U-614 .3

STATOIL

SLUTTRAPPORT
Brønn 34/10-33CR
PL 050

STATOIL

Tittel:	Rapportnr.:
SLUTTRAPPORT **Brønn 34/10-33CR** **PL 050**	Kontraktnr./Prosjektnr.:
	Tildelt-ID: / Arkivnr.:

Gradering:	Distribusjon:
Fortrolig	**Ingen distribusjon uten tillatelse fra ansvarlig enhet**

Utgivelsesdato:	Eksemplarnr.:
90.06.14	

Antall sider:	Antall vedlegg:	Antall kopier:	Tekstoperatør:
			jcs/koe/aey

Forfatter(e)/Kilde(r):

John C. Self **B&B BOT**
Kåre Otto Eriksen **UND OP**
Arild Eldøy **UND OP**

Omhandler (Fagområder/emneord):

Ansvarlig for utgivelse:	Godkjennende enhet:

Utarbeidet:	Anbefalt:	Godkjent:
Dato Sign. Org.	Dato Sign. Tittel	Dato Sign. Tittel

STATOIL

Rapport		Nr	Dato
SLUTTRAPPORT 34/10-33CR		RUV/T900315R	10.10.90
Kap.	Utarbeidet	Kontrollert	Godkjent
1,2,3	K.O.Eriksen, GEO-OP	A.Eldøy, GEO-OP	Avd.leder,GEO-OP
4	J.C.Self, B&B	J.Haave, B&B	Ass. boresjef

STATOIL

DISTRIBUSJONSLISTE

Nr		Antall
K1&2	Oljedirektoratet	2
K3&4&5	Norsk Hydro	3
K6	Saga Petroleum	1
K7	UND arkiv	1
K8	Arkiv DDB-TDS	1
K9	Arkiv DDB-BBT	1
K10&K11	Brønnarkiv DDB-BBT	2
K12&K13	Brønnarkiv DDB-RUV	2
K14	Arkiv B&B ST-FA	1
K15	UND GEO-OP	1

STATOIL

Innholdsfortegnelse

1 GENERELL INFORMASJON

1 GENERELL INFORMASJON

1.1 Brønndata

Brønnbetegnelse:	34/10-33CR
Brønnklassifisering:	Reentret
Felt:	Gullfaks Sør
Land:	Norge
Lisens:	PL 050 Statoil (operatør) 85% Norsk Hydro 9% Saga Petroleum 6%
Borerigg:	Deepsea Bergen
Rigg på lisens:	22.02.90 kl.10:00
Rigg av lisens:	27.04.90 kl.19:30
Høyde til rotasjonsbord (RKB):	23 m
Vanndyp:	134 m
Geografiske koordinater overflatelokasjon:	61° 07' 34.44" Nord 02° 12' 57.10" Øst
UTM koordinater over-flatelokasjon:	UTM sone 31, CM 03° øst Nord: 6 777 262 Øst: 457 765
Seismisk beliggenhet overflatelokasjon:	Linje nr. ST 8134-156 Skuddpunkt nr. 296
Totalt dyp for brønnen:	3752 m Målt dyp, ref. RKB 3563.9 m vert. dyp MHN.
Status:	Permanent plugget

BLOCK 34/10 GULLFAKS

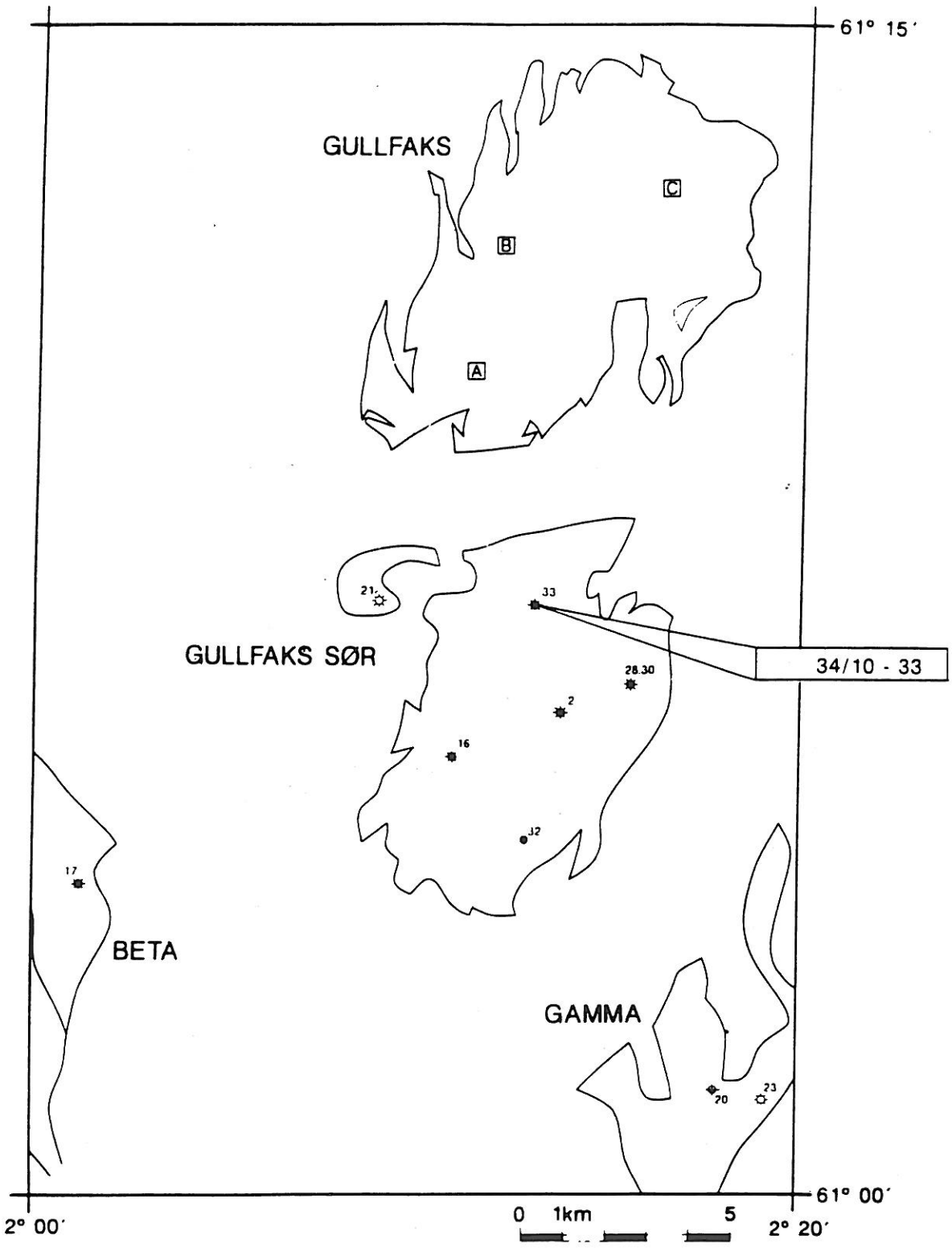


Fig.1.1

1.2 Hensikt med brønnen

Hovedhensikten med reentring av den midlertidig forlatte brønnen 34/10-33C(T1) var å hente opp trykkmålere som var hengt av i nippel etter testproduksjonen i brønn 34/10-33C(T1) samt plugge brønnen permanent.

Følgende hovedformål med testproduksjonen i 34/10-33C(T1) ble ikke oppfylt:

- Bestemme midlere reservoartrykket etter testproduksjon i 34/10-33C(T1) for å evaluere trykkstøtten fra gasskappen.

For å få denne informasjonen måtte trykkmålerene som ble hengt av i nippel hentes opp fra brønnen.

- Det var ikke mulig å benytte produksjonsloggeverktøy.

- Alle bunnhullstrykkmålerene sviktet før hovedstrømningsperioden startet.

I tillegg ble det observert en uventet økning i GOF. På grunnlag av eksisterende data var det ikke mulig å fastslå årsaken til denne økningen.

De to trykkmålerene som var installert i brønn 34/10-33C(T1) skulle i henhold til tidligere vedtatte planer hentes opp og brønnen skulle deretter plugges permanent. Sannsynligheten for at disse trykkmålerene fungerte var antatt liten (ref. rapport "Problem med trykkmålere under testing av 34/10-33T1").

For å oppnå opprinnelige hovedformål med testproduksjonen i 34/10-33C(T1) ble det i forbindelse med reentringen besluttet å utføre en ny produksjonstest med samme perforeringsintervall som i 34/10-33C(T1).

1.3 Resultater fra brønnen

De to trykkmålerene som var installert i brønn 34/10-33C hadde begge sviktet.

Alle hovedformålene med produksjonstesten i brønn 34/10-33CR ble oppfylt. For detaljer vedrørende testresultatene, refereres det til "Testrapport brønn 34/10-T1 og 34/10-33CR".

1.4 Kontraktører

Borekontraktør:	Oddfjell Drilling
Dykking:	Subsea Dolphin
Elektrisk logging:	Atlas Wireline Services
Forsyningsbåter:	Statoil Forsyningsbåt Pool
Hjelpefartøy:	Statoil Båt Pool
Foringsrør:	TOS
Helikopter:	Helikopter Services
Riggposisjonering:	Geoteam/Decca
Sementering:	Halliburton
Slamlogging:	Exlog
Slamkontrakt:	Promud
Kutting av foringsrør:	A-1

1.5 Foringsrør

Se "Sluttrapport Brønn 34/10-33C".

1.6 Elektrisk logging

Logg type	Kjør nr.	Intervall (m RB)
PERF/CCL	4A,B	3100.0 - 3180.5
GR/CCL	6B	3160.0 - 3351.0
GR/CCL	7C	3157.8 - 3393.6
GR/CCL-PLT	9A	3428.0 - 3537.0
B-PLUG/CCL	6A	3365.0 - 3385.0
B-PLUG/CCL	10B,C,D	340.0 - 2425.0
BACK-OFF/CCL	7A	91.0 - 180.0
PLT/GR/CCL	9A	3428.0 - 3537.0

1.7 Oversikt over andre rapporter fra brønnen

- Re-entry and Well Test Programme
  Well 34/10-33CR ..... Statoil
- Navigation and Positioning of Drilling
  Rig Deepsea Bergen for Re-entry ..... Statoil
- Sluttrapport brønn 34/10-33C ..... Statoil
- Testrapport brønn 34/10-33T1 og
  34/10-33CR ..... Statoil
- Gauge Report , well 34/10-33CR
  DST 1A ..... MWS
- Gauge Report , well 34/10-33CR
  DST 1B ..... MWS
- Gauge Report , well 34/10-33CR
  DST 1A ..... HRS
- Gauge Report , well 34/10-33CR
  DST 1B ..... HRS
- Well Summary ..... Promud
- Flow computer data from well 34/10-33CR Statoil
- Well Testing Report, 34/10-33CR DST#1,1A Schlumberger
- Well Testing Report, 34/10-33CR DST#1B . Schlumberger

2 GEOLOGISK SAMMENDRAG

2 GEOLOGISK SAMMENDRAG

Se sluttrapporter 34/10-33A, B, C

3 BRØNNTEST SAMMENDRAG

3.1 DST-1, DST-1A

3.2 DST 1B

3.3 VEDLEGG

3 BRØNNTEST SAMMENDRAG

34/10-33CR ble testet i intervallet 3448.0 - 3517.0 m målt dyp RB (3370.3 - 3418.4 m vertikalt dyp RD) i Ness enhet 2. Dette er samme intervall som ble testet i 34/10-T1 brønnen. Inervallet ble perforert på nytt med 5" OD kanoner med 6 skudd/fot, 90 grader fase og 32 gram ladninger. Nummerering av testene er basert på følgende :

DST-1 : Gikk i hullet med perforeringskanon på teste-strengen. Kom ikke ned med perforerings-spettet. Teststrengen ble trukket.

DST-1A : Før testestrengen ble kjørt for denne testen var det perforert på borestreng i overbalanse. Denne testen ble avbrutt da en gikk fast med kabelutstyr.

DST-1B : Dette er en komplett test med opprenskning og hovedstrømming med PLT logging.

3.1 DST-1, DST-1A

DST nr. 1A bestod av en initiell strømning og trykkoppbygningsperiode etterfulgt av en lengre strømningsperiode for å renske opp borehull/perforeringer. Testen måtte avbrytes og testestrengen trekkes etter opprenskingsstrømningsperioden (før planlagt PLT operasjon) p.g.a. kabel med kabelverktøy ble sittende fast i testestrengen.

Tabell 3.1.1 gir en oversikt over hovedaktivitetene sammen med resultatene fra test 1A.

Tabell 3.1.2 gir en oversikt over trykkmålere kjørt sammen med testestrengen.

Aktivitet	Varighet timer	Dyse 1/64"	Qo Sm3/d	Qg Sm3/d	GOR Sm3/Sm3	WHP kPa	WHT deg. C	BHP kPa	BHT deg. C
Initiell strømning	2.20	16	-	-	-	18670	50.0	41156	123.0
Initiell trykkoppb.	4.57	0	0	0	-	22500	9.0	43518	116.9
Opprenskings-strømningsperiode	11.40	52	1624	313300	193	16360	80.0	40234	124.3
Trykkoppbygging	26.43	0	0	0	-	-	-	43504	116.5

- Bortsett fra opprenskingsperioden er verdier tatt fra siste lesning fra hver aktivitet.
- Data fra opprenskingsperioden er tatt ved strømming på 52/64" fast dyse kl.11:45.
- Rate og brønnhodetrykk fra Statoil "flow computer".
- Bunnhullstrykk og temperatur fra HMR 10122.
- Brønnhodetemperatur fra Schlumberger manuelle avlesninger.

Tabell 3.1.1 Test-resultat

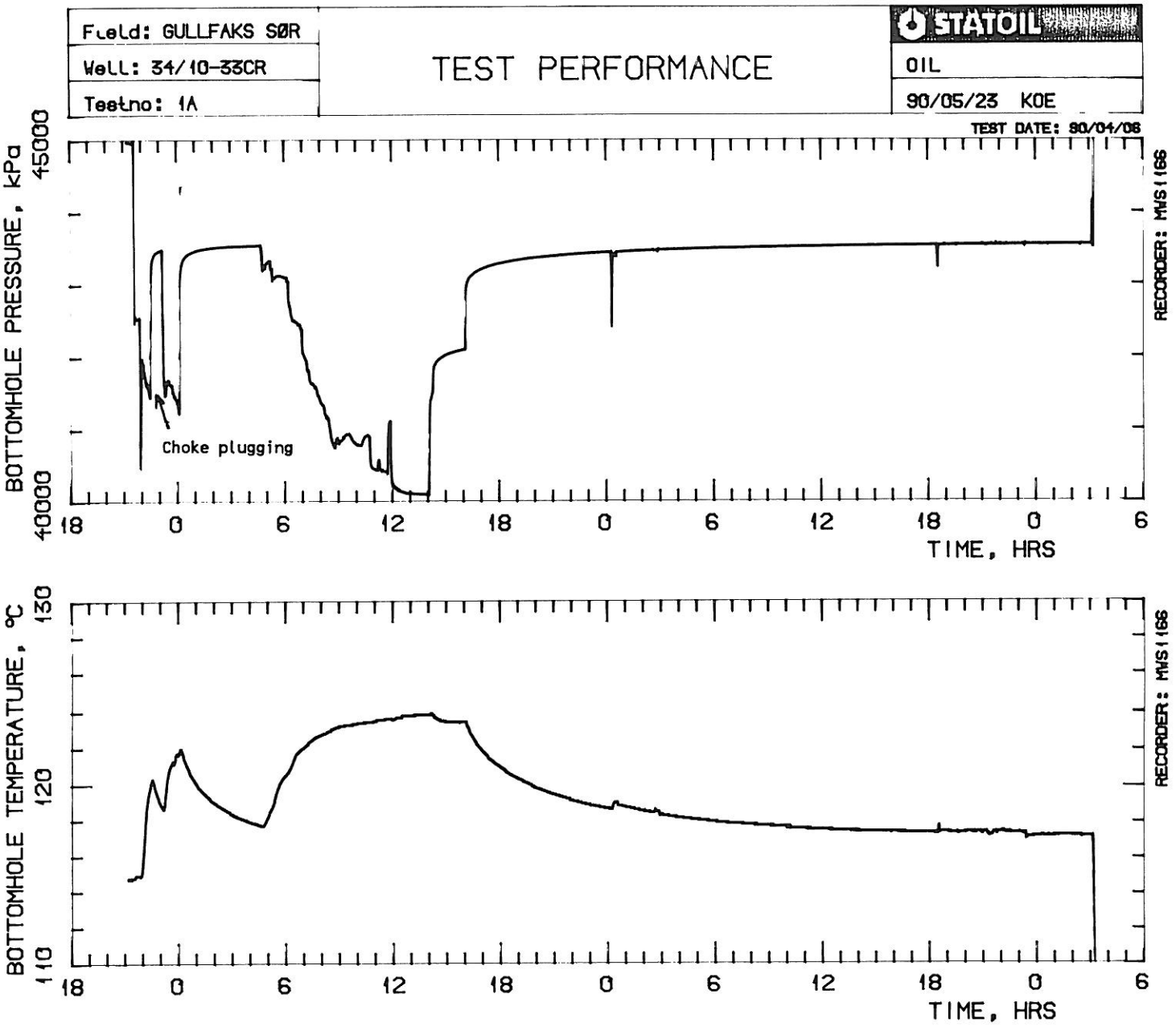
Figur 3.1.1 viser en grafisk presentasjon av bunnhullstrykk og bunnhullstemperatur fra hele testeforløpet. Det korresponderende brønnhodetrykk sammen med dysestørrelser og gass/oljerater er vist i figur 3.1.2. Figur 3.1.3 viser separator trykk og temperatur samt gass/oljerater.

Leverandør	Betegnelse	Nr.	Måledyp m MD RKB	Måledyp m SVD RKB
Maritime Well Service	Panex 1575	24-1164	3216.81	
Maritime Well Service	Panex 1575	24-1166	3216.81	
Maritime Well Service	Panex 1420B	3-1457	3212.56	
Maritime Well Service	Panex 1420B	24-1164	3212.56	
Halliburton Reservoir Serv.	HMR	10525	3208.06	
Halliburton Reservoir Serv.	HMR	10209	3208.06	
Halliburton Reservoir Serv.	HMR	10080	3208.06	
Halliburton Reservoir Serv.	HMR	10122	3208.06	

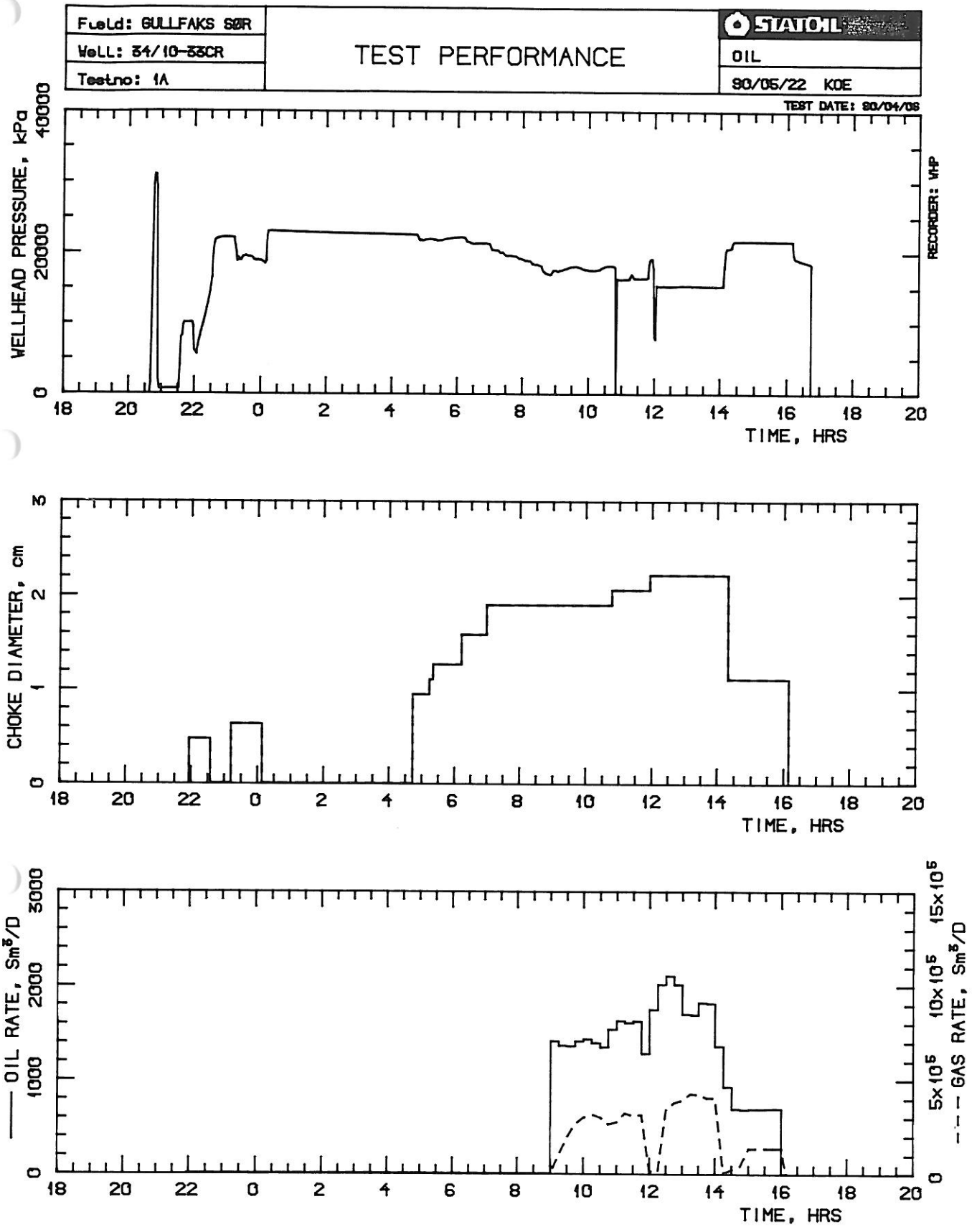
Tabell 3.1.2 Trykkmålere

Alle trykkmålerene fungerte hele testeperioden. Bortsett fra MWS trykkmålernr. 1164, som leser ca. 100 kPa for høye trykkverdier, samsvarer trykkmålerene meget bra.

