

WELL TEST EVALUATION REPORT
Chapter 8

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8.1 SUMMARY

Well 6407/9-5 is the fourth appraisal well on the Draugen structure.

Well 6407/9-5 is drilled on the southern culmination to evaluate the development, quality and lateral continuity of the reservoir Frøya sands, to quantify the crestal oil production potential and to acquire reservoir fluid samples.

Prior to testing several runs were made with the RFT tool; confirming the reservoir pressure seen in earlier wells, 2392 psia at a datum of 1630 m.s.s. The OWC was established at 1639 m.s.s in line with the field average.

The oil zone was perforated from 1622 to 1629 m.s.s. and subsequently gravel packed. Post stimulation rates of up to 7600 stb/d of 40° API oil was achieved. Pressure build-up survey evaluation indicated a permeability of 5514 md and a skin of 51. Damage skin was observed to be 30. The calculated productivity index after gravel packing was 140 stb/d/psi with an ideal PI of 639 stb/d/psi. Reservoir pressure from the build-up survey was 2394 psia at datum.

Tidal effects were superimposed on the build up as in earlier wells. Filtered build up data was characterised by a rising slope for which no consistent explanation is available. A more in depth study using a numerical simulator is planned.

8.2 INTRODUCTION

8.2.1 Background

Well 6407/9-5 is the fourth appraisal well on the Draugen structure in block 6407/9 (See Fig. 8.2.1). Wells 6407/9-1, 6407/9-2 and 6407/9-3 delineated an areally extensive oil accumulation in a relatively thin Upper Jurassic Frøya sandstone formation. Net oil sand thicknesses in these wells were 39, 12 and 34 m respectively. The oil gravity was 40^oAPI.

Well 6407/9-4, located on the west flank of the northern accumulation (Fig 8.2.1) confirmed pinch out of the Frøya formation and encountered similar oil in the underlying Haltenbanken formation. The initial conditions of pressure and oil water contact (1638.5 m.s.s.) were similar to those in the Frøya formation accumulation.

All four appraisal wells were tested at rates of up to 15,700 b/d (Well 6407/-3). The optimally completed well 6407/9-3 exhibited 674 D-ft permeability thickness product.

The objectives of this well, 6407/9-5, were to delineate top structure and rock qualities in the southern culmination (Frøya south). The well was drilled during September/October 1985 and encountered an 18 m oil column between 1621 and 1639 m.s.s in excellent quality Frøya Unit I sands (Fig. 8.2.2).

This report describes the operational details and evaluation of the test carried out on this well.

8.2.2 Test Objectives

The objectives of testing the well were:

- 1 to quantify the crestal oil production potential and rock properties on the southern culmination
- 2 collect representative reservoir oil samples.

8.3 OPERATIONS

8.3.1 RFT Survey

The objectives of the RFT (Repeat Formation Tester) survey were: to define oil and water gradients, measure initial formation pressures in the Frøya and Haltenbanken formations, and to collect a fluid sample from the hydrocarbon bearing Frøya formation.

The RFT tool of Schlumberger was equipped with a 10 000 psi strain gauge and a 10 000 psi quartz crystal gauge.

A total of 14 pretests were carried out successfully. Attempts to obtain a segregated oil sample were eventually abandoned after probe plugging (twice) and seal failure in the unconsolidated formation.

8.3.2 Oil Zone Test

8.3.2.1 Sequence of Events

Prior to testing the interval 1635-41 m.s.s at the oil water contact was squeezed with cement to remedy an interpreted poor primary cement bond. Significant bond improvement was found in a subsequently run CBL/VDL/GR. The well was perforated under 325 psi drawdown from 1622 - 1629 m.s.s using a 6" tubing conveyed gun (12 shots per foot) (Fig. 8.3.1).

The well was backsurged over a fully open adjustable choke for 10 bbls and then cleaned up on a 28/64" choke at rates of between 200 and 400 stb/d of oil. The final FTHP was 484 psig, BSW 0%, H₂S 0ppm and CO₂ 0.35%. The well was then shut in downhole for a 2 hour pressure build-up. A summary of the sequence of events and the separator data in the flow period and the ensuing periods is given in Appendices A and B.

The well was killed and the string recovered. The perforated interval was gravel packed using 10/20 mesh gravel and the work string recovered. The tie back packer and tail pipe were run, however it was not possible to smash the flapper valve and seal off the string in the gravel pack FAB-1 packer. The flapper valve was smashed with drillpipe and 100 bbls of brine were lost before a viscous chalk laden pill was placed. The tie back packer assembly and production test string were then run (Fig. 8.3.2).

The well was flowed at rates of 1000 stb/d to 2000 stb/d to stabilise the gravel pack (PT-1B). The well was then stimulated with 100 bbls of 15% HCL. Well clean up proceeded by increasing the rate at steps of 2000 b/d to achieve a maximum rate. A maximum rate of 7600 stb/d was achieved on a 1" choke.

Fig 8.3.3 shows the test performance for this and ensuing flow periods. The producing separator GOR was 102 scf/stb at a separator temperature of 70^oF and at a separator pressure of 130 psi, BSW was 0%, the oil gravity 40^oAPI and the gas gravity 0.814 (air=1).

3 gauges (2 Hewlett-Packard crystal gauges and 1 Flopetrol SDP strain gauge) were run and hung off downhole.

A single rate drawdown test (PT-1D) was carried out. During the drawdown period, the well was flowed at a rate of 7000 stb/d on a 56/64" choke for 24 hours. Eleven sets of separator samples were taken during this flow period. Over the period, the FTHP was 310 psig, the separator GOR 55 scf/stb, BSW 0%, oil gravity 40^oAPI and gas gravity 0.784 (air=1). The well was then shut-in for a 24 hour build up.

Gauges were recovered and 3 bottom hole samples taken whilst flowing the well at 330 stb/d. Agreeing bubble points (225 psig at 40^oF) were measured on these samples.

On completion of the testing the well was suspended as a possible future oil producer.

8.3.2.2 Pressure Gauges

Pressure gauges were run during the initial flow period (back surge) PT-1A, the main flow period and shut-in period of PT-1D, and the bottom hole sampling period PT-1E. Two types of gauges: Hewlett Packard crystal gauges and a Flopetrol strain gauge were run in the production test. One Hewlett-Packard crystal gauge and 2 Valstar gauges were run in PT-1A. Two Hewlett-Packard crystal gauges and 1 Flopetrol strain gauge were run in the main flow period and build up (PT-1D). A GRC strain gauge was run during the bottom hole sampling (PT-1E).

The Hewlett-Packard crystal gauges run in PT-1D were unsatisfactory as both gave pressure data that were highly unreliable. Analysis of the pressure data obtained during PT-1D could only be done using the Flopetrol strain gauge data. A summary of the gauges run during the various tests is listed in Table 8.3.1.

8.3.2.3 Fluid Sampling

Details of the samples collected during the oil zone test are given in Table 8.3.2.

A total of 3 oil BHS and 4 sets of recombined oil and gas surface samples were recovered. A full PVT analysis has been carried out on a duplicate bottom hole sample taken during PT-1E. Key results are as follows:

Bubble point Pressure:	486 psig at 160 ⁰ F
Initial Oil FVF	1.19 rb/stb
GOR (Differential)	234 scf/stb
Oil gravity	40 ⁰ API
Oil viscosity	0.68 cps

This result confirms the trend of declining bubble point and GOR from north - north east to south - south west across the Draugen structure.

8.4 EVALUATIONS

8.4.1 RFT Survey

A common water gradient of 0.443 psi/ft was obtained throughout Frøya and Haltenbanken formations and is identical to the gradient observed in previous wells (6407/9-1, 2, 3, 4) (See Table 8.4.1, Fig. 8.4.1 and 8.4.2). An oil gradient of 0.325 psi/ft is also identical to the gradient observed in other wells. Calculated datum pressure (at 1630 m.s.s) was 2391 psia using HP gauge data, very much in line with the previously established datum pressure of 2392 psia.

8.4.2 Oil Zone Test

During the back surge and pressure buildup (PBU) after perforation of the oil zone, two of the three gauges successfully recorded pressure data. No strain gauge was used in this period as it had been shown in previous production tests on wells 6407/9-2, 3, and 4 that no useful information could be gathered by the strain gauge because large pressure fluctuations made any analysis impossible. The kh and skin

cannot be evaluated independently from the backsurge. The average PI observed was 433 stb/d/psi, using a final build-up pressure of 2393 psia, an average flowing pressure of 2392.1 psia and an oil flowrate of 380 stb/d.

Transient state drawdown analysis of the main flow period was as usual impossible in this very high permeable rock due to slight, continuous cleaning up. (See Fig. 8.4.3).

After the single rate drawdown period, a 24 hour build survey was recorded successfully by the Flopetrol SDP strain gauge whereas the two Hewlett-Packard gauges failed to record useable pressure data (See Fig 8.4.4 and 8.4.5).

No wellbore storage effects were present as a downhole shut-off tool successfully eliminated wellbore storage. Fig. 8.4.6 shows the pressure response of the reservoir over the length of the test period.

Fig. 8.4.7 shows the superposed log time plot of the PBU as recorded by the Flopetrol strain gauge. Tidal effects were clearly seen towards the end of the build up period. These effects were filtered out using a cosine function with an amplitude of 0.25 psi and high tide time of 0030 hours. The amplitude was estimated from the peaks and the trough of the tidal effect at the end of the build-up. A superposed log time plot of the filtered data is shown in Fig. 8.4.8.

A detailed analysis of the filtered data from the PBU is given in Appendix C. For analysis the total Frøya formation drained is 161 ft. From Fig 8.4.8 it is clear that two straight lines can be drawn through the early and late pressure data respectively. The first straight line (points 32 to 60) yielded a kh of 887 D-ft which corresponds to an average permeability of 5514 md. The second straight line (points 65 to 130) yielded a kh of 411 D-ft which corresponds to an average permeability of 2559 md.

