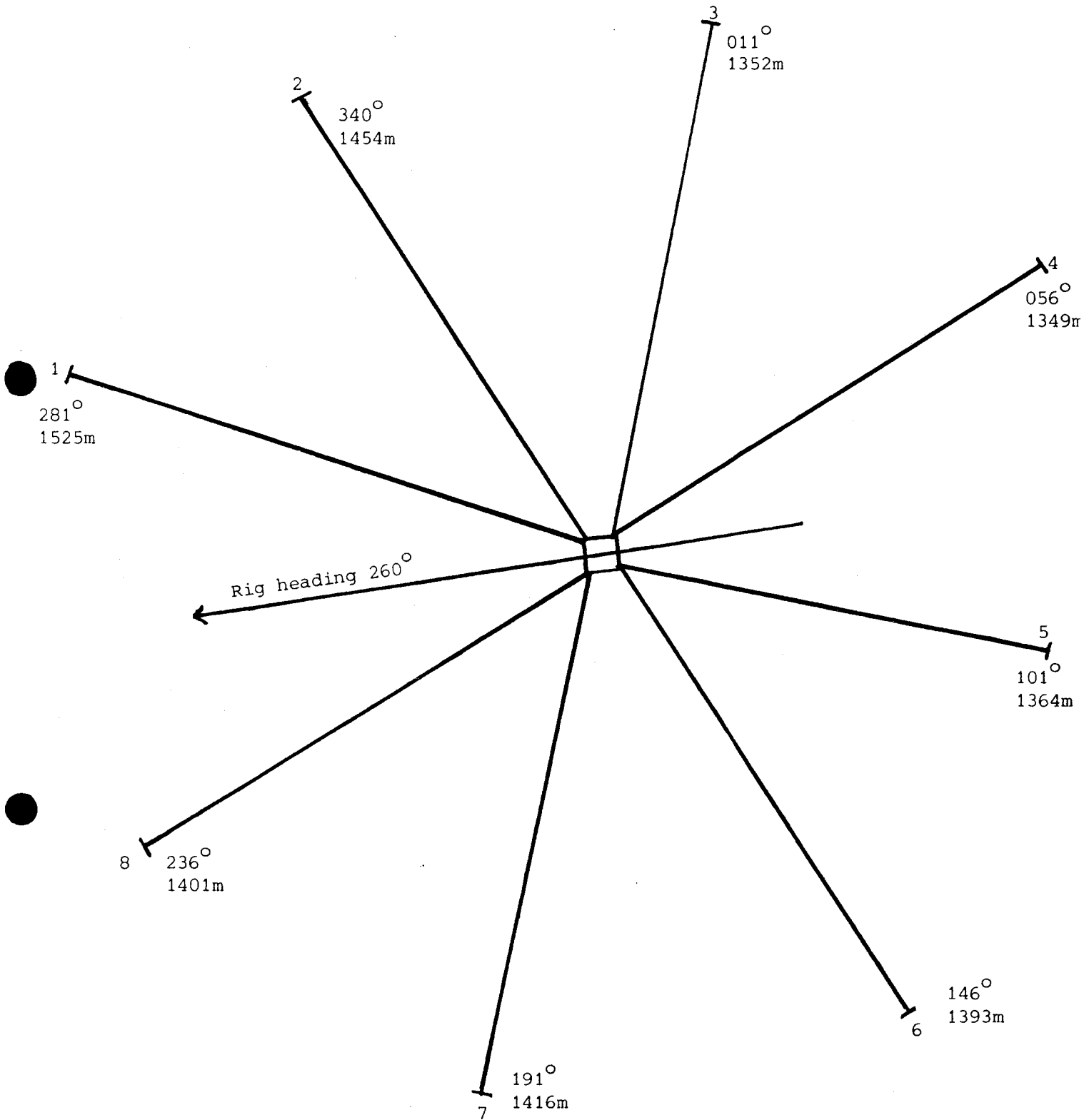
Permission given by DNV to use anchor No. 2 without piggy back anchor.

The working tension to be less than 100T.

FINAL ANCHOR PATTERN

Fig 3.8.2

WELL 6507/7-9



Final position of Treasure Hunter:

65° 19' 31.55" N
 07° 19' 03.95" E

UTM: Northing 7 245 951.2m
 Easting 421 641.1m

40.9m at 198° from intended location.

