ESSO EXPLORATION AND PRODUCTION NORWAY, INC.

WELL 15/8-1

FINAL WELL REPORT

Esso Proprietary

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May 1982

A1-2126

SECTION ONE

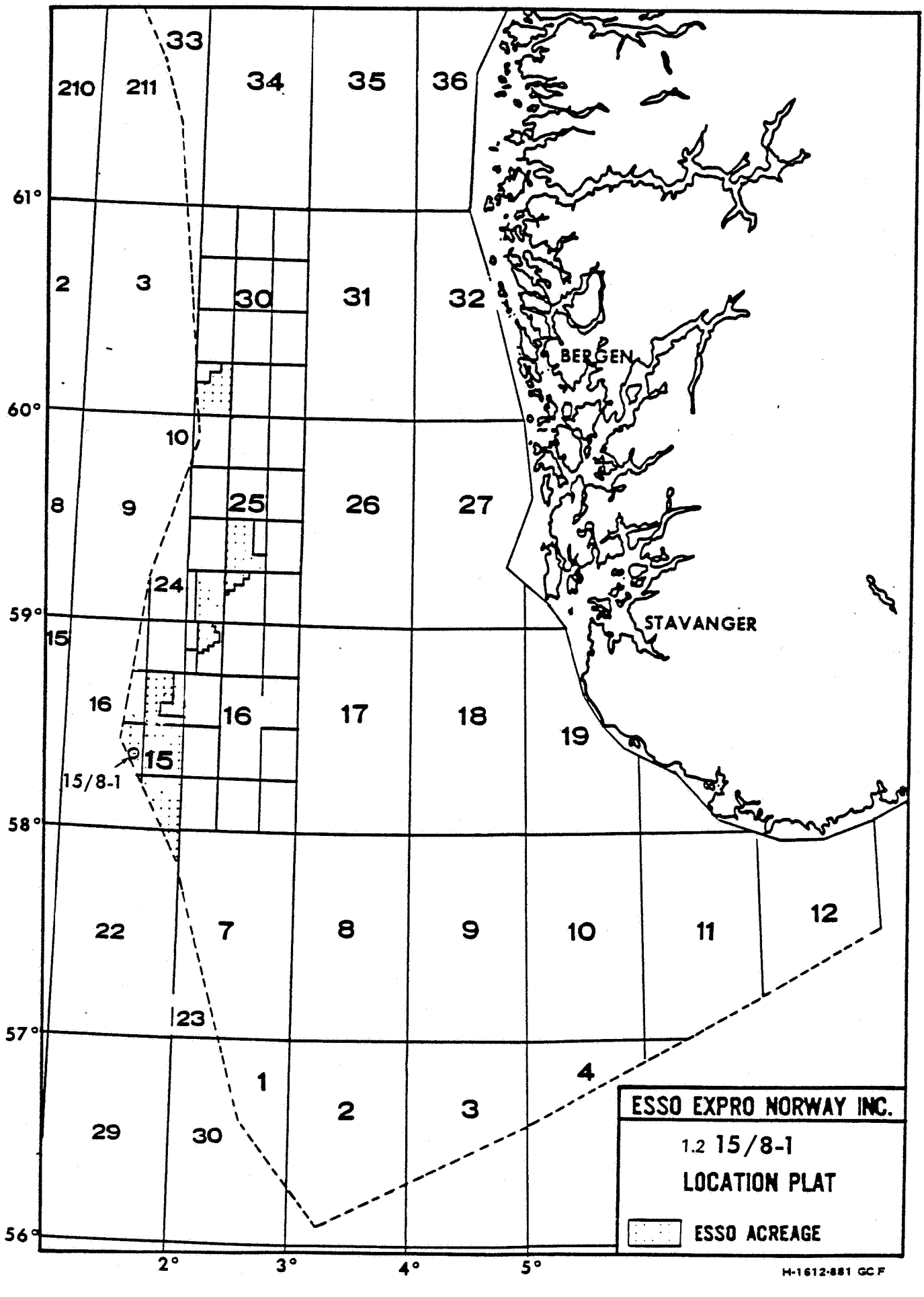
OPERATIONS SUMMARY

1.1 Overview

The 15/8-1 well, drilled by Esso for Statoil, on the Sleipner field, was drilled to a total depth of 4300 m (RKB), production tested, and abandoned in 175.44 days; with the move from the 25/10-5 location requiring an additional 0.58 days. The final well cost is estimated at 30,546.5 KUSD which is 16,691.5 KUSD over the original Esso Exploration Inc. dry hole estimate. The well was drilled to obtain data on a structure in the 15/8 block which appeared similar to structures in block 15/9.

The Glomar Biscay II arrived at the 15/8-1 location at 0418 hours, 18 July 1981. The well consisted of 30" casing in a 36" hole, 20" casing in a 26" hole, 13-3/8" in a 17-1/2" hole, 9-5/8" casing in a 12-1/4" hole, 7" liner in an 8-1/2" hole and a 4-1/2" liner in a 6" hole. After reaching TD, logging the lower portion of the hole, and setting the 4-1/2" liner, the 7" liner was tied back to the surface with a 7" casing string. Four zones were production tested. The well was abandoned as shown in the abandonment profile.

Reservoir data indicated significant accumulations of gas and condensate.


33
210
211
34
35
36
61°
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30
31
32
BERGEN
60°
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8
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26
27
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STAVANGER
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11
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23
57°
1
4
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56°
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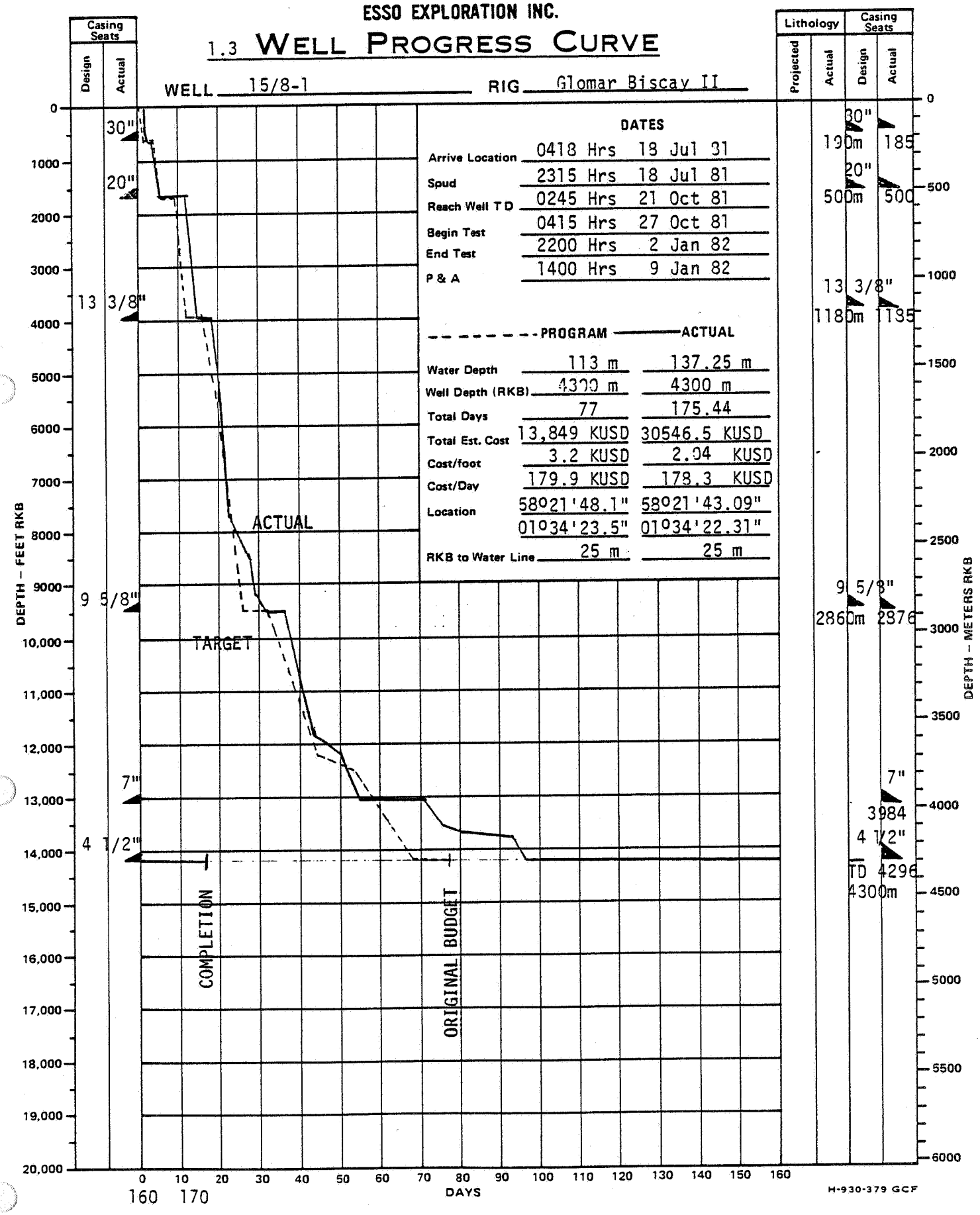
4°
5°
ESSO EXPRO NORWAY INC.
1.2 15/8-1
LOCATION PLAT
ESSO ACREAGE
H-1612-881 GCF

ESSO EXPLORATION INC.

1.3 WELL PROGRESS CURVE

WELL 15/8-1 RIG Glomar Biscay II



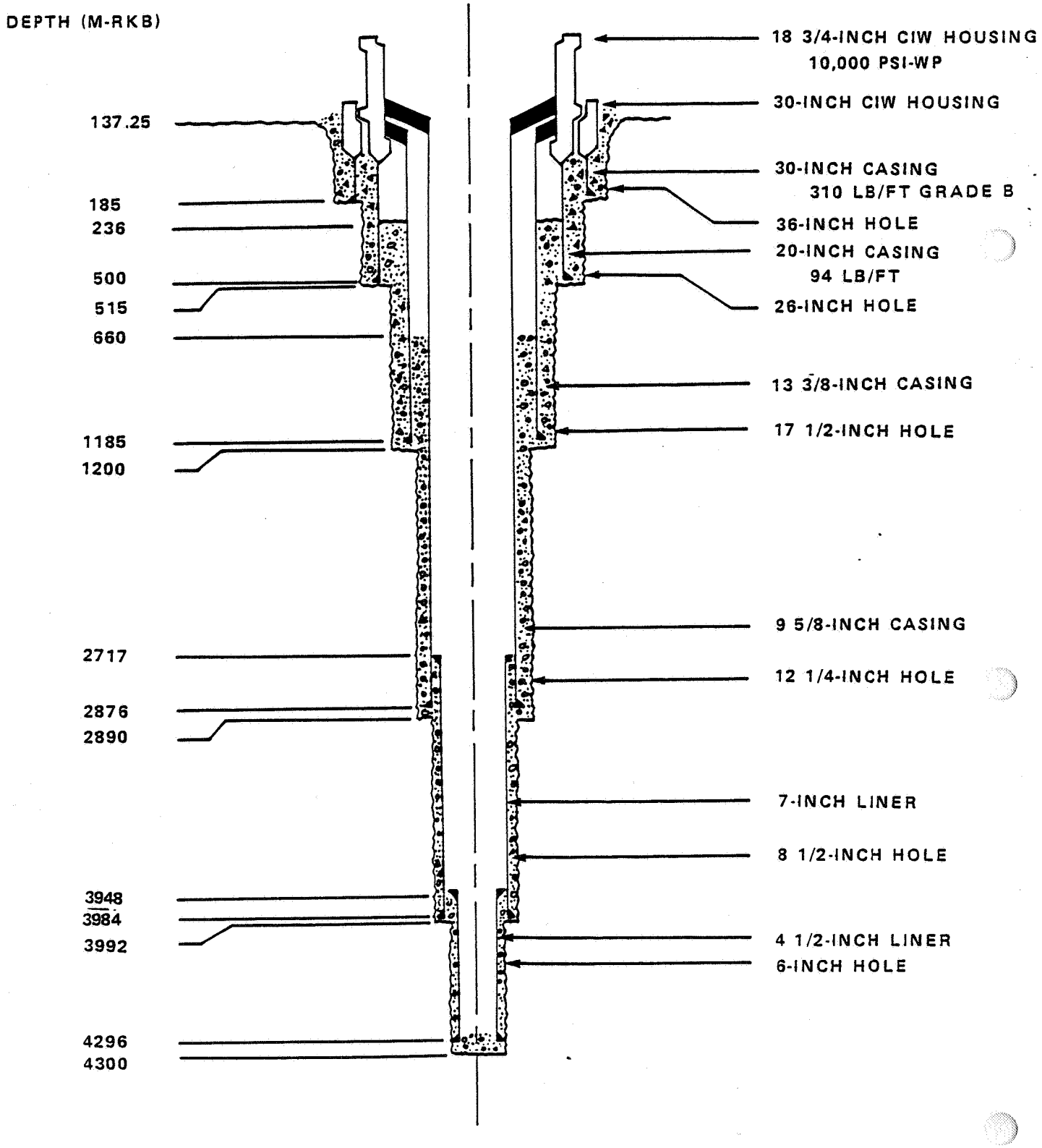
DATES	
Arrive Location	0418 Hrs 18 Jul 31
Spud	2315 Hrs 18 Jul 81
Reach Well TD	0245 Hrs 21 Oct 81
Begin Test	0415 Hrs 27 Oct 81
End Test	2200 Hrs 2 Jan 82
P & A	1400 Hrs 9 Jan 82