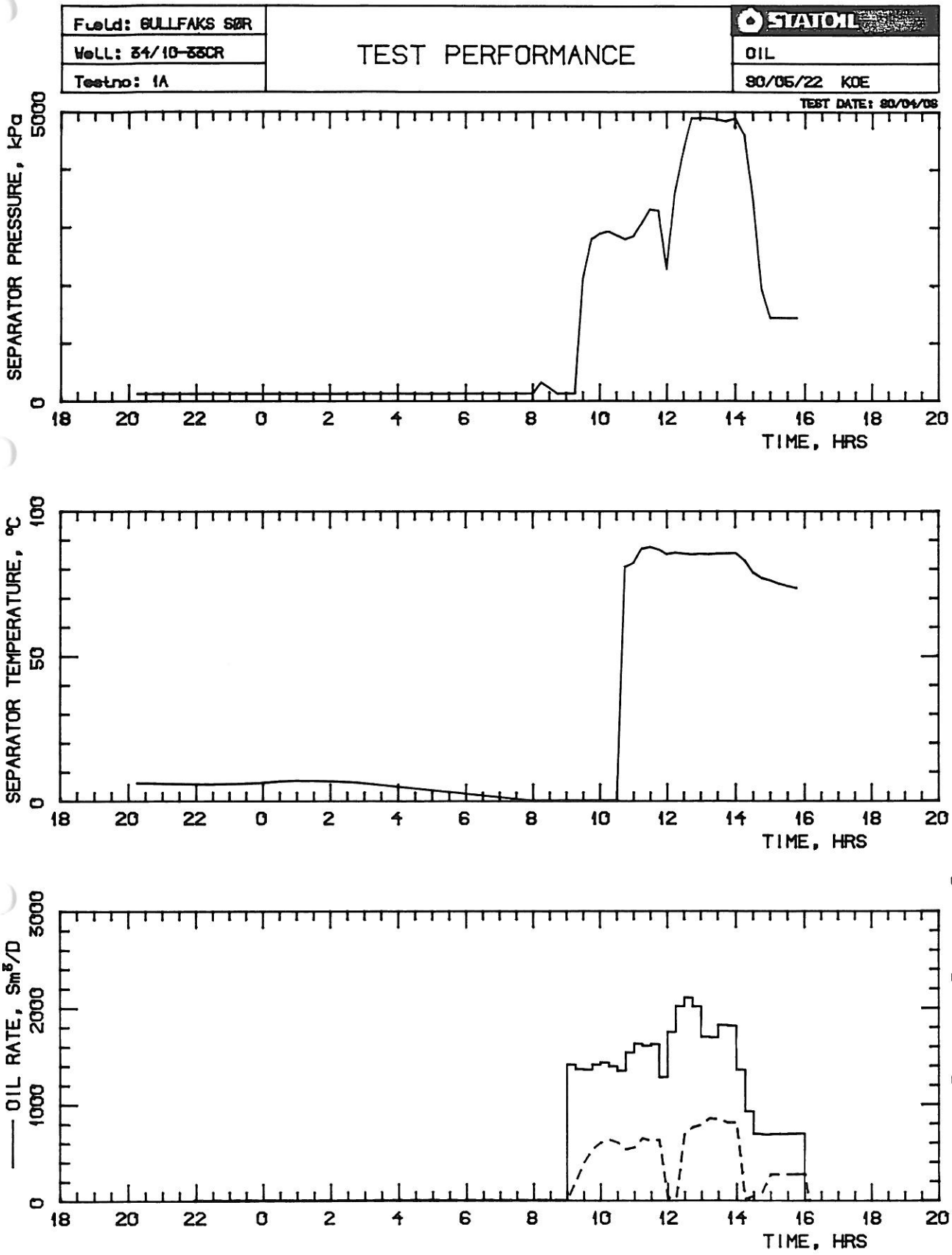
Hendelsforløp og trykkmålerarrangement fins i 3.3 Vedlegg.


Field: GULLFAKS SØR
Well: 34/10-33CR
Testno: 1A
TEST PERFORMANCE
STATOIL
OIL
90/05/23 KOE
TEST DATE: 90/04/08
BOTTOMHOLE PRESSURE, kPa
45000
40000
Choke plugging
RECORDER: MWS1166
18
0
6
12
18
0
6
12
18
0
6
TIME, HRS
BOTTOMHOLE TEMPERATURE, °C
130
120
110
RECORDER: MWS1166
TIME, HRS

Figur 3.1.1



Figur 3.1.2



Figur 3.1.3

3.21 DST-1B

DST nr. 1B bestod av en lengre strømningsperiode for å renske opp borehull/perforeringer. Deretter ble PLT utstyr kjørt inn i hullet og en hovedstrømning bestående av 3 ulike rater ble utført.

Tabell 3.2.1 gir en oversikt over hovedaktivitetene sammen med resultatene fra test 1B.

Tabell 3.2.2 gir en oversikt over trykkmålere kjørt sammen med testestrengen.

Aktivitet	Varighet timer	Dyse 1/64"	Qo Sm3/d	Qg Sm3/d	GOR Sm3/Sm3	WHP kPa	WHT deg. C	BHP kPa	BHT deg. C
Opprensknings-strømningsperiode	13.68	56	1986	297900	150	15170	92.3	40118	124.9
Trykkoppbygging	15.65							44089	119.4
Lav-rate	10.85	20	408	85680	210	22480	52.4	43363	124.2
Middels-rate	10.50	40	1113	211470	190	19720	80.6	41762	124.7
Høy-rate	19.61	52	1634	305558	187	16110	94.2	40454	125.0
Trykkoppbygging	17.80							44061	120.7

- Verdier er tatt fra siste lesning fra hver aktivitet.
- Rate, brønnhodetrykk og temperatur er fra Statoil "flow computer".
- Bunnhullstrykk og temperatur fra HMR 10044.

Tabell 3.2.1 Test-resultat

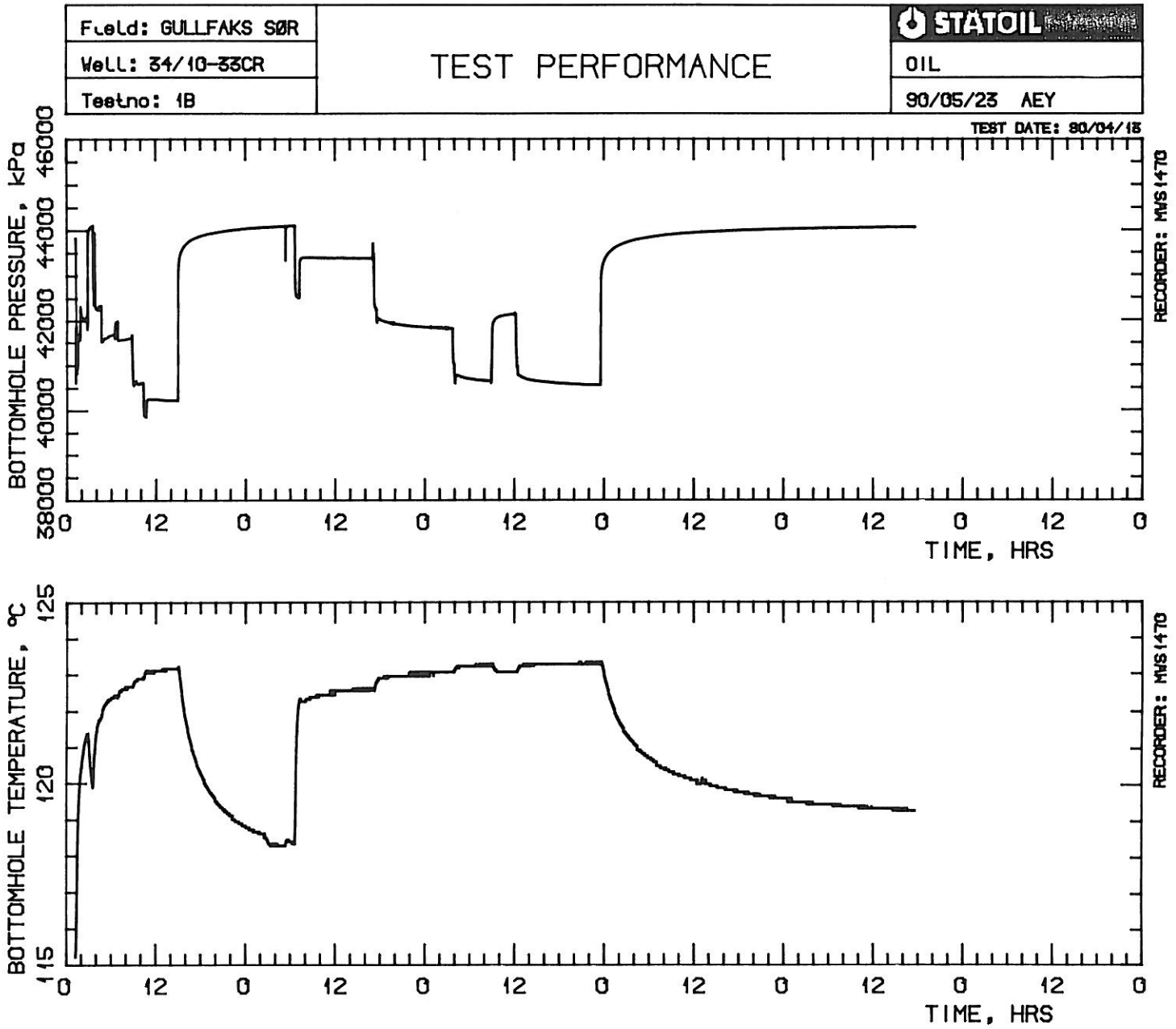
Figur 3.2.1 viser en grafisk presentasjon av bunnhullstrykk og bunnhullstemperatur fra hele testeforløpet. Det korresponderende brønnhodetrykk sammen med dysestørrelser og gass/oljerater er vist i figur 3.2.2. Figur 3.2.3 viser brønnhode trykk og temperatur. Figur 3.2.4 viser separator trykk og temperatur. Figur 3.2.5 Viser målte rater og midlere rater for DST-1B.

Leverandør	Betegnelse	Nr.	Måledyp m MD RKB	Måledyp m SVD RKB
Maritime Well Service	Panex 1575	24-1164	3353.58	3300.00
Maritime Well Service	Panex 1575	24-1166	3353.58	3300.00
Maritime Well Service	Panex 1420B	9-0060	Failed	
Maritime Well Service	Panex 1420B	3-1470	3349.33	3296.80
Halliburton Reservoir Serv.	HMR	10525	3344.86	3293.50
Halliburton Reservoir Serv.	HMR	10209	3344.86	3293.50
Halliburton Reservoir Serv.	HMR	10080	3344.86	3293.50
Halliburton Reservoir Serv.	HMR	10122	Failed	

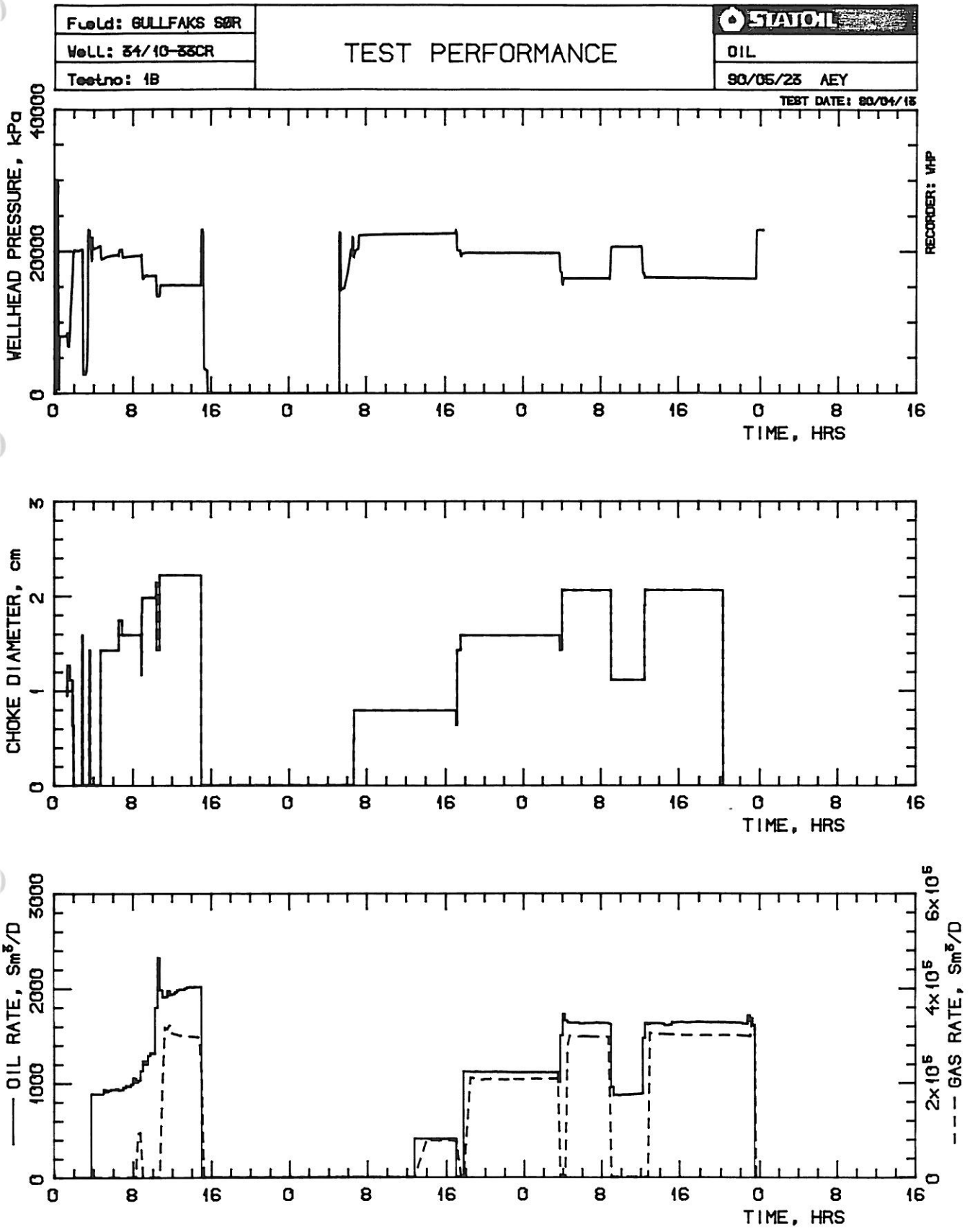
Tabell 3.2.2 Trykkmålere

To trykkmålerene sviktet, en fra MWS og en fra HRS.
I tillegg fins det trykkdata fra AWS PLT logging. Samplingrate er her varierende fra 1 sekund til 5 minutt.

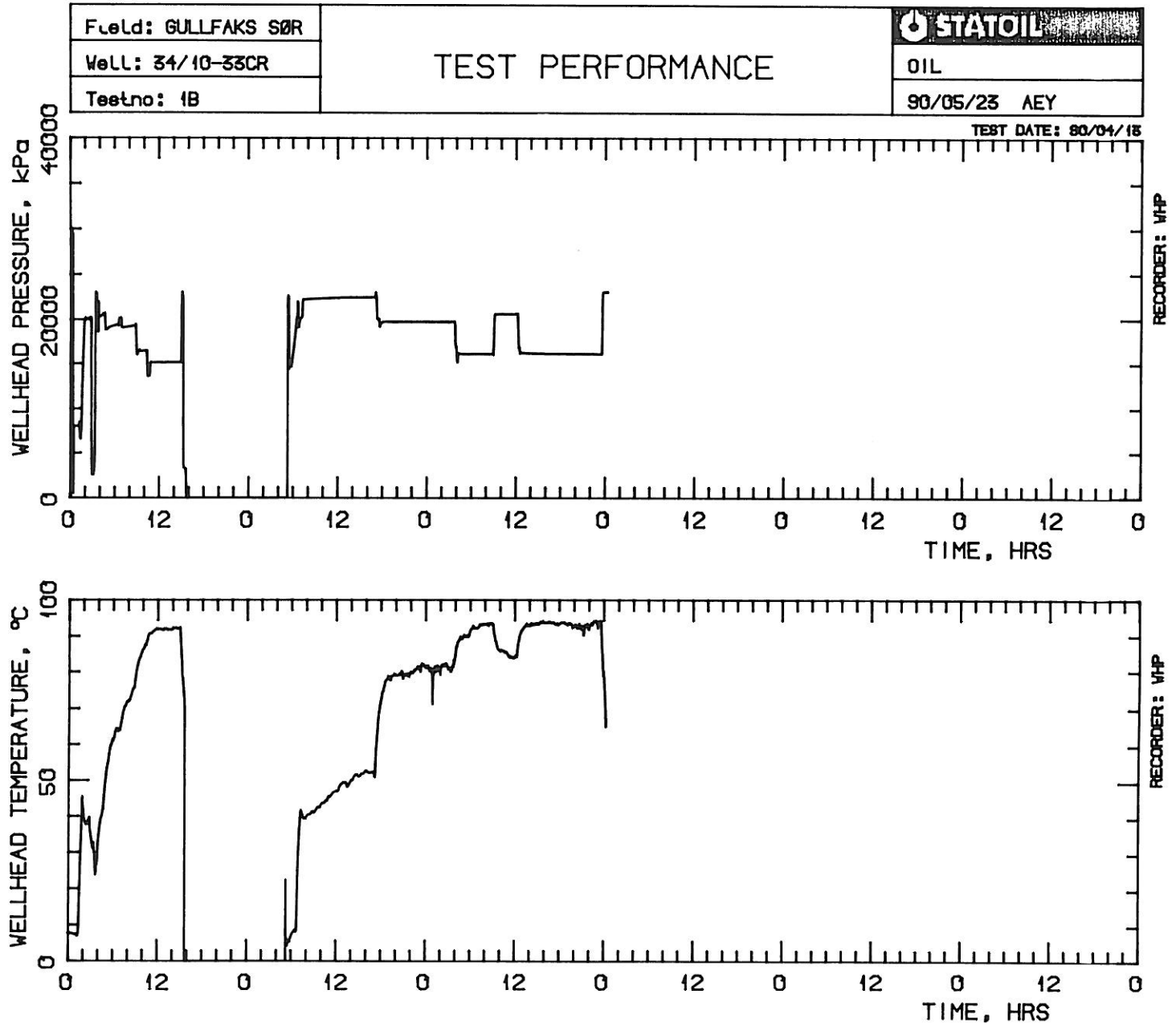
Hendelsforløp og trykkmålerarrangement fins i 3.3 vedlegg.