4 GEOLOGY AND GEOPHYSICS

4.1 Regional Setting

4.2 Objectives

4.3 Sampling

4.4 Stratigraphy

4.5 Special Studies And Associated Reports

4.6 Wireline And MWD Logs

4.7 Re-evaluation Of The Site Survey

4 GEOLOGY AND GEOPHYSICS

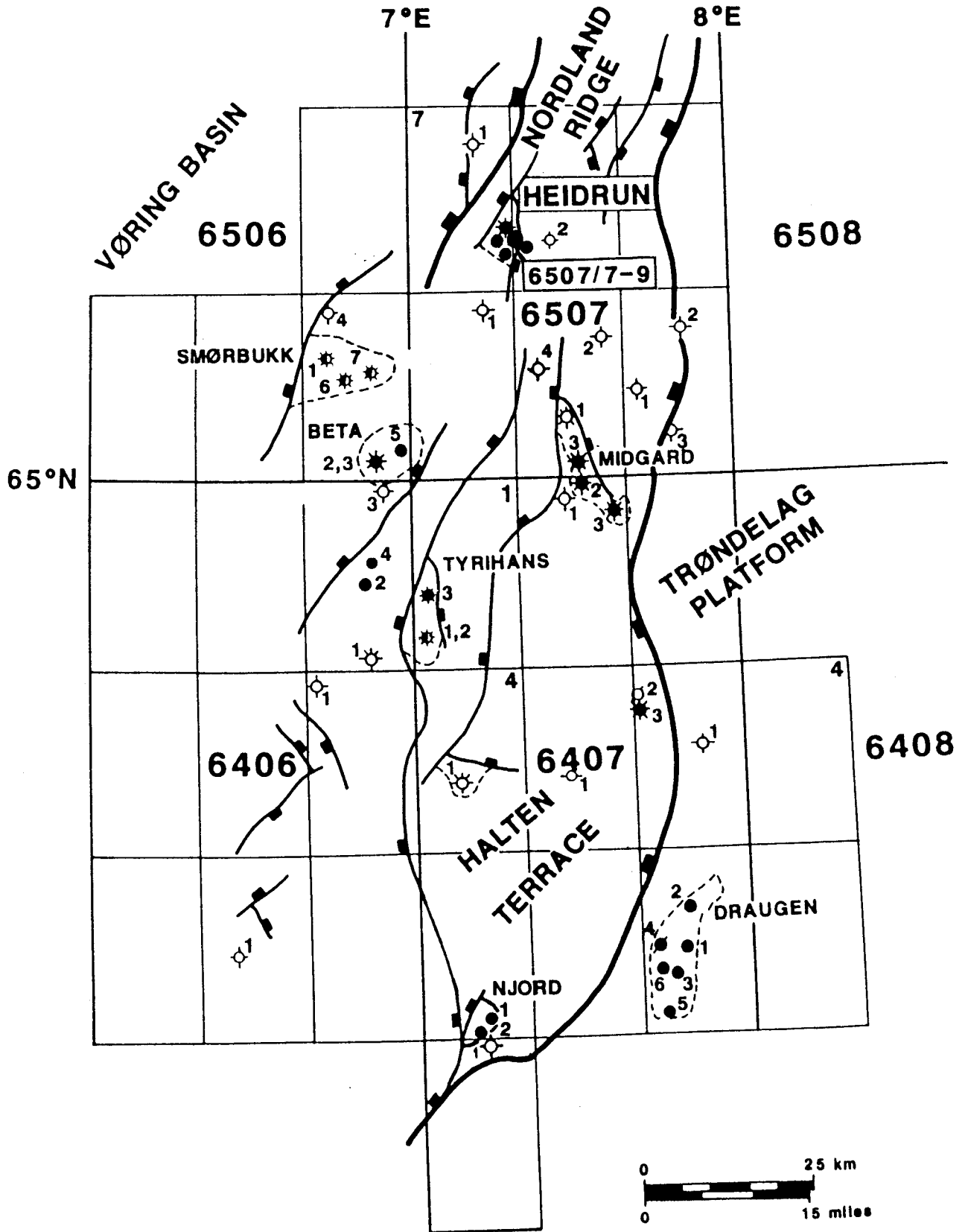
4.1 Regional Setting

Well 6507/7-9 was drilled in the northern part of the Haltenbank area, approximately 192 km west of the Norwegian coast.