	PROGRAM	ACTUAL
Water Depth	113 m	137.25 m
Well Depth (RKB)	4300 m	4300 m
Total Days	77	175.44
Total Est. Cost	13,849 KUSD	30546.5 KUSD
Cost/foot	3.2 KUSD	2.94 KUSD
Cost/Day	179.9 KUSD	178.3 KUSD
Location	58°21'48.1"	58°21'43.09"
	01°34'23.5"	01°34'22.31"
RKB to Water Line	25 m	25 m

H-930-379 GCF

1.4 WELLBORE SCHEMATIC

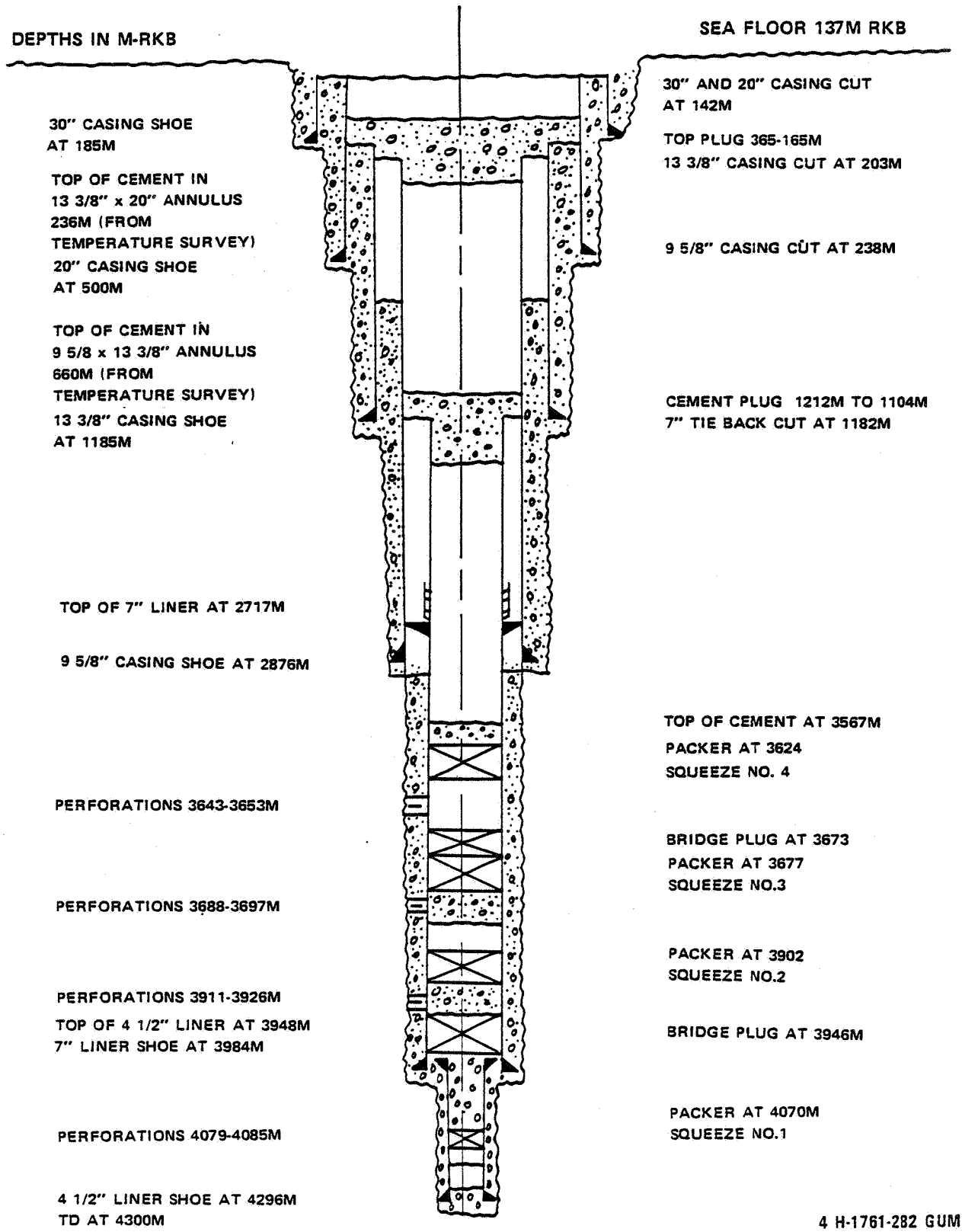
WELL 15/8-1



4 H-1760-282 GUM

WELL 15/8-1

1.5 ABANDONMENT PROFILE



4 H-1761-282 GUM

1.6 PERSONNEL (Esso Exploration Inc.)

The following Esso Exploration Inc. personnel participated in the drilling of well 15/8-1:

Operations Manager:	J. F. Homer
Operations Superintendents:	D. K. McClean D. B. Stickle
Operations Supervisors:	Bob Smith Ron Parish George Sharkey Paul Rogers Harvey Aschenbeck
Operations Technicians:	Eric Bethke Joe Sexton Dave Edlen
Drilling Engineers:	Dave Crockett Eric Kocian Al Romero John Monus Bill Dixon
EPRCo. Test Engineers:	Shep Barnum Tanya Streltsova R. M. McKinley

1.7 PERSONNEL (Esso Expro. Norway)

The following Esso Norway personnel participated in drilling well 15/8-1:

Operations Manager:	A. N. Gist
Regulatory Coordinator:	T. Lode
Accounting:	Hestness Tollefsen
Warehouse:	L. Rasmussen T. Thommassen P. Berge J. Fossmark
Geology:	D. B. Kolasa G. Zeebregts K. O. Foss J. Seldal O. Dahl-Stamnes T. Valheim S. Utskot O. Tangen W. W. Hallstein P. T. Svela
Drilling Engineers:	Asheim Stamnes Roed R. N. Mefford
Services:	N. Egeland I. Hovland H. Bjelland
Reservoir Engineer:	W. Wright

1.8 CONTRACTORS

The following contractors were involved in drilling well 15/8-1:

Rig	Global Marine
Mud Logging	Gearhart Geodata
Mud Engineering	Anchor Drilling Fluids A/S and Dresser Magcobar
Cement	Halliburton
Electric Logging	Dresser-Atlas
Testing	Otis Norway Halliburton Sperry Sun Flopetrol
Positioning	Decca
Helicopter	Helikopter Service A/S
Workboats	Siddis Pilot Sandtor Maersk Topper Stad Senior Norman Rock
Standby Boats	Alcor Sjarmor Ondur
Casing Crew	Weatherford-Lamb
Coring	X-1 Oil Tool Co. Ltd.
Turbodrilling	Eastman
BOP's	Cameron Iron Works Hydril
Wellheads	Cameron Iron Works
Casing Cutter	A-1
DP/Riser Inspection	Scan-Test
Subsea Services	Scan-Dive Cameron Iron Works

SECTION THREE

RIG TIME DISTRIBUTION

3.1 Summary

The 15/8-1 well was drilled, production tested, and abandoned in 175.44 days. An additional 0.58 day was required to move the rig from its previous location on block 25/10. Productive operations were conducted during 73.75% of the dry hole operational period excluding moving. Productive operations were conducted during 53.29% of the production testing period.

Well 15/8-1 was drilled to a depth of 4000 m in approximately 54 days (30.8% of total time on the well). At this point, the well progress was several days ahead of the target curve. Numerous problems, detailed elsewhere in this report, resulted in 42 days elapsing from reaching 4000 m until TD was achieved.

The non-productive time summary is divided into two mutually exclusive categories; dry hole time and production testing time. This provides data which is more meaningful when compared to other wells which may not have conducted a production test.

3.2

RIG TIME DISTRIBUTION

WELL 15/8-1

RIG GLOMAR BISCAY II

		HOURS	DAYS	%
I. RIG MOVE & MOORING				
1.	MOVING*	14.0	.58	--
2.	MOORING	40.0	1.67	0.95
	SUBTOTAL	40.0	1.67	0.95
II. DRILLING OPERATIONS				
3.	DRILLING	611.25	25.47	14.53
4.	HOLE OPENING	0.0	0.0	-0-
5.	UNDERREAMING	30.0	1.25	0.71
6.	TRIPS	325.5	13.56	7.73
7.	CSG; CMT; WOC	195.5	8.15	4.64
8.	SUBSEA EQUIPMENT	152.5	6.35	3.62
9.	ABNORMAL PRESSURE DETECTION	6.75	.28	0.16
10.	ROUTINE CIRCULATING & CONDITIONING	56.0	2.33	1.33
11.	REAMING	1.75	.07	0.04
12.	SURVEY	62.0	2.58	1.47
13.	PLUG & ABANDON	11.0	.46	0.26
14.	EQUIPMENT REMOVAL & SALVAGE	96.5	4.02	2.29
15.	BLOWOUT PREVENTION ACTIVITIES	51.25	2.14	1.22
16.	OTHER	9.25	.39	0.22
	SUBTOTAL	1609.25	67.05	38.22
III. FORMATION EVALUATION				
18.	CORING	98.75	4.11	2.35
19.	LOGGING	107.0	4.46	2.54
20.	CIRCULATING SAMPLES	9.25	.39	0.22
21.	WIRELINE FORMATION TESTS	40.25	1.68	0.96
22.	OTHER	0.0	0.0	-0-
	SUBTOTAL	255.25	10.64	6.07
IV. NON-PRODUCTIVE				
24.	RIG REPAIRS	47.75	1.99	1.13
25.	FISHING	0.0	0.0	-0-
26.	SUBSEA & SURFACE BOP EQUIP. REPAIRS	397.0	16.54	9.43
27.	LOST CIRCULATION	0.0	0.0	-0-
28.	WELL CONTROL	10.25	.43	0.24
29.	HOLE INSTABILITY	105.5	4.40	2.51
30.	FORMATION EVALUATION	35.25	1.47	0.84
31.	MOORING	0.0	0.0	-0-
32.	WAITING ON WEATHER	54.5	2.27	1.29
33.	ANCILLORY CONTRACTOR'S REPAIRS	19.5	.81	0.46
34.	CASING & WELLHEAD	1.25	.05	0.03
35.	DRILL STRING	5.25	.22	0.12
36.	UNFORSEEN EVENTS	0.0	0.0	-0-
37.	OTHER WAITING	0.0	0.0	-0-
38.	OTHER	1.5	.06	0.04
	SUBTOTAL	677.75	28.24	16.09
V. PRODUCTION TESTING				
40.	PRODUCTION TESTING	867.75	36.16	20.61
41.	PRODUCTION TESTING DOWNTIME	760.5	31.69	18.06
	SUBTOTAL	1628.25	67.84	38.67
	GRAND TOTAL	4210.5	175.44	100.00

(1) *Moving is presented only for sake of completness and is not included in the totals or calculations so that an even basis for drilling distribution between locations may be obtained.