A change in slope between these two lines is quite apparent. The slope of line 2 is approximately twice that of line 1. This change in slope was detected at about 4.68 hours into the build up test. If the change in slope is due to a reservoir feature, i.e. a fault, the distance of the event from the wellbore can be estimated from:

$$L = \left(\frac{0.0002637 k t_p}{4 \phi \mu C_t (t_D / (2L/r_w))^2} \right)^{0.5}$$

where

k = permeability, md : 5514
 t_p = producing time, hours: 24.03
 φ = porosity fraction: 0.3
 μ = viscosity, cp.: 0.67
 C_t = Total compressibility, $\frac{1}{\text{psi}}$: 20 x 10⁻⁶

t_D (2L/r_w)² : 2.5 (value from Fig. C.2 pg. 194 "Advances in Well Test Analysis" R.C. Earlougher, Jr. Monograph 5, SPE-AIME 1977.)

From the above equation a linear discontinuity was detected at 932 feet from the wellbore.

The cause of the slope change could be due to many factors, the most obvious being a large change in the thickness of the interval drained, the presence of a sealing fault or an abrupt change in permeability. These factors are not supported by geological evidence. From seismic data, the fault closest to the well (Fig 8.2.1) is too small to cause a large thickness change or be sealing.

Layering could also be a possible reason for the change in slope. For the sake of analysis, the total interval drained included both Frøya units (Units I and II). Data from cores in all wells have indicated that Unit I has much higher permeability than Unit II. As the well was completed in Unit I, some element of crossflow between Unit I and Unit II is to be expected. This however, is not expected to be an important effect as the permeability-thickness product of Unit II is rather small compared to that of Unit I.

Residual tidal effects may also contribute to the slope change. These effects are qualitative and are assumed, for the sake of analysis, to have been filtered out by the cosine function.

Multifluid situations could also be a contributing factor. This could come about due to cone development during the flow periods of the production test. Cone development and its effect on the build-up period of this production test could be studied with the aid of a single well numerical simulation model.

In this report the most obvious case, reservoir heterogeneity, is the basis of the analysis. As this well is outside the main development area, a detailed study of all the possible contributing factors contributing to the change in slope will be carried out in due time.

Total skin for the flow period of PT-1D using the first straight line in Fig 8.4.8 was 51. A partial penetration skin of 21 was calculated, thus damage or mechanical skin was 30. The flowing bottom hole pressure was approximately 2345 psia over the last 7 hours of the flow period. A PI of 140 stb/d/psi was calculated, with an ideal PI (skin = 0) of 639 stb/d/psi.

Reservoir pressure established during the RFT survey was 2391 psia at datum see Table 8.4.1. Extrapolation of the second straight line and correcting to datum gives a datum pressure of 2394 psia. This is within the accuracy of the tools.

8.5 RESULTS AND CONCLUSIONS

8.5.1 RFT Survey

- 1 The oil and water gradient of 0.325 and 0.443 psi/ft respectively, were identical to the previous values obtained in wells 6407/9-1, 2, 3 and 4.

- 2 The Frøya and Haltenbanken Formations belong to the same hydrostatic pressure regime.
- 3 The average reservoir was 2391 psia at datum of 1630 m.s.s and is within measurement accuracy of the previously established initial reservoir pressure of 2392 psia at datum.

8.5.2 Oil Zone Test

- 1 The well produced up to a maximum of 7600 stb/d of 40⁰ API oil from the interval 1622 to 1629 m.s.s. Separator GOR was measured at 102 scf/stb.
- 2 The evaluated kh product was 887 D-ft. This is equivalent to an average permeability of 5514 md for the drained interval of 161 ft.
- 3 The build up plot exhibits a change in slope (doubling) after some 4 - 5 hours. One explanation is the presence of a sealing fault some 932 from the well. However this is not supported by seismic/geological data.
- 4 Average post gravel pack PI was 140 stb/d/psi. Total skin was 51 and the partial penetration skin was 21. The ideal PI (skin = 0) was calculated as 639 stb/d/psi.
- 5 Initial reservoir pressure was calculated as 2394 psia at datum (1630 m.s.s). The previously established value of 2392 psia (at datum) is within the accuracy of the gauges.
- 6 It is recommended that a single well reservoir simulation model study be carried out to study the effects of coning and layering on a build up test in well 6407/9-5.