The well was located near the crest of the Heidrun Field between 6507/7-2 and 6507/8-1 at the proposed site for the production platform. The field was discovered by 6507/7-2 well and is located along the western flank of a NNE-SSW oriented fault system.

The reservoir structure is a south plunging horst block formed by Late Jurassic to Early Cretaceous tensional faulting. Closure is provided by convergence of the two major bounding faults. The structure is strongly eroded in the crestal area and faulted throughout.

HALTENBANKEN STRUCTURAL FEATURES



4.2 Objectives

Well 6507/7-9 was drilled on the Heidrun Field with the following objectives:

1/ Drill to 850m RKB to ensure that the section to be penetrated by the conductors and surface pipes for all the production wells, is free of shallow gas.

2/ Evaluation of the top 150m of sediments below the seabed for foundation studies of the Heidrun Production Platform.

4.3 Sampling

No samples were taken in this well, all returns were to the seabed.

4.4 Stratigraphy

The stratigraphy is dealt with under section 4.7, Re-evaluation of the Site Survey.

4.5 Special Studies And Associated Reports.

The list of reports is as follows:-

Geoteam	: Heidrun Platform Site Survey in block 6507/7 (No. 31035.4)
Geoteam	: Drilling Hazard Evaluation of Heidrun Platform Site Survey in Block 6507/7 (No.31035.5)
NPS NL Baroid	: Post-Well Audit (drilling fluids)
Exploration Logging	: Final Well Report
Teleco	: End of Well Report

6507/7-9

COWOCO

4.6 Wireline And MWD Logs

A Teleco MWD tool was run from 466m to TD at 850m RKB, recording gamma ray and formation resistivity as well as directional data. The following wireline logs were run:

Table 4.6

Date	Logs	Hole Size	Interval (RKB)
----	----	-----	-----
6/8/87	DLL-LSS-GR-CAL	17.5"	847m - 370m

The logs were recorded inside the 13 3/8" dia. casing from 474m to 370m RKB

Interpretation of Log Data

Three sands were interpreted from the logs:

600 - 610m RKB (575 - 585m SS):

Throughout this upper sand horizon the caliper displays severe washout- averaging 15.5" and up to 22" from a nominal hole size of 12 1/4". The washout is probably due to a lithology change to unconsolidated sand. The associated severe decrease in sonic velocity appears in part be due to the washout, but possibly also reflects the presence of gas. However the decrease in resistivity to a brine value through the sand indicates the lack of hydrocarbons.. Sw can be estimated as c. 100%- however severe invasion may have occurred. As gas bubbles were observed while drilling this interval, there must be some gas present. These gas bubbles decreased after the section had been drilled (with sea water) indicating that the sand is hydrostatically pressured.

695 - 698m and 749 - 757m RKB (670 - 673, 724 - 732m SS):

The sonic response through these sections could indicate the presence of minor concentrations of gas. However the resistivity readings, and the fact that no gas bubbles were seen while drilling these sands (with sea water) would indicate that no gas was present or that the concentration was very low.

Conclusion

Of the three sands observed in this well, the uppermost (600 - 610m RKB) can be interpreted as a water bearing sand with low gas saturations possibly in the order of 5 - 10%. The two lower sands (695 - 698m and 749 - 747m RKB) are thought to be water wet.

4.7 Re-evaluation Of The Site Survey

A thorough site survey was carried out between the 16th February and 7th March 1987 in the area proposed for the Heidrun platform. A 2 km by 1 km grid was surveyed with side scan sonar and mini airgun. The full details of the survey are to be found in the Geoteam report, no.31035.5 Three proposed platform locations were made reference to in the report, locations C,D and E. The 6507/7-9 well was drilled approximately 1.6 km SSE of the 6507/7-2 well and approximately 350m ENE and 40m SSE of locations C and D respectively, see section 6.2 Appendix. The prognosed drilling hazards were as follows:

(depths in metres subsea)

	C location	D location
Boulders	353	353
Boulders	368	371
Gas	410	407
Gas	480	480
Gas	529	533
Gas	581	584
Gas	685	683
Gas	735	737

No high amplitude anomalies were recognised at the C location, but at the D location high amplitude diffractions were recognised at 584m, 683m and 737m.