(2) Numbered functions correspond to the Drilling Time Distribution Categories and Definition codes.

H-782-478 WWE

3.3 NON-PRODUCTIVE TIME SUMMARY

3.3.1 Dry Hole Time

	Hours	% of NPT	% of the Total Time (Dry Hole Basis)
Rig Repairs			
1. Swap hoses on standpipe	2-3/4	.41	.11
2. Swap over kelly hose to other standpipe. Unibolt on bottom end of upper standpipe section washed	1-3/4	.26	.07
3. Repair drive pins on kelly drive bushings	3-3/4	.55	.15
4. Change wash pipe	1	.15	.04
5. Repair brake drum equalization bar in drawworks	6-1/2	.96	.25
6. Repair leak on cooling water line to EMD	3/4	.11	.03
7. Repair monkey board	1/2	.07	.02
8. Remove bent cover from air bottle on drill string compensator	1/2	.07	.02
9. Work on pump #1	1/4	.04	.01
10. Swivel packing leaking standback kelly to repair	1-1/4	.18	.05
11. Drillers pressure gauge malfunctioned sensor burst	1/4	.04	.01
12. Lost swab on #1 pump	3-1/2	.52	.14
13. Repair Baylor Elmaggo electric brake	14	2.07	.54
14. Overhaul mud cleaner	10-1/2	1.55	.40
Subsea and Surface BOP Equipment Repairs			
1. Riser parted at RCK connector	24.25	3.58	.93
2. Lower hydril lockdown grooves damaged	15	2.21	.57
3. Work on hydraulic BOP skid unit	1-3/4	.26	.07
4. Misrun on setting wear bushing	1-1/2	.22	.06
5. Seal assembly not torquing correctly	3	.44	.11
6. Tensioner ring jarred loose while running BOP	5-1/2	.81	.21
7. Slip jt packing leaking	29	4.28	1.11
8. Test upper annular, LMRP connector	1-1/2	.22	.06
9. Pull stack to repair leaking MPR	315.5	46.55	12.10

	Hours	% of NPT	% of the Total Time (Dry Hole Basis)
Well Control			
1. Gas kick at 4265m	1	.15	.04
2. Gas into mud at 4300m	9-1/4	1.36	.35
Hole Instability			
1. Cir. 30" csg. down to 185m	1/4	.04	.01
2. Flowline plugged w/gumbo	3-3/4	.55	.14
3. Large sand content in possum belly and flowline	1-1/4	.18	.05
4. Ream 1080-1113m and 1132-1147m	6-1/4	.92	.24
5. Tight hole 958-1115m	11	1.62	.42
6. Drag 50 kips	1-1/4	.18	.05
7. 75K overpull needed to free pipe	1	.15	.04
8. Ream 1381-1390m and 1440-1468m	1	.15	.04
9. Ream 1391-1426m	1/2	.07	.02
10. Ream 1694-1742,	2-1/4	.33	.09
11. Clean cuttings from flow-line	1/4	.04	.01
12. Pump 3 singles out at 1957m	1	.15	.04
13. Pump out singles at 2130 2073m	3-1/4	.48	.12
14. Tight hole 2168-2130m	3	.44	.11
15. Tight hole 2231-2539m	9-1/2	1.40	.36
16. Tight hole 1185-2567m	5-1/2	.81	.21
17. Ream 2823-2833m	1/4	.04	.01
18. Ream 2865-2886m	1/4	.04	.01
19. Worked pipe free with 90K overpull	1/4	.04	.01
20. Logging tool stuck 3212m	1	.15	.04
21. Stuck pipe - 3699m	5-1/4	.77	.20
22. Stuck pipe - 3647m	7-3/4	1.14	.30
23. 30K overpull at 4071m	5-1/2	.81	.21
24. Ream 4137-4174	1-1/4	.18	.05
25. Ream bridge at 4230m	22-1/2	3.32	.86
26. Found gas cut mud Conditioned mud to 11.8 ppg	10	1.48	.38
Waiting on Weather			
1. Heave 14-20 ft	28-1/4	4.17	1.08
2. Heave 15-20 ft	26-1/4	3.87	1.01

	Hours	% of NPT	% of the Total Time (Dry Hole Basis)
Ancillary Contractors Repairs			
1. Cementing unit problems	1-1/4	.18	.05
2. Leaks on cementing unit	1-1/2	.22	.06
3. Circulating sub leaking	16-3/4	2.47	.64
Drill String			
1. Slip set stabilizer jammed	1	.15	.04
2. Plugged nozzles	1	.15	.04
3. Plugged nozzles	3-1/4	.48	.12
Casing & Wellhead			
1. Could not pull 7" casing free	1-1/4	.18	.05
Other			
1. Survey misrun	3/4	.11	.03
2. Plugged airline to barite tank	3/4	.11	.03
3.3.2 **Production Testing**			
1. Lost returns	7-3/4	1.02	.48
2. Leak on surface lines	2	.26	.12
3. Leak through RTTS packer. Rubber was damaged while RIH.	32	4.21	1.98
4. The top of the liner tie-back sleeve was damaged and had to be milled out.	18-3/4	2.47	1.16
5. WOW	27-3/4	3.65	1.72
6. Mill and chase junk (RTTS rubbers)	8-1/2	1.12	.53
7. Slip and cut riser tensioners	5-3/4	.85	.40
8. WOW	20-1/2	3.02	1.42
9. Inability to open down-hole test valves and WOW	435-1/2	57.26	26.91
10. Failure to inject into zone #1	1	.13	.06
11. WOW	40	5.26	2.47
12. Could not reconnect to Otis SSTT plus fishing job on Otis stinger	92-1/4	12.13	5.70

		Hours	% of NPT	% of the Total Time (Dry Hole Basis)
13.	Could not set RTTS packer	13	1.71	.80
14.	WOW	32-1/4	4.24	2.00
15.	EZSV cement retainer would not test	23-1/2	3.09	1.45
		760.5	100.0	46.71
	TOTAL	1438.25	100.0	72.96

WELL 15/8-1
WATER DEPTH 112.25
TOTAL DEPTH
TOTAL DAYS

PAGE 1 OF 10

DAILY DRILLING REPORT

RIG TIME DISTRIBUTION

DATE	DEPTH	MOVE-MOOR		DRILLING OPERATION															FORMATION EVALUATION					NON-PRODUCTIVE																PROD. TEST	
		MOVING	MOORING	DRILLING	HOLE OPEN	UNDERREAM	TRIPS	CSG. CMT. WOC	SUBSEA EQUIPMENT	AP DETECTION	ROUTINE C & C	REAM	SURVEY	P & A	EQUIP. REMOVE & SAL	BOP ACTIVITIES	OTHER	REMARKS	CORING	LOGGING	CIR. SAMPLES	W/L FORM. TEST	OTHER	REMARKS	RIG REPAIRS	FISHING	SUBSEA/BOP	LOST CIRC.	WELL CONTROL	HOLE INSTAB.	FORM EVAL	MOORING/ASK	WOW	ANCILLARY CNTR. REPAIR	CASING & WELL HEAD	DRILL STRING	UNFORSEEN EVENTS	OTHER WAITING	OTHER	REMARKS	PRODUCTION TESTING	PROD. TESTING DOWNTIME
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41
17 JULY		9¼																																						
18	140	4¼	14	¾		5																																		
19	187		1	3½			5½	12¼			¾		¾																	¼										
20	207			1			7¼	1½	14							¼																									
21	515			8¾							1½		4¾			½				8½																					
22	515					15½	7									1⅓																									
23	515					9½	7	½		¾		½				3¼										2¼														REBAR		
24	515						½	13¼																		21¼															
25	515							22¾																									1¼						CEMENTING HOSE		
26	515						7¼	2¼	2½																	12														LOWER ANNULAR		
27	515								12⅞																	4¾								1½						HYDRIL CAP BOP SEAL		
28	519			¾			2¾	3	15¾		1					¾																								
29	783			17¾							4		1½																									¾		
30	1046			12			5½						1½																	5										GUMBO		
31	1200			6¼			3				5¼		1¾							½										6¼										
1 AUG	1200							6												7										11										
2	1200							21¾	21¾																															
3	1202			4¾			2¼	16½	1							9½																									
SUB TOTAL		14	15	51½		30	53	82¼	53¼	2¾	13½	-1¾	10½			10¾				16						41			22½				2¾				3¾			
CUMULATIVE																																								

WELL 15/8-1
WATER DEPTH
TOTAL DEPTH
TOTAL DAYS

DAILY DRILLING REPORT

RIG TIME DISTRIBUTION

DATE	DEPTH	MOVE-MOOR		DRILLING OPERATION															FORMATION EVALUATION						NON-PRODUCTIVE																		PROD. TEST	
		MOVING	MOORING	DRILLING	HOLE OPEN	UNDERREAM	TRIPS	CSG. CMT. WOC	SUBSEA EQUIPMENT	AP DETECTION	ROUTINE C & C	REAM	SURVEY	P & A	EQUIP. REMOVE & SAL.	BOP ACTIVITIES	OTHER	REMARKS	CORING	LOGGING	CIR. SAMPLES	W/L FORM. TEST	OTHER	REMARKS	RIG REPAIRS	FISHING	SUBSEA/BOP	LOST CIRC.	WELL CONTROL	HOLE INSTAB.	FORM EVAL	MOORING/ASK	WOW	ANCILLARY CNTR. REPAIR	CASING & WELL HEAD	DRILL STRING	UNFORSEEN EVENTS	OTHER WAITING	OTHER	REMARKS	PRODUCTION TESTING	PROD. TESTING DOWNTIME
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41
4 Aug	1484			14 1/4									6 1/4			3/4													2 3/4													
5	1569			8			1 3/4						2 1/2												2 3/4					1													
6	1251			13			1			1/2			6 3/4																	2 3/4													
7	2025			15 1/2									6 1/4																	1/4													
8	2203			10 3/4			8						3 1/2				3/4	SLIP & CUT DRILLING												1													
9	2324			16 3/4							1/4		2 3/4																	3 1/4													
10	2400			3			9 1/4					1/2	1/4			6 1/2										1 1/2				3													
11	2519			17 1/4							4 1/4		1/2												1 3/4																	
12	2539			4 3/4			7 3/4				3/4		1/4																	9 1/2					1							
13	2582			11 1/4			7 1/4				1/4		1/4																	5													
14	2701			16 3/4							1 1/4		3/4												4 3/4					1/2													
15	2806			18 3/4							4		3/4								1/2																					
16	2842			12 1/2			10						1/4				1													1/4													
17	2886			20 3/4							3 1/4																																	
18	2886						9 1/4	1			1		1/4				1/2			12																							
19	2890			1 1/2			7	11 1/2	1/2 3/4		1/2 3/4						1/4													1/4													
20	2890							13	3 1/4							1 1/2										3																	
21	2894			1/4			10 1/4	3 3/4			1/2					1 3/4									6 1/2																		
SUB TOTAL		-0-	-0-	186.25	-0-	-0-	79.5	29.25	5.25	0.50	17.25	0.50	34.25	-0-	-0-	13.5	2.5		-0-	12	1/2	-0-	-0-		15.75	-0-	4.0	-0-	-0-	29.5	-0-	-0-	-0-	-0-	-0-	1.0	-0-	-0-	-0-		-0-	-0-
CUMULATIVE																																										