Field: GULLFAKS SØR
Well: 34/10-33CR
Testno: 1B
TEST PERFORMANCE
STATOIL
OIL
90/05/23 AEY
TEST DATE: 90/04/15
BOTTOMHOLE PRESSURE, kPa
38000 40000 42000 44000 46000
RECORDER: MMS1470
0 12 0 12 0 12 0 12 0 12 0 12 0
TIME, HRS
BOTTOMHOLE TEMPERATURE, °C
115 120 125
RECORDER: MMS1470
0 12 0 12 0 12 0 12 0 12 0 12 0
TIME, HRS

Figur 3.2.1



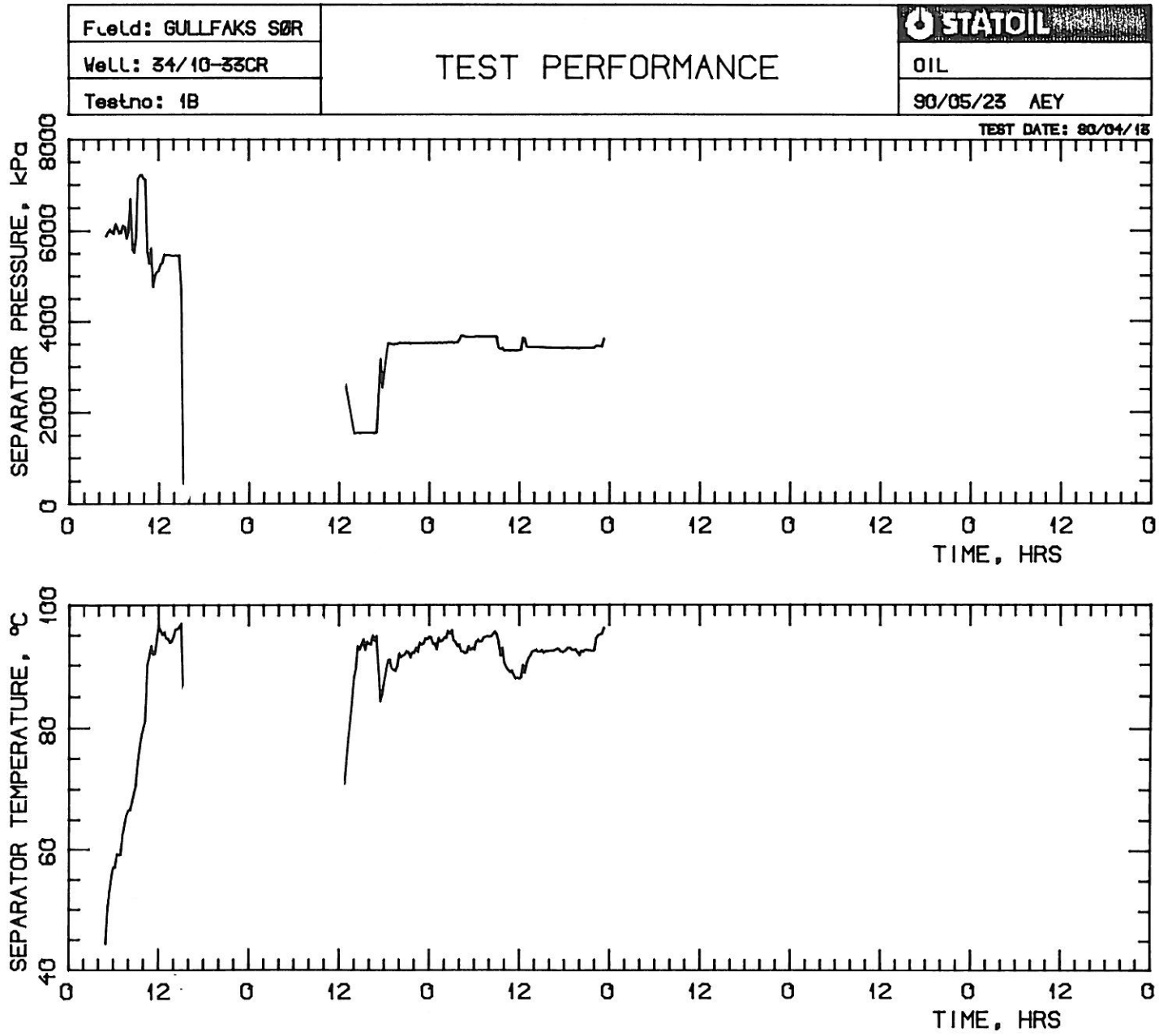
Figur 3.2.2



Figur 3.2.3

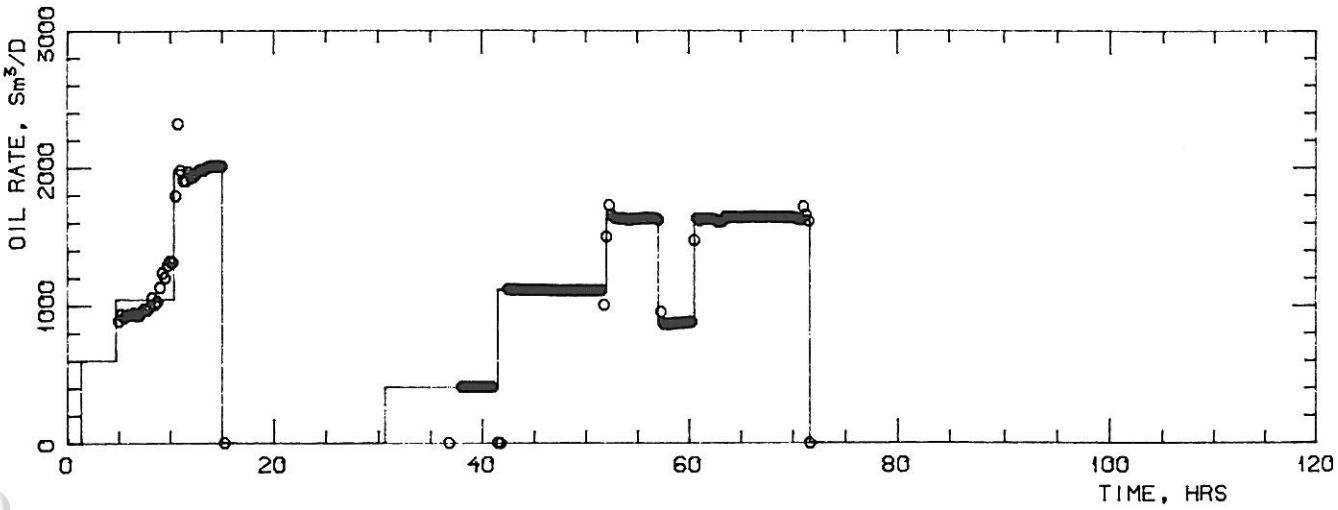
23.05.1990 9:10 AM BY D11789

STATOIL


Field: GULLFAKS SØR
Well: 34/10-33CR
Testno: 1B
TEST PERFORMANCE
STATOIL
OIL
90/05/23 AEY
TEST DATE: 90/04/15
SEPARATOR PRESSURE, kPa
0
2000
4000
6000
8000
0 12 0 12 0 12 0 12 0 12 0 12 0
TIME, HRS
SEPARATOR TEMPERATURE, °C
40
60
80
100
0 12 0 12 0 12 0 12 0 12 0 12 0
TIME, HRS

Figur 3.2.4

Field: GFS	RATE HISTORY	STATOIL
Well: 34/10-33CR		
Testno: 1B		90/04/19 AEY



RATE HISTORY:

t_0	=	0.000 hrs	q_0	=	0.0 Sm^3/d
t_1	=	1.317 hrs	q_1	=	0.0 Sm^3/d
t_2	=	4.716 hrs	q_2	=	600.0 Sm^3/d
t_3	=	10.367 hrs	q_3	=	1043.0 Sm^3/d
t_4	=	15.000 hrs	q_4	=	1986.0 Sm^3/d
t_5	=	30.650 hrs	q_5	=	0.0 Sm^3/d
t_6	=	41.500 hrs	q_6	=	408.0 Sm^3/d
t_7	=	52.000 hrs	q_7	=	1113.0 Sm^3/d
t_8	=	57.000 hrs	q_8	=	1631.0 Sm^3/d
t_9	=	60.500 hrs	q_9	=	878.0 Sm^3/d
t_{10}	=	71.610 hrs	q_{10}	=	1634.0 Sm^3/d
t_{11}	=	120.000 hrs	q_{11}	=	0.0 Sm^3/d

PRESSURE DATA ANALYZED FROM $t = t_{10}$

RATE (CHANGE) USED IN EQUATIONS: $q = q_{10}$

Figur 3.2.5

DST-1A

	0340	Started RIH w/test string for DST 1A. Not able to pass through wellhead.
	0930	POOH w/BHA, found tubing entry guide bent. Layed out perforated anchor.
	1400	Started RIH w/test string. String took 30 ton weight at 3214 m.
060490	0300	Worked string from 3214 to 3231 m with 15 ton down weight. Not able to get below 3231 m.
	0815	Started POOH w/landing string, spaced out below fluted hanger.
	1000	Pressure tested according to program.
	1952	Set RTTS packer at 3222.5 m MD RKB .
	2136	Press. up tubing to 70 bar to reduce press. differential across LPR-NR valve.
	2138	Opened LPR-NR valve.

INITIAL FLOW

	2156	Opened well on 12/64" adj. choke on choke manifold. Flow to stock tank.
	2208	Bypassed tank, flow diverted to oil flare. Total of 6 m3 produced to tank (eqiv. to a flow rate of 864 sm3/d).
	2230	Mud to surface, adjustable choke plugged.
	2234	Changed to 16/64" fxd. choke on CM. Fixed choke plugged. Closed choke manifold.
	2312	Opened well on 16/64" adj. choke on CM.
	2314	Gas to surface.
	2344	Bled off annulus pressure to close LPR-NR valve. No indication of LPR-NR closed.
	2352	Pressured up ann. to open LPR-NR.
070490	0003	Bled off annulus pressure to close LPR-NR. No success.
	0007	Pressured up annulus to open LPR-NR.

INITIAL BUILD-UP

	0003	Well closed in at choke manifold for initial build-up.

CLEAN-UP FLOW

	0443	Opened well slowly to 24/64" adj. choke on choke manifold flowing direct to oil flare.
	0514	Increased to 28/64" adj. choke on CM.
	0520	Increased to 32/64" adj. choke on CM.
	0613	Increased to 40/64" adj. choke on CM.
	0659	Increased to 48/64" adj. choke on CM.
	0745	Flow diverted through separator.
	1047	Changed to 52/64" fxd. choke on CM.
	1146	Changed to 52/64" adj. choke on CM.
	1156	Changed to 56/64" fxd. choke on CM.
	1405	Changed to 56/64" adj. choke on CM.
	1419	Changed to 28/64" fxd. choke on CM.
	1545	Switched flow through tank for meterfactor measurement.

	1555	Switched flow back to burners.
	1607	Bled off annulus pressure to close LPR-NR.
		BUILD-UP
	1609	Closed CM.
	1645	Started to rig up AWS for PLT dummy run.
	2148	Ran in hole.
	2344	Tagged LPR-NR valve at 3199m. PO to 3168.5 m.
080490	0020	Cycled LPR-NR valve to locked open position. WHP increased from 170 bar to 230 bar.
	0045	Attempted to RIH with dummy tool to verify that LPR-NR valve was open, negative. Tool stuck at approx. 3160 m. Worked wireline to free tool.
	0241	Cycled LPR-NR valve (later proved to be in closed position).
	0440	Opened well on choke manifold and bled off gas in string.
	0700	Filled string above LPR-NR with 1.45 SG mud. After pumped 16.8 m3, pressure increased to 220 bar and Atlas Wireline lost 1400 lbs cable tension.
	0800	POOH w/Atlas Wireline, found dummy tool and 0.5 m cable left in test string. RD AWS.
	1433	Attempted to cycle RS-OMNI tool, negative.
	1835	Sheared APR-M valve, started to reverse circulate string volume.
090490	0311	Unset RTTS packer and attempted to bullhead. Unable to bullhead, max pump pressure 160 bar.
	0510	Started circulating the long way. POOH w/test string.
100490	1430	Test string OOH.

3.3 VEDLEGG

HENDELSESFORLØP WELL 34/10-33CR, DST-1, DST-1A

Perforated interval: 3448.0 - 3517.0 m MD RKB
3370.3 - 3418.4 m TVD RKB

DATE	TIME	SEQUENCE OF EVENTS
		DST-1
260390	1315	RIH test string for DST-1.
310390	1715	RIH GR-CCL for correlation.
	1900	POOH GR-CCL. 2.4 m deep.
010490	0842	Set packer at 3376 m MD RKB (ref.CBL/VDL run 2A).
	1305	Opened LPR-NR.
	1311	RIH w/det.bar, stopped at 3375 m.
	1410	Opened well on 12/64" adj. choke. No flow. Well closed.
	1413	Re-opened well on 8/64" adj.choke.
	1415	Cont. RIH w/det. bar. Unable to pass 3420 m. POOH. Re-designed firing bar assembly and RIH. Not able to pass 3422 m. POOH. New re-design of the firing bar (more knuckle joints) Not possible to pass 3422 m. POOH.
020490	0350	Attemted to bullhead. Negativ. Max bullhead press. 300 bar.
	0536	Started to rev.circ.
	1230	POOH w/teststring.
		PERFORATION
040490	0600	RIH w/perf. guns on drillpipe.
	1530	R/U and RIH GR-CCL.
	1830	POOH GR-CCL. 2.1 m deep. Spaced out.
	2024	Re-perforated 7" liner from 3448 m to 3517 m using 5" OD 6 spf perforating guns loaded with 32 gram DP charges.
	2100	Started to POOH w/perf. string.
050490	0330	OOH w/guns. All shots fired.

STATOIL

WELL : 34/10-33CR	GAUGE ARRANGEMENT	PERF.: 3448.0-3517 (m MD RKB)
TEST NO.: **1A**		ZONE : NESS 2

MWS Bundle carrier : 3218.28 m MD RKB

MWS

Gauge type and number	: Panex 1575 24-1164
Sensor depth	: 3216.81 m MD RKB
Max. op. pressure	: 68966 kPa
Memory capasity	: 21400 data set
Interval	: 30 sec for 96 hrs. 1 min for 164 hrs.
Delay	: 30 hrs.
Start recording	: 06.04.90 06:01

MWS

Gauge type and number	: Panex 1575 24-1166
Sensor depth	: 3216.81 m MD RKB
Max. op. pressure	: 68966 kPa
Memory capasity	: 21400 data set
Interval	: 30 min for 96 hrs. 1 min for 164 hrs.
Delay	: 30 hrs.
Start recording	: 06.04.90 06:12

MWS

Gauge type and number	: Panex 1420B 3-1457
Sensor depth	: 3212.56 m MD RKB
Max. op. pressure	: 68966 kPa
Memory capasity	: 30000 data set
Interval	: 30 sec for 150 hrs. 1 min for 198 hrs.
Delay	: 24 hrs.
Start recording	: 05.04.90 23:50

MWS

Gauge type and number	: Panex 1420B 3-1470
Sensor depth	: 3212.56 m MD RKB
Max. op. pressure	: 68966 kPa
Memory capasity	: 30000 data set
Interval	: 30 sec for 150 hrs. 1 min for 193 hrs.
Delay	: 24 hrs.
Start recording	: 05.04.90 23:54

Remarks: All four MWS gauges worked OK. However, gauge 1164 read approx. 100 kPa too high compared to the other MWS and HMR gauges run. From the before and after job calibration checks and by comparing the MWS gauges to the HMR gauges, 1166 proved to be the most representative gauge.

STATOIL

WELL : 34/10-33CR	GAUGE ARRANGEMENT	PERF.: 3448.0-3517 (m MD RKB)
TEST NO.: **1A**		ZONE : NESS 2

HRS Bundle carrier : 3208.39 m MD RKB

HRS

Gauge type and number	: HMR 10525
Sensor depth	: 3208.06 m MD RKB
Max. op. pressure	: 68966 kPa
Memory capasity	: 32000 data set ?
Interval	: 4 min for 24 hrs. 30 sec. for 240 hrs.
Delay	: 0 hrs.
Start recording	: 05.04.90 01:43

HRS

Gauge type and number	: HMR 10209
Sensor depth	: 3208.06 m MD RKB
Max. op. pressure	: 68966 kPa
Memory capasity	: 32000 data set
Interval	: 4 min for 24 hrs. 30 sec for 240 hrs.
Delay	: 0 hrs.
Start recording	: 05.04.90 01:50

HRS

Gauge type and number	: HMR 10080
Sensor depth	: 3208.06 m MD RKB
Max. op. pressure	: 68966 kPa
Memory capasity	: 32000 data set ?
Interval	: 4 min. 24 hrs 30 sec. 192 hrs. 1 min. 120 hrs.
Delay	: 0 hrs.
Start recording	: 05.04.90 01:50

HRS

Gauge type and number	: HMR 10122
Sensor depth	: 3208.06 m MD RKB
Max. op. pressure	: 68966 kPa
Memory capasity	: 32000 data set ?
Interval	: 4 min. 24 hrs 30 sec. 192 hrs. 1 min. 120 hrs.
Delay	: 0 hrs.
Start recording	: 05.04.90 01:47

Remarks: All four HMR gauges worked OK. Except for gauge 10080 they all compare very well. Gauge 10080 read approx. 22 kPa too low compared to the other HMR gauges run.

STATOIL

HENDELSESFORLØP WELL 34/10-33CR, DST-1B

Perforated interval 3448.0 - 3517.0 m MD RKB
3370.3 - 3418.4 m TVD RKB

DATE	TIME	SEQUENCE OF EVENTS
900411	1730	Started RIH with test string.
900412	2239	Sat RTTS packer at 3356.25 m MD RKB.
900413	0027	Pressured up tubing to 70 bar to reduce pressure differential across LPR-NR valve.
	0118	Opened LPR-NR valve.
		CLEANUP FLOW
	0119	Opened well on 24/64" adj. choke on choke manifold. Flow to burner.
	0121	Increased to 28/64" adj. choke.
	0122	Increased to 32/64" adj. choke.
	0126	Increased to 36/64" adj. choke.
	0136	Reduced to 28/64" adj. choke.
	0152	Reduced to 16/64" adj. choke.
	0153	Mud to surface.
	0154	Increased to 24/64" adj. choke.
	0155	Reduced to 16/64" adj. choke. Oil to surface.
	0156	Increased to 20/64" adj. choke. Choke washed out.
	0159	Reduced to 16/64" adj. choke.
	0250	Attempted to change to 40/64" fixed choke. WHP downstream increased. Changed back to adj. choke. Opened bypass on heater.
	0251	Attempted to change to 40/64" fixed choke. WHP increased and high pilot on heater closed failsafe valve.
	0253	Well shut in at CM.
	0308	Closed master valve.
	0310	Opened failsafe valve.
	0313	Opened kill valve.
	0315	Pressured up against CM to 220 bar.
	0328	Closed kill valve.
	0331	Opened master valve.
	0335	Attempted to open well on 36/64" fxd. choke. WHP downstream increased.
	0339	Well shut in at CM.
	0340	Opened well on adj. choke.
	0345	Switch flow into separator.
	0346	Failsafe valve closed.
	0347	Closed choke manifold.
	0349	Opened failsafe valve.
	0350	Opened well on adj. choke.
	0351	Flowed well to separator.
	0405	Opened gas line on separator.
	0443	Changed to 36/64" fxd. choke.
	0633	Changed to 44/64" fxd. choke on adj. side.
	0655	Changed to 40/64" fxd. choke on fixed side.
	0850	Changed to 36/64" adj. choke.
	0851	Increased to 40/64" adj. choke.