G. 22181

6407/8

6407/9

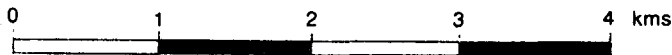
A/S Norske Shell



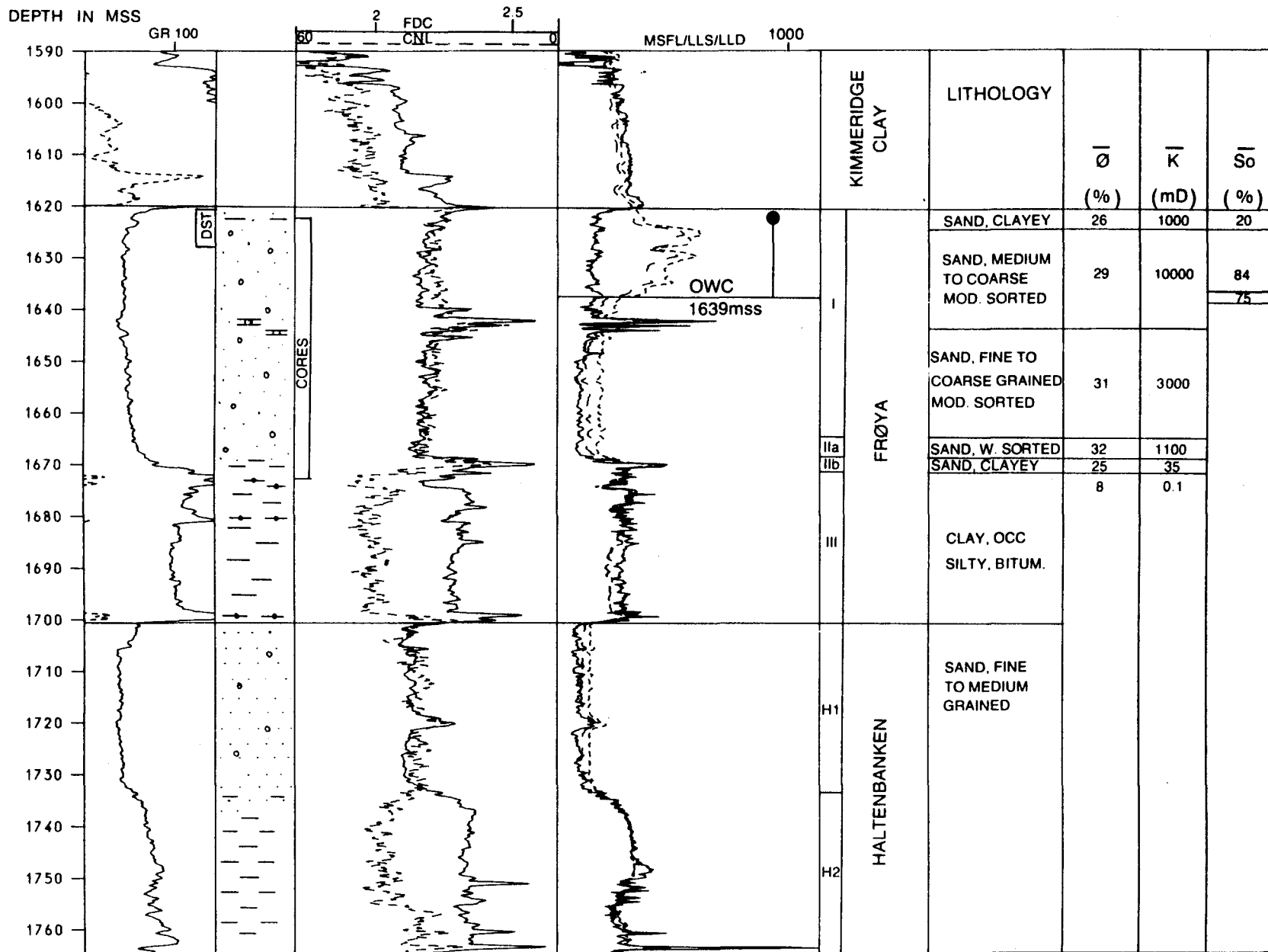
6407/12



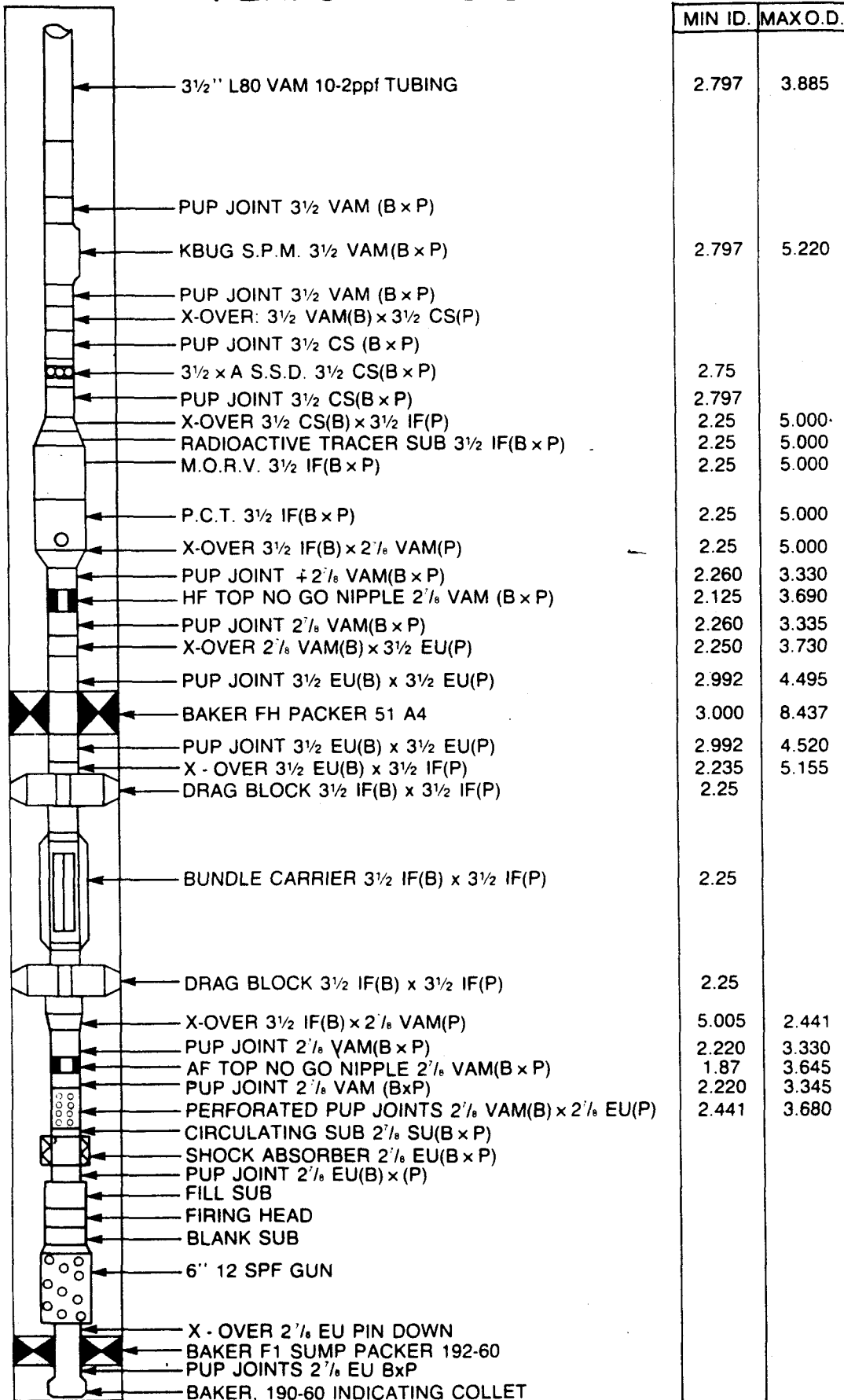
DRAUGEN FIELD
 BASE KIMMERIDGE CLAY
 DEPTH CONTOUR MAP



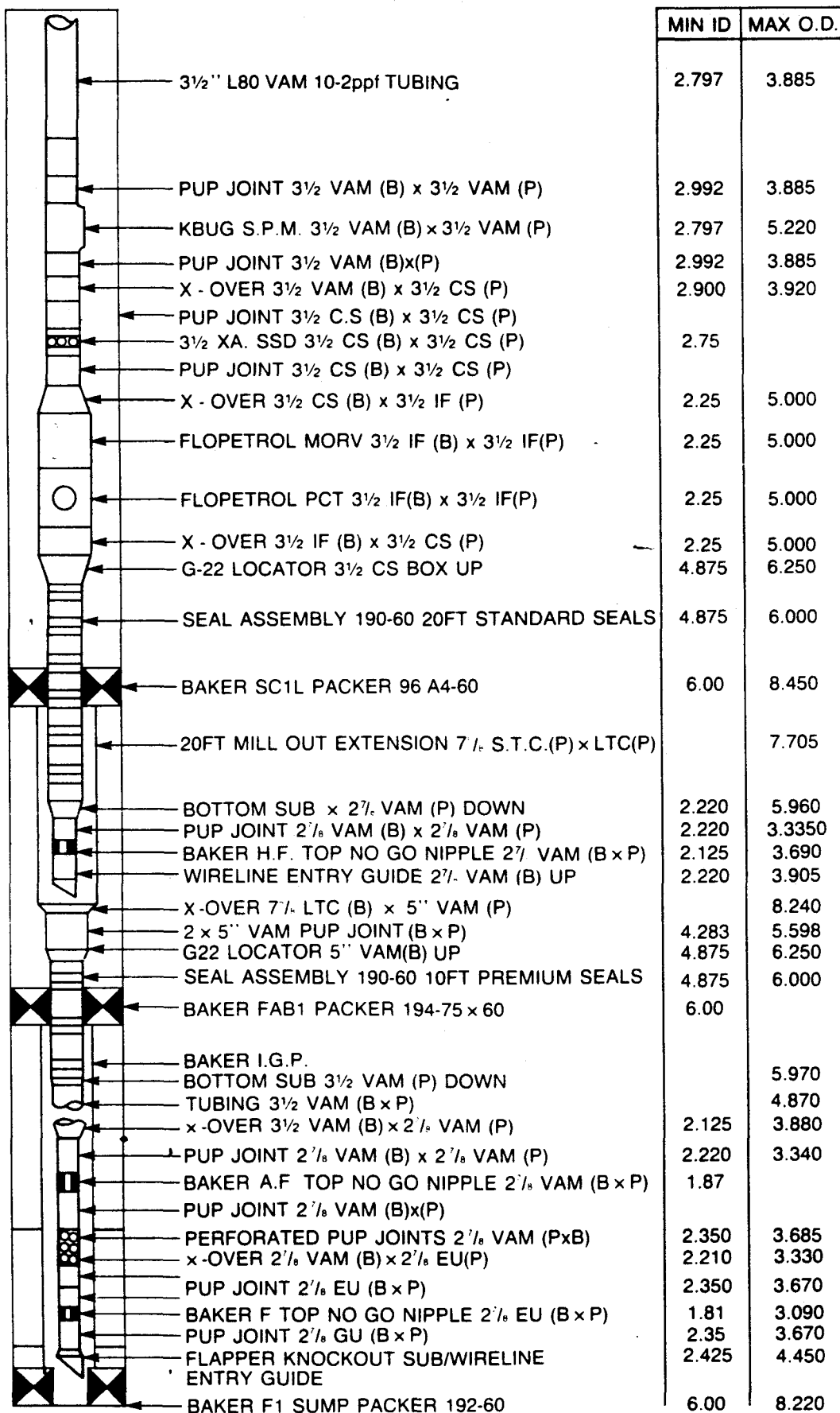