Whilst drilling, boulders were encountered between 355m and 357m SS. Sands at 575 - 587mSS, 670 - 673mSS and 724 - 732mSS were interpreted from the sonic and resistivity logs. None showed any signs of high resistivity in fact the resistivity decreased through the sands. Returns whilst drilling were to the seabed, where constant monitoring of the wellhead was made with the subsea camera. During drilling, gas bubbles were observed from the anomaly between 575-584m SS. No further gas bubbles were observed until TD was reached at 850m RKB. Whilst flow-checking at TD with the hole displaced with sea water a plume of silt and gas bubbles was observed. This ceased when the hole had been displaced with 1.14 g/cc mud.

The base of the Pleistocene is inferred from the log response to be at 610m RKB (585m SS). It is also inferred from correlation with nearby wells that the underlying sediments are of Pliocene age. Together the two units represent the Sula lithostratigraphic group.

A summary of the site survey and the assessment of its effectiveness can be found in Appendix, 6.2 and 6.3.

STRATIGRAPHY AND LITHOLOGY OF SHALLOW GEOLOGY 6507/7-9

	STRATIGRAPHY	LITHOLOGY Depth in metres ss.	MAIN REFLECTORS 2-way reflection time in mill seconds	INTERVAL VELOCITY (m/s)	COMMENTS
		to top of formation			
100				1492	
200					
300		Seabed ↓			
345		345	462		
400	PLEISTOCENE QUATERNARY	Overcompacted clay with boulders			
		Layered sandst. clays		2014	
500		Hard clays	600		
		Hard clays	631		2387
575	SULA GROUP	Claystones	650		1830
600		Claystones			1920
		Claystones	790		2356
670	PLIOCENE TERTIARY	Claystones	850		3600
724		Claystones			1920
800		Claystones			1920
900					
1000					
1100					