	0852	Increased to 42/64" adj. choke.
	0854	Increased to 46/64" adj. choke.
	0857	Increased to 48/64" adj. choke.
	0858	Increased to 50/64" adj. choke.
	0940	Opened oil flow to both burners.
	1022	Increased to 54/64" adj. choke.
	1045	Changed to 56/64" fxd. choke.
		BUILD-UP
	1500	Closed well in at CM
	1509	Closed lubricator valve Started rigging up AWS PLT equipment
	2030	GRC pressure gauge failed when pressure testing. Replaced it.
	2245	Started RIH with PLT.
900414	0100	Performed GR tie in using 9 5/8" RM.
	0200	Performed GR tie in 7" liner.
	0210	Started to take stationary readings.
	0325	Started PLT logging.
	0455	Ended PLT logging.
		MAIN FLOW
	0523	Opened well on adj. choke on CM.
	0525	WHP downstream increased and high pilot on heater closed failsafe valve. Well shut in.
	0546	Pressured up to 200 bar to equalize pressure.
	0635	Opened failsafe valve.
	0639	Opened well on 12/64" adj. choke on CM.
	0642	Increased choke to 20/64" adj.
	0715	Changed to 20/64" fxd. choke.
	1212	Switched flow into separator.
	1421	Started PLT logging.
	1520	Ended PLT logging.
	1550	Started taking first PVT sample. A-14820, A-14049, TS-16-2.
	1630	Finished taking PVT sample. Switched flow into tank for meter-factor measurements.
	1650	Meter-factor measurements finished.
	1705	Changed to 16/64" adj. choke.
	1708	Started to increase adj. choke slowly to 36/64".
	1733	Increased to 40/64" adj. choke.
	1740	Changed to 40/64" fixed choke.
	1932	Started PLT correlation run.
	1958	PLT spinner positioned at 3465 m RKB.
	2030	Switched flow into tank for meter-factor measurements.
	2035	Meter-factor measurements finished.
	2230	Started taking second PVT sample. A-14760, A-14572, TS-15-08.
	2258	Finished taking PVT sample.
900415	0045	Started PLT logging.
	0320	Stopped PLT logging.
	0345	Changed to 36/64" adj. choke.
	0346	Started to increase adj. choke.

	0400	Adj. choke 52/64".
	0401	Opened heater bypass.
	0408	Changed to 52/64" fixed choke.
	0805	Started PLT logging. Unable to move tool down.
	0857	Changed to 52/64" adj. choke.
	0859	Started to reduce choke size in steps to 28/64" on adjustable side.
	0904	Adjustable choke on 28/64".
	0908	Problems with hydraulic gearbox on Atlas unit.
	1150	Finished repairing Atlas unit.
	1214	Increased adj. choke slowly to 48/64".
	1234	Changed to 52/64" fixed choke.
	2129	Started PLT logging.
	2321	Stopped PLT logging.
		BUILD-UP
	2336	Shut-in well at CM.
900417	1630	Started PLT logging
		END BUILD-UP
	1748	Opened well on adjustable choke.
	2015	Shut-in well at CM.
	2020	POOH with WL, PLT tool lost in hole.
	2121	Opened well on adjustable choke.
	2200	Shut-in well at CM.
900418	0125	Started to bullhead.
	0210	Stopped bullheading.
	0845	Unseated packer. POOH test string.
900419	1200	Test string OOH.

NOTE : Adjustable choke used at start of cleanup washed out, values noted only indicate adjustment of choke size.

STATOIL

WELL : 34/10-33CR	GAUGE ARRANGEMENT	PERF.: 3448.0-3517 (m MD RKB)
TEST NO.: 1B		ZONE : NESS 2

MWS Bundle carrier : 3355.05 m MD RKB

MWS

Gauge type and number	: Panex 1420B 9-0060
Sensor depth	: 3296.80 m TVD RKB
Max. op. pressure	: 68966 kPa
Memory capasity	: 30000 data set
Interval	:
Delay	:
Start recording	: Failed

MWS

Gauge type and number	: Panex 1420B 3-1470
Sensor depth	: 3296.80 m TVD RKB
Max. op. pressure	: 68966 kPa
Memory capasity	: 30000 data set
Interval	:
Delay	:
Start recording	: 90.04.11 13:51

MWS

Gauge type and number	: Panex 1575 24-1164
Sensor depth	: 3300.00 m TVD RKB
Max. op. pressure	: 68966 kPa
Memory capasity	: 21400 data set
Interval	:
Delay	:
Start recording	: 90.04.11 13:55

MWS

Gauge type and number	: Panex 1575 24-1166
Sensor depth	: 3300.00 m TVD RKB
Max. op. pressure	: 68966 kPa
Memory capasity	: 21400 data set
Interval	:
Delay	:
Start recording	: 90.04.11 13:58

Remark: MWS1166 best gauge.

STATOIL

WELL : 34/10-33CR	GAUGE ARRANGEMENT	PERF.: 3448.0-3517 (m MD RKB)
TEST NO.: 1B		ZONE : NESS 2

HRS Bundle carrier : 3345.16 m MD RKB

HRS

Gauge type and number : HMR 10525
Sensor depth : 3293.50 m TVD RKB
Max. op. pressure : 68966 kPa
Memory capasity : 32000 data set
Interval :

Delay :
Start recording : 900411 14:56

HRS

Gauge type and number : HMR 10209
Sensor depth : 3293.50 m TVD RKB
Max. op. pressure : 68966 kPa
Memory capasity : 32000 data set
Interval :

Delay :
Start recording : 900411 14:58

HRS

Gauge type and number : HMR 10080
Sensor depth : 3293.50 m TVD RKB
Max. op. pressure : 68966 kPa
Memory capasity : 32000 data set
Interval :

Delay :
Start recording : 900411 14:59

HRS

Gauge type and number : HMR 10122
Sensor depth : 3293.50 m TVD RKB
Max. op. pressure : 68966 kPa
Memory capasity : 32000 data set
Interval :

Delay :
Start recording : Failed

Remark: HRS10044 best gauge.

4 Drilling Report

4.1 Summary

Well	:	34/10-33CR
Type of Well	:	Re-entry
Drilling Rig	:	Deepsea Bergen
Start Date	:	21.02.1990
Finish Date	:	27.04.1990
Total Days	:	63
TD	:	3715m MD (7″ float collar)
Main Objectives	:	Brent sandstones
Plugging	:	Permanently abandoned

4.2 Operation by Interval

4.2.1 Well Re-entry and Packer Retrieval

The well was re-entered and the cement and bridge plugs drilled out without problem. A special washover tool was run over the male member of the Extenda joint to clean out any debris that might have accumulated above the packer. The washover tool stopped at 3176.5 m (equivalent to 3174.5 m loggers depth) which was sufficient to permit running the retrieving tool but meant that the last six meterswere not cleaned out.

The re-entry/kill string was run according to programme, pressure tested and the landing string run before bad weather necessitated unlatching and landing string retrieval.

After the weather had subsided, the landing string was rerun and the subsea tree relatched without problems. The remainder of the surface equipment was tested according to programme prior to displacing the string to water. The wireline equipment was then rigged up and pressure tested and the equalizing prong from the 2.75″ AF blanking plug pulled. At this point a pressure increase of some 10 bars was noted, indicating that the lower plug was leaking.

Eight attempts were then made to retrieve the AF blanking plug but without success, the pulling tool latched on to the plug without problem but it was not possible to jar the plug loose. On the eighth attempt the wireline parted at the stuffing box and it was decided to displace the mud before commencing fishing operations. As it proved to be impossible to bullhead past the leaking plug the string was raised free of the Extenda joint and the water cushion reversed out.

After relanding the string further wireline operations were severely hampered by bad weather but ultimately the wireline cable, without the tool string was recovered. The entire tool string was recovered after removing the final 1.4 m of wire, the slickline unit rigged down and preparations made to fish for the plug with a 7/32″ braided line unit before the weather again shut down operations and the landing string disconnected.

After reconnecting the landing string, attempts to pull the plug with braided line were unsuccessfull and it was therefore decided to abandon any further attempts with wireline, to pull the re-entry string and to retrieve the Extendajoint and anchor.

At the second attempt the anchor was released and retrieved. A new bottom hole assembly and anchor was run and latched into the SAB-3 packer before it became necessary to hang off and wait on weather.

Attempts to pull the prong from the 2.56″ HFIIB blanking plug were unsuccessfull and it was decided to perforate the millout extension below the packer to permit bullheading the oil back into the formation before milling the packer and retrieving the entire tailpipe. Two runs with tubing punchers were made and despite positive indications that the tubing was perforated and using high pump pressures it was still impossible to bullhead into the formation. After rigging down the wireline equipment the string was pulled and preparations made to mill the packer.

Mud weight was increased to 1.60 sg prior to commencing milling,and the packer milled until it fell free. The packer catcher, however, failed to hold the packer and a second run was necessary to retrieve the packer and tailpipe. Before pulling out after the first run the mud weight was increased to 1.65 sg.

4.2.2 *Tie-back*

It was suspected that there could be a leakage in the 9 5/8" casing close to the top of the 7" liner tie-back and preparations were therefore made to pressure test this area and to isolate the leak by running a tie-back (scab liner).

It was first necessary to clean out the entire hole and to cut the mud weight back to 1.55 sg. A tapered string consisting of 5 7/8" bit, 7" and 9 5/8" casing scrapers and a PBR mill was run and the hole cleaned out down to the float collar; an error in spacing out resulted in the PBR mill not reaching the liner top. Back reaming in the 7" liner was necessary due to accumulations of junk above the bit and scraper. After pulling out of the hole a gauge ring and junk basket was run on Western wireline but this became stuck at 3270 m and it was necessary to perform a "cut and thread" operation to recover the tools.

A PBR mill and 9 5/8" casing scraper were run to dress the top of the liner before running in with a 5 7/8" bit and 7" casing scraper. The liner was washed and reamed down to 3678 m with obstructions being noted between 3511 m and 3670 m.

A RTTS packer was then run and the casing tested; after setting the packer at different depths it was concluded that there was a leak and that the scab liner would be run.

A 7" EZSV bridge plug was run on wireline and set at 3385 m. The setting tool would not release and it was necessary to break the cable at the weak point and fish the setting tool with an overshot on drillpipe.

A 9 5/8" RTTS packer was run and set at various depths to localise the leak. The leakage was found to be between 3177 and 3187 m (3179 - 3189 m loggers depth). The scab liner and tie back packer were made up such that the top would be at 3167 m (drillers depth).

The weather deteriorated whilst running the scab liner and it was decided to hang off; whilst running the hang off string the scab liner took weight and during a heave the master bushing was lifted out of the rotary table by the hang off tool. Attempts to back out the scab liner running tool were unsuccessfull due to not having any space in the derrick and finally the master bushing fell down on to the drill floor and one of the lock pins fell down the riser. At this point the lower pipe rams had already been closed.Further operations were postponed until the weather had improved.

The drillpipe was backed off below the rotary and the hang off tool laid out. A basket grapple was used to re-engage the string and a back off performed using string shots at the joint immediately above the lower pipe rams. The initial attempt to fish the bolt with a magnet was unsuccessfull and an impression block was run to determine the exact location and orientation of the fish.

After several attempts without luck the pin was finally retrieved using a modified magnetic fishing tool. The drillpipe was reconnected and the scab liner running tool retrieved. The running tool was run in again and the scab liner engaged at 3167 m (planned setting depth). The packer was pulled free with 30T overpull and then slacked off and the running tool released and pulled out of hole.

A new bottom hole assembly comprising a 7" RTTS packer and the setting tool was run in hole. The packer was set at 3189 m and the lower chevron seals tested to 103 bar before setting the lower packer. The packer was then released, the actuator landed and the top packer set. After testing the scab liner to 360 bar the tools were pulled out of the hole.

The EZSV bridge plug was drilled out, the liner scraped from 3366 to 3386 m and a Miltemp pill spotted in the 7" liner.

4.2.3 *Testing*

The perforating guns, test tools and test string were run in the hole in accordance with the programme. Attempts to detonate the perforating guns were negative as the detonating bar stood up in the 2 7/8″ tailpipe. The tester valve was then cycled to the lock open position before reversing out and pulling the string. On surface one of the 2 7/8″ joints was found to be slightly bent and there were indications that there was still debris in the hole. A 5 7/8″ bit and 7″ casing scraper was therefore run to clean out the liner; at the same time the mud weight was reduced to 1.45 sg. and a new Miltemp pill placed in the liner.

The perforating guns were made up with a dual firing head and run in the hole on drillpipe. After spacing out the MPR were closed and the annulus pressured to detonate the guns. After flow checking, the guns were pulled and observed to have fired completely.

A new test string was made up (see test string test 1A) and run in the hole. The tailpipe hung up in the wellhead, the tools were therfore pulled, the perforated joint removed and a modified wireline entry guide installed below the packer. This time the tools passed through the wellhead without problem, however, the packer started to take weight at 3214 m and had to be worked down finally stopping at 3232 m. It was decided therefore, to set the packer high and continue with the test, the string was pulled up, the landing string installed and the packer finally set at 3222.5 m.

The well was opened for initial flow but attempts to close the tester valve were unsuccessfull and the well was therefore shut in at the choke manifold. After the clean up flow the tester valve was closed successfully and the build up recorded whilst rigging up for production logging (PLT).

A dummy logging tool was run in the hole and the tester valve tagged. The tools were then pulled up 30 meters and the valve opened; at this point the tools were blown up the hole and became stuck.The gas in the string was bled off and mud lubricated in, however, after pumping 16.8 m^3 the pressure suddenly increased and wireline tension was lost. The wireline was pulled out of the hole and it was discovered that the tools and a small amount of cable were left in the hole.

As the RS circulating valve had been damaged by the tools and was inoperative the APR-M valve was opened and the well reversed and then circulated to fresh mud prior to pulling the string.

A 5 7/8″ bit and both 7″ and 9 5/8″ casing scrapers were run to clean up the hole before re-running the test string. This time (test 1B) no problems were encountered whilst running the string, the packer was finally set at 3356 m. and the test conducted without any special problems. At the end of the test, however, the logging cable parted as the PLT tools were being pulled back into the tubing and the tools lost.

4.2.4 *Plug and Abandonment*

After pulling the test string a cement diverting tool was run and a pill of 2.02 sg., high viscosity mud was placed from 3620 to 3570 m before setting a balanced cement plug across the perforations. This plug was finally squeezed with 100 bar. The plug was dressed to 3424 m prior to setting a 7″ wireline bridge plug at 3423 m.

A cement plug was set from 3420 to 3307 m with a further plug being set across the liner lap from 3260 to 3050 m.

A 9 5/8″ wireline bridge plug was set at 3000 m., the seal assembly retrieved from the wellhead and the 9 5/8″ casing cut at 1204 m. A cement plug was placed across the cut from 1250 to 1050 m and squeezed 100 meters into the 9 5/8″ x 13 3/8″ annulus.

A 13 3/8″ wireline bridge plug was set at 394 m the seal assembly retrieved and the casing cut at 300 m. A cement plug was placed from 390 to 190 m. and the riser and kill and choke lines flushed to sea water prior to pulling the BOP and riser.

Pulling the riser and BOP was hampered by bad weather. The 20″ and 30″ casings were ultimately cut and retrieved with the guidebase.

After a sea bed inspection the rig left the location.

4.3 Extract of Daily Operations

Well: 0034/10-033CR

90/02/21 - IN TRANSIT TO NEW LOCATION, 34/10-33CR.
- SAILED DISTANCE LAST 14 HRS = 42 NM.
- POSITION AT 2400 HRS: 58 DEG 06 MIN N
02 DEG 19,5 MIN E

90/02/22 IN TRANSIT TO LOCATION 34/10-33CR.
SAILED DISTANCE LAST 24 HRS : 83 NM.
POSITION AT 2400 HRS.
N 59 DEG. 23.5 MIN.
E 02 DEG. 17.5 MIN.

90/02/23 IN TRANSIT TO LOCATION 34/10-33CR
SAILED DISTANCE LAST 24 HRS. : 79 NM.
POSITION AT 2400 HRS.
N 60 DEG. 43 MIN.
E 02 DEG. 19 MIN.

90/02/24 - IN TRANSIT TO LOCATION 34/10-33CR.
- ANCHORHANDLED
- RETRIEVED WELLHEAD PROTECTOR FRAME.
- RAN RETRIEVABLE GUIDE BASE.

90/02/25 - RAN R.G.B
- RAN B.O.P
- PRESSURE TESTED B.O.P
- ATTEMPTED TO SET WEAR BUSHING, NEGATIVE.
- POOH WITH WEAR BUSHING.

90/02/26 - TESTED BOP
- INSTALLED WEAR BUSHING.
- DRILLED OUT CEMENT PLUG FROM 363 M TO 462 M.
- R.I.H, PICKED UP SINGLES FROM 1200M.

90/02/27 - DRILLED OUT BRIDGE PLUG AT 2894 M AND CEMENT PLUG FROM 2927 M TO 3001 M.
- R.I.H. WITH 7" WASHOVER ASSEMBLY AND WASHED OVER EXTENDA JOINT TO TOP PACKER. P.O.O.H. TO 2603 M.
- PERFORMED A BOP SPACE OUT RUN WITH FLUTED HANGER.

90/02/28 - POOH WITH 7" WASHOVER ASSEMBLY.
- RIH WITH RE-ENTRY/KILL STRING.

90/03/01 -PRESSURE TESTED RE-ENTRY STRING AGAINST BLANKING PLUG TO 415 BAR.
-PULLED LANDING STRING AND SPACED OUT.
-RAN LANDING STRING AND LANDED SAME IN WELLHEAD.
-DISCONNECTED EZ-TREE AND PULLED LANDING STRING.
-W O W
-RAN LANDING STRING TO 8 M ABOVE EZ-TREE LATCHING POINT.

90/03/02 - RIGGED UP FLOWHEAD AND COFLEXIP HOSES.
- DISPLACED RE-ENTRY STRING TO SEAWATER.
- PRESSURE TESTED RE-ENTRY STRING ACCORDING TO PROGRAM.
- RIH WITH WIRELINE AND RETRIEVED EQUALIZING PRONG.

90/03/03 -RETRIEVED EQUALIZING PRONG FROM BLANKING PLUG WITH WIRELINE.
-MADE SEVERAL ATTEMPTS TO RETRIEVE BLANING PLUG WITH WIRELINE, NEGATIVE.

90/03/04 -PARTED WIRELINE AT WIRE-DRUM
-PULLED STRING 2,5 M OFF EXTENDA JOINT AND KILLED THE WELL BY REVERSE CIRCULATE 1,55 SG MUD. WELL STATIC.
- W. O. W.
-RIH WITH WIRELINE FISHING EQUIPMENT AND TAG FISH 26 M +/- BELOW RKB. POOH WITH FISH AND SECURED SAME WITH A WIRE CLAMP ON TOP OF WIRE LINE BOP.
- W. O. W.

90/03/05 - W.O.W.

90/03/06 - W.O.W.
- POOH WITH BROKEN WIRELINE, FOUND TOOLSTRING LEFT IN HOLE
- CHANGED TO NEW WIRELINE UNIT
- MADE THREE WIRELINE RUNS WITH IMPRESSION BLOCK.

90/03/07 - RAN BLIND BOX AND HIT TOP OF FISH TO BREAK OFF WIRE. POOH.
- RAN WIRE-FINDER AND WORKED SAME TO TOP OF FISH. POOH.
- RAN WIRE-GRAB. RECOVERED 1,4M WIRE FROM GRAB.
- RAN J.U.C. FISHING TOOL. LATCHED ON AND POOH WITH FISH. RIGGED DOWN SLICK LINE.
- WOW.

90/03/08 -CONNECTED EZ-TREE
-CONT. FISHING 2.72 AF PLUG W/7/32" BRAIDED FISHING WIRELINE.