WELL RESULTS 6407/9-5



6407/9-5 TUBING CONVEYED PERFORATING STRING



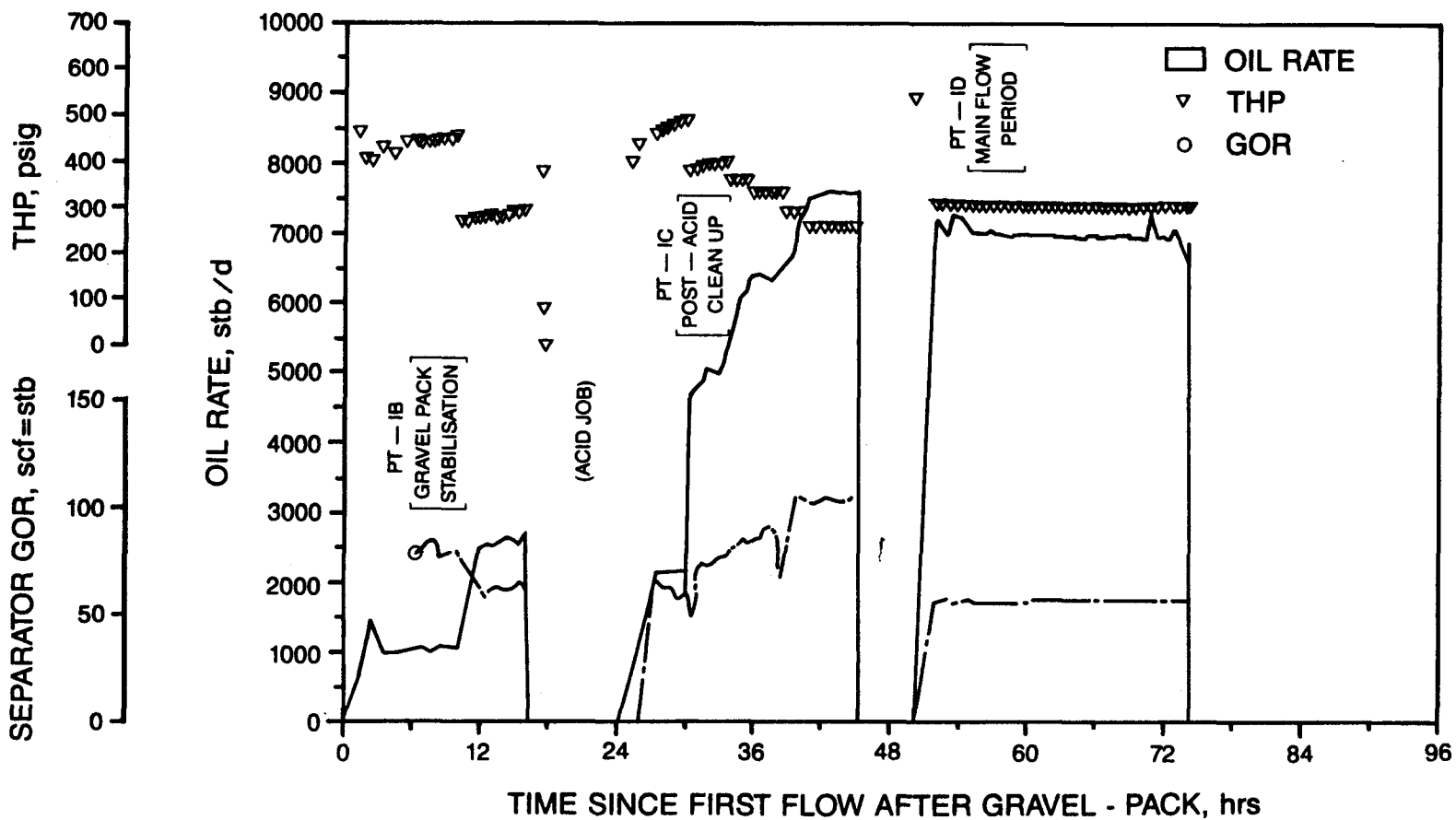
6407/9-5 PRODUCTION TEST STRING





DRAUGEN 6407/9-5

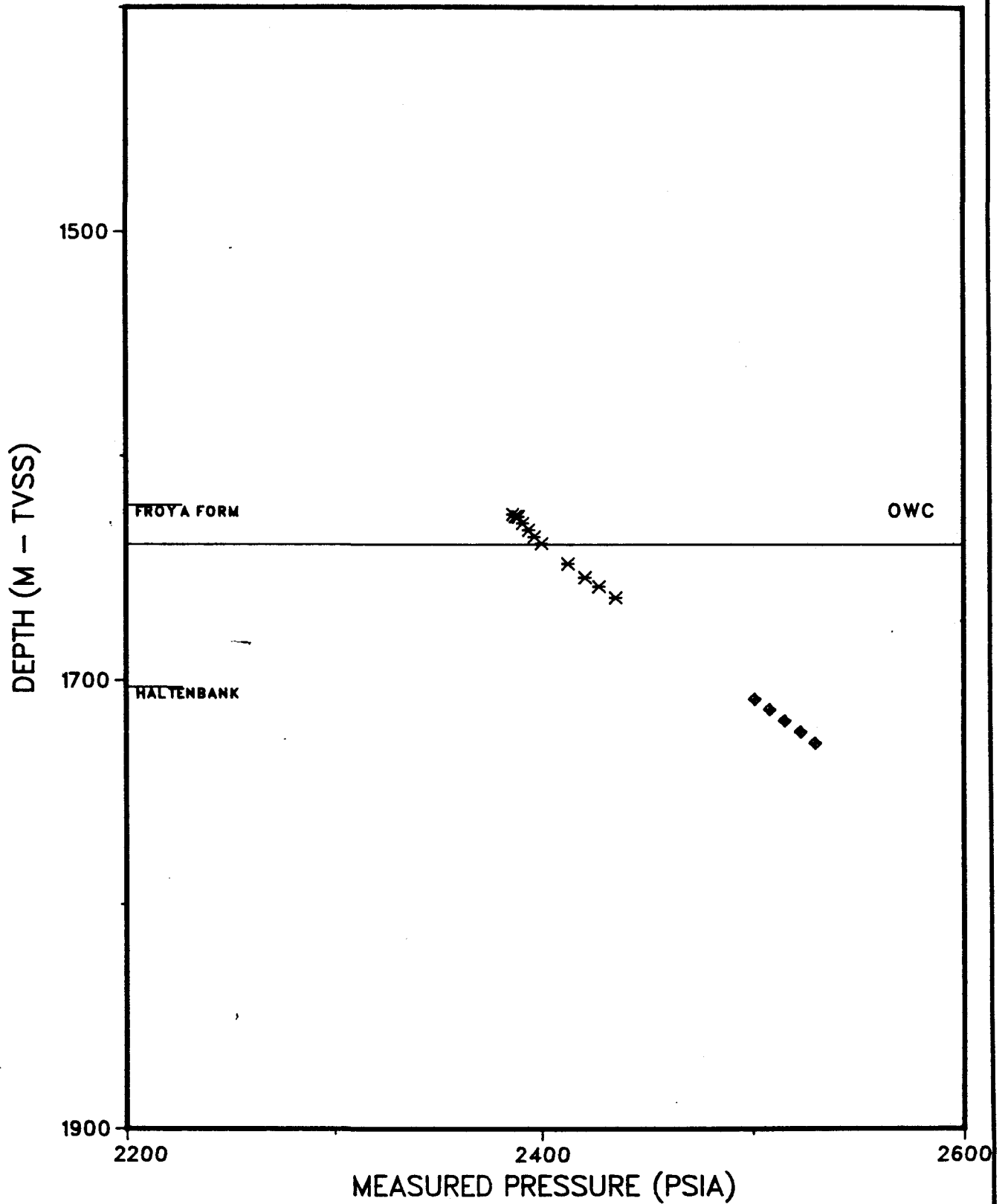
OILZONE TEST - TIME ZERO IS 1036 HRS. 27/10/85