WELL 15/8-1
WATER DEPTH 137 M RKB
TOTAL DEPTH
TOTAL DAYS

DAILY DRILLING REPORT

RIG TIME DISTRIBUTION

DATE	DEPTH	MOVE-MOOR		DRILLING OPERATION																FORMATION EVALUATION						NON-PRODUCTIVE															PROD. TEST	
		MOVING	MOORING	DRILLING	HOLE OPEN	UNDERREAM	TRIPS	CSG. CMT. WOC	SUBSEA EQUIPMENT	AP DETECTION	ROUTINE C & C	REAM	SURVEY	P & A	EQUIP. REMOVE & SAL.	BOP ACTIVITIES	OTHER	REMARKS	CORING	LOGGING	CIR. SAMPLES	W/L FORM. TEST	OTHER	REMARKS	RIG REPAIRS	FISHING	SUBSEA/BOP	LOST CIRC.	WELL CONTROL	HOLE INSTAB.	FORM EVAL	MOORING/ASK	WOW	ANCILLARY CNTR. REPAIR	CASING & WELL HEAD	DRILL STRING	UNFORSEEN EVENTS	OTHER WAITING	OTHER	REMARKS	PRODUCTION TESTING	PROD. TESTING DOWNTIME
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41
22 AUG	2944			12			10 3/4				1/4																															
23	3029			20 1/2							2 1/4		1 1/4																													
24	3227			22							1/4		1 1/4																													
25	3356			22 3/4									1 1/4																													
26	3467			19 1/2							2		2 1/4																													
27	3570			24																																					
28	3570						9 3/4			1 1/4	2 3/4		1			7	1	SLIP AND CUT DRILL LINE							1 1/4																	
29	3633			22			1 3/4				1/4																															
30	3658			9			6 3/4				2 1/2		1/2						2 3/4		2 3/4									1/4												
31	3667.5																		24																							
1 SEPT	3675.9																1	SLIP AND CUT DRLG LINE	23																							
2	3675.5																		24																							
3	3705.5																		24																							
4	3705.5						2 3/4									8 3/4				11 1/2										1											
5	3752			11 3/4			2 1/2						2 1/2				1 1/2	SLIP AND CUT DRLG LINE	1											5 1/4									PIPE STUCK		
6	3839			22 3/4									1 1/2																												
7	3957			8 1/4			13 3/4				1/4		1/2																	3/4											
8	3923			17																										7									PIPE STUCK		
SUB TOTAL		-0-	-0-	212	-0-	-0-	47.75	-0-	-0-	1.25	11.25	-0-	12.00	-0-	-0-	15.75	3.50		98.75	11.5	2.25	-0-	-0-		1.25	-0-	-0-	-0-	-0-	14.25	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-		-0-	-0-
CUMULATIVE																																									

WELL 1518-1
WATER DEPTH 137m RKB
TOTAL DEPTH
TOTAL DAYS

DAILY DRILLING REPORT

RIG TIME DISTRIBUTION

DATE	DEPTH	MOVE-MOOR		DRILLING OPERATION																FORMATION EVALUATION						NON-PRODUCTIVE																		PROD. TEST	
		MOVING	MOORING	DRILLING	HOLE OPEN	UNDERREAM	TRIPS	CSG. CMT. WOC	SUBSEA EQUIPMENT	AP DETECTION	ROUTINE C & C	REAM	SURVEY	P & A	EQUIP. REMOVE & SAL	BOP ACTIVITIES	OTHER	REMARKS	CORING	LOGGING	CIR. SAMPLES	W/L FORM. TEST	OTHER	REMARKS	RIG REPAIRS	FISHING	SUBSEA/BOP	LOST CIRC.	WELL CONTROL	HOLE INSTAB.	FORM EVAL	MOORING/ASK	WOW	ANCILLARY CNTR. REPAIR	CASING & WELL HEAD	DRILL STRING	UNFORSEEN EVENTS	OTHER WAITING	OTHER	REMARKS	PRODUCTION TESTING	PROD. TESTING DOWNTIME
1981	M	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41
9 SEP	3457			9¼			13¼				¾		½																														
10	3941			11½			6¼				3¾		¼								2¼																						
11	3941						1¾													22¼																						
12	3941																¾	SLIP AND CUT DRLG LINE		19½		3¾																					
13	3941							2¼												4¼		17½																					
14	3942			¼				23¼												¼																						
15	3942						2	22																																		
16	3942						5½	10¼	8¼																																		
17	3942								24																																		
18	3942								24																																		
19	3942								18½																		5½																
20	3942								4¼																							14¾								REPAIR SWIVEL SLIP JOINT		
21	3942																										13					11										
22	3942						4	9½	7								1	SLIP AND CUT DRLG LINE														2½												
23	3942						8																				16															
24	3942						20¼	2¼																			1½															
25	4010			12				9								3																										
26	4010						15¼																										5½									
SUB TOTAL		-0-	-0-	33½	-0-	-0-	76½	73¾	91	-0-	4¾	3¼	2½	-0-	-0-	3	1¾		-0-	46¼	3	21¼	-0-		1½	-0-	36	-0-	-0-	-0-	-0-	28½	5½	-0-	-0-	-0-	-0-	-0-		-0-	-0-
CUMULATIVE																																									

DAILY DRILLING REPORT

RIG TIME DISTRIBUTION

WELL 15/8-1
WATER DEPTH 137 m RKB
TOTAL DEPTH
TOTAL DAYS

DATE	DEPTH	MOVE-MOOR: MOVING	MOVE-MOOR: MOORING	DRILLING OPERATION: DRILLING	HOLE OPEN	UNDERREAM	TRIPS	CSG. CMT. WOC	SUBSEA EQUIPMENT	AP DETECTION	ROUTINE C & C	REAM	SURVEY	P & A	EQUIP. REMOVE & SAL.	BOP ACTIVITIES	OTHER	REMARKS
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
27 Sept	4037			11							1							
28	4093			24														
29	4106			6½			14				2¼		½					
30	4113.6			8¼			5¼						¾					
1 Oct	4139			13¾			9¼				1		½					
2	4147			6¾			2½						1					
3	4147						6½		3							3¼		
4	4147																	
5	4147																	
6	4147																	
7	4147																	
8	4147																	
9	4147																	
10	4147																	
11	4147																	
12	4147																	
13	4147																	
14	4147																	
SUB TOTAL				[illegible] 3/4			37 1/2		3		4 1/4		[illegible] 3/4			3 1/4		
CUMULATIVE																		

DATE	FORMATION EVALUATION: CORING	LOGGING	CIR. SAMPLES	W/L FORM. TEST	OTHER	REMARKS
	18	19	20	21	22	23
27 Sept						
28						
29						
30						
1 Oct						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
SUB TOTAL						
CUMULATIVE						

DATE	NON-PRODUCTIVE: RIG REPAIRS	FISHING	SUBSEA/BOP	LOST CIRC.	WELL CONTROL	HOLE INSTAB.	FORM EVAL	MOORING/ASK	WOW	ANCILLARY CNTR. REPAIR	CASING & WELL HEAD	DRILL STRING	UNFORSEEN EVENTS	OTHER WAITING	OTHER	REMARKS	PROD. TEST: PRODUCTION TESTING	PROD. TESTING DOWNTIME
	24	26	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41
27 Sept										11		1						
28																		
29						¾												
30	5					4¾												
1 Oct																		
2	14																	
3	10½		¾															
4			24													BOP's would NOT TEST		
5			24															
6			24													Set cmt plugs to pull stack		
7			24															
8			24													Finish repair to BOP stack		
9			24													WOW to Run stack		
10			24													" "		
11			24													" "		
12			24													" "		
13			24													" "		
14			24													Run BOP stack		
SUB TOTAL	29 1/2		[illegible]			5 1/2				11		1						
CUMULATIVE																		

WELL 15/8-1
WATER DEPTH 137m RKB
TOTAL DEPTH
TOTAL DAYS

DAILY DRILLING REPORT

RIG TIME DISTRIBUTION

DATE	DEPTH	MOVE-MOOR		DRILLING OPERATION															FORMATION EVALUATION						NON-PRODUCTIVE																		PROD. TEST	
		MOVING	MOORING	DRILLING	HOLE OPEN	UNDERREAM	TRIPS	CSG. CMT. WOC	SUBSEA EQUIPMENT	AP DETECTION	ROUTINE C & C	REAM	SURVEY	P & A	EQUIP. REMOVE & SAL.	BOP ACTIVITIES	OTHER	REMARKS	CORING	LOGGING	CIR. SAMPLES	W/L FORM. TEST	OTHER	REMARKS	RIG REPAIRS	FISHING	SUBSEA/BOP	LOST CIRC.	WELL CONTROL	HOLE INSTAB.	FORM EVAL	MOORING/ASK	WOW	ANCILLARY CNTR. REPAIR	CASING & WELL HEAD	DRILL STRING	UNFORSEEN EVENTS	OTHER WAITING	OTHER	REMARKS	PRODUCTION TESTING	PROD. TESTING DOWNTIME
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41
15 Oct	4147																										24													TEST BOP'S		
16 Oct	4147																										24													DRL OUT Cmt PLUGS		
17 Oct	4174			12			6¾				2½																23¼													BACK TO DRILLING		
18 Oct	4220			15			4½																						1¼						3¼							
19 Oct	4260			12½			6½				¼		1¼				½ *	SLIP AND cut DRILL LINE			3																							
20 Oct	4291			16¼			6¾																					1															
21 Oct	4300			2¾			7			4¼	2¼		¾							1									6 *											1 UNABLE TO GET LOG TO BOTTOM		
22 Oct																				7½									16½ *											* CATCHING UP		
23 Oct																				6½		12½								5 *										* RFT TOOL FAILURE		
24 Oct								4¾									1 *	* SLIP AND cut DRILL LINE												18¼										* CBL TOOL FAILURE		
25 Oct																													9¼	7½	6½						3/4				
26 Oct																3¼				6¼		6½								2½	5½											
27 Oct																1¾																									14½	7¾
28 Oct	4300																																								22	2
29 Oct																																								24	
30 Oct																																								24	
31 Oct																																								14	10
1 Nov																																								2	22
SUB TOTAL		-0-	-0-	58.5	-0-	-0-	31.5	4.75	-0-	4.25	5.00	-0-	2.0	-0-	-0-	5.0	1.5		-0-	21.25	3.0	19.0	-0-		-0-	-0-	50.75	-0-	10.25	33.75	35.25	-0-	-0-	-0-	3.25	-0-	-0-	0.75		100.5	41.75
CUMULATIVE																																									