90/03/09 - ATTEMPTED TO RELEASE AF PLUG. NO GO.
- WOH
- PULL OFF MALE MEMBER AND POOH W/REENTRY TEST STRING.

90/03/10 POOH W/REENTRY TEST STRING. TEST BOPS. REPAIR FAILED SAFETY VALVE, NO SUCCESS. RIH TO RETRIEVE TUBING ANCHOR. MISRUN.

90/03/11 - RIH AND RETRIEVED TUBING ANCHOR. M/U NEW ANCHOR AND STUNG INTO SAB PACKER AND SPACED OUT.
- PREPARE TO HANG OFF TO SECURE WELL DUE TO HEAVY WIND/SEA.

90/03/12 - W.O.W.
- RIG REPAIR. CHANGE UPPER SAFETY VALVE ON TOP DRIVE.
- SPACE OUT BELOW EZ-TREE AND RIH.

90/03/13 - RIH W/2 RUNS TO RETRIEVE PRONG IN 2,56" HFHB-HANGER WITHOUT SUCCESS.
- RIH W/WL HYDROSTATIC BAILER TO CLEAR POSSIBLE DEBRIS ABOVE PLUG. TOOL FAILURE.
- PERFORMED 2 RUNS W/WESTERN ATLAS W/TUBING PUNCHER TO PERFORATE MILLOUT EXTENSION AT 3182 M. ATTEMPTED TO BULLHEAD W/UP TO 150 BAR PRESSURE (1,94 SG EQV.) NO SUCCESS.

90/03/14 - W.O.W.
- POOH W/REENTRY STRING AND L/D.

90/03/15 - RIH W/PACKER MILLING ASSY TO TOP SAB-PACKER AT 3179 M.
- INCR. MUD WT. FROM 1,55 SG TO 1,60 SG.
- MILLED ON SAB-PACKER.
- SHUT IN WELL AND CIRC DOWN GAS OVER CHK-MANIFOLD, MAX GAS: 10 %
- CONT MILLED ON SAB-PACKER. ATTEMPTED TO BULLHEAD - NO SUCCESS. MAX BULLHEAD PRESS = 250 BAR.
- INCR MUD WT FROM 1,60 SG TO 1,65 SG AND CIRC UNTIL GAS DOWN TO 1,5 %

90/03/16 - SPOTTED 2 M3 HI-VIS PILL AT 3180M - 3130M AND POOH, NO TAIL-PIPE TO SURFACE.
- REDRESSED MILL-ASSY AND RIH TO 3152M.
- CIRC BTMS UP, MAX GAS: 9%
- ENTERED TAIL-PIPE AT 3192M.
- SPOTTED 2 M3 HI-VIS PILL AT 3184M - 3134M AND POOH.

90/03/17 - POOH W/TAIL-PIPE, 100 % RECOVERY.
- M/U NEW BHA W/5 7/8" BIT, 7" AND 9 5/8" CSG SCRAPER, PBR-MILL ASSY AND RIH.
- CIRC. BTM'S UP AT 3180 M AND ATTEMPTED TO BULLHEAD W/77 BAR - NO SUCCESS.
- WASHED DOWN FROM 3180 M TO 3280 M AND CIRC. BTM'S UP.

90/03/19 - ATTEMPTED TO WORK FREE STUCK GAUGE RING AND JUNKBASKET,
MOP : 4200 LBS/1,9 TON
NO SUCCESS.
- CUT WIRELINE AT SURFACE AND PERFORMED AN "CUT AND THREAD FISHING OPERATION".
- GOT INDICATION OF STUCK WIRELINE AT 3180 M,
ATTEMPTED TO WORK SAME FREE.

90/03/20 - CIRC. STRING VOLUME AND FLUSHED OVERSHOT.
- ENTERED FISH AT 3267 M AND POOH TO 3160 M.
- PULLED OFF WIRE AND POOH W/ SAME.
- POOH W/ FISH, 100 % RECOVERY.
- RIH W/ PBR MILL-ASSY AND 9 5/8" CSG. SCRAPER TO TOP 7" LINER AND DRESSED SAME.
- CIRC. BTM'S UP AT 3210 M.

90/03/21 - POOH W/ PBR MILL ASSY AND 9 5/8" CSG. SCRAPER.
- RIH W/ 5 7/8" BIT AND 7" CSG. SCRAPER TO 3680 M/3439 M (SCRAPER).
- SPOTTED 1,55 SG "MIL-TEMP" MUD IN 7" LINER
- POOH.
- RIH W/ BOP TESTTOOL AND PRESSTESTED BOP 360/241 BAR.

90/03/22 - CONT. PRESSURE TEST BOP AND POOH W/TEST TOOL.
- PRESSURE TESTED TOP DRIVE ASSY.
- M/U 7" RTTS PACKER AND RIH.
- ATTEMPTED TO PRESSURE TEST 7" X 9 5/8" CSG., NO SUCCESS.
- POOH W/7" RTTS.
- RIH W/EZSV-BRIDGE PLUG ON WIRELINE AND SET SAME AT 3385 M.
- ATTEMPTED TO POOH W/FIREING-HEAD - NO SUCCESS.
- PULLED CABEL OFF AT WEAKPOINT AND POOH W/WIRELINE.

90/03/23 - RIH W/OVERSHOT TO TOP OF LINER.
- REPAIRED RIG. CHANGED AFT GUIDE WHEEL ON TRAVELLING BLOCK.
- CONT. RIH AND ENTERED TOP OF FISH AT 3382 M.
- PULLED OFF BRIDGE PLUG TENSION SLEEVE W/30 TON AND POOH W/BRIDGE PLUG SETTING TOOL.
- RIH W/ 9 5/8" RTTS PACKER AND PRESSTESTED 7" X 9 5/8" CSG. OK BELOW 3206 M AND ABOVE 3177 M.
- POOH W/ 9 5/8" RTTS PACKER.

90/03/24 - POOH W/ 9 5/8" RTTS-PACKER.
- M/U 7" SCABLINER W/TIE-BACK PACKER AND RIH TO 2828 M.
- ATTEMPTED TO RUN HANG OFF TOOL - NO SUCCESS DUE TO STUCK SCAB LINER AT +/- 2828 M.
- LANDED STRING ON LPR AND W.O.W.

90/03/25 - CONT. W.O.W.

90/03/26 - PERFORMED BLIND BACK OFF, RETRIEVED H.O.T. INSIDE BOP AND 2 JNT 5" DP. TOP OF FISH AT 19 M.
- RIH W/OVERSHOT AND RETRIEVED 2 JNT 5" DP. MADE SEVERAL ATTEMPTS TO RETRIEVE REMAINING STRING DOWN TO LOWER PIPE RAM - NO SUCCESS.
- RIH W/5" DP AND ENTERED TOP OF FISH AT 38 M.
- R/U AND PREPARED TO RUN STRINGSHOT ON WIRELINE.

90/03/27 - BACKED OFF 5" DP ABOVE LOWER PIPE RAM W/STRING SHOT AND POOH W/SAME.
- RETRIEVED MASTER BUSHING LOCK PIN FROM TOP OF LOWER PIPE RAM.
- L/D OVERTORQUED DRLG EQUIPMENT FROM DRK/RIG FLOOR.

90/03/28 - CONT. L/D OVERTORQUED DRLG EQUIPMENT FROM DRK/RIG FLOOR.
- RIH W/OPEN ENDED 5" DP, ENTERED STRING AT LOWER PIPERAM AND POOH W/7" SCABLINER RUNNING TOOL.
- RIH W/SCABLINER RETRIEVING TOOL. TAGGED TOP SCABLINER/PBR AT 3167M. POOH W/RETRIEVING TOOL.

90/03/29 - RIH W/7" RTTS PACKER AND SCABLINER SETTING TOOL.
- SET RTTS PACKER AT 3189M AND TESTED CHEVRON SEALS TO 103 BAR - OK.
- SET SCABLINER BTM PACKER W/40 TON - 10 MIN.
- RELEASED RTTS AND LANDED ACTUATOR ON TOP OF PBR AND SET TOP PACKER W/40 TON - 10 MIN.
- PRESS.TESTED 9 5/8" - 7" CSG TO 360 BAR - OK.
- POOH.
- M/U 5 7/8" - 7" CSG SCRAPER AND RIH TO 3385M AND DRILLED EZSV PLUG.

90/03/30 - RIH W/5-7/8" BIT TO 3680M.
- CIRC. AND COND. MUD.
- PUMPED MILTEMP PILL.
- POOH.
- PRESSURE TESTED BOP, KILL AND CHOKE VALVES.
- M/U TEST STRING BHA.

90/03/31 - M/U REST OF TEST STRING BHA. TESTED SAME AGAINST CLOSED LPR-NR TO 200 BAR/10 MIN - OK.
- RIH W/TEST STRING.
- PRESS.TESTED SAME ACC. TO PROGRAM.
- MADE SPACE OUT CHECK ON TEST STRING. CORRECTED SAME AND CHECKED BOP SPACING.

90/04/01 - M/U REST OF TEST STRING AND SURFACE EQUIPMENT. PRESS TESTED SAME ACC. TO PROGRAMME.
- SET RTTS-PACKER AT 3376 M.
- OPEN LPR-NR VALVE AND RIH W/FIRING BAR ASSY. MADE THREE ATTEMPTS TO PASS 3420 M USING DIFFERENT FIRING BAR ASSEMBLIES.

90/04/02
- R/D WIRELINE EQUIPMENT.
- TRIED TO BULLHEAD - NO SUCCESS. 300 BAR/400 L SEAWATER.
- REV.CIRC. STRING VOLUME. FLOWCHECKED.
- CYCLE LPR-NR TO OPEN POSITION AND CIRC. ANN. VOLUME THROUGH CHOKE MANIFOLD AND DEGASSER. FLOWCHECKED - OK.
- OPENED MPR AND CIRC. DOWN KILL LINE RISER ANN.VOLUME. FLOWCHECK -OK.
- FLUSHED W/WATER KILL AND FLOW LINE TO BURNERS.
- L/D FLOW HEAD ETC. POOH. W/TEST STRING.

90/04/03
- CONTINUED L/D TEST STRING BHA.
- M/U 5-7/8" BIT/7" CSG. SCRAPER AND RIH. WORKED SAME FROM 3350M TO 3680M.
- REDUCED M.W FROM 1.55 TO 1.45 S.G.
- POOH.

90/04/04
- POOH - L/D 5-7/8" BIT AND 7" CSG. SCRAPER.
- SLIPPED TO NEW DRILL LINE.
- RUN IN HOLE W/69M PERFORATING GUNS.
- MADE SPACE-OUT CHECK. CORRECTED SPACE OUT W/-2.10M.
- PRESSURED UP ANNLUS AND RE-PERFORATED TESTINTERVAL.
- OPENED MPR, FLOWCHECKED OK.
- POOH.

90/04/05
- P.O.O.H WITH GUNS AND LAID DOWN SAME.
- R.I.H WITH TEST B.H.A - COULD NOT PASS THROUGH WELLHEAD.
- P.O.O.H WITH TEST B.H.A AND FOUND WIRELINE ENTRY GUIDE BENT.
- MADE NEW WIRELINE ENTRY GUIDE AND MADE UP SAME.
- R.I.H WITH TEST STRING AND FILLED SAME WITH SEAWATER.

90/04/06
- R.I.H WITH TESTSTRING. NOT ABLE TO PASS THROUGH 3132M
- P.O.O.H WITH LANDINGSTRING AND SPACED OUT STRING BELOW FLUTED HANGER TO SET PACKER AT 3222,5M
- R.I.H WITH TEST STRING AND PRESSURE TESTED SAME ACCORDING TO PROGRAM
- SET RTTS PACKER AT 3222,5M
- OPENED LPR-NR VALVE AND WELL AGAINST CLOSED CHOKE.
- OPENED WELL FOR INITIAL FLOW
- CLOSED WELL AT CHOKE MANIFOLD FOR INITIAL BUILD UP.

90/04/07
- FLOWED WELL (INITIAL FLOW).
- ATTEMPTED TO CLOSE LPR-NR VALVE, NEGATIVE. SHUT IN WELL AT CHOKE MANIFOLD FOR INITIAL BUILD UP.
- OPENED WELL FOR CLEAN UP FLOW.
- SHUT IN WELL FOR BUILD UP AT LPR-NR VALVE.
- RIH WITH ATLAS WIRELINE DUMMY TOOL.

90/04/08
- OPENED LPR-NR VALVE AND WHP INCREASED FROM 170 - 230 BAR.
- WIRELINE DUMMY TOOL STUCK AT 3160M.
- ATTEMPTED TO WORK DUMMY TOOL FREE, NEGATIVE.
- BLED OFF GAS IN STRING AND PRESSURE TO 20 BAR.
- FILLED TESTSTRING WITH 16,8 M3 1,45 SG MUD. LOST 1400 LBS TENSION IN WIRELINE.
- POOH WITH WIRELINE. FOUND DUMMY TOOL AND 5M CABLE LEFT IN TEST STRING.
- ATTEMPTED TO CYCLE RS-VALVE IN REVERSE POSITION, NEGATIVE.
- SHEARED APR-M VALVE OPEN AND REVERSE CIRCULATED.

90/04/09
- CIRCULATED LONG WAY WITH 1,48 SG MUD.
- UNSEATED PACKER AND ATTEMPTED TO BULLHEAD WITH MAX PRESSURE 160 BAR, NEGATIVE.
- CIRCULATED LONG WAY, MAX GAS 7,1%
- BULLHEADED 4,2 M3 INTO FORMATION WITH MAX PRESSURE 316 BAR.
- CIRCULATED LONG WAY. MAX GAS 12,8%
- LAID DOWN FLOWHEAD AND LUBRICATOR VALVE. POOH TO 3155 M.
- CIRCULATED LONG WAY, MAX GAS 9,1%
- POOH WITH TESTSTRING.

90/04/10
- POOH WITH TESTSTRING AND LAID DOWN TEST BHA.
- RIH WITH 5 7/8" BIT, 7" AND 9 5/8" SCRAPER TO 3613 M.
- CIRCULATED AND WORKED JUNKBASKET.

90/04/11
-CIRCULATED AND WORKED JUNK BASKET.
-POOH TO 3167 M. CIRCULATED AND WORKED JUNKBASKET.
-RIH TO 3613 M AND CIRCULATED GAS DOWN BELOW 1 %
-SPOTTED MILL TEMP PILL.
-POOH.
-PRESSURE TESTED BOP STACK.
-RIH WITH TESTSTRING.

90/04/12
- R.I.H WITH TEST STRING AND PRESSURE TESTED SAME ACCORDING TO PROGRAM.
- SET 7" RTTS PACKER AT 3356M.
- HELD PRE-TEST MEETING WITH INVOLVED PERSONNEL.

90/04/13
- FLOWED WELL FOR CLEAN UP.
- SHUT IN WELL AT 15:00 HRS.
- RIGGED UP AND RAN PRODUCTION LOGGING TOOL.

90/04/14
- RIH WITH ATLAS WIRELINE PLT STRING.
- FLOWED THE WELL FOR PRODUCTION LOGGING AND MAIN FLOW ON 20/64" AND 40/64" FIXED CHOKE.

90/04/15
- FLOWED THE WELL FOR PRODUCTION LOGGING AND MAIN FLOW.
- SHUT IN THE WELL AT CHOKE MANIFOLD FOR MAIN BUILD UP.

90/04/16 - WELL SHUT IN FOR MAIN BUILD UP

90/04/17 - WELL SHUT IN FOR MAIN BUILD UP.
- FLOWED WELL TO HEAT UP STRING.
- POOH WITH PLT. HAD 400 LBS OVERPULL WHEN PULLING THROUGH WIRELINE ENTRY GUIDE AND LOST 200 LBS TENSION AND SIGNALS FROM TOOL.
- MADE 4 ATTEMPTS TO CLOSE LPR-NR VALVE, NEGATIVE.

90/04/18 - ATTEMPTED TO CLOSE LPR-NR VALVE, NEGATIVE
- BULLHEADED WELL DOWN TEST STRING BY PUMPING 3,2 M3 GLYCOL/SW FOLLOWED BY 35,3 M3 1,48 SG MUD.
- POOH WITH ATLAS WIRELINE AND FOUND PLT STRING LOST IN HOLE.
- SHEARED APR-M VALVE AND REVERSE CIRCULATED.
- UNSEATED PACKER AND LANDED FLUTED HANGER IN WEAR BUSHING.
- BULLHEADED DOWN ANNULUS BY PUMPING 5,1 M3 1,48 SG MUD.
- CIRCULATED LONG WAY.
- POOH WITH TEST STRING.

90/04/19 - CONT POOH W/ TEST STRING.
- RIH W/CMT DIVERTING TOOL TO 3620M AND SPOTTED A HI-VIS MUD PILL FROM 3620M TO 3570M.
- CIRC BTMS UP AND GAS DOWN AT 3570M, MAX GAS: 7,7%
- SET A BALANCED CMT PLUG FROM 3570M TO 3300M.
- POOH, REVERSE CIRC AT 3000M AND ATTEMPTED TO SQUEEZE CMT INTO PERF - WITH 100 BAR PRESSURE.

90/04/20 - POOH
- RIH W/5-7/8" BIT AND 7" CSG SCRAPER, TAGGED TOC AT 3420 M.
- DRLD CMT FROM 3420 M TO 3424 M AND CIRC. BTM'S UP.
- POOH
- SET 7" BRIDGE PLUG ON WIRELINE AT 3423 M AND PRESS.TESTED SAME TO 195 BAR W/1.48 SG MUD - OK.
- RIH W/DP.

90/04/21 - RIH W/DP TO 3420M, SET A BALANCED CMT PLUG FROM 3420M TO 3300M, REVERSE CIRC AT 3260M.
- SET A BALANCED CMT PLUG FROM 3260M TO 3050M, POOH TO 3000M, REVERSE CIRC AND CONT POOH.
- SET 9 5/8" BRIDGE PLUG AT 3000M.
- RETRIEVED 9 5/8" X 18 3/4" WEAR BUSHING.
- M/U AND RIH W/SEAL ASSY R/R-TOOL ON 8" DC-STRING.
- ATTEMPTED TO BACK OUT SEAL ASSY, RELEASED R/R-TOOL AND POOH TO CHECK FOR LOOSE CONN IN 8" DC RUNNING-STRING.
- REPAIRED RIG, CHANGED OUT BROKEN HYDR HOSES FOR TRAVELLING BLOCK RETRACTING SYST.

90/04/22 - CONT REPAIRED RIG, CHANGED HYDR HOSES FOR RETRACTING SYST.
- RETRIEVED SEAL ASSY.
- RIH AND CUT 9 5/8" CSG AT 1204M.
- RIH W/ 9 5/8" CSG SPEAR, CIRC TO COND MUD AND POOH W/ 9 5/8" CSG.

90/04/23 - CONT POOH AND L/D 9 5/8" CSG.
- SET A CMT PLUG FROM 1250 M TO 1100 M.
(SQUEEZED 100 M CMT IN 9 5/8" X 13 3/8" ANNULUS)
- MADE CLEAN UP RUN TO 420 M W/12 1/4" BIT AND 13 3/8" CSG SCRAPER.
- PRESSTESTED CMT PLUG TO 90 BAR W/1,48 SG MUD WT.
- L/D EXCESS DP.

90/04/24 - SET 13 3/8" BRIDGE PLUG ON WIRELINE AT 394 M.
- CONT. L/D EXCESS DP FROM DRK.
- RIH W/SEAL ASSY R/R-TOOL AND RETRIEVED SEAL ASSY.
- RIH AND CUT 13 3/8" CSG AT 300 M.
- RIH W/CSG SPEAR AND POOH W/CUT 13 3/8" CSG.

90/04/25 - CONT. L/D CUT 13 3/8" CSG.
- CLEANED OUT 20" CSG DOWN TO 300 M W/17 1/2" BIT.
- CIRC BTM'S UP AND POOH.
- RIH W/DP AND SET A CMT PLUG FROM 390 M TO 190 M.
- POOH TO 170 M AND CIRC BTM'S UP.
- LAY DOWN EXCESS DP AND DC.
- DISPL. RISER TO SEAWATER AND PRESSTESTED CMT PLUG TO 35 BAR - OK.
- STARTED TO PULL RISER AND BOP.