RFTPLOT

RFT 640795

DATE 031085



DRAUGEN FIELD

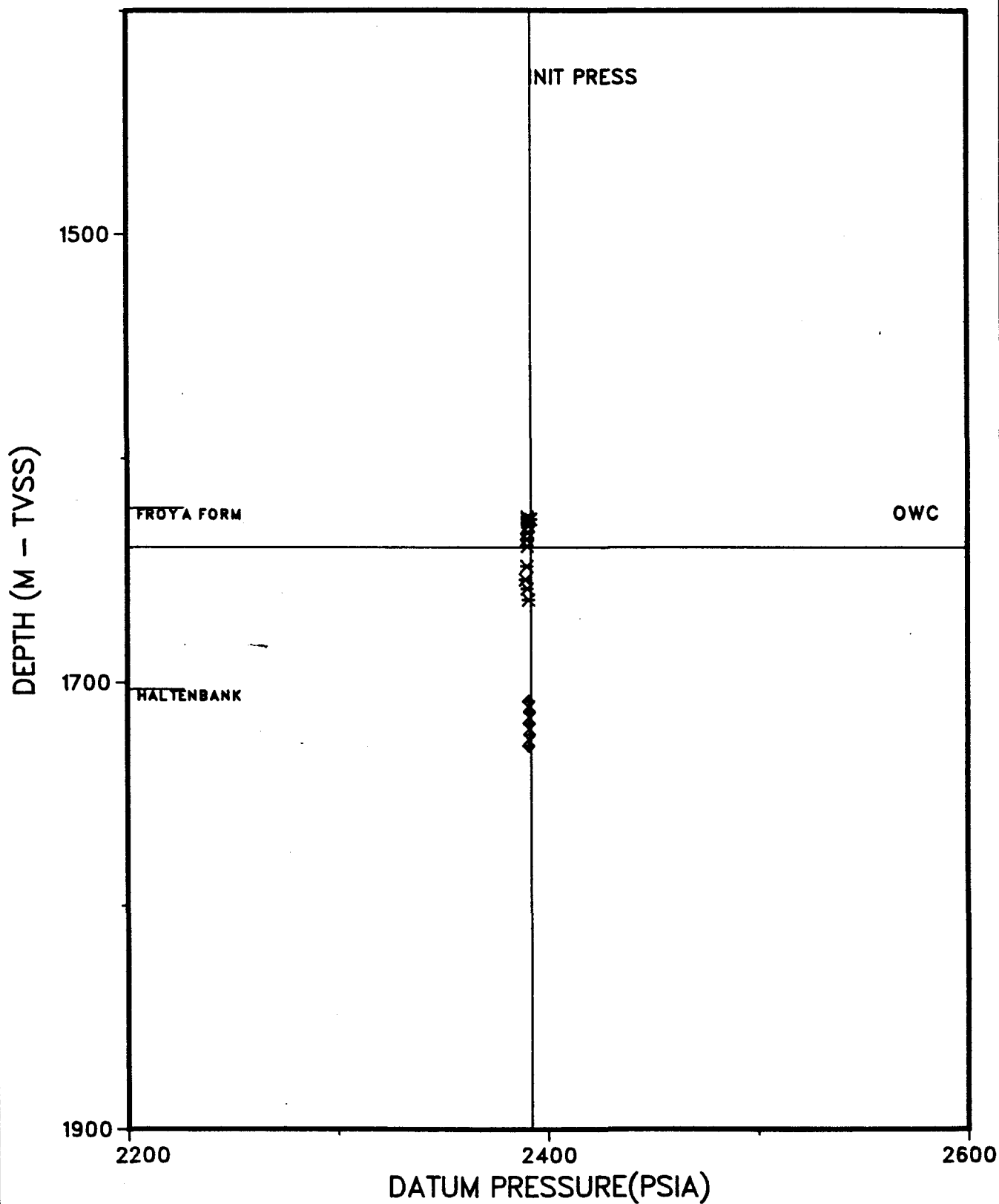
A/S Norske Shell



RFTPLOT

RFT 640795

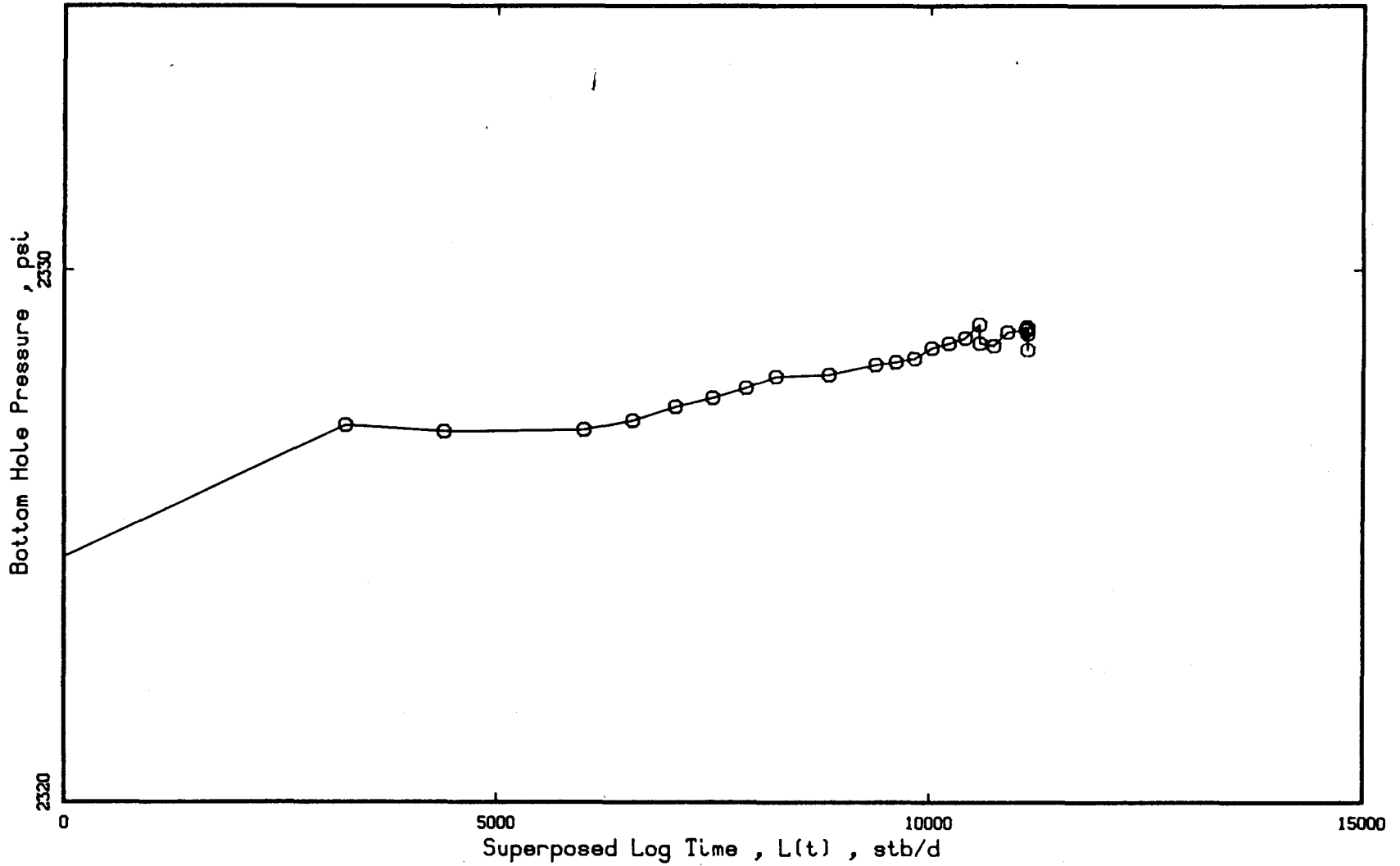
DATE 031085



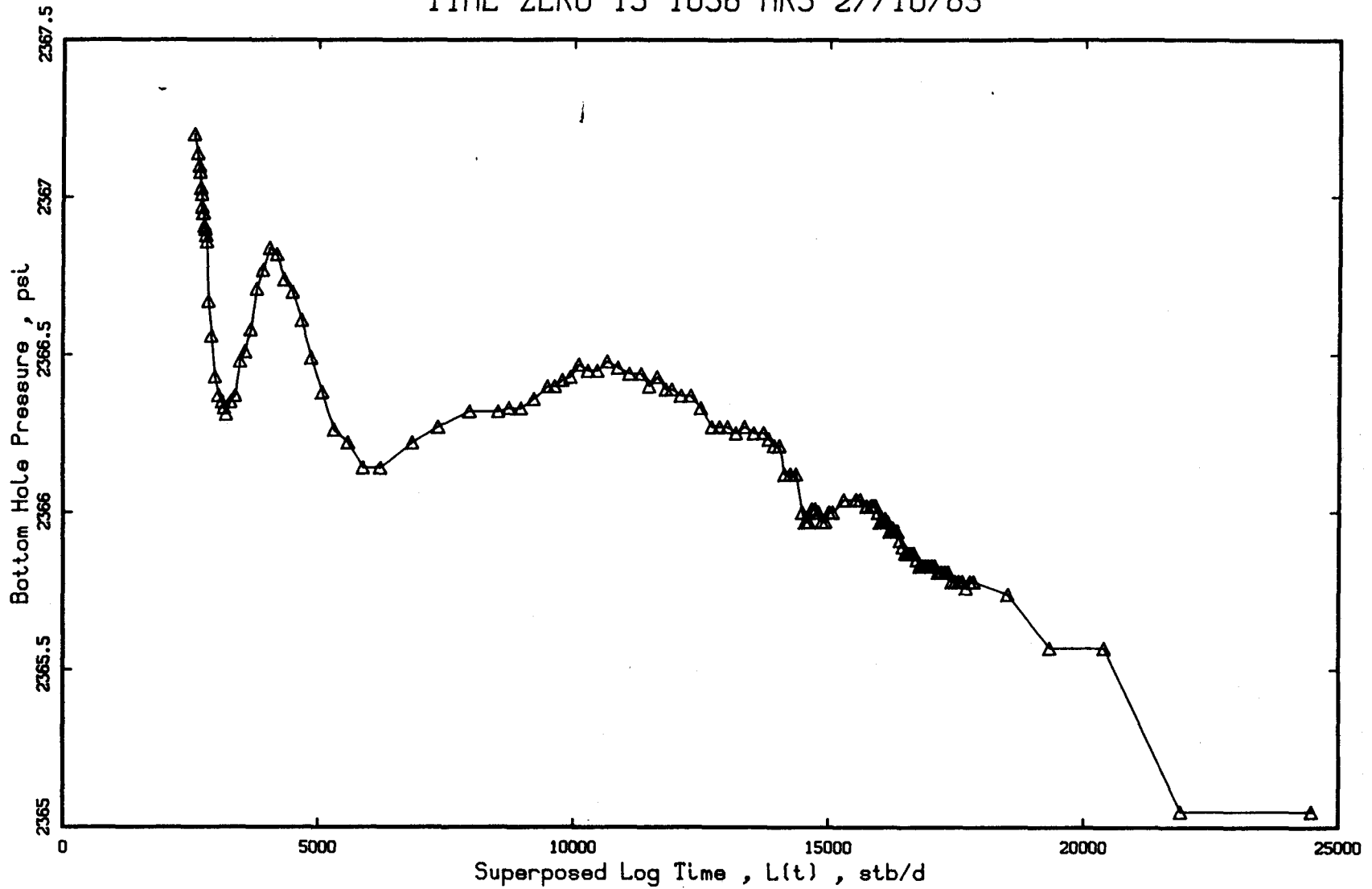
DRAUGEN FIELD



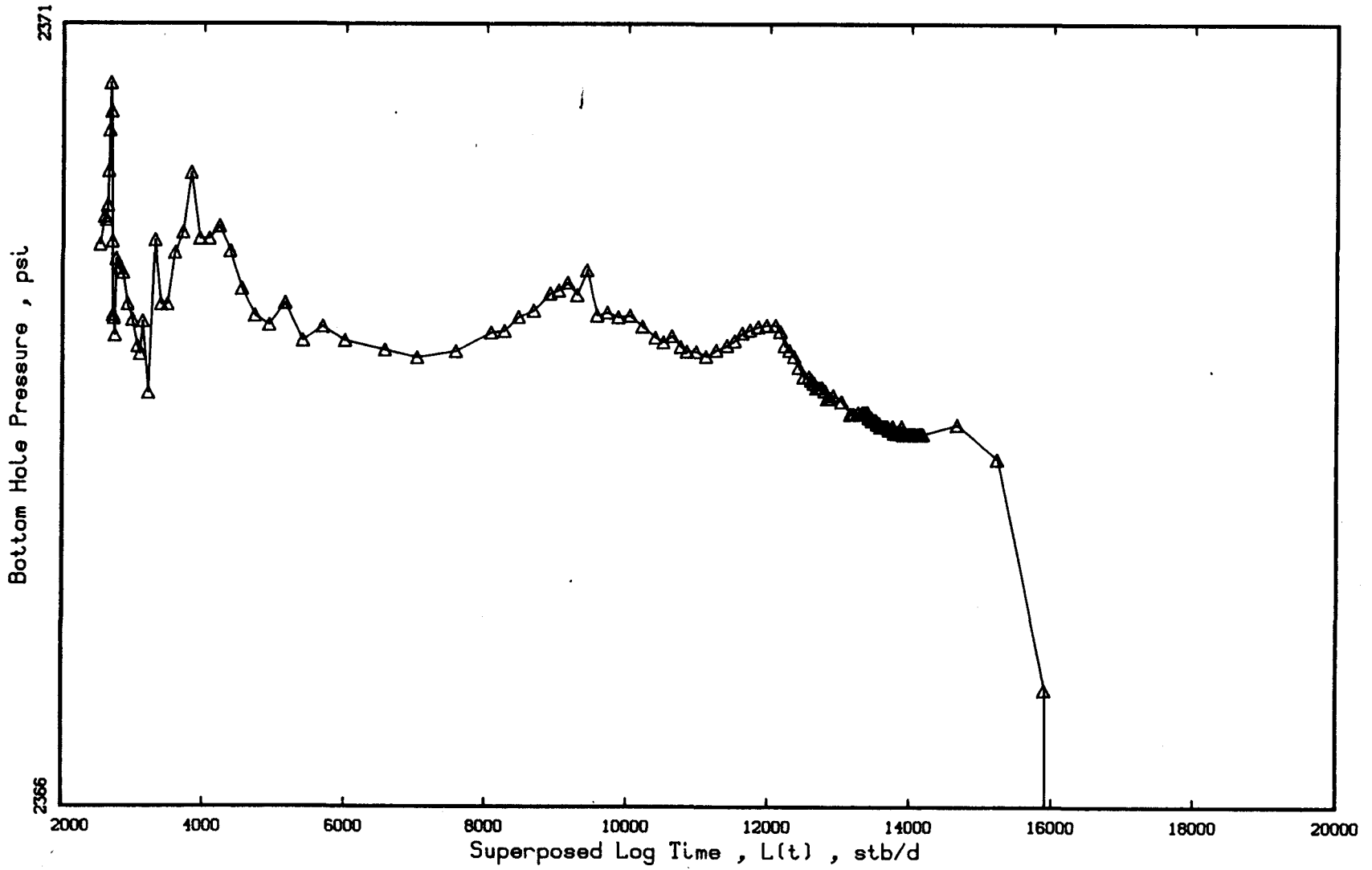
DRAUGEN WELL : 6407/9-5
PROD. TEST PT-1D STRAIN GAUGE 85369 TIDE CORRECTED
TIME ZERO IS 1036 HRS 27/10/85