some gas

waterbearing

waterbearing

5 WELL PROFILES

5.1 Well Diagram

5.2 Abandonment Profile

37

Fig 5.1

6507/7-9

WELL DIAGRAM

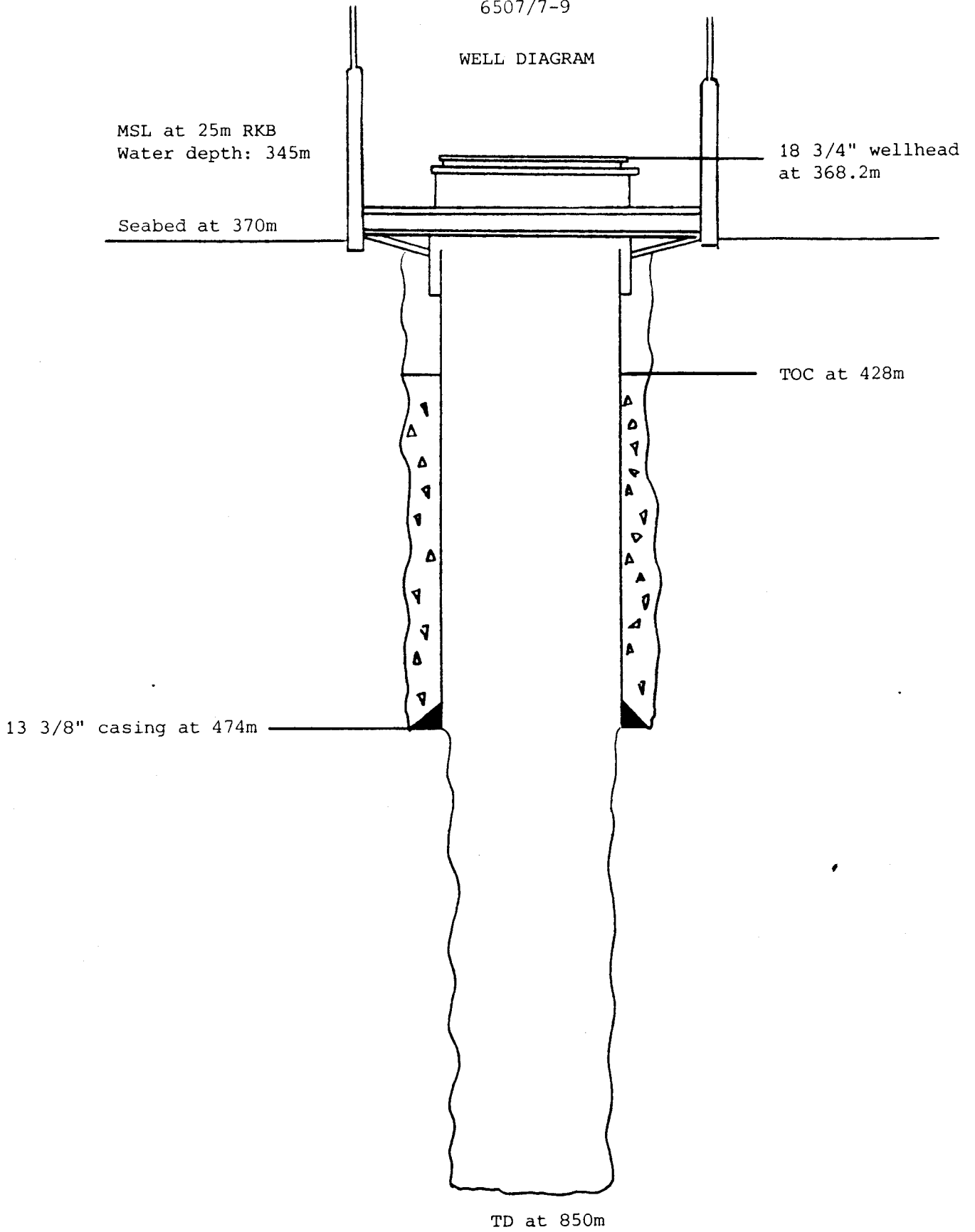
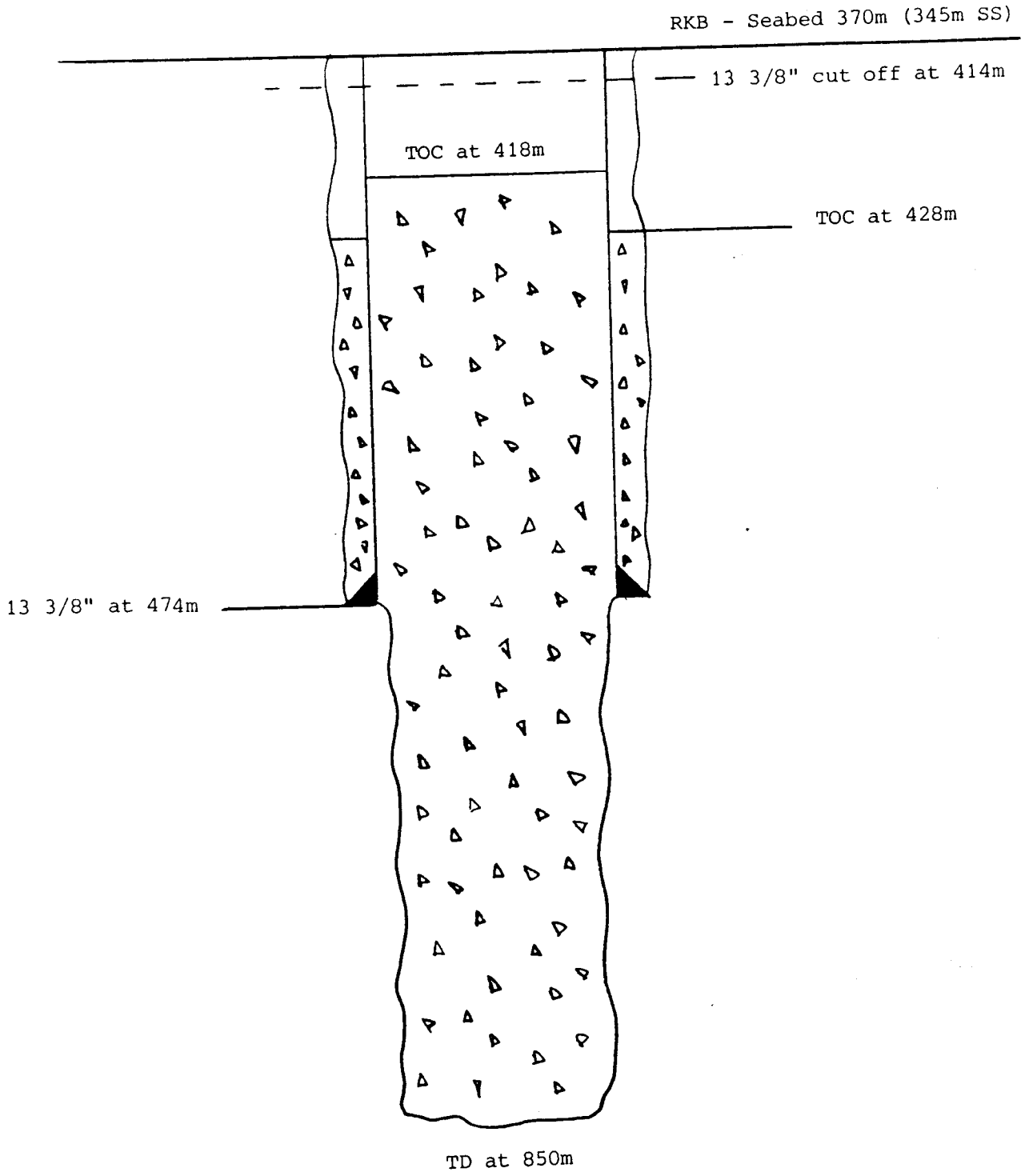