DAILY DRILLING REPORT
RIG TIME DISTRIBUTION

WELL 15/8-1
WATER DEPTH 137·M
TOTAL DEPTH
TOTAL DAYS

DATE 1981	DEPTH	MOVE-MOOR: MOVING 1	MOORING 2	DRILLING OPERATION: DRILLING 3	HOLE OPEN 4	UNDERREAM 5	TRIPS 6	CSG. CMT. WOC 7	SUBSEA EQUIPMENT 8	AP DETECTION 9	ROUTINE C & C 10	REAM 11	SURVEY 12	P & A 13	EQUIP. REMOVE & SAL 14	BOP ACTIVITIES 15	OTHER 16	REMARKS 17	FORMATION EVALUATION: CORING 18	LOGGING 19	CIR. SAMPLES 20	W/L FORM. TEST 21	OTHER 22	REMARKS 23	NON-PRODUCTIVE: RIG REPAIRS 24	FISHING 25	SUBSEA/BOP 26	LOST CIRC. 27	WELL CONTROL 28	HOLE INSTAB. 29	FORM EVAL 30	MOORING/ASK 31	WOW 32	ANCILLARY. CNTR. REPAIR 33	CASING & WELL HEAD 34	DRILL STRING 35	UNFORSEEN EVENTS 36	OTHER WAITING 37	OTHER 38	REMARKS 39	PROD. TEST: PRODUCTION TESTING 40	PROD. TESTING / DOWNTIME 41
2 NOV	4300																																								21	3
3	↓																																								8¼	15¾
4																																									24	
5																																									4¾	19¼
6																																									15½	8½
7																																									24	
8																																									15½	8½
9																																									24	
10																																									24	
11																																									18¼	5¾
12																																									24	
13																																									3½	20½
14																																									14½	9½
15																																										24
16																																										24
17																																										24
18																																										24
19	↓																																									24
SUB TOTAL		-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-		-0-	-0-	-0-	-0-	-0-		-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-		221.25	210.75
CUMULATIVE																																									321.75	

WELL 15/8-1
WATER DEPTH 137 M RKB
TOTAL DEPTH
TOTAL DAYS

DAILY DRILLING REPORT

RIG TIME DISTRIBUTION

DATE	DEPTH	MOVE-MOOR		DRILLING OPERATION															FORMATION EVALUATION						NON-PRODUCTIVE																		PROD. TEST	
		MOVING	MOORING	DRILLING	HOLE OPEN	UNDERREAM	TRIPS	CSG. CMT. WOC	SUBSEA EQUIPMENT	AP DETECTION	ROUTINE C & C	REAM	SURVEY	P & A	EQUIP. REMOVE & SAL.	BOP ACTIVITIES	OTHER	REMARKS	CORING	LOGGING	CIR. SAMPLES	W/L FORM. TEST	OTHER	REMARKS	RIG REPAIRS	FISHING	SUBSEA/BOP	LOST CIRC.	WELL CONTROL	HOLE INSTAB.	FORM EVAL	MOORING/ASK	WOW	ANCILLARY CNTR. REPAIR	CASING & WELL HEAD	DRILL STRING	UNFORSEEN EVENTS	OTHER WAITING	OTHER	REMARKS	PRODUCTION TESTING	PROD. TESTING DOWNTIME
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41
20 NOV	4300																																										24
21 NOV																																											24
22																																											24
23																																											24
24																																											24
25																																											24
26																																											24
27																																											24
28																																											24
29																																											24
30																																											24
1 DEC																																											24
2																																										6	18
3																																										24	*
4																																										10	14
5																																											24
6																																											24
7																																											24
SUB TOTAL		-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-		-0-	-0-	-0-	-0-	-0-		-2-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-		40	392
CUMULATIVE																																											

WELL 15/8-1
WATER DEPTH 137-M
TOTAL DEPTH 4300-M
TOTAL DAYS

PAGE 9 OF 10

DAILY DRILLING REPORT

RIG TIME DISTRIBUTION

DATE	DEPTH	MOVE-MOOR		DRILLING OPERATION															FORMATION EVALUATION						NON-PRODUCTIVE																		PROD. TEST	
1981		MOVING	MOORING	DRILLING	HOLE OPEN	UNDERREAM	TRIPS	CSG. CMT. WOC	SUBSEA EQUIPMENT	AP DETECTION	ROUTINE C & C	REAM	SURVEY	P & A	EQUIP. REMOVE & SAL.	BOP ACTIVITIES	OTHER	REMARKS	CORING	LOGGING	CIR. SAMPLES	W/L FORM. TEST	OTHER	REMARKS	RIG REPAIRS	FISHING	SUBSEA/BOP	LOST CIRC.	WELL CONTROL	HOLE INSTAB.	FORM EVAL	MOORING/ASK	WOW	ANCILLARY CNTR. REPAIR	CASING & WELL HEAD	DRILL STRING	UNFORSEEN EVENTS	OTHER WAITING	OTHER	REMARKS	PRODUCTION TESTING	PROD. TESTING DOWNTIME
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41
8 DEC																																											24
9																																									2 3/4	21/4
10																																								24	
11																																								22	2
12																																								24	
13																																								24	
14																																								24	
15																																								18 1/4	5 3/4
16																																								16 3/4	7 1/4
17																																								24	
18																																								24	
19																																								24	
20																																								10 1/2	13 1/2
21																																								5 1/4	18 3/4
22																																								24	
23																																								24	
24																																								24	
25																																								24	
SUB TOTAL																																								339.5	12.5
CUMULATIVE																																									

WELL 15/8-1
WATER DEPTH 137-M
TOTAL DEPTH 4300-M
TOTAL DAYS

DAILY DRILLING REPORT

RIG TIME DISTRIBUTION

DATE	DEPTH	MOVE-MOOR		DRILLING OPERATION														FORMATION EVALUATION						NON-PRODUCTIVE															PROD. TEST	
		MOVING	MOORING	DRILLING	HOLE OPEN	UNDERREAM	TRIPS	CSG. CMT. WOC	SUBSEA EQUIPMENT	AP DETECTION	ROUTINE C & C	REAM	SURVEY	P & A	EQUIP. REMOVE & SAL.	BOP ACTIVITIES	OTHER	REMARKS	CORING	LOGGING	CIR. SAMPLES	W/L FORM. TEST	OTHER	REMARKS	RIG REPAIRS	FISHING	SUBSEA/BOP	LOST CIRC.	WELL CONTROL	HOLE INSTAB.	FORM EVAL	MOORING/ASK	WOW	ANCILLARY CNTR. REPAIR	CASING & WELL HEAD	DRILL STRING	UNFORSEEN EVENTS	OTHER WAITING	OTHER	REMARKS	PRODUCTION TESTING	PROD. TESTING DOWNTIME
1981		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41
26 DEC																																								24	
27																																								½	23½
28																																								24	
29																																								24	
30																																								24	
31																																								24	
1982																																									
1 JAN																																								24	
2															2																										22	
3														5	19¾																			1¼							
4														6	18																										
5															24																										
6															24																										
7			6¼												10¾																		7								
8			13½																														19¼								
9			14																																						
SUB TOTAL			25											11	96.5																	26.25		1.25							166.5	23½
CUMULATIVE		14	40	611.25	0	30.0	22.5	55.5	52.5	6.75	56.0	1.75	62	11	96.5	57.25	9.25		78.25	10.5	9.25	40.25	0		47.75	0	20	0	10.25	105.5	5.25	0	64.5	19.5	1.25	5.25	0	0	1.5		867.75	5.5

SECTION FOUR

WELL COST ANALYSIS

4.1 SUMMARY

The 15/8-1 final well costs are estimated at 30,546.5 KUSD. This is 1,143.8 KUSD (3.6%) less than the final supplemented AFE, but 16,691.5 KUSD (120.5%) more than the original dry hole AFE. A breakdown and comparison of the final costs with the final AFE is provided in subsection 4.2, Final Well Cost Report.

The final dry hole cost of 17,356.5 KUSD is 3,501.5 KUSD (25.3%) over the original dry hole estimate. The significant factors contributing to this increased cost are the 7" liner and the lost time experienced while waiting on weather to run the BOP stack after it was pulled for repair when the 3-1/2" ram leaked during a BOP stack test (see Equipment Failure Report #17).

The testing cost was 13,190.0 KUSD. This is 166.0 KUSD (1.24%) less than the final test AFE, but 4,927.7 KUSD (59.6%) more than the original testing AFE. The primary reasons for this variation are the troubles experienced with the Halliburton drill pipe tester valve (see Special Report Subsection 7.5) during the first test, weather, and re-establishment of the Otis subsea test tree after it was unlatched due to weather (see Special Report Subsection 7.6).

ESSO EXPLORATION INC

FINAL WELL COST REPORT

REPORT BY John Monus

DATE 5/11/82

RIG Glomar Biscay II

COUNTRY Norway

WELL 15/8-1

M$	ORIGINAL AFE	SUPPLEMENTS	TOTAL AFE	EST. FINAL WELL COST	FINAL COST VS. ORIGINAL AFE
1. RIG	7103	3013.3	10116.3	9539.2	577.1
2. TRANSPORTATION					
Marine	898	466.9	1364.9	1314.5	50.4
Air - Helicopters	395	100.2	495.2	578.4	(83.2)
Air - Fixed Wing					
Total Transportation	1293	567.1	1860.1	1892.9	(32.8)
3. LOGGING					
Mud Logging	83	40.2	123.2	116.4	6.8
Electric Logging	709	650.4	1359.4	1461.5	(102.1)
Fixed Testing Costs	141	59.3	200.3	189.2	11.1
Velocity Survey	15	(2.5)	12.5	5.5	7.0
Total Logging	948	747.4	1695.4	1772.6	(77.2)
4. MUD HANDLING	24	25.8	49.8	46.9	2.9
5. CEMENTING	98	23.9	121.9	119.2	2.7
6. SUBSEA SERVICES	217	84.4	301.4	284.5	16.9
7. WELL LOCATION	90	(10.0)	80	80.0	-0-
8. MATERIALS AND SUPPLIES	1514	507.3	2021.3	1972.0	49.3
9. LAND FACILITIES	424	179.1	603.1	597.4	5.7
10. SUPERVISION					
Direct (Rig/Venture Company)	370	142.7	512.7	484.3	28.4
Distributed (Region/Headquarters)	445	172.4	617.4	53.2	564.2
Total Supervision	815	315.1	1130.1	537.5	592.6
11. OTHER					
Mob/Demobilization	193	(93.2)	99.8	99.8	-0-
Other	470	81.1	552.1	414.5	137.6
Total Other	663	(12.1)	650.9	514.3	136.6
CONTINGENCY	660	(387.9)	272.1	0	272
Total Dry Hole	13849	5053.4	18902.4	17356.5	1545.9
12. PRODUCTION TESTING (Days 73..)		13747.2	13747.2	13190.0	557.2
Total Well Cost	13849	18800.6	32649.6	30546.5	2103.1

STATISTICAL COST DATA	ORIGINAL AFE	SUPPLEMENTS	TOTAL AFE	EST. FINAL WELL COST	FINAL COST VS ORIGINAL AFE
Operating Days	77	102	179	176.02	(2.98)
Meters Drilled	4300		4300	4300	-0-
Operating Cost Per/Day (Dry Hole)	179.9	184.3	178.3	163.7	14.6
(Total)			182.4	170.7	11.7
Operating Cost Per/ "M" (Dry Hole)	3.22		4.4	4.0	.4
(Total)			7.59	7.1	.49

H-1692-1181 GUM

SECTION FIVE

CONCLUSIONS AND RECOMMENDATIONS

5.1 HALLIBURTON DRILL PIPE TESTER VALVE

Personnel should be aware that the drill pipe tester valve operation may be severely hampered by differences between its internal and external pressure. Equalization of the pressures enables the tool to operate freely. The special report in Section 7.5 discusses the problems encountered during well 15/8-1.