DRAUGEN WELL : 6407/9-5
PROD.TEST PT-1D HP/VALSTAR 17/711/125 (RAW DATA)
TIME ZERO IS 1036 HRS 27/10/85



DRAUGEN WELL : 6407/9-5
PROD. TEST PT-1D HP/VALSTAR 30/784/098 (RAW DATA)
TIME ZERO IS 1036 HRS 27/10/85





DRAUGEN WELL : 6407/9-5
PROD. TEST PT-1D STRAIN GAUGE 85369 (RAW DATA)
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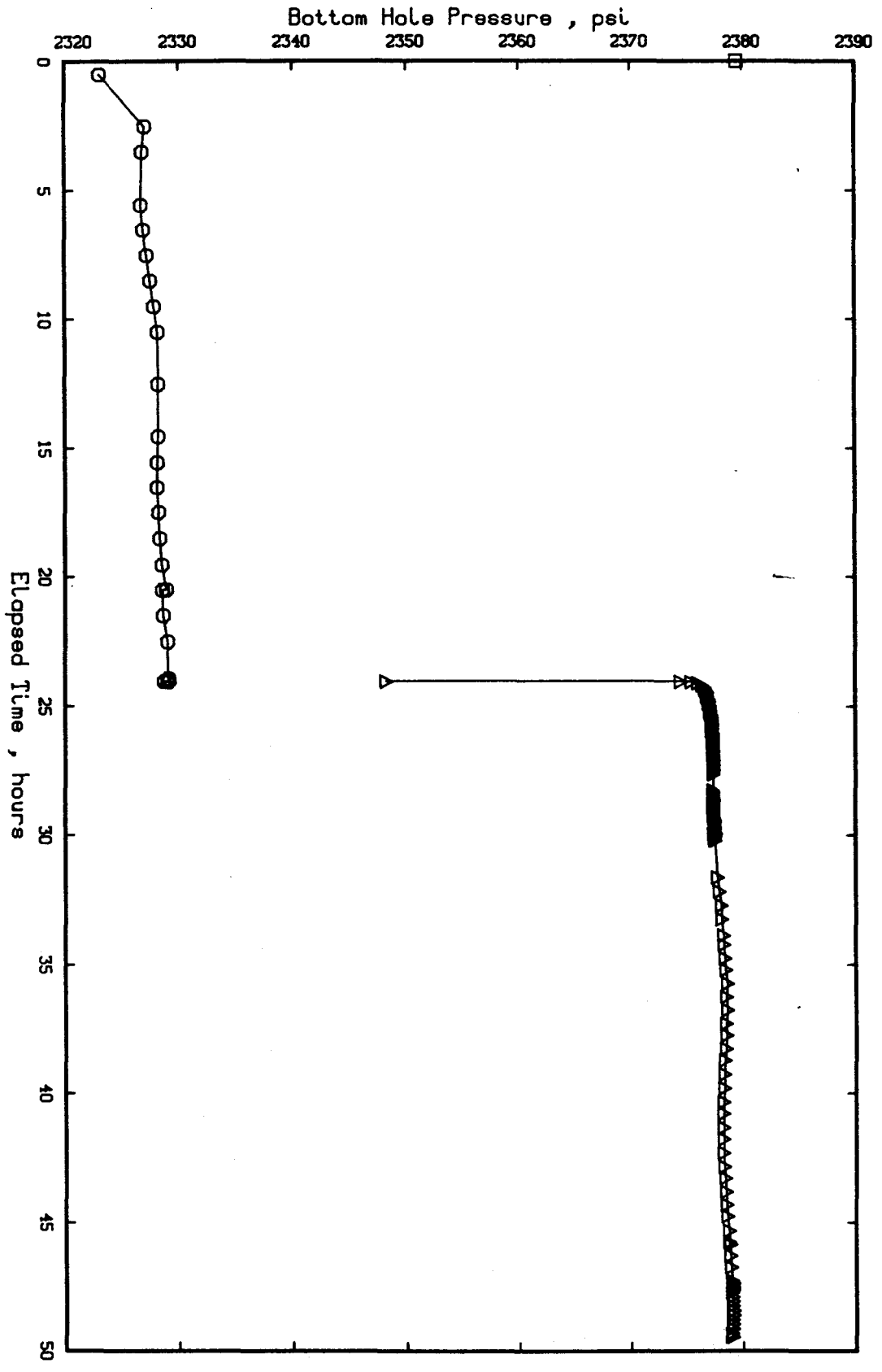
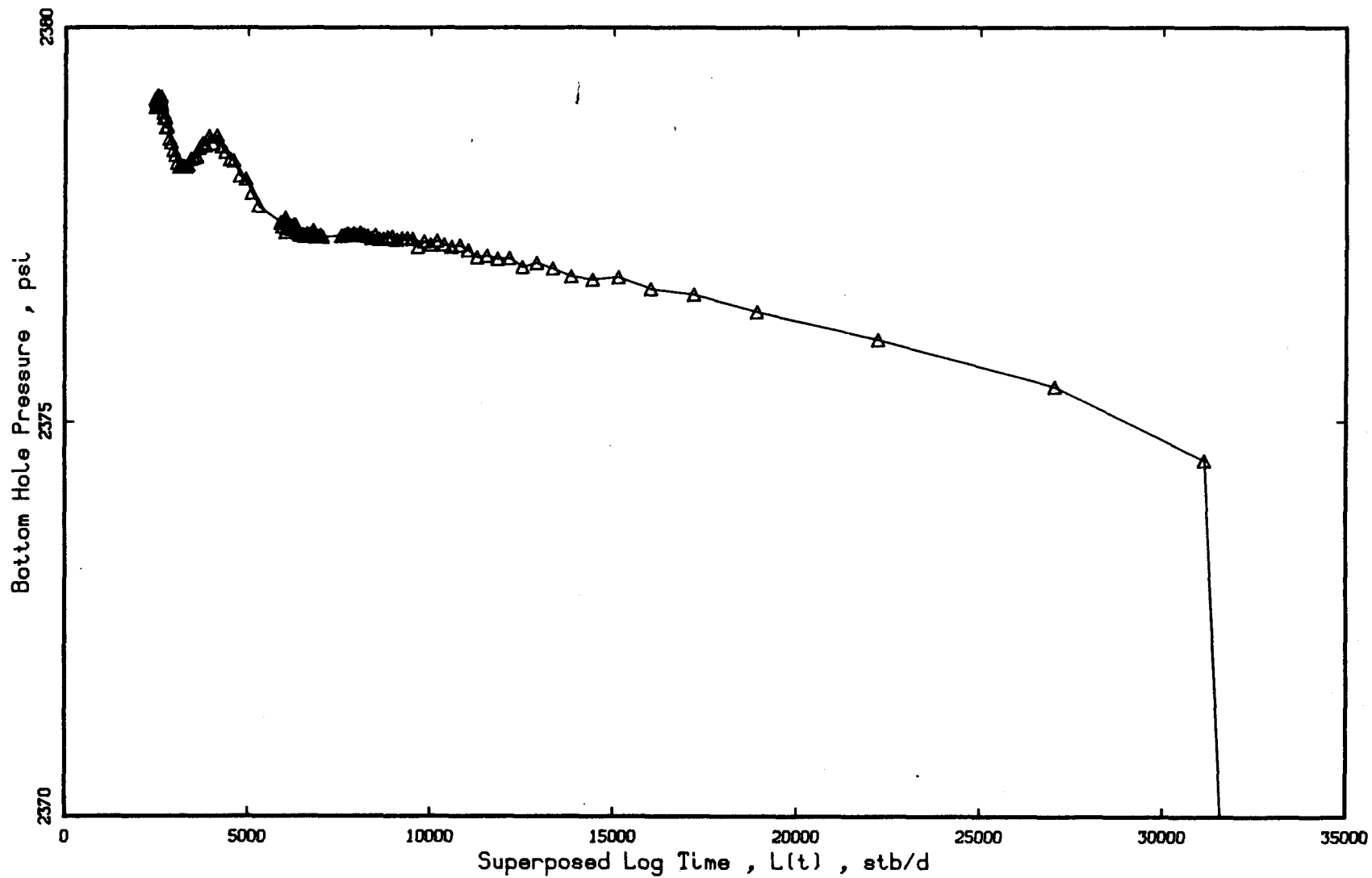