Fig 5.2

6507/7-9
ABANDONMENT SKETCH



6 APPENDIX

6.1 Composite Log

6.2 Site Survey Summary Chart

6.3 Shallow Gas Report Sheets

WELL: 6507/7-9 PL: 095 OPERATOR: CONOCO COMPLETION DATE: 9 August 1987

WELL DATA:

1. Depth from RKB to sea level (m). 25. 2. Water depth. 345m
- 3a. Casing depth to conductor pipe (m RKB). 3b. Leak off test (LOT) or FIT, if performed (g/cc)....
- 4a. Casing depth of the casing on which the BOP is mounted (m RKB). 474. 4b. LOT or FIT (g/cc).....
5. Depth (m RKB and TWT) to top of formations/members/layers.
 610m (0.72 sec)..... Top Pliocene.....
6. Depths (m RKB and TWT) and ages of sand units shallower than 1000 m below the sea bottom.
 Indicate those units with possible gas content. 600-612m (0.65 sec). minor gas saturation.
 697m (0.8 sec) and 749-757m (0.85 sec). possible minor gas saturation.....
7. In which way was the gas registered? ... Increase in ΔT (Low velocity) - Bubbles and silt
 flow observed with the subsea camera;.....
8. Constitution of and possible genesis of the gas.
 Unknown, no samples taken, all returns to seabed.
9. Describe all measurements carried out on the gas-containing strata.
 0-10 API Gamma-ray decrease, 0-0.5 ohmm decrease in Lateralog resistivity.....
 Sonic velocities slower than 240 μ sec/ft. Observation of the well head during a
 flow check with the hole displaced with sea water showed that the strata were normally
 pressured.

SEISMIC DATA:

10. State depth (m RKB and TWT) to unconformities in the well location.
 610m (0.72 sec) Pleistocene/Pliocene boundary.....
11. State extent of sand units (communication, continuity, truncation etc.) The sands detected....
 at 600m, 696m and 749m RKB extend throughout the detailed survey area and those....
 at 600m and 696m are probably the same sands that were seen in 6507/7-8.....
12. State extent of any gas blanking.
 None.
13. State any seismic indications of the gas originating from a deeper level. Give a description if
 the gas originates from a deeper level.
 None.....
14. How does the interpretation of the site survey correspond with the well data with respect to:
 - shallow gas ... No significant shallow gas was found although it was prognosed...
 as possibly present at all levels. Reflection anomalies existed at 609m, 703m,
 and 762m RKB.
 - sand units The sands were within \pm 12m of prognosis except the sand at....
 749m which was not prognosed.
 - unconformities 7m low.....
 - correlation to nearby wells Sand at 749m does not correlate with offset data and
 is probably a lens. The other sands can be correlated.....