90/04/26 - W.O.W.
- CONTINUED PULLING RISER AND BOP

- CUT 20" X 30" CASING AT 163 M.

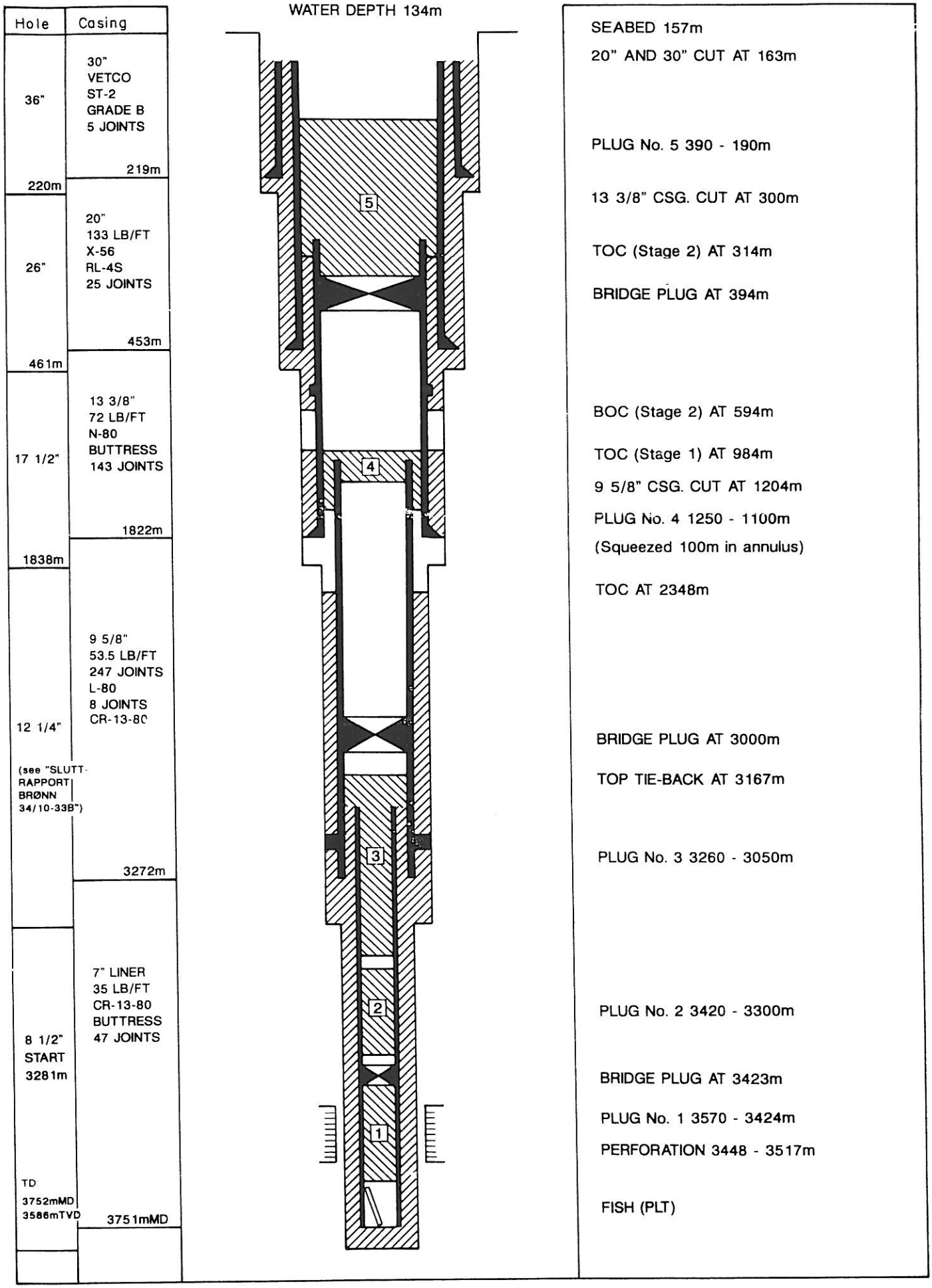
90/04/27 - POOH W/CUTTING ASSY.
- RIH W/20" HOUSING SPEAR AND RETRIEVED CUT 20" X 30" CSG AND GUIDE BASE.
- PERFORMED SEABED INSPECTION
- PULLED ANCHORS.

4.4 Well and Subsea Schematic

WELLBORE SCHEMATIC
WELL 34/10-33CR

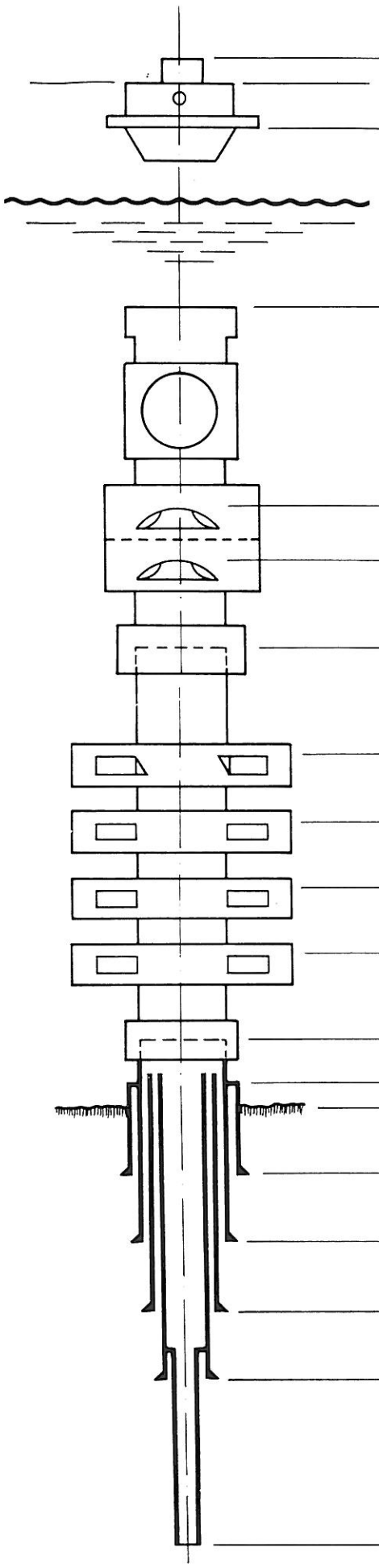
(not to scale)

(all depths mRKB)
RKB - MSL 23m



DEEPSEA BERGEN | SUBSEA ASSEMBLY | WELL 34/10-33CR

(NOT TO SCALE)



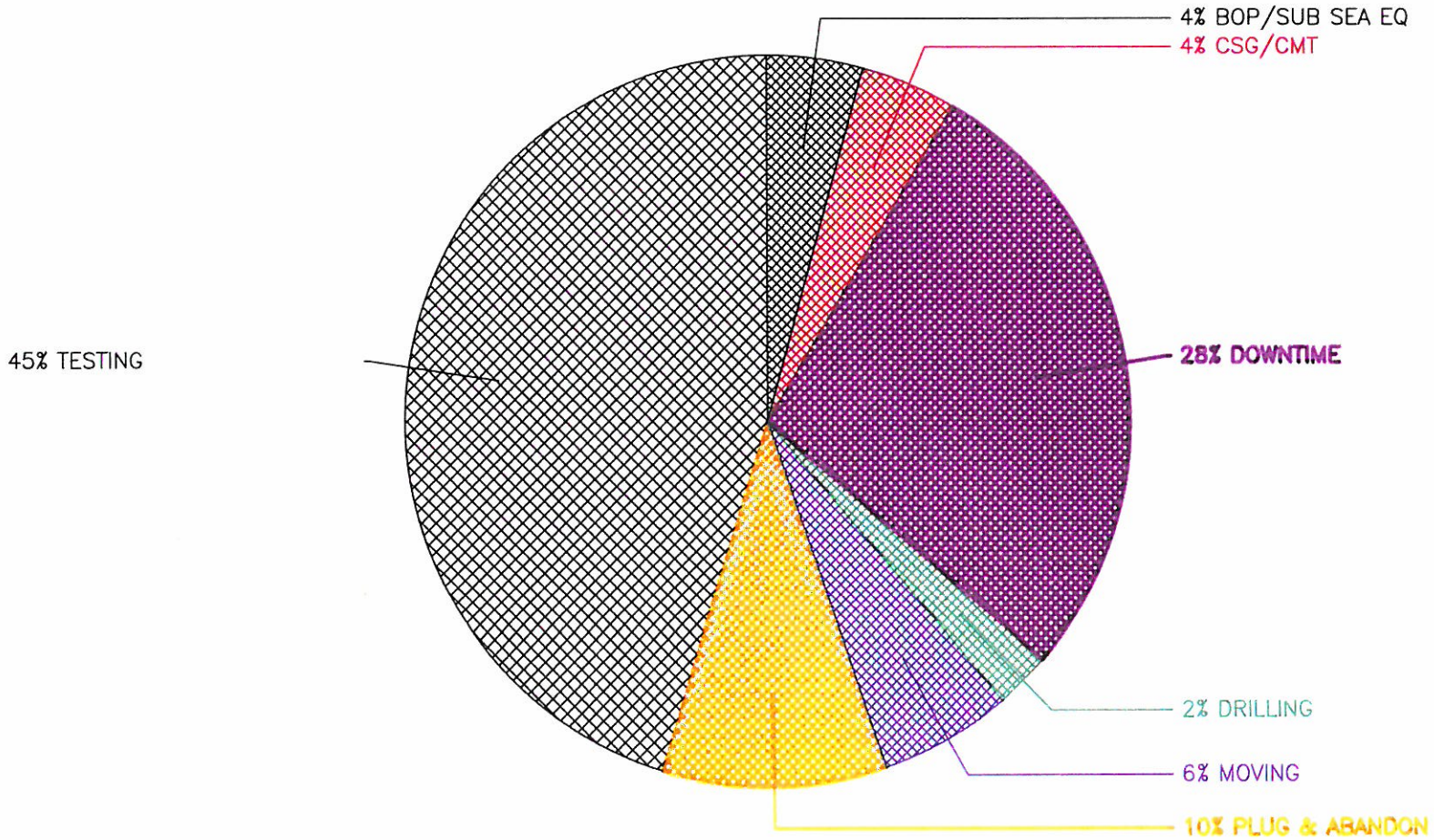
	m	
	0m	RKB
		DIVERTER RISER CONNECTOR FLANGE
	23m	MEAN SEA LEVEL
	143.46m	JOINT RISER CONNECTOR FLANGE
2.76m		
	146.22m	UPPER ANNULAR RUBBER TOP (CLOSED)
1.00m		
	147.22m	LOWER ANNULAR RUBBER TOP (CLOSED)
1.84m		
	149.06m	LOWER STACK ASSEMBLY TOP
2.00m		
	151.06m	SHEAR RAMS TOP
0.49m		
	151.55m	U.P RAMS TOP
1.24m		
	152.79m	M.P. RAMS TOP
0.49m		
	153.28m	L.P. RAMS TOP
1.22m		
	154.50m	18 3/4" WELLHEAD TOP
	155.50m	30" HOUSING TOP
	157.00m	MUD LINE
	219.00m	30" SHOE
	453.00m	20" SHOE
	1822.0m	13 3/8" SHOE
	3272.0m	WINDOW IN 9 5/8" CASING
	3751.0m	7" SHOE

4.5 Rig Time Distribution

Statoils Daglige Borerapportsystem – DBR

RIG TIME DISTRIBUTION

Well: 0034/10–033CR

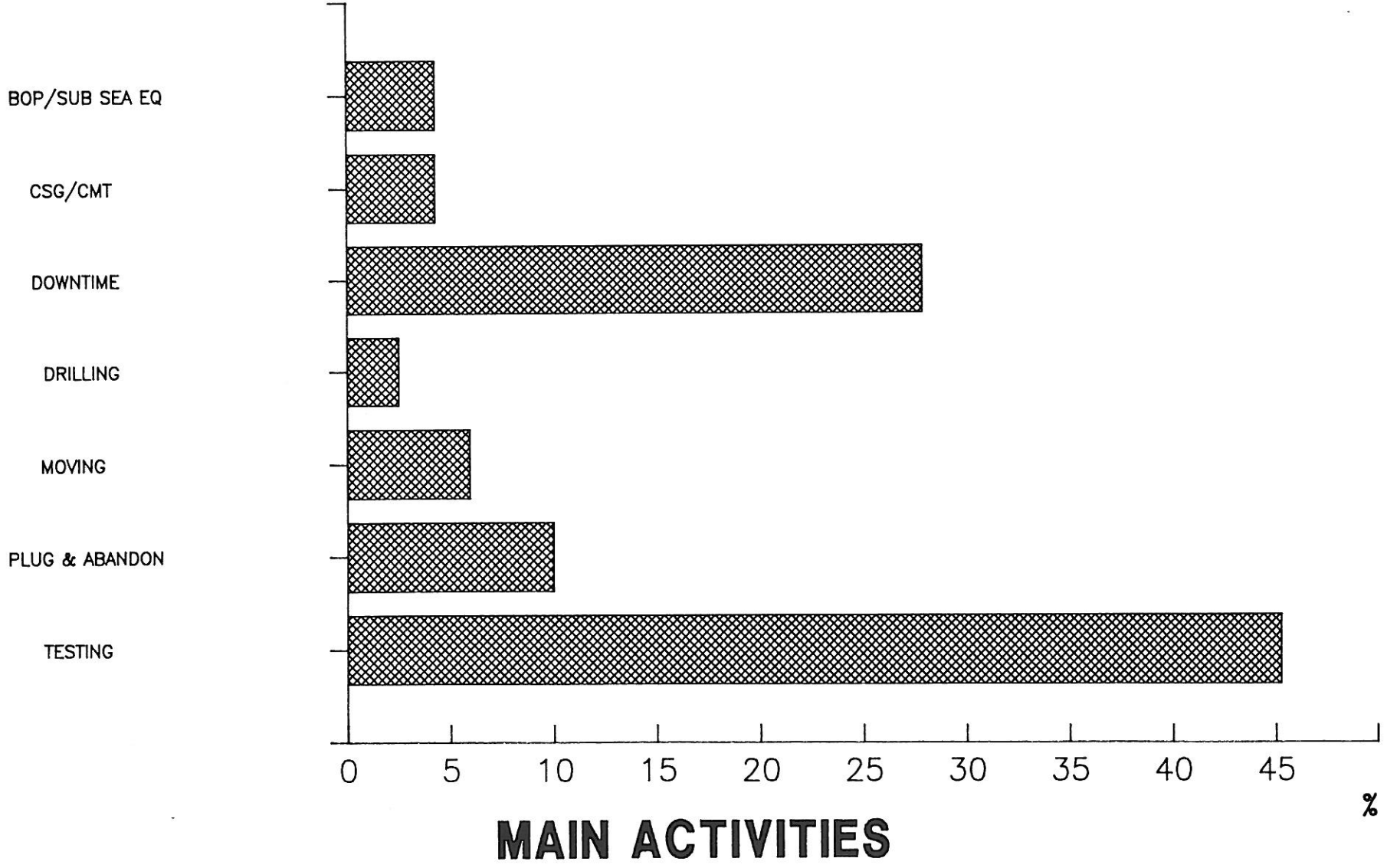


MAIN ACTIVITIES

Statoils Daglige Borerapportsystem – DBR

RIG TIME DISTRIBUTION

Well: 0034/10–033CR



R I G T I M E D I S T R I B U T I O N

Well: 0034/10-033CR

MAIN-ACTIVITY	SUB-ACTIVITY	HRS.	%
BOP/SUB SEA EQ	BOP	48,0	3,06
	EQUIPMENT	,5	,03
	OTHER	17,5	1,12
	WELLHEAD	1,0	,06
		67,0	4,27
CSG/CMT	CIRC/COND	,5	,03
	DRILL	10,5	,67
	OTHER	42,5	2,71
	TEST	13,5	,86
		67,0	4,27
DRILLING	CIRC/COND	4,5	,29
	OTHER	6,5	,41
	TRIP	28,0	1,79
		39,0	2,49
MOVING	ANCHOR	19,0	1,21
	TRANSIT	74,0	4,72
		93,0	5,93
PLUG & ABANDON	CEMENT	6,5	,41
	CIRC/COND	15,0	,96
	CUT	50,0	3,19
	DRILL	1,0	,06
	MECHANICAL PLUG	9,0	,57
	OTHER	10,0	,64
	SQUEEZE	2,0	,13
	TRIP	63,0	4,02
		156,5	9,98

R I G T I M E D I S T R I B U T I O N

Well: 0034/10-033CR

MAIN-ACTIVITY	SUB-ACTIVITY	HRS.	%
TESTING	CIRC/COND	80,0	5,10
	EQUIPMENT	188,0	11,99
	FLOW	147,5	9,40
	LOG	2,0	,13
	OTHER	175,5	11,19
	PERFORATE	21,5	1,37
	TEST	95,0	6,06
		709,5	45,23
DOWNTIME	BOP	,5	,03
	DUMMY	2,0	,13
	LOGGING	44,5	2,84
	MAINTAIN/REP	17,0	1,08
	OTHER	234,5	14,95
	WAIT	135,5	8,64
	WELLHEAD	2,5	,16
		436,5	27,83
TOTAL		1568,5	100,00

4.6 Bit Record

B I T R E C O R D

Well: 0034/10-033CR

Run no.	Bit no.	BHA no.	Bit-Size	UR/HO	Cutter-type	Bit type	IADC code	Manufacturer	Ser.no.	Nozzle (n/32') n x no
1	1	1	8 1/2"		TCI	HP 12	1-2-6	REED	BT6728	3 15
2	2	8	5 7/8"		MTB	J3	1-3-6	HTC	U23EF	
3	3	11	5 7/8"		MTB	J4	2-1-6	HTC	G63EF	
4	4	22	5 7/8"		MTB	HP-12J	1-2-6	REED	EB1853	
5	5	23	5 7/8"		MTB	HP-12J	1-2-6	REED	EB1854	
6	6	24	5 7/8"		MTB	HP-12J	1-2-6	REED	EB1854	
7	4 RR	26	5 7/8"		MTB	HP-12J	1-2-6	REED	EB1854	
8	10RR	26	12 1/4"		TCI	HP51J	5-1-7	REED	Y73639	
9	6 RR	27	17 1/2"		TCI	15JSLCE	4-3-5	SMITH	NA0196	

Run no.	Bit no.	Flow-area mm2	Flow-rate l/min	Pump-press bar	Depth In mMD	Depth Out mMD	Made m.	HR. Drlg.	ROP m/hr	WOB Min ton	WOB Max ton	RPM Min	RPM Max	Condition T/8	Condition B/8	Condition Gage	Condition Worn %	Remarks
1	1		2400	220	363,0	3150,0	,0	7,7		5	14	120	140	3	2	1	0	DRILLED EZSV AND CEMENT PLUGS
2	2		1620	230	3712,0	3712,0	,0							3	1	0	0	3-3-JD-G-E-I-BT-TD
3	3		1200	150	3680,0	3680,0	,0				20	50	50	2	8	2	0	2-2-PB-C-F-3/16-JD-TD
4	4		1650		3385,0	3386,0	1,0	,5	2,00	3	7	80	120	2	1	1	0	3 BROKEN TEETH, 1 CONE LOCKED
5	5						,0							2	4	1	0	3BT JUNKMARKS ON ONE SIDE
6	6				3515,0	3515,0	,0							2	4	1	0	
7	4 RR						,0							2	4	1	0	RIH WITH BIT NO. 4RR
8	10RR				420,0	420,0	,0							0	0	0	0	BIT 10 (7/7-1), CIRC AND COND.
9	6 RR				300,0	300,0	,0							3	6	2	0	RR BIT 6 WELL 7/7-1

4.7 Pressure and Temperature Profiles

For pressure and temperature profiles in this well refer to the completion reports for wells 34/10-33, -33A, -33B and 33C.

Details of the reservoir pressures and temperatures may be found in the reservoir evaluation reports for these as well as the present well.