Fig.8.46

G 221612

DRAUGEN WELL : 6407/9-5
PROD.TEST PT-1D STRAIN GAUGE 85369 (RAW DATA)
TIME ZERO IS 1036 HRS 27/10/85



A/S Norske Shell



Fig.8.4.7

DRAUGEN WELL : 6407/9-5
PROD. TEST PT-1D STRAIN GAUGE 85369 TIDE CORRECTED
TIME ZERO IS 1036 HRS 27/10/85

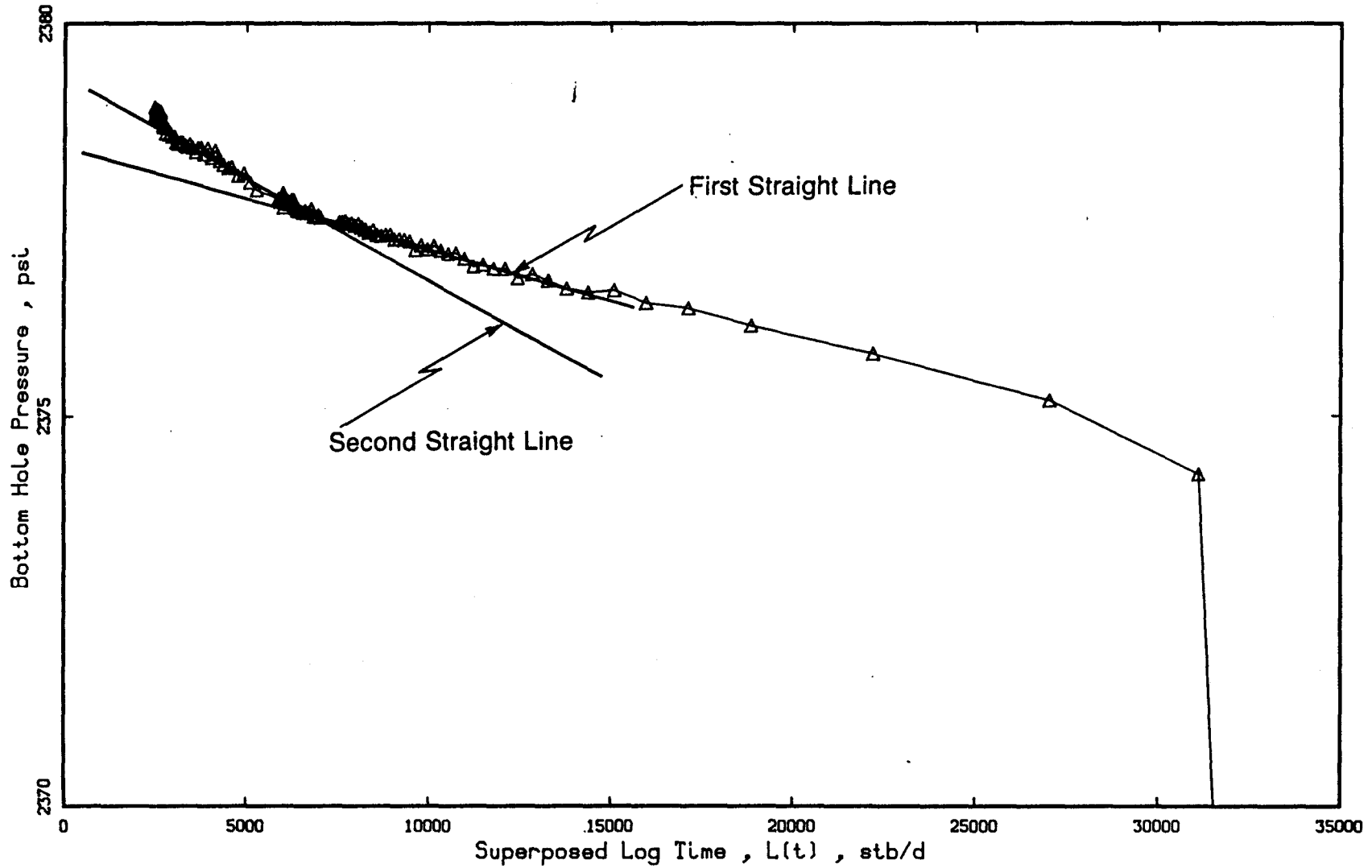


Table 8.3.1

Well: 6407/9-5

Gauge Summary Oil Zone Test: PT-1

Perforated Interval 1622-1629 m.s.s.

Test	PT-1A	PT-1A	PT-1A	PT-1D	PT-1D	PT-1D	PT-1E
Gauge Type	VALSTAR	VALSTAR	HP/VALSTAR	HP/VALSTAR	HP/VALSTAR	SDP STRAIN GAUGE	GRC/EMR
Serial No.	017/711/125	003/100/100	030/504/116	17/117/125	30/784/098	SG85369	635A7/1141/58455
Gauge Depth (m BDF)	1627.79	1627.79	1627.79	1639.1	1643.77	1647.4	/625
No of Data points	7920	7920	7920	7890	7890		2000
Scan Interval/Duration	30S/33 hrs	30S/33 hrs	30S/33 hrs			10	.01 hrs/20 hrs
Date/time on	20-10/0400	20-10/0400	20-10/0400	29-10/0900	29-10/0900	29-10/0835	31-10/1730
Date/time off	21-10/1300	21-10/1300	21-10/1300	02-11/0200	02-11/0200		01-11/1330
Performance		Failed		Poor	Poor	Excellent	
Comments		Temperature recorded		Decreasing pressure during build up	Decreasing pressure during build up		

Well 6407/9-5

PT-1 Samples Collected

No. Test	Time	Date	Fluid	S.G	Sampling Point	Container (Description / Volume)	Serial Number	Remarks
1	PT-1D 0130 0345	30.10.85	Oil	.817	Separator	Bbl-drum /45 gal		Bulk sample
2	PT-1D 0347 0445	30.10.85	Oil	.817	Separator	Bbl-drum /45 gal		Bulk sample
3	PT-1D 0447 0715	30.10.85	Oil	.818	Separator	Bbl-drum /45-gal		Bulk sample
4	PT-1D 0718 0740	"	Oil	.818	Separator	PVT-oil 800 c.c	811420	
5	PT-1D 0722 0745	"	Gas	(Air=1) .785	Separator	PVT-gas Leutert 20 litres	A13409	Gas Sample
6	PT-1D 0846 0922	"	Oil	.818	Separator	PVT-oil 800 c.c	811511	Oil Sample declared void sample dumped
7	PT-1D 0916 0935	"	Gas	(Air-1) .785	Separator	PVT-gas Leutert 20 litres	N/A	Sample declared void and aborted due to oil carry over in gas line

Table 8.3.2
Page 2 of 2

No. Test	Time	Date	Fluid	S.G	Sampling Point	Container (Description / Volume)	Serial Number	Remarks	
8	PT-1D	0954	"	Oil	.818	Separator	PVT-oil 800 c.c	810816	
9	PT-1D	1011 1032	"	Gas	(Air-1) .826	Separator	PVT-gas Leutert 20 litres	A4588	
10	PT-1D	1110 1138	"	Oil	.818	Separator	PVT-oil 800 c.c	811450	
11	PT-1D	1117 1140	"	Gas	(Air=1) .833	Separator	PVT-gas Leutert 20 litres	5051036	
12	PT-1E	0845	31.10.85	BHS	-	1614m BDF	Leutert 800 c.c	810697	Bottom sampler of a 3 sampler run. 100 psia at 150 ^o F shipping conditions
13	PT-1E	0845	"	BHS	-	1614m BDF	Leutert 800 c.c	8115113	150 psia at 150 ^o F shipping conditions
14	PT-1E	0845	"	BHS	-	1614m BDF	Leutert 800 c.c	811511	200 psig at 160 ^o F shipping conditions

Table 8.4.1

WELL 640755 SURVEY DATE 031085
 =====

HP GAUGE DATA

RESERVOIR DATA:-

FLUID CONTACTS (H-TVSS)
 DATUM DEPTH = 1630.0
 GDC = .0
 OHC = 1639.5

FLUID GRADIENTS (FSI/M)
 GAS = .000
 OIL = 1.066
 WATER = 1.452

GEOLOGICAL DATA:-

FORMATION TOP
 FROYA FORM
 HALTENBANK

DEPTH (H-TVSS)
 1622.0
 1703.0

PRESSURE DATA:-

GEOLOGICAL ZONE	DEPTH (H)		PRESSURE (PSIA)			COMMENT
	AMEDF	TVSS	MEASURED	DATUM	MUD (PRE-SETTING)	
FR	1658.0	1626.0	2386.1	2390.4	2888.0	
FR	1659.0	1627.0	2387.3	2390.5	2890.2	
FR	1662.0	1630.0	2390.9	2390.9	2895.9	
FR	1665.0	1633.0	2393.8	2390.6	2901.0	
FR	1668.0	1636.0	2396.5	2390.1	2906.4	
FR	1671.0	1639.0	2400.0	2390.4	2911.7	
FR	1680.0	1648.0	2412.6	2390.1	2926.4	
FR	1686.0	1654.0	2420.7	2389.5	2936.7	
FR	1690.0	1658.0	2427.3	2390.3	2943.0	
FR	1695.0	1663.0	2435.2	2391.0	2953.0	
HA	1740.0	1708.4	2501.0	2390.8	3028.0	
HA	1745.0	1713.0	2508.1	2391.3	3041.0	
HA	1750.0	1718.0	2515.2	2391.1	3049.2	
HA	1755.0	1723.0	2522.7	2391.3	3057.9	
HA	1760.0	1726.0	2529.5	2390.9	3066.1	
FR	1659.0	1627.0	2388.9	2392.1	2891.5	ATTEMPTED TO SAMPLE
FR	1659.0	1627.0	2386.7	2391.9	2890.5	ATTEMPTED TO SAMPLE
FR	1659.0	1627.0	2387.4	2390.5	2892.0	RUN 2: NO SAMPLE
FR	1659.0	1627.0	2388.3	2391.5	2891.0	RUN 3: NO SAMPLE

11: 6407/9-5

PT-1: Sequence of events.

Fow Period	Start Time	End Time	Duration (hours)	Cum Prod	Final oil rate STB/D	Comments
PT-1A	20-10-85					
	1040	Perforated intervals 1622-1629 m.s.s with a 400 psi drawdown.				
1Dd	1040	1045	.083	19.2	5530	
2Dd	1040	1050	.067	33.2	4781	Beaned down to 40/64 bean
3Dd	1050	1145	0.083	39.1	1609	Beaned down to 18/64 bean
4Dd	1145	1400	1.25	71.20	24	Beaned up to 26/64 bean
5Dd	1400	1507	.75	79.45	336	Beaned up to 28/64 bean
6Dd	1507	1645	1.63	110.85	384	Beaned down to 26/64 bean
7Bu	1645	1836	1.85	-	-	Buildup survey

Killed well - Pulled String - Gravel packed - ran completion string.

Fow Period	Start Time	End Time	Duration (hours)	Cum Prod	Final oil rate	Comments
PT-1B	27-10-85					
1Dd	1036	1430	4.06	235.5		Clean up period 1st gravel pack stabilisation flow period
2Dd	1430	2030	6.00	495.0	1031	
3Dd	2030	0230	6.00	1106	2634	
	0230 Well shut-in					

Acidised with 60 bbls 15% HCL

Fow Period	Start Time	End Time	Duration (hours)	Cum Prod	Final oil rate STB/D	Comments
PT-1C	28-10-85					
	29-10-85					
1Dd	0401	0612	2.2	-	-	Unloaded well
2Bu	0612	0701	0.65	-	-	Open up SSD
3Dd	0701	0727	0.43	53	-	Reverse circulate
4Bu	0732	1051	3.47	-	-	
5Dd	1051	1645	5.9	415.7	1728	38/64" choke
6Dd	1645	2015	3.5	1124	5026	44/64" choke
7Dd	2015	0115	5.0	1952	6458	52/64" choke
8Dd	0115	0745	6.5	4334.5	7604	1" choke
9Bu	0745	0820	058	-	-	Wireline returned to surface

Flow Period	Start Time	End Time	Duration (hours)	Cum Prod	Final oil rate STB/D	Comments
PT-1D	29-10-85	30-10-85				
1Dd	1245	1245	24	7064	6875	Opened well on 16/64" choke progressively beaning up to 56/64" choke. Oil and gas samples takes form the separator during the flowing period
2Bu	30-10-85 1249	31-10-85 1245	23.93			Well shut-in for main build up test