5.2 SUBSEA TEST TREE CENTRALIZERS

Subsea test tree (SSTT) centralizers should be as large as is reasonably possible. 13-5/8" centralizers were used on the 15/8-1 well. In an 18-3/4" BOP stack this is too small. Problems were encountered when trying to reconnect at the SSTT after it was unlatched due to severe weather. The reconnection problems led to a fishing operation as described in Section 7.6.

5.3 POLISHED BORE TIE-BACK

A Brown Oil Tool polished bore tie-back sleeve and mandrel were successfully used on this well and should be considered for other liner and/or tie-back operations. The equipment can provide a significant time savings over a conventional tie-back and cementing situation. Section 7.7 provides additional data on this equipment's use in the 15/8-1 well.

5.4 P-110 TUBULAR GOODS

The analysis of the cracked 7" casing couplings by EPRCo. confirmed that the toughness was too low and the couplings failed by brittle fracture (see EPRCo. report pg. 7-48). The low toughness values, determined by Charpy impact testing, were caused by inadequate heat treating during the manufacturing process. In light of the importance of obtaining tubulars of acceptable specification, future P-110 purchases for all drilling campaigns should require the API monogram and the other requirements of API 5AX. It should also be specifically required that the material receive a quench-and-temper heat treatment. Since the API 5AX does not specify minimum toughness, the manufacturer should be consulted regarding material properties typically achieved (including toughness) and quality control measures in force to insure proper specifications are met.

5.5 SLIP SET STABILIZERS

From the discussion of Special Report 7.9, it is recommended to:

- Use conventional stabilizers in straight hole drilling.
- Use slip set stabilizers selectively in direction drilling.

SECTION SIX

SEQUENTIAL OPERATIONS

6.1 MOBILIZATION

The Glomar Biscay II was moved from the 25/10-5 location in the Balder Field to the 15/8-1 location in the Sleipner Field in a total of 14 hours. The rig departed 25/10-5 at 1415 hours, 17 July 1981, and arrived at 15/8-1 at 0415 hours, 18 July 1981.

6.2 MOORING

The mooring operation required 15 hours to complete. Anchors 1, 6, 7 and 8 were piggy-backed as they were run. All anchors were tensioned to 250 kips then slacked off to 200 kips.

6.3 DRILLING OPERATIONS

6.3.1 36" Hole/30" Structural Casing

The well was spudded at 2315 hours, 18 July 1981, after tagging hard bottom at 137.25 m RKB. The 36" hole was drilled to 187.65 m without a temporary guide base using sea water and high viscosity gel slugs. The hole was displaced with gel mud and a survey was taken. A wiper trip was made (no drag, one meter fill) and the hole was again displaced with gel mud.

The 30" casing was run to 185 m with the wellhead 3.74 m above the sea floor. The casing was cemented with 210 sacks of neat cement mixed with sea water followed by 790 sacks of "G" cement with 3% $CaCl_2$ mixed with sea water. Full returns were observed throughout the job. The 30" shoe was drilled out with a 17-1/2" bit and a 26" hole opener to 189 m. The riser was installed.

6.3.2 26" Hole/20" Conductor Casing

The 12-1/4" pilot hole was drilled to 515 m. The bit was tripped to the 30" shoe to recover a survey, then run back to bottom. There was no fill. Logs were run. The riser and hole were displaced with sea water in three stages to check for flow.

The hole was then refilled with mud and an underreamer was used to open it to 26". Again the riser and hole were displaced with sea water prior to running a caliper log.

While running in the hole with the caliper log, the riser parted at the Cameron RCK connector above the lower ball joint. This allowed the caliper log to go outside the wellhead and become tangled on the PGB. It was necessary to jump the Mantis submarine in order to free the caliper log. The Mantis was also used to cut the soft lines tying the pin connector hydraulic hose to the riser.

Once the riser and pin connector had been recovered, a wiper trip was made with a 26" hole opener and a 17-1/2" bit and the hole was filled with mud.

The 20" casing was run and landed in the 30" wellhead with the casing shoe at 500 m. The casing was cemented with 1630 sacks of 0.4 gal/sx Econolite lead slurry and 303 sacks of 0.27 gal/sx $CaCl_2$ tail slurry. Four separate equipment failures occurred on the cementing unit during the job.

While conducting the surface BOP stack test of the upper Hydril, the cap on the lower Hydril dislodged. This was due to the cap not being correctly made up after the rubber element had been changed. A total of 15 hours were lost because of this.

Once the stack was repaired, the annular preventers were tested to 300/3500 psi and the rest of the stack was tested to 300/10,000 psi. The stack and riser were run and landed on the 18-3/4" wellhead. The stack was retested, the wear bushing was set, and the 20" casing shoe was drilled.

6.3.3 17-1/2" Hole/13-3/8" Surface Casing

Three meters of new hole were drilled and a PIT was run to a 14.3 ppg EMW. The hole was displaced with gyp mud and drilled to 1200 m. The highly active clays in the formation, high penetration rate, and large hole all contributed to hole instability problems. Massive sea water dilutions were necessary to keep the mud weight down and the viscosities in the recommended range. In spite of these hole problems, hole was drilled in "target" time.

At TD, two wiper trips were made, and a multi-shot survey was run. The results of this survey are provided in Section 8.12 and a comparison of the multi-shot and single-shot survey results is presented in Section 7.1.

Two attempts were made to run the induction/acoustic/GR log without success. A conditioning trip was made prior to successfully running this log. A second logging run consisting of GR/CNL/CDC was also run.

A conditioning trip was made and the 13-3/8", 68 lb/ft, K-55 casing was run to 1185 m. After circulating 350 bbl (annular volume between surface and 20" shoe), the pH dropped from 9.3 to 7.7 and 7ppm of H_2S was recorded. The pH of the surface mud was increased to 10.5 and the casing was circulated. After the pH in the returns increased to 9.1, the H_2S level dropped to zero. No H_2S was seen at any later time. As results of lab test, this occurrence was attributed to decomposition of starch preservatives.

The casing was cemented with 1027 sacks of Class "G" cement with 0.4 gal/sx Econolite and 0.15 gal/sx CFR-2L and 533 sacks cement with 0.15 gal/sx CFR-2L. The plug was bumped.

6.3.4 12-1/4" Hole/9-5/8" Intermediate Casing

The casing shoe and 2 m of new hole were drilled. A PIT was run to a 16.1 ppg EMW. Highly active clays continued to be a problem in this section of hole. However, due to the smaller hole size and slower penetration rate, dilutions of the mud were much lower.

During the trip back into the hole after picking up a new bit, the pipe became stuck at 2254 m. The pipe was jarred and worked free. The hole was then reamed from 2245 m to TD at 2539 m. Drilling continued with mill tooth bits until 2582 m. At this point, a J-22 insert journal bearing bit was run with a definite improvement over mill tool bits in penetration rate as well as meters of hole drilled.

The J-22 was pulled at 2833 m after entering the chalk and a new bit was run to drill to 2886 m. A short trip was made to 1800 m, the hole circulated and conditioned, and the junk sub worked prior to pulling out of the hole to log. The 12-1/4" hole was drilled in slightly over "target" time.

After logging the well, an X1G bit was run and the hole deepened to 2890 m to ensure sufficient rat hole while running the 9-5/8" casing.

A dual grade string of 9-5/8" casing (P-110 and N-80) was run due to casing availability. Cement was pumped and full returns were observed throughout. The plugs were bumped and the floats held.

6.3.5 8-1/2" Hole/7" Liner

A bit was run in the hole and the cement was tagged at 2844 m. The cement was drilled out and 2 m of new hole were drilled. A leak-off equivalent to 14.6 ppg was obtained. Two more meters of hole were drilled and the BHA pulled in order to run the turbine and diamond bit. The gyp mud was converted to a gel-lignosulfonate system by ceasing all additions of gyp and allowing the mud to gradually revert.

The turbine and LX-13 diamond bit were used to drill the Upper Cretaceous chalk formation. The bit was pulled after entering the Lower Cretaceous shales. A total of 672 m were drilled in 117.25 hours for an average ROP of 5.73 m/hr.

A J-3 bit was used to drill into the top of the Jurassic sands. Five cores were cut from 3658 m to 3705.5 m. A total of 44.9 m of core were recovered for a recovery rate of 95%. Logs were then run to evaluate the reservoir sands.

A J-22 bit was run and the hole reamed from 3646 to 3699 m where the drill pipe became stuck. The pipe was freed by jarring and the hole reamed to bottom. The hole was drilled to 3860 m. The bit was pulled to rerun the turbine.

The turbine and an LX-16 diamond bit were run in the hole to 3648 m where it became stuck. It was again necessary to jar the pipe loose and ream this interval. The turbine then drilled to 3927 m in 18.5 hours at 3.6 m/hr. At this point, the pump pressure increased 600 psi and the turbine was pulled. Inspection of the bit showed that it had "ringed out".

A J-22 bit was used to drill to 3991 m where the hole was logged.

It was decided to set a 7" liner to protect the Jurassic sandstones prior to drilling into the Triassic formation. Lost returns had been experienced

in the Triassic in other North Sea wells. The 7" liner was set at 3990 m with it's top at 2717 m. It was cemented with 1120 sacks of cement. The liner hanger was prematurely set when the annulus partially packed off while circulating. This pack-off caused the surface pressure to increase to 1400 psi (97 bar).

6.3.6 6" Hole

After WOC, an 8-1/2" bit was run to the top of the cement at 2584 m. The cement was drilled to 2687 m, 30 m above the top of the liner, prior to testing the 9-5/8" casing and 7" liner to 4000 psi (276 bar).

The BOP stack was pulled and the upper and middle pipe rams were changed from 5" to 3-1/2". This was to allow closing in on the 3-1/2" tubing and drill pipe strings that were necessary for operation inside the 7" liner. Also at this time, the short slip joint that had been used was changed out to a longer slip joint in preparation for winter weather.

After going back into the hole with an 8-1/2" bit to drill out of the top of the liner, it was discovered that the slip joint was leaking 35-40 bbl/hr. The cause of this leak was sand left inside the slip joint after the inner barrel had been sandblasted. Additionally, a flange on the upper ball joint had not been torqued up. It was necessary to pull the slip joint and repair it prior to drilling out the 7" liner.

A 6" J-4 bit was run to drill out of the liner. After cleaning out the rat hole and drilling 3.5 m of new hole, a PIT test was run to a 17.8 ppg (2.14 s.g.) EMW. The J-4 bit then drilled to 4010 m where it was pulled to run a turbine.

A 5" Eastman turbine and a 6" ACC Armadillo diamond bit were run. After reaming to near bottom (4002 m) an attempt was made to start the turbine. The pumps were brought up to 45 spm and the pressure went to 3800 psi. The pressure fell sharply to 3100 psi followed by a slow drop to 2800 psi. After checking the surface equipment, the pipe was pulled out of the hole to look for leaks. Upon recovering the BHA, the circulating sub was found to be washed out and the turbine would not rotate. What appears to have happened is as follows: when the pressure dropped, the rotary was left running while looking for the leak. The bit probably caught the formation and held (remember they were reaming to bottom), thus the turbine was turned in reverse by the rotary while little or no cooling fluid got down to the turbine. The result: an overheated bearing which froze.

A J-33 bit was run and the hole drilled to 4106 m. The BHA was pulled and the turbine, with a new circulating sub, rerun. It was necessary to ream from 4071 m to bottom. The turbine stalled out several times at 5000 and 12,000 lb weight on bit and, combined with a leak in the swivel packing and several pump failures, was able to drill only 7.6 m during 4 hours of on-bottom time. The turbine was pulled and a J-4 run in the hole.

The J-4 drilled from 4113.6 to 4147 m. While drilling the last 8 m, the Elmago brake became inoperative. After pulling up into the shoe, using power on the drawworks to slow the block, the air supply valve on the number one riser tensioner began to leak.