4.8 Drilling Fluid Summary

The well had been temporarily abandoned with 1.55 S.G. gel/ligno mud between the plugs, mud from the hole drilled prior to the re-entry was therefore weighted up and used. The following summary has been taken from Promud's "Well Summary".

Comments

Arrived location with 168 m^3 old gel/ligno mud from the previous well. Mixed this mud together and weighted up to 1.55 S.G.. Seawater was used to drill the first plug and the hole displaced to mud prior to drilling out the remaining plugs.

Made 16 m^3 of lignosulphonate-premix. Added 3 m^3 premix into active system whilst drilling remainder of cement and circulated old mud from the hole. The Extenda joint male member was washed over and the hole circulated clean.

90 m^3 prehydrated bentonite was prepared as reserve mud but due to high chloride content in the drillwater the bentonite did not yield. 50 m^3 of this was dumped due to repairs to the mixing lines in the pit. After new drillwater had been recieved a further 43 m^3 of prehydrated bentonite was prepared.

The re-entry string was run with water as cushion but due to fishing operations the string was re-displaced to mud. Attempts to bullhead the mud were unsuccessful, and when gas appeared during packer milling operations the weight was increased in two stages to 1.65 S.G..

After circulating out at the bottom of the 7" liner at 3712 m. the mud weight was again reduced to 1.55 S.G. by the addition of light gel/ligno mud. The string was circulated with complete bottoms up at 3280 m. and 3440 m. in case of oil in the liner, however no significant amounts of oil were detected in the retort. A low solids, bentonite/Miltemp pill was prepared to fill the 7" liner before running in with the test string.

Prior to testing the casing the liner lap was milled and soda ash (to remove Ca^{++}) and Miltemp were added to make the mud more temperature stable. Bit and scrapers were run to clean out the 7" liner, prehydrated bentonite being added to maintain the rheology.

Prior to pulling out the liner was displaced to a low solids bentonite/Miltemp (6 kg/m^3) mud. At the expected bottom hole temperature of 125 °C, the above Miltemp concentration should be sufficient to prevent gelation over a long period of time. (Flat gel strength: 8/14).

The casing was tested and a leak found, operations to set a tie-back took more than a week before a bit and scraper was run and the hole circulated. With the exception of the bentonite/Miltemp pill in the 7" liner, the mud returns from the bottom part of the hole had a rather high rheology and gels. To avoid high temperature gelation, 45 m^3 low solids bentonite/Miltemp (6 kg/m^3) was placed in the hole from 3680 to 2260 m..

The test string was run but had to be pulled again due to tool failure. The mud in the upper part of the hole was circulated and treated with caustic soda and lignosulphonate but was otherwise in good shape. A bit and scraper was run and the mud weight reduced from 1.55 S.G. to 1.45 S.G. by adding premixed gel/ligno. Prior to pulling out of the hole the 7" liner was displaced to new bentonite/Miltemp mud at the previous concentration.

The second attempt to test the well was aborted due to stuck wireline tools, the well was killed and the mud weight increased to 1.48 S.G.. A bit and scraper run was made to circulate out gas and the mud treated with lignosulphonate, again a temperature stable pill was placed in the 7" liner.

The well was then tested over a period of approximately five days after which the mud was circulated out and found to be in good shape. Plugging operations began and cement contaminated mud treated with lignosulphonate as necessary.

Recommendations

The chrome free lignosulphonate and lignite system with approximately 2 - 3 kg/m^3 Miltemp from the previous well should have been tolerant up to approximately 120 °C. This Miltemp concentration was not sufficient as gelation was observed in the mud returning from the well. Based on these observations it was decided to spot clean bentonite/Miltemp on bottom. These pills provided stable properties throughout the static periods. It is recommended that in future wells with bottom hole temperatures in excess of 120 °C that the Miltemp concentration should be maintained at 6 - 9 kg/m^3 which will increase the temperature tolerance to the 140 - 150 °C range.

4.9 Casing and Cement Summary

CASING CONSUMPTION

See "Final Well Report Well 34/10-33C"

CEMENT REPORT

See "Final Well Report Well 34/10-33C"

For details of plugs set for the final abandonment see attached table and wellbore schematic.

Tabell 4-1 Cement Report: Plugging

Well 34/10-33CR										
Cement Contractor: Halliburton										
Job type	Depth int. (m MD)	Slurry volume (m^3)	Slurry density (S.G.)	Comp. Strength (bar/hr)	Thick. time (hr)	Additive name	Composition l/100 kg (1) %BWOC (2)	Total used liter (1) Kg (2)	Test pressure (bar)	Remarks
Plug 1	3570-3424	6.0	1.9	159/16	3.5	SSA-1 Halad-9 CFR-3 HR-6L	35.0 (2) 0.8 (2) 0.5 (2) 0.8 (1)	2081 (2) 48 (2) 30 (2) 48 (1)	100	Balanced plug over perforations, squeezed at 100 bar
Plug 2	3420-3300	2.1	1.9	159/16	3.5	SSA-1 Halad-9 CFR-3 HR-6L	35.0 (2) 0.3 (2) 0.3 (2) 0.8 (1)	732 (2) 6.3 (2) 6.3 (2) 16.8 (1)	-	
Plug 3	3260-3050	5.9	1.9	159/16	3.5	SSA-1 Halad-9 CFR-3 HR-6L	35.0 (2) 0.3 (2) 0.3 (2) 0.8 (1)	2055 (2) 17.7 (2) 17.7 (2) 47.2 (1)	-	Balanced plug across liner lap
Plug 4	1250-1100	13.31	1.95	114/16	4.75	HR-6L	0.8 (1)	208 (1)	90	Squeezed 100 m. in 9 5/8″ x 13 3/8″ annulus. Tested with 1.48 sg. mud
Plug 5	390-190	27.5	1.92	59/16	7.1	-	-	-	-	Tested with sea water

4.10 Bottom Hole Assemblies

4.10.1 Drilling and Washover Assemblies

B O T T O M H O L E A S S E M B L I E S

Well: 0034/10-033CR

Date	BHA no	BHA component	O.D. (inch)	I.D. (inch)	Length (m)	Akk. length (m)
900227	1	BIT	8,500		,24	,24
		BIT SUB	6,500	2,250	,90	1,14
		DRILL COL	6,500	2,250	83,69	84,83
		HW DRILL PIPE	5,000	3,000	136,98	221,81
		DART SUB	5,000	2,938	,41	222,22
Total length BHA no: 1					222,22	
900228	2	GAUGE SLEEVE	8,200		,84	,84
		WASHPIPE	7,000		11,87	12,71
		WASHPIPE	7,000		2,40	15,11
		XO SUB			,51	15,62
		HW DRILL PIPE	5,000		136,98	152,60
Total length BHA no: 2					152,60	
900311	4	OVERSHOT			,73	,73
		WASHPIPE	7,000		9,96	10,69
		XO SUB			,29	10,98
		XO SUB			,45	11,43
		HW DRILL PIPE	5,000		27,39	38,82
		BUMBER SUB	5,000		5,20	44,02
		HW DRILL PIPE	5,000		109,59	153,61
		DART SUB	5,000		,41	154,02
Total length BHA no: 4					154,02	
	5	OVERSHOT	8,200		,73	,73
		WASHPIPE	7,000		9,96	10,69
		XO SUB			,29	10,98
		XO SUB			,45	11,43
		HW DRILL PIPE			9,13	20,56
		STABILIZER	8,500		1,55	22,11
		HW DRILL PIPE	5,000		18,26	40,37
		BUMBER SUB			5,20	45,57
		HW DRILL PIPE	5,000		109,59	155,16
		DART SUB			,41	155,57
Total length BHA no: 5					155,57	
900312	6	OTHER			,65	,65
		OTHER	7,000	3,500	3,07	3,72
		XO SUB			,33	4,05
		HW DRILL PIPE	5,000		136,98	141,03
		DRILL PIPE	5,000		230,16	371,19
		XO SUB			,62	371,81
		BUMBER SUB			3,74	375,55
		BUMBER SUB			3,79	379,34
		XO SUB			,78	380,12
Total length BHA no: 6					380,12	

B O T T O M H O L E A S S E M B L I E S

Well: 0034/10-033CR

Date	BHA no	BHA component	O.D. (inch)	I.D. (inch)	Length (m)	Akk. length (m)
900317	7	MILL	8,240		4,04	4,04
		JUNK BASKET	6,630		1,44	5,48
		OTHER	5,500		,50	5,98
		JAR	6,250	2,250	2,39	8,37
		DRILL COL	6,500	2,250	27,77	36,14
		HW DRILL PIPE	5,000	3,000	136,98	173,12
		DART SUB	5,000		,42	173,54
Total length BHA no: 7					173,54	
900318	8	BIT	5,875		,18	,18
		BIT SUB	4,750	2,313	,92	1,10
		DRILL COL	4,750	2,250	140,09	141,19
		DRILL PIPE	3,500	2,500	155,21	296,40
		XO SUB	4,625	1,375	,61	297,01
		SCRAPER	7,000	1,375	1,03	298,04
		BIT SUB	4,750	2,313	,91	298,95
		DRILL PIPE	3,500	2,500	223,11	522,06
		MILL	8,250	2,688	1,98	524,04
		SCRAPER	9,625	2,375	1,35	525,39
		BIT SUB	6,375	2,250	,82	526,21
		OTHER	6,375	4,375	,58	526,79
		DRILL COL	6,500	2,250	55,79	582,58
		HW DRILL PIPE	5,000	3,000	136,98	719,56
Total length BHA no: 8					719,56	
900320	9	OVERSHOT	4,380	3,500	,40	,40
		XO SUB	4,380	2,560	,29	,69
		DRILL PIPE	3,500	2,500	174,60	175,29
		XO SUB	6,500	2,250	,88	176,17
		HW DRILL PIPE	5,000	3,000	136,98	313,15
Total length BHA no: 9					313,15	
900321	10	BULL NOSE	3,500	2,500	2,00	2,00
		MILL	8,250	2,250	1,98	3,98
		SCRAPER	9,630	2,380	1,35	5,33
		BIT SUB	6,380	2,250	,82	6,15
		JAR	6,250	2,250	2,39	8,54
		OTHER	6,380	1,630	,58	9,12
		DRILL COL	6,500	2,250	55,79	64,91
		HW DRILL PIPE	5,000	3,000	136,98	201,89
		DART SUB	6,250	3,000	,41	202,30
Total length BHA no: 10					202,30	

B O T T O M H O L E A S S E M B L I E S

Well: 0034/10-033CR

Date	BHA no	BHA component	O.D. (inch)	I.D. (inch)	Length (m)	Akk. length (m)
900322	11	BIT	5,880		,18	,18
		BIT SUB	4,750	2,310	,92	1,10
		DRILL COL	4,750	2,250	140,09	141,19
		DRILL PIPE	3,500	2,500	96,97	238,16
		XO SUB	4,630	1,380	,61	238,77
		SCRAPER	7,000	1,380	1,02	239,79
		BIT SUB	4,750	2,310	,91	240,70
		OTHER	4,750	1,500	,55	241,25
		DRILL PIPE	3,500	2,500	291,05	532,30
		XO SUB	6,380	2,250	,45	532,75
		HW DRILL PIPE	5,000	3,000	27,40	560,15
		JAR	6,250	2,250	2,39	562,54
		HW DRILL PIPE	5,000	3,000	109,56	672,10
		DART SUB	6,250	3,000	,41	672,51

Total length BHA no: 11					672,51	
	12	OTHER	5,750	2,250	1,38	1,38
		OTHER	5,000	2,400	,95	2,33
		JAR	4,630	2,250	1,57	3,90
		OTHER	4,630	2,250	2,13	6,03
		DRILL COL	4,750	2,250	140,09	146,12
		DRILL PIPE	3,500	2,500	378,32	524,44
		XO SUB	6,380	2,250	,45	524,89

Total length BHA no: 12					524,89	
900323	13	OTHER	5,250	3,750	,19	,19
		OVERSHOT	4,375	3,375	,38	,57
		EXTENSION SUB	4,750	2,563	,29	,86
		DRILL COL	4,750	2,250	140,09	140,95
		DRILL PIPE	3,500	2,500	378,37	519,32
		XO SUB	6,500	2,250	,45	519,77
		HW DRILL PIPE	5,000	3,000	136,98	656,75
		DART SUB	6,250	3,000	,41	657,16

Total length BHA no: 13					657,16	
900324	14	OTHER	8,150	3,750	1,99	1,99
		OTHER	6,120	4,910	1,09	3,08
		OTHER	6,120	3,000	,97	4,05
		DRILL COL	6,500	2,250	83,69	87,74
		HW DRILL PIPE	5,000	3,000	136,98	224,72
		DART SUB	6,250	3,000	,41	225,13

Total length BHA no: 14					225,13	

B O T T O M H O L E A S S E M B L I E S

Well: 0034/10-033CR

Date	BHA no	BHA component	O.D. (inch)	I.D. (inch)	Length (m)	Akk. length (m)
900325	15	OTHER	7,000		45,79	45,79
		DRILL COL	6,500	2,250	111,42	157,21
		HW DRILL PIPE	5,000	3,000	136,98	294,19
		DART SUB	6,250	3,000	,41	294,60

Total length BHA no: 15					294,60	
900326	16	OVERSHOT	11,250	6,376	1,23	1,23
		DRILL COL	8,000	2,813	27,55	28,78

Total length BHA no: 16					28,78	
900327	17	OTHER	11,250		,76	,76
		XO SUB	8,000	2,250	,62	1,38
		XO SUB	6,250	2,875	,90	2,28

Total length BHA no: 17					2,28	
	18	OTHER	17,250		,81	,81
		STABILIZER	17,000	2,875	1,14	1,95

Total length BHA no: 18					1,95	
900328	19	OTHER	14,630		2,09	2,09
		XO SUB	8,000	2,250	,62	2,71
		XO SUB	6,250	2,875	,89	3,60

Total length BHA no: 19					3,60	
900329	20	OTHER	6,500		3,35	3,35
		DRILL COL	6,500	2,250	111,42	114,77
		HW DRILL PIPE	5,000	3,000	136,98	251,75
		DART SUB	6,250	3,000	,41	252,16

Total length BHA no: 20					252,16	
	21	OTHER	5,750	2,400	1,32	1,32
		OTHER	5,000	2,440	,85	2,17
		OTHER	4,870	2,440	,97	3,14
		DRILL COL	4,750	2,250	28,02	31,16
		XO SUB	6,375	2,250	,88	32,04
		OTHER	6,875	2,875	,57	32,61
		DRILL COL	6,500	2,250	223,55	256,16
		HW DRILL PIPE	5,000	3,000	256,80	512,96
		DART SUB	6,250	3,000	,41	513,37

Total length BHA no: 21					513,37	

Well: 0034/10-033CR

Date	BHA no	BHA component	O.D. (inch)	I.D. (inch)	Length (m)	Akk. length (m)
900330	22	BIT	5,875		,18	,18
		BIT SUB	4,750	2,313	,92	1,10
		DRILL COL	4,750	2,250	140,09	141,19
		DRILL PIPE	3,500	2,500	106,59	247,78
		XO SUB	4,625	1,375	,61	248,39
		SCRAPER	7,000	1,375	1,02	249,41
		BIT SUB	4,750	2,313	,91	250,32
		DRILL PIPE	3,500	2,500	291,05	541,37
		XO SUB	6,375	2,250	,45	541,82
		HW DRILL PIPE	5,000	3,000	136,98	678,80
		DART SUB	6,250	3,000	,41	679,21

Total length BHA no: 22					679,21	
900404	23	BIT	5,875		,19	,19
		SCRAPER	7,000	1,375	1,02	1,21
		BIT SUB	4,375	2,312	,92	2,13
		DRILL COL	4,750	2,250	167,88	170,01
		DRILL PIPE	3,500	2,500	378,32	548,33
		XO SUB	6,375	2,250	,46	548,79
		HW DRILL PIPE	5,000	3,000	109,60	658,39
		DART SUB	6,250	3,000	,41	658,80

Total length BHA no: 23					658,80	
900405	24	OTHER	5,000		,28	,28
		OTHER	5,000		69,00	69,28
		OTHER	5,000		1,12	70,40
		OTHER	3,150		,91	71,31
		OTHER	3,130	2,000	1,09	72,40
		OTHER	3,690	2,440	,28	72,68
		OTHER	4,830	2,250	,30	72,98
		DRILL COL	4,750	2,250	56,22	129,20
		OTHER	5,000	2,250	,30	129,50
		DRILL COL	4,750	2,250	55,91	185,41
		DRILL PIPE	3,500	2,500	378,32	563,73
		XO SUB	6,500	4,250	,46	564,19

Total length BHA no: 24					564,19	
900411	24	HW DRILL PIPE	5,000	3,000	109,60	109,60

Total length BHA no: 24					109,60	

B O T T O M H O L E A S S E M B L I E S

Well: 0034/10-033CR

Date	BHA no	BHA component	O.D. (inch)	I.D. (inch)	Length (m)	Akk. length (m)
900420	26	BIT	5,880		,19	,19
		SCRAPER	7,000	1,380	1,02	1,21
		BIT SUB	4,750	2,250	,92	2,13
		DRILL COL	4,750	2,250	167,88	170,01
		DRILL PIPE	3,500	2,500	465,60	635,61
		XO SUB	6,380	2,250	,45	636,06

Total length BHA no: 26					636,06	
900427	27				,00	,00
		BIT	17,500		,43	,43
		BIT SUB	9,500	3,000	,91	1,34
		XO SUB	9,500	3,000	,66	2,00
		DRILL COL	8,000	2,810	18,56	20,56
		XO SUB	7,880	2,940	1,11	21,67
		HW DRILL PIPE	5,000	3,000	9,13	30,80

Total length BHA no: 27					30,80	

4.10.2 Completion and Testing Assemblies

DESCRIPTION	SUPPLIER	ID	OD	LENGTH	DEPTH
		inch	inch	meter	mRKB
Flowhead with swivel	Schlumberger	3.00			-5.58
Crossover 6 1/2" SA x 4 1/2" MOD IF	Schlumberger	3.00	8.30	0.35	-5.23
3 Joints 5" Modified Drillpipe	KL Oiltools	4.28	6.38	30.78	25.55
Crossover 4 1/2" Mod IF x 4 1/2 SA	Schlumberger	3.00	6.50	0.25	25.80
Lubricator valve	Schlumberger	3.00	13.00	1.75	27.55
Crossover 4 1/2 SA x 4 1/2" Mod IF	Schlumberger	3.00	6.50	0.18	27.73
11 Joints 5" Modified Drillpipe	KL Oiltools	4.28	6.38	112.86	140.59
3 Pup joints 5" Modified Drillpipe	KL Oiltools	4.28	6.38	7.65	148.24
Crossover 4 1/2" Mod IF x 4 1/2 SA	Schlumberger	3.00	6.50	0.26	148.50
Centralizer	Schlumberger	3.00	16.00	1.06	149.56
EZ-Tree	Schlumberger	3.00	13.00	2.69	152.25
Slick joint	Schlumberger	3.00	5.00	2.18	154.43
Crossover 4 1/2 SA x 4 1/2 SA	Schlumberger	3.00	6.50	0.25	154.68
Fluted hanger	Schlumberger	3.00	13.00	0.30	154.98
Crossover 4 1/2 SA x 4 1/2" Mod IF	Schlumberger	3.00	6.50	0.20	155.18
Pup joint 5" Modified Drillpipe	KL Oiltools	4.28	6.38	2.00	157.18
290 joints 5" Modified Drillpipe	KL Oiltools	4.28	6.38	2974.09	3131.27
Crossover 4 1/2" Mod IF x 5 1/4" CAS	Halliburton RS	3.44	7.75	0.30	3131.57
APR-M2 Circulating valve	Halliburton RS	3.50	7.00	2.74	3134.31
Crossover 5 1/4" CAS x 4 1/2" VAM	Halliburton RS	3.50	7.75	0.33	3134.64
Joint 4 1/2" VAM Tubing	Baker Oil Tools	3.96	5.04	9.96	3144.60
Crossover 4 1/2" VAM x 5 1/4" CAS	Halliburton RS	3.38	7.75	0.31	3134.91
LPR-N Tester valve	Halliburton RS	3.50	7.00	4.92	3149.83
APR-M2 Circulating valve (sleeve)	Halliburton RS	3.50	7.00	2.74	3152.57
Crossover 5 1/4" CAS x 4 1/2" VAM	Halliburton RS	3.50	7.75	0.31	3152.88
4 1/2" VAM Pup joint	Baker Oil Tools	3.96	5.04	1.84	3154.72
2.81" AF Nipple	Baker Oil Tools	2.81	4.90	0.64	3155.36
4 1/2" VAM Pup joint	Baker Oil Tools	3.96	5.04	1.23	3156.59
4 1/2" VAM Pup joint	Baker Oil Tools	3.96	5.04	0.99	3157.58
4 1/2" VAM Pup joint	Baker Oil Tools	3.96	5.04	1.81	3159.39
Flow coupling	Baker Oil Tools	3.96	5.04	1.89	3161.28
Extenda joint housing	Baker Oil Tools	3.63	5.40	7.43	3168.71
Guide shoe	Baker Oil Tools	3.63	8.21	0.31	3169.02