An attempt was made to test the BOP stack. The middle pipe ram (a recently installed 3-1/2" pipe ram) was leaking.

A 60 sack cement plug was set from 4014 m to 3950 m (calculated height) across the 7" liner shoe at 3990 m. After waiting on cement, the plug was tagged at 3995 m, 5 m below the shoe. A 60 sack cement plug was then set from 3995 m to 3908 m. After waiting on cement, the plug was tagged at 3930 m and tested to 5000 psi. Another cement plug was set from 2747 to 2686 m with 55 sacks of cement. The BOP stack was pulled, the ram rubbers replaced (refer to Equipment Failure Report #17) and the BOP stack tested to 300 and 7500 psi. After WOW for 4.96 days, the BOP stack was run and tested to 300 and 7500 psi successfully. The cement plugs were drilled out and drilling resumed after a total of 13.15 days of lost time due to this stack problem.

The 6" hole was drilled from 4147 m to 4300 m. After making a wiper trip to the 7" shoe with no drag or fill, the bit was pulled. The first log (induction/acoustic) encountered a bridge at 4230 m. The logging tool was pulled and the centralizers removed. However, the tool encountered a bridge at 4240 m on the second run. The tool was pulled and a clean-out trip was made. After making four successful logging runs, a clean-out trip was made.

The Dresser-Atlas multiple formation test (MFT) tool was run in an attempt to determine the formation pressures. After several tool failures and while attempting to repair the MFT, a CBL was run. On the next MFT run the tool stuck at 4143 m. The tool was pulled up to 4080 m at which point it stuck again and the wire line was pulled out of the rope socket. An overshot was made up, run in the hole, and the tool recovered.

A clean-out trip was made and the mud weight in the pit was found to be cut from 11.8 to 10.7 ppg. The mud was weighted up to 11.8 ppg. On circulation, the gas units rose to 65 and a 5 bbl PIT gain occurred. A flow check was made - no flow. The annular BOP was closed and no pressure was observed. However, the mud in the riser was observed to be "rolling" as gas evolved. Continued flow checks and circulation had a maximum of 1700 units of gas which later reduced to 20 units and finally down to 11 units after several circulations.

The MFT was run again and failed. After repairs were made, a fifth MFT run was successfully made.

A sidewall core run was made with 23 of 26 shots being recovered. The tools were recovered, the wear bushing pulled and the BOP stack successfully tested.

6.4 PRODUCTION TESTING

6.4.1 4-1/2" Liner

A clean-out trip was made. The mud weight was increased from 11.8 ppg to 12.1 ppg and it was observed that mud was being lost to the formation. Full returns were regained at a low pump rate (30 spm) and the mud weight was cut back to 11.9 ppg. The pipe was pulled out of the hole.

The 4-1/2" liner was run, landed, and cemented. Minor problems were encountered with the surface lines and blender which delayed the cementing operation slightly. The plug was not released although this was not realized

until the cement manifold was laid down and the drill pipe wiper plug was found in its holder. The plug release latch was not fully retracted (unscrewed) to allow the dart to be launched. The cementing manifold was an old style that did not have the 'tattletale' stinger which gives a positive indication of the dart being released. As a result, the plug was not bumped, but the cement was not overdisplaced.

A bit was run and the cement was tagged at 3928.75 m (the top of the liner was at 3948 m). A pressure test to 5000 psi was conducted with no leak-off. The cement was washed to the top of the liner and the liner lap was tested to 5000 psi with no leakage.

After pulling out of the hole and laying down drill pipe, the 2-7/8" drill pipe and the 3-1/8" drill collars were picked up. A Tri-State J-1 3-3/4" mill was run and worked through the top of the 4-1/2" liner. There was no cement in the top of the liner. The top of the cement was tagged at 4031 m. Cement was washed and drilled to 4268 m - the top of the landing collar. Bottoms-up was circulated and the 4-1/2" liner, liner lap, 7" liner and 9-5/8" casing, tested to 5000 psi - no leak. The pipe was pulled out of the hole.

A 7" RTTS with circulating valve and safety joint was made up and run in the hole. The packer was set at 3920 m. An attempt was made to test below the packer to 6000 psi. A small leak was noticed. The packer was reset at 3921 m. The pressure dropped from 6000 psi to 800 psi in 5 minutes. Upon recovery of the RTTS packer, the bottom packer element and half of the upper element were missing.

A 7" casing scraper run was made followed by running in the hole with another RTTS. The RTTS was set at 3910 m and the drill pipe was displaced with water to dry test the liner lap. A 2550 psi differential existed. The D.P. pressure was bled off and both liner tops tested ok. The water was reversed out and the liner lap and 4-1/2" shoe tested to 6000 psi. After 15 minutes the pressure had dropped 200 psi. This was considered to be acceptable. The RTTS was released and pulled out of the hole.

6.4.2 7" Tie-Back

A Brown Oil Tool PBR polishing mill was made up and run in the hole. However, the mill would not enter the top of the tie-back sleeve. The polishing mill was pulled out of the hole. While waiting on a BOT mill which is specially designed for opening a damaged tie-back sleeve, the 7" casing hanger was made up to a joint of casing and 8" drill collars were laid down.

The tapered mill was run and the tie-back sleeve opened without trouble. The tapered mill was pulled out of the hole and the polishing mill was run.

The wear bushing was pulled. The 7" tie-back string was run. One 7" (P-110) casing collar split longitudinally while being made up (see Equipment Failure Report #20). After waiting on weather and a four hour "sympathy strike", the tie-back mandrel was stabbed in. A pressure test to 2500 psi was run and the tie-back string was pulled back for a space-out adjustment. After making up the additional pup joints and casing hanger joint, the casing was rerun and landed with 2.5 m of seals inside the tie-back sleeve.

A pressure test to 3000 psi was run (the pressure being limited to prevent pumping the string out of the hole). After testing both inside and outside the 7" tie-back string, the 7" casing hanger seal assembly was run, set, and tested to 6000 psi. The wear bushing was run and landed. A 6" bit was run and the orfice collar drilled. The tie-back seals were then tested to 6000 psi (see Special Report Section 7.7).

6.4.3 Production Test - Zone 1: Sleipner Formation

6.4.3.1 First Attempt - Zone 1

The 4-1/2" liner was cleaned out with a 3-3/4" cement mill to the landing collar at 4269 m. A GR/CBL/CCL was run, the wear bushing pulled and the BOP stack tested to 300/7500 psi. The formation was perforated from 4078 to 4084 m and 4089 - 4092 m, with a 2-5/8" casing gun at zero phase and 4 spf. A second perforating run was made due to questionable surface firing indications. The test string was run as specified in the test program with two Sperry Sun MRPG, one Flopetrol SSDR, one Otis Amerada and one Halliburton BT pressure gauges. The tail pipe and bottom hole assembly were filled with a viscous gel pill. The test string was run to 3615 m testing to 500/7500 psi for 10 minutes. After hanging off and WOW for 22.75 hours, running and testing the string was completed, and the surface equipment rigged up and tested. The RTTS was set at 3937 m, 11.5 m above 4-1/2" liner top. The annulus was pressured to 1700 psi to open the APR-N valve. No pressure increase was indicated at the surface. The calculated differential pressure with a full water cushion was 1880 psi into the tubing. The annulus pressure was bled off and 2200 psi applied to the annulus. The calculated APR-N opening pressure was 1600 psi. No flow or pressure increase was noted at the surface. The annulus pressure was bled off, the slip joints picked up and an attempt was made to recycle the drill pipe tester valve to ensure it had opened. The annulus was then pressured to 2500 psi. No pressure increase or flow was noted at the surface. The annulus was bled off, the drill pipe tester valve recycled, and the annulus repressured to 2400 psi. There was no indication that the APR-N valve had opened. The tubing was pressured to 3500 psi in an attempt to equalize the pressure across the APR-N valve and to try to detect a pressure decrease, due to the increase in volume, if the N value was opening. The annulus was pressured to 2200 psi with no response. The tubing was pressured to 1900 psi and bled off to surge the perforations. Finally, the tubing was bled down to 200 psi, the APR-M valve sheared with 4300 psi, and the water cushion was reversed out. The test string was pulled and the pressure gauges recovered. The Amerada and the Flopetrol gauges were damaged and had no recordings (refer to Equipment Failure Report #18). The clock on the Halliburton gauge had stopped prior to attempting the test. The two Sperry Sun gauges provided the only useful pressure information. Upon inspection of the valves, the APR-N was free of debris and appeared to have functioned as evidenced by markings on the ball. The drill pipe tester valve was plugged with barite. The pressure plot confirmed that the APR-N was opening since there was a drop in pressure each time the valve was functioned.

6.4.3.2 Second Attempt - Zone 1

A conditioning trip was made to 4130 m (30 m below the perforations) with a

3-3/4" cement mill. The mud was circulated and conditioned with trip gas of 23 units at bottoms up. The test string was run in the hole in the same configuration and tested as in the first attempt. The tail pipe and bottom hole assembly were filled with a viscous gel pill consisting of 30 lb/bbl bentonite and 5 lb/bbl resinex to 158 m above the APR-N valve. The gel pill was mixed in the cementing unit to avoid contamination. The remainder of the string was filled with fresh water to the surface to give a calculated differential pressure into the tubing of 1927 psi. The packer was set at 3934 m and the annulus pressured to 1900 psi to open the APR-N valve. No flow or pressure increase was noted at the surface. After 30 minutes, the annulus was bled off and repressured to 1900 psi. No indication was observed at the surface to indicate that the APR-N valve had opened. The annulus was repressured to 1900 psi, then to 2100 psi with no response. The annulus was bled off and the drill pipe tester valve recycled. The annulus was repressured to 2100 psi. No indications of valve opening were apparent. The tubing was pressured to 1900 psi to equalize the pressure across the valve with no response. The tubing and annulus were bled to zero and repressured. This sequence was repeated twice with no response. The tubing was then pressured to 3800 psi and the annulus to 1900 psi, with no result. The pressure was bled off, the drill pipe tester valve recycled, the annulus repressured to 1900 psi, and the well left for six hours with no flow and zero tubing pressure. The APR-M was sheared with 3400 psi, the water cushion reversed out, the test string pulled and the gauges recovered. There was no evidence of plugging in the tubing. All gauges had functioned properly except the Halliburton gauge which experienced clock problems, apparently from the tail pipe hitting the 4-1/2" liner top. All gauges gave basically the same result. There was no evidence that the formation was ever exposed to a pressure less than 8100 psi. The significance of two pressure peaks between midnight and 0100 hours is unclear. However, if the APR-N had functioned during this time, these pressure peaks should have been 9584 psi at the highest (water cushion plus 3850 psi on the tubing) and 5784 psi at the lowest (hydrostatic pressure of the water cushion). The only conclusion that can be made is that the formation was never opened to flow. It could not be determined whether the APR-N or the drill pipe tester valve had failed to open.

6.4.3.3 Third Attempt - Zone 1

A bit trip was made to 4130 m and the mud circulated and conditioned with no trip gas on bottoms up. The formation was re-perforated from 4079-85 m and 4090-93 m. The bottom hole assembly was changed to exclude the drill pipe tester valve to eliminate one possible source of failure. The bottom hole assembly and 28 stands of tubing were run in the hole using an external pressure test tool to check connection integrity. The string was hung off for 9 hours to WOW. After resuming running in the hole, the well began U-tubing. After pulling out of the hole, it was found that the mechanical circulating valve had opened. This was due to turning the string to the right to hang off. The clocks were pulled and restarted, the bottom hole assembly filled with 18 m of gel pill and tested to 500/4000 psi. The remainder of the string was filled with fresh water to 188 m to give a differential pressure into the tubing of 5635 psi. The test string was hung off due to severe weather conditions.

After 3.41 days WOW, it was possible to pick up the SSTT and attempt to

complete the production test. However, after multiple problems, including trouble setting the RTTS packer, the test string was pulled due to an inability to get the mechanical circulating valve to close.

The test tools were serviced. However, before a new test could begin, it was necessary to hang off due to weather. As the storm severity increased, the LMRP was disconnected and the riser was pulled. After a delay of 3.66 days including time to repair guide lines and retest the BOP stack, efforts to run in the hole with the test string were recommenced.

6.4.3.4 Fourth Attempt - Zone 1

The tail pipe assembly and gauges were made up and run into the hole without the drill pipe tester valve. At 63 stands of tubing in the hole, the string was tested to 6000 psi. The string was again tested to 6000 psi just prior to picking up the SSTT. The tubing, above the APR-N, had been filled with water as the string was run in the hole.

After testing the surface equipment to 7500 psi and holding a safety meeting (in both the English and the Norwegian languages) the RTTS was set as 3928 m. The 5" rams were closed on the SSTT slick joint and the APR-N valve opened with 1600 psi on the annulus. (A total of 17.95 days of lost time had elapsed since the first attempt to open the APR-N valve on 14 November 1981.)

The well was flowed for 10 minutes. It was shut in for 1 hour 20 minutes prior to being re-opened for the major flow period. The major flow period lasted 12-1/2 hours, during which time the well produced at a rate of about 15 million SCF/day of gas and 1900 bbl/day of condensate.

The well was shut in at the APR-N valve and then at the floor choke manifold. The surface pressure was 1750 psi initially, but gradually increased to 4985 psi. After bleeding the pressure above the APR-N to 500 psi, 79 bbls of mud were pumped into the tubing. At 1500 psi of pump pressure, the pumps were stopped. After 2 bbl bled back, the well was shut in at the floor choke manifold and the pressure monitored while continuing the major build-up period. The well maintained about 680 psi on the tubing.

Upon completion of the major shut-in period, an attempt was made to open the APR-N and inject down the tubing. After several attempts at 5000 psi tubing pressure, the APR-M valve was sheared and the tubing was reversed out. The tubing mud was gas cut to 10 ppg. The annulus was then circulated and conditioned the long way.

Due to rising sea states, the test string was disconnected at the SSTT disconnect. The lubricator valve and SSTT disconnect were recovered and laid down. When the seas subsided, the landing string was picked up and an attempt was made to stab back onto the SSTT disconnect mandrel.

After numerous attempts to reconnect to the subsea test tree, the stinger below the SSTT latch was accidently backed off leaving a fish in the hole, (see Special Report Section 7.6). A protective housing was fabricated from a piece of 12-1/4" pipe and the rig TV mounted in the housing. After circulating the riser with sea water, the TV was run and the stinger was observed

to be in the center of the SSTT. (There had been significant concern regarding the possibility that the stinger had fallen along side the SSTT.) Using a second stinger which was aboard the rig as a test device, it was determined that the fingers of a reverse circulating junk basket could possibly recover the fish. The junk basket was run and the fish recovered.

The SSTT latch, without the stinger, was run and latched to the SSTT. The riser was displaced with mud. The surface mud flowline was plugged and had to be cleaned before the packer could be released, causing a delay of 4-1/2 hours. The packer was unseated with 10,000 lb of overpull. The hole was watched closely. It took no mud and did not flow. An attempt was made to bullhead into the formation, however, at 5000 psi the formation would not take any mud. The SSTT was pulled to the surface. The SSTT latch was released and a new latch assembly was made up. The ball valves in the SSTT could not be opened. Mud was, therefore, pumped down the SSTT, past the closed ball valves. Eighty-five bbls of mud was circulated down the tubing. The SSTT was then broken out and laid down.

The 5" hang-off tool was made up and run in the hole. The hole was then circulated through a full open choke with a maximum of 958 units of gas with 6300 strokes. After 4-1/2 circulations, the gas decreased to 14 units. The RTTS packer, test tools, and tail pipe were pulled out of the hole.

The first zone was then plugged and abandoned by setting an EZSV cement retainer 9 m above the top perforations and squeezing 10.5 bbls of cement (50 sxs) below it. A balanced plug was set above the EZSV retainer with 11.5 bbls of cement (55 sxs). The plug was drilled out to the top of the 4-1/2" liner (3948 m) and the plug and abandonment was completed by setting a 7" EZSV cement retainer with a bridge plug adapter at 3946 m.

6.4.4 Production Test - Zone 2: Sleipner Formation

The second test zone was perforated from 3911 m to 3926 m with 4 spf, 120° phasing. The test string, as shown in Figure 6-1, was run and the tubing tested against the drill pipe tester valve every 20 stands to 500/7500 psi for 5 minutes. The SSTT was landed and the surface equipment rigged up and tested to 500/ 7500 psi for 5 minutes. After repeated attempts to set the packer, the surface equipment was laid down, the SSTT pulled, and the packer set successfully at 3747 m. The packer was run back into the hole, the SSTT landed, and the surface equipment rigged up and tested. The packer was set at 3881 m, 30 m above the perforations. After several attempts to open the APR-N valve, 2000 psi was put on the tubing string. The drill pipe tester valve was recycled and the APR-N valve opened. The well flowed 3-1/2 barrels (volume of string to bottom of APR-N valve) with a surface pressure of 1125 psi. The well was shut-in at the APR-N valve for 1-1/2 hours. The well was opened for a major flow period of 13-3/4 hours. The average flow rate was 16.7 MMSCFD of gas and 2500 B/D of condensate on a 42/64 choke with 0-2% water cut. The well was shut-in at the APR-N valve and at the surface for 21 hours. Initial shut-in pressure was 2320 psi decreasing to 2100 psi at the end of the build-up. The well was killed by bullheading mud down the tubing and shearing the APR-M valve. The fluids were reversed out of the string. The test string was pulled and an EZSV cement retainer was set at 3902 m (10 m above the perforations). The perforations were squeezed

with 105 sxs of Class "G" cement with 0.15 gal/sx HR12L, 0.29 gal/sx CFR2-L and 1.2 gal/sx HLX-C248. The final squeeze pressure was 3500 psi. A bit and casing scraper were run and the cement tagged at 3808 m. The cement plug and retainer were tested to 5000 psi. The clean out string was hung off for bad weather before it could be pulled. A total of 32.25 hours was lost while WOW.

6.4.5 Production Test - Zone 3: Hugin Formation

The third test zone was perforated from 3688 m to 3697 m with a 4" casing gun at 4 spf and a 90° phase angle. The test string BHA was made up and filled with a Hi-Vis spersene pill. The remainder of the string was filled with water. The test string was pressure tested to 500/7500 psi for 5 minutes. The surface equipment was rigged up and tested to 500/7500 for 5 minutes. The RTTS packer was set at 3658 m and the well opened for initial flow with 2000 psi annular pressure. Initial surface pressure was 1190 psi. The well flowed 2-1/4 bbls and was shut-in for initial build-up for 1 hour. The well was re-opened for a major flow at the APR-N valve on a 20/64 positive choke. Initial surface pressure was 1310 psi. Flow stabilized at 23.22 MMSCFD and 2403 BPD of condensate on a 56/64 positive choke with 1879 psi FTP. The well was shut in at the APR-N and the surface for an 18 hour build-up. Final shut in pressure was 2440 at the end of the build-up. The well was killed by bullheading mud down the tubing, shearing the APR-N valve and reversing out the string. The test string was pulled and an EZSV retainer set at 3677 m. Cement was squeezed beneath the EZSV retainer but when the plug was tested, it would not hold 3500 psi. An additional 100 sxs of cement was then squeezed into the zone and a bridge plug was set at 3673 m.

6.4.6 Production Test - Zone 4: Hugin Formation

The fourth zone was perforated from 3643 m to 3653 m at 4 shots per foot. After successfully testing the test string, the well was opened for an initial flow of 1-1/2 bbls on a 24/64 choke. The initial shut in time was 2 hours. The well was opened for the major flow period. The well opened on a 32/64 choke but was changed to a 56/64 choke before being diverted through the separator. The well flowed for 7 hours at an average production of 19.5 MMSCF/Day and 1800 STB/D of condensate. The well was shut-in for a final build-up period. Due to upcoming bad weather the APR-M valve was sheared 7-1/2 hours after final shut in and the test tubing was reverse circulated clean. When the weather subsided the well was killed by bullheading down the annulus with 30 bbl of mud. An EZSV cement retainer was set at 3624 m, and after injecting cement below it, a balanced plug was laid from 3624 m to 3534 m with 50 sxs of cement.

6.5 TEST SUMMARY

6.5.1 Zone 1: Sleipner Formation

Perforations	4078 - 4084 4089 - 4092 m RKB
Initial Flow	5 bbls
Initial Build-up	1 hr. 20 min.
Major Flow Period	12-1/2 hours

Flow Rate	15 MMCFD; 1900 BCPD
Final Build-up	15-1/2 hours
ISIP	1750 psi
FSIP	4985 psi (APR-N valve leaking)

6.5.2 Zone 2: Sleipner Formation

Perforations	3911 - 3926 m RKB
Initial Flow	3.5 bbls
Initial Build-up	1.5 hrs
Major Flow Period	13-3/4 hours
Flow Rate	16.7 MMCFD; 2500 BCPD
Final Build-up	21 hrs
ISIP	2320 psi
FSIP	2100 psi

6.5.3 Zone 3: Hugin Formation

Perforations	3688 - 3697 m RKB
Initial Flow	2.25 bbls
Initial Build-up	1 hr
Major Flow Period	12.75 hours
Flow Rate	23 MMCFD; 2403 BCPD
Final Build-up	18 hrs
ISIP	2600 psi
FSIP	2440 psi

6.5.4 Zone 4: Hugin Formation

Perforations	3643 - 3653 m RKB
Initial Flow	1.5 bbls
Initial Build-up	2 hrs
Major Flow Period	7 hours
Flow Rate	19.5 MMCFD; 1800 BCPD
Final Build-up	7.5 hrs
ISIP	2350 psi
FSIP	2300 psi

6.6 PLUG AND ABANDONMENT

An attempt was made to recover the 7" tie-back string. The string would not pull free at the tie-back sleeve. Therefore, the 7" casing was cut at 1182 m, and after ensuring that the well was not flowing, the 7" casing was recovered with a spear. A plug was set from 1212 m to 1092 m with 125 sxs of cement. The plug was tagged at 1104 m and successfully tested to 2000 psi. The 9-5/8" casing was cut at 238.5 m and recovered with a spear. Eighty-five kips of overpull were required. The 9-5/8" x 13-3/8" annulus was tested to 1200 psi - 18.1 EMW - 2 ppg above leak-off at the 13-3/8" shoe. The 13-3/8" casing was cut at 203 m and recovered with a modified spear assembly that utilized a 3.5 m pup joint in between the spear and stop ring. The 13-3/8" x 20" annulus was tested to 500 psi - 18.1 EMW - 3.8 ppg above leak-off at the 20" shoe. A balanced plug was set from 365 m to 165 m with 435 sxs cement. The riser and BOP stack were pulled after the yellow and blue control pod

lines were unfrozen with steam. While pulling the stack, it was discovered that the #1 and #4 guide line to the PGB were disconnected. The Mantis submarine was put in the water and re-established guide line #4. The 20" and 30" casing strings were cut at 142 m, 5.2 m below the mud line. The 20", 30" and PGB were retrieved. The rig was deballasted, but due to weather delays, the last anchor was not picked up until 1400 hours, January 9, 1982, at which time the rig was released to drill well 16/7-2.