Tabell 4-2 34/10-33CR: Re-entry and kill string

See figure on page 30, "Re-entry and Test Programme"

DESCRIPTION	SUPPLIER	ID	OD	LENGTH	DEPTH
		inch	inch	meter	mRKB
Top of mandrel		2.75	3.63		3167.00
Model A Extenda Joint (Mandrel)	Baker Oil Tools	2.75	3.63	7.00	3174.00
4 1/2" VAM Ace Pup Joint	Statoil	3.83	5.04	1.18	3175.18
4 1/2" VAM Ace Pup Joint	Statoil	3.83	5.04	1.80	3176.98
Flow coupling	Statoil	3960	5.04	1.84	3178.82
Model "N-225" Anchor	Baker Oil Tools	2.99	5.50	0.64	3179.46
Model "SAB-3" Packer (above seals)	Baker Oil Tools	3.68	8.13	0.69	3180.15
Model "SAB-3" Packer (below seals)	Baker Oil Tools	3.68	8.13	0.91	3181.06
Crossover 5" TAC-1 x 5" BDS	Statoil	4.28	5.41	0.32	3181.38
5" BDS coupling (box x box)	Statoil	4.28	5.41	0.20	3181.58
Millout extension	Baker Oil Tools	4.28	5.04	1.59	3183.17
Casing sub 5" VAM x 4 1/2" VAM	Baker Oil Tools	3.63	5.59	0.33	3183.50
4 1/2" VAM Ace Pup Joint	Statoil	3.83	5.04	1.19	3184.69
4 1/2" VAM Ace Pup Joint	Statoil	3.83	5.04	1.76	3186.45
Spacer Nipple	Baker Oil Tools	2.80	5.04	0.71	3187.16
Flow coupling	Statoil	3.63	5.04	1.89	3189.05
2.56" "HOF" top no-go nipple	Baker Oil Tools	2.56	5.04	0.67	3189.72
Flow coupling	Statoil	3.63	5.04	1.89	3191.61
Pup Joint 4 1/2" VAM	Statoil	3.83	5.04	1.07	3192.68
Perforated Joint 4 1/2" VAM	Statoil	3.83	5.04	12.90	3205.58
2.56" "HOR" bottom no-go nipple	Baker Oil Tools	2.47	5.04	0.71	3206.29
Pup Joint 4 1/2" VAM Ace	Statoil	3.83	5.04	1.18	3207.47
Joint 4 1/2" VAM Ace	Statoil	3.83	5.04	13.09	3220.56
Wireline entry guide	Baker Oil Tools	3.89	5.03	0.25	3220.81

Tabell 4-3 34/10-33C: Completion after temporary abandonment

See figures on pages 24 and 25, "Re-entry and Test Programme"

DESCRIPTION	SUPPLIER	ID	OD	LENGTH	DEPTH
		inch	inch	meter	mRKB
Flowhead with swivel	Schlumberger	3.00			-5.68
Crossover 6 1/2" SA x 4 1/2" MOD IF	Schlumberger	3.00	8.30	0.35	-5.33
3 Joints 5" Modified Drillpipe	KL Oiltools	4.28	6.38	30.78	25.45
Crossover 4 1/2" Mod IF x 4 1/2 SA	Schlumberger	3.00	6.50	0.25	25.70
Lubricator valve	Schlumberger	3.00	13.00	1.75	27.45
Crossover 4 1/2 SA x 4 1/2" Mod IF	Schlumberger	3.00	6.50	0.18	27.63
11 Joints 5" Modified Drillpipe	KL Oiltools	4.28	6.38	112.86	140.49
4 Pup joints 5" Modified Drillpipe	KL Oiltools	4.28	6.38	8.00	148.49
Crossover 4 1/2" Mod IF x 4 1/2 SA	Schlumberger	3.00	6.50	0.26	148.75
Centralizer	Schlumberger	3.00	16.00	1.06	149.81
EZ-Tree	Schlumberger	3.00	13.00	2.69	152.50
Slick joint	Schlumberger	3.00	5.00	2.18	154.68
Fluted hanger	Schlumberger	3.00	13.00	0.30	154.98
Crossover 4 1/2 SA x 4 1/2" Mod IF	Schlumberger	3.00	6.50	0.20	155.18
Pup joint 5" Modified Drillpipe	KL Oiltools	4.28	6.38	2.62	157.80
292 joints 5" Modified Drillpipe	KL Oiltools	4.28	6.38	2994.64	3152.44
Crossover 4 1/2" Mod IF x 3 1/2" IF	Test Tech	2.75	6.38	0.61	3153.05
Slip joint (open)	Halliburton RS	2.25	5.00	5.58	3158.63
Slip joint (open)	Halliburton RS	2.25	5.00	5.58	3164.21
Slip joint (retrofit) (partly closed)	Halliburton RS	2.25	5.00	6.42	3170.63
Slip joint (retrofit) (closed)	Halliburton RS	2.25	5.00	6.03	3176.66
5 stands 4 3/4" Drill collar	Odfjell	2.25	4.75	139.79	3316.45
RS circulating valve	Halliburton RS	2.25	5.00	4.84	3321.29
2 joints 4 3/4" Drill collar	Odfjell	2.25	4.75	18.73	3340.02
Radioactive marker sub	Baker Sand Control	2.25	5.00	0.30	3340.32
APR-M2 Circulating valve (ball)	Halliburton RS	2.25	5.00	2.94	3342.61
Drain valve	Halliburton RS	2.25	5.00	0.00	3342.61
Joint 4 3/4" Drill collar	Odfjell	2.25	4.75	9.36	3351.97
LPR-NR Tester valve	Halliburton RS	2.25	5.00	5.27	3357.24
Hydraulic bypass	Halliburton RS	2.25	5.00	2.13	3359.37
Gauge carrier	Halliburton RS	2.25	5.50	2.89	3362.26
Gauge carrier	Maritime Well Services	2.25	5.50	9.89	3372.15
Radioactive marker sub	Baker Sand Control	2.25	5.00	0.30	3372.45
Big John Jar	Halliburton RS	2.25	4.63	1.57	3374.02
Safety joint	Halliburton RS	2.40	5.00	0.95	3374.97
7" RTTS Packer	Halliburton RS	2.25	5.75	1.38	3376.35
Perforated joint	Halliburton RS	2.44	3.50	4.93	3381.28
Shock absorber	Baker Sand Control	2.38	5.00	0.86	3382.14
2 7/8" EUE pup joint	Baker Sand Control	2.44	3.50	2.46	3384.60
Ported disc sub	Baker Sand Control	2.44	3.69	0.20	3384.80
2 7/8" EUE pup joints (2 x 3.05)	Baker Sand Control	2.44	3.50	6.10	3390.90
2 7/8" Mechanical gun release	Baker Sand Control	2.31	3.69	0.59	3391.49
6 x 2 7/8" EUE joints	Baker Sand Control	2.44	3.50	54.16	3445.65
Wireline conveyed firing head	Baker Sand Control	2.00	3.13	1.23	3446.88
Gun spacer	Baker Sand Control		5.00	1.12	3448.00
5" Guns 6 shots/foot	Baker Sand Control		5.00	69.00	3517.00
Bottom nose	Baker Sand Control		5.00	0.28	3517.28

Tabell 4-4 34/10-33CR: Main test string (Test 1)

See figure on page 42, "Re-entry and Test Programme"

DESCRIPTION	SUPPLIER	ID	OD	LENGTH	DEPTH
		inch	inch	meter	mRKB
Flowhead with swivel	Schlumberger	3.00			-5.68
Crossover 6 1/2" SA x 4 1/2" MOD IF	Schlumberger	3.00	8.30	0.35	-5.33
3 Joints 5" Modified Drillpipe	KL Oiltools	4.28	6.38	30.78	25.45
Crossover 4 1/2" Mod IF x 4 1/2 SA	Schlumberger	3.00	6.50	0.25	25.70
Lubricator valve	Schlumberger	3.00	13.00	1.75	27.45
Crossover 4 1/2 SA x 4 1/2" Mod IF	Schlumberger	3.00	6.50	0.18	27.63
11 Joints 5" Modified Drillpipe	KL Oiltools	4.28	6.38	112.86	140.49
4 Pup joints 5" Modified Drillpipe	KL Oiltools	4.28	6.38	8.00	148.49
Crossover 4 1/2" Mod IF x 4 1/2 SA	Schlumberger	3.00	6.50	0.26	148.75
Centralizer	Schlumberger	3.00	16.00	1.06	149.81
EZ-Tree	Schlumberger	3.00	13.00	2.69	152.50
Slick joint	Schlumberger	3.00	5.00	2.18	154.68
Fluted hanger	Schlumberger	3.00	13.00	0.30	154.98
Crossover 4 1/2 SA x 4 1/2" Mod IF	Schlumberger	3.00	6.50	0.20	155.18
277 joints 5" Modified Drillpipe	KL Oiltools	4.28	6.38	2840.80	3003.63
Crossover 4 1/2" Mod IF x 3 1/2" IF	Test Tech	2.75	6.38	0.61	3004.24
Slip joint (open)	Halliburton RS	2.25	5.00	5.53	3009.77
Slip joint (open)	Halliburton RS	2.25	5.00	5.53	3015.30
Slip joint (closed)	Halliburton RS	2.25	5.00	4.01	3019.31
Slip joint (closed)	Halliburton RS	2.25	5.00	4.01	3023.32
5 stands 4 3/4" Drill collar	Odfjell	2.25	4.75	139.79	3163.11
RS circulating valve	Halliburton RS	2.25	5.00	4.84	3167.95
2 joints 4 3/4" Drill collar	Odfjell	2.25	4.75	18.73	3186.68
APR-M2 Circulating valve (ball)	Halliburton RS	2.25	5.00	2.16	3188.84
Drain valve	Halliburton RS	2.25	5.00	0.00	3188.84
Joint 4 3/4" Drill collar	Odfjell	2.25	4.75	9.36	3198.20
LPR-NR Tester valve	Halliburton RS	2.25	5.00	5.27	3203.47
Hydraulic bypass	Halliburton RS	2.25	5.00	2.13	3205.60
Gauge carrier	Halliburton RS	2.25	5.50	2.79	3208.39
Gauge carrier	Maritime Well Services	2.25	5.50	9.89	3218.28
Radioactive marker sub	Baker Sand Control	2.25	5.00	0.30	3218.58
Big John Jar	Halliburton RS	2.25	4.63	1.57	3220.15
Safety joint	Halliburton RS	2.40	5.00	0.95	3221.10
7" RTTS Packer	Halliburton RS	2.25	5.75	1.38	3222.48
Wireline entry guide	Halliburton RS	2.44	4.00	0.72	3223.20

Tabell 4-5 34/10-33CR: Test string (Test 1A)

DESCRIPTION	SUPPLIER	ID	OD	LENGTH	DEPTH
		Inch	inch	meter	mRKB
Flowhead with swivel	Schlumberger	3.00			-5.68
Crossover 6 1/2" SA x 4 1/2" MOD IF	Schlumberger	3.00	8.30	0.35	-5.33
3 Joints 5" Modified Drillpipe	KL Oiltools	4.28	6.38	30.78	25.45
Crossover 4 1/2" Mod IF x 4 1/2 SA	Schlumberger	3.00	6.50	0.25	25.70
Lubricator valve	Schlumberger	3.00	13.00	1.75	27.45
Crossover 4 1/2 SA x 4 1/2" Mod IF	Schlumberger	3.00	6.50	0.18	27.63
11 Joints 5" Modified Drillpipe	KL Oiltools	4.28	6.38	112.86	140.49
4 Pup joints 5" Modified Drillpipe	KL Oiltools	4.28	6.38	8.00	148.49
Crossover 4 1/2" Mod IF x 4 1/2 SA	Schlumberger	3.00	6.50	0.26	148.75
Centralizer	Schlumberger	3.00	16.00	1.06	149.81
EZ-Tree	Schlumberger	3.00	13.00	2.69	152.50
Slick joint	Schlumberger	3.00	5.00	2.18	154.68
Fluted hanger	Schlumberger	3.00	13.00	0.30	154.98
Crossover 4 1/2 SA x 4 1/2" Mod IF	Schlumberger	3.00	6.50	0.20	155.18
290 Joints 5" Modified Drillpipe	KL Oiltools	4.28	6.38	2974.18	3129.36
Crossover 4 1/2" Mod IF x 3 1/2" IF	Test Tech	2.75	6.38	0.61	3129.97
Slip joint (open)	Halliburton RS	2.25	5.00	5.53	3135.50
Slip joint (open)	Halliburton RS	2.25	5.00	5.53	3141.03
Slip joint (closed)	Halliburton RS	2.25	5.00	4.01	3145.04
Slip joint (closed)	Halliburton RS	2.25	5.00	4.01	3149.05
5 stands 4 3/4" Drill collar	Odfjell	2.25	4.75	139.79	3288.84
RS circulating valve	Halliburton RS	2.25	5.00	4.84	3293.68
2 joints 4 3/4" Drill collar	Odfjell	2.25	4.75	18.73	3312.41
APR-M2 Circulating valve (ball)	Halliburton RS	2.25	5.00	2.16	3314.57
Drain valve	Halliburton RS	2.25	5.00	0.00	3314.57
Joint 4 3/4" Drill collar	Odfjell	2.25	4.75	9.36	3323.93
LPR-NR Tester valve	Halliburton RS	2.25	5.00	5.27	3329.20
Hydraulic bypass	Halliburton RS	2.25	5.00	2.13	3331.33
Gauge carrier	Halliburton RS	2.25	5.50	2.79	3334.12
Gauge carrier	Maritime Well Services	2.25	5.50	9.89	3344.01
Radioactive marker sub	Baker Sand Control	2.25	5.00	0.30	3344.31
Big John Jar	Halliburton RS	2.25	4.63	1.57	3345.88
Safety joint	Halliburton RS	2.40	5.00	0.95	3346.83
7" RTTS Packer	Halliburton RS	2.25	5.75	1.38	3348.21
Wireline entry guide	Halliburton RS	2.44	4.00	0.38	3348.59

Tabell 4-6 34/10-33CR: Test string (Test 1B)

4.11 Equipment Failures

Equipment failure reports were issued for the following items:

10.04.90	
7″ RTTS packer	One drag block and four springs were missing when the test string was pulled.
13.04.90	
GRC gauge in PLT	Gauge signal was lost whilst pressure testing in the lubricator.
14.04.90	
Gamma ray tool in PLT	The tool failed during PLT logging, apparently due to the wellbore temperature.
15.04.90	
Reduction gearbox	The reduction gearbox on the logging unit failed whilst logging.
17.04.90	
Logging cable broke	The PLT logging cable parted at the weak point whilst pulling the tools back into the tubing.
18.04.90	
LPR-NR tester valve	The LPR-NR valve would not close after concluding the test.

4.12 Inspection of tailpipe from well 34/10-33C (T-1)

4.12.1 Observations

1. The lowest joint of 4 1/2" Vam, and the pup joint below the 2.56" HOR nipple were completely filled with gelled mud, a total length of 14 meters. This was undoubtedly the reason why it was not possible to run wireline tools through the nipple during the extended well test. (See Photograph 1)

2. On top of the gelled mud, and in the nipple itself, there was an appreciable amount of metallic debris. The debris would appear to come from the tubing cutters used in the unsuccessful attempts to severe the tailpipe at 3203 and 3201 m. Some of the steel splinters and fragments may also have come from the tubing itself which was badly damaged by the explosions.

3. The 4 1/2" Vam perforated joint was not severed by the JRC explosives, but was however ballooned to approximately 7" diameter over the areas where the charges had been detonated. The ballooning resulted in longitudinal splits in the tubing, through the drilled holes where the tubing was weakest (See photographs 3 and 4). Some of the jagged splinters had also been bent inwards thus blocking the passage through the tubing. Other splinters had been torn off and were found above the gelled mud. A 100 cm. long, 32mm diameter, tube (part of a tubing cutter), plus several other pieces of debris were retrieved from the perforated joint.

4. The millout extension and 4 1/2" Vam pup joint below the packer were both perforated by the Atlas tubing punchers, 11 3 mm holes were observed. Normally it should have been possible to bullhead the well through these holes; the condition of the mud under the packer, however, prevented bullheading.

5. The model "N-225" anchor was damaged and badly scored. Two attempts had been made to retrieve the anchor and the damage may be the result of an accumulation of metal cuttings from the EZSV bridge plug that had previously been drilled out (see photograph 5).

6. The flow coupling below the Extenda joint showed clear signs of erosion due to the washover operation prior to running the re-entry string (see photograph 6).

7. The 2.75" AFH plug was in the release position, i.e. the inner sleeve was at its upper limit, the dogs were retracted and the plug had moved 15 cm. upwards. Efforts to withdraw the plug from the nipple were unsuccessful and the plug had to be removed by splitting the nipple longitudinally (see photographs 7 and 8).

8. Access to the lower plug had been hampered by the presence of debris above the nipple. This debris had apparently fallen into the tailpipe when the original anchor was pulled. Both the equalising prong and the plug itself were removed without problem. The leakage through the plug which had been noted earlier, was found to be due to damaged 'O'-rings on the equalising prong.

4.12.2 *Conclusions*

1. The gellation of the mud appears to be temperature related. As discussed in the "Drilling Fluids Summary" section in this report the concentration of stabilising agents such as Miltemp are important, especially in cases where the mud is not being circulated.

2. The failure of the JRC tubing cutters to severe the tailpipe has been refered back to JRC. In retrospect the cutters should not have been used:

   - They would undoubtedly have resulted in a jagged cut which could have damaged the logging cable.
   - The ballooning effect would have prevented the severed end from entering the 7" liner.

3. The 'O'-rings on the 2.56" HFHB equalising prong had obviously been damaged on the way in the hole. The plug appeared to be holding pressure when tested but the relatively short time allowed was insufficient for a small leak to be observed. The 'O'-rings have probably been damaged while passing over a sharp shoulder. Every effort had been made when designing the completion to avoid this possibility but it would seem that there was sufficient variation in hole angle to press the prong against an edge and damage the rings.

4. The debris above the 2.56" plug originated from the plugs which had been drilled out during the well re-entry. The problems experienced when washing over the Extenda joint indicate that the hole was not completely clean. If this debris had not been present there would not have been any problems in pulling the prong and the plug and gauges.

5. The inability to bullhead after perforating the millout extension may be related to the state of the mud in the hole; normally, circulation through these holes should not have been a problem. Later attempts to bullhead the well were also unsuccessful indicating that some form of perforation plugging was present.

6. The damage to the original anchor is related to the debris from the drilled plugs. It was not possible to wash down to the top of the packer with the washover tool and this debris, both cement and metal, has been pressed into the small clearance between the anchor and the casing (see photograph 5). The temporary abandonment method chosen was unfortunate as it was impossible to prevent the accumulation of debris above the packer.

7. The upper plug, after removal, was found to have wedged itself into the nipple body. Close inspection shows that the mandrel has been subjected to a blow or crushing force sufficient to cause deformation. This deformation, close to the top of the mandrel, prevented the removal of the plug (see photographs 7 and 8).
   The problem is again related to the debris trapped between the casing and the mandrel and anchor. This coupled with the angle of the overshot entry guide has contributed to the damage (see also photograph 2).