Flow Period	Start Time	End Time	Duration (hours)	Cum Prod	Final oilrate STB/D	Comments
PT-1E	01-11-85					
1Dd	0230	2330	1.00	336	64.53	Running in hole with 3 BHS. Well flowing on a 19/64" choke. BHS not obtained due to malfunction. Redressed the samplers.
2Dd	2330	0845				3 BHS returned commenced determination of field bubblepoints

Well 6407/9-5
Summary of Separator data

Date Time	THP/THT psig/°F	Oil Rate stb/d	GOR scf/stb	Psep/Tsep psig/°F	BHP Psia	Comments
18-10-85						
1100	354/49	-	-	-	2350	PT-1A 18/64 bean
1400	470/48	-	-	50/48	2353	28/64" bean
1430	472/48	288	212	65/46	2353	28/64" bean
1500	472/48	768	67	55/45	2351	30/64" bean
1530	484/48	278	139	40/45	2353	26/64" bean
1600	484/48	298	130	40/44	2353	26/64" bean
27-10-85						
1300	405/46	1440	-	-	-	Pt-1A 26/64" bean
1345	427/45	1009	70.8	58/44	-	26/64" bean
1445	430/-	1070	79.8	61/43	-	30/64" bean
1545	431/-	1008	83	58/43	-	30/64" bean
1745	440/-	1228	70	60/53	-	30/64" bean 0.1% H ₂ O
2100	270/44	2580	60	97/44	-	38/64" ² bean 0.1% H ₂ O
2300	281/-	2545	61.1	98/45	-	38/64" ² bean 0% BSW
28-10-85						
0230	293/55	26334	62.2	106/48	-	38/64" bean 0% BSW
28-10-85						
1345	447/50	2126	66.4	80/46	-	PT-1C 38/64" bean
1500	470/51	1895	69.9	75/46	-	38/64" bean
1700	382/58	4609	49	130/49	-	42/64" bean
1830	392/65	5021	72.5	100/44	-	42/64" bean 0% BSW
2115	342/71	6064	88.5	117/64	-	52/64" bean
29-10-85						
0200	290/72	6671	98	117/71	-	56/64" bean
0630	264/68	7600	103	130/64	-	64/64" bean
0745	264/70	7604	104	132/68	-	64/64" bean
29-10-85						
1400	306/62	7263	55.3	150/56	2317	PT-1D 56/64" bean
1430	309/63	7179	55.4	150/54	2317	0.6% CO ₂ Eleven samples taken over flowing period. Two samples declared void.
1730	309/66	7016	55.6	145/57	2316	
2115	309/66	6998	55.2	140/56	2317	

Date Time	THP/THT psig/ ^o F	Oil Rate stb/d	GOR scf/stb	Psep/Tsep psig/ ^o F	BHP Psia	Comments
30-10-85 1145	308/68	6944	77	155/60	2318	
31-10-85 2030	539/43	-	-	-	2348	PT-1E BHS 19/64" bean 3 BHS obtained bubble points measured.
2130	539/44	437	-	15/38	2348	
01-11-85 0330	530/42	336	-	-	-	
0500	531/44	345	-	-	-	

DEAUGEN WELL : 6467/9-5
PROD. TEST PT-ID STRAIN GAUGE 65367 (RAW DATA)
TIME ZERO IS 1034 HRS 27/12/85

WELL AND RESERVOIR DATA

Formation net thickness : 151.88 ft
Reservoir fluid : oil
Pre-test reservoir pressure : 2377.5 psi
Perforated interval : 5321.0- 5344.0 ft
Wellbore radius : .510 ft
Absolute porosity : .360

OIL PVT PROPERTIES

FORMATION VOL FACTOR BO 661/661	OIL VISC AT RESV CONDITIONS cP	TOTAL COMPRES SIBILITY ct psi-f
1.1600	.670	.1522-204

BRANDEN WELL : 6407/B-5
PROD. TEST FT-10 STRAIN GAUGE 55769 (RAW DATA)
TIME ZERO IS 1936 HRS 27/10/85

SEQUENCE OF EVENTS

FRT	PER	PRODUCTION RATE	CUMULATIVE TIME SINCE INITIAL CONDITIONS	TIME SINCE START OF PERIOD	PRESSURE OBSERVED
		stb/d	hours	hours	psi
1	0	.0	.00000	.00000	2379.5
2	10d	7000.0	.51944	.51944	2323.1
3	10d	7000.0	2.53856	2.53856	2327.1
4	10d	7000.0	3.56278	3.56278	2326.6
5	10d	7000.0	5.56111	5.56111	2326.7
6	10d	7000.0	6.52778	6.52778	2326.9
7	10d	7000.0	7.52500	7.52500	2327.3
8	10d	7000.0	8.51667	8.51667	2327.5
9	10d	7000.0	9.51111	9.51111	2327.9
10	10d	7000.0	10.50000	10.50000	2328.2
11	10d	7000.0	12.50633	12.50633	2328.2
12	10d	7000.0	14.54444	14.54444	2328.2
13	10d	7000.0	15.55278	15.55278	2328.1
14	10d	7000.0	16.52500	16.52500	2328.1
15	10d	7000.0	17.49722	17.49722	2328.3
16	10d	7000.0	18.51389	18.51389	2328.4
17	10d	7000.0	19.53667	19.53667	2328.6
18	10d	7000.0	20.49444	20.49444	2328.9
19	10d	7000.0	20.51667	20.51667	2328.6
20	10d	7000.0	21.49167	21.49167	2328.6
21	10d	7000.0	22.49167	22.49167	2329.0
22	10d	7000.0	23.91389	23.91389	2329.1
23	10d	7000.0	24.00278	24.00278	2329.2
24	10d	7000.0	24.02500	24.02500	2329.1
25	10d	7000.0	24.03856	24.03856	2329.0
26	10d	7000.0	24.03333	24.03333	2328.7
27	20u	.0	24.03911	.00278	2348.0
28	20u	.0	24.03889	.00556	2374.5
29	20u	.0	24.05000	.01667	2375.5
30	20u	.0	24.09444	.06111	2376.3
31	20u	.0	24.10000	.10000	2376.4
32	20u	.0	24.07000	.06889	2376.6
33	20u	.0	24.06111	.02778	2376.7
34	20u	.0	24.49000	.41667	2376.8
35	20u	.0	24.03889	.00556	2376.8
36	20u	.0	24.60778	.57444	2376.9
37	20u	.0	24.71667	.68333	2377.0
38	20u	.0	24.03856	.00556	2377.0
39	20u	.0	24.09444	.06111	2377.0
40	20u	.0	24.03000	.00000	2377.1

DAWGEN WELL : 640719-5
 PROD. TEST #1-10 STRAIN GAUGE BEGINS (RAW DATA)
 TIME ZERO IS 1036 HRS 07/10 85

SEQUENCE OF EVENTS

FWO	PER	PRODUCTION RATE	CUMULATIVE TIME SINCE INITIAL CONDITIONS	TIME SINCE START OF PERIOD	PRESSURE OBSERVED
		stb/d	hours	hours	psi
41	28u	.0	25.07222	1.63889	2377.1
42	28u	.0	25.16111	1.12778	2377.1
43	28u	.3	25.25000	1.21667	2377.1
44	28u	.0	25.33889	1.30556	2377.2
45	28u	.0	25.42778	1.39444	2377.2
46	28u	.0	25.51667	1.48333	2377.2
47	28u	.0	25.60556	1.57222	2377.3
48	28u	.0	25.69444	1.66111	2377.3
49	28u	.0	25.78333	1.75000	2377.3
50	28u	.0	25.87222	1.83889	2377.3
51	28u	.0	25.96111	1.92778	2377.2
52	28u	.3	26.05000	2.01667	2377.3
53	28u	.0	26.13889	2.10556	2377.3
54	28u	.0	26.22778	2.19444	2377.3
55	28u	.0	26.31667	2.28333	2377.3
56	28u	.0	26.40556	2.37222	2377.4
57	28u	.0	26.49444	2.46111	2377.3
58	28u	.0	26.58333	2.55000	2377.3
59	28u	.0	26.67222	2.63889	2377.3
60	28u	.0	26.76111	2.72778	2377.4
61	28u	.0	26.85000	2.81667	2377.3
62	28u	.0	26.93889	2.90556	2377.4
63	28u	.0	27.02778	2.99444	2377.4
64	28u	.0	27.11667	3.08333	2377.4
65	28u	.0	27.20556	3.17222	2377.4
66	28u	.0	27.29444	3.26111	2377.4
67	28u	.0	27.38333	3.35000	2377.4
68	28u	.0	27.47222	3.43889	2377.4
69	28u	.0	27.56111	3.52778	2377.4
70	28u	.0	27.65000	3.61667	2377.4
71	28u	.0	27.73889	4.20889	2377.4
72	28u	.0	27.82778	4.32778	2377.4
73	28u	.0	27.91667	4.41667	2377.4
74	28u	.3	28.00556	4.50556	2377.4
75	28u	.0	28.09444	4.59444	2377.4
76	28u	.0	28.18333	4.68333	2377.4
77	28u	.0	28.27222	4.77222	2377.4
78	28u	.0	28.36111	4.86111	2377.4
79	28u	.3	28.45000	4.95000	2377.4
80	28u	.0	28.53889	5.03889	2377.4

FRACER WELL : 84077-5
 FREQ. TEST F1-10 STRAIN GAUGE 85369 (RAW DATA)
 TIME ZERO IS 1006 HRS 07/10/85

SEQUENCE OF EVENTS

ENT	PER	PRODUCTION RATE	CUMULATIVE TIME SINCE INITIAL CONDITIONS	TIME SINCE START OF PERIOD	PRESSURE OBSERVED
		stb/d	hours	hours	psi
81	28u	.0	29.16111	5.12778	2377.4
82	28u	.0	29.25800	5.21667	2377.4
83	28u	.0	29.33889	5.30556	2377.4
84	28u	.0	29.42778	5.39444	2377.5
85	28u	.0	29.51667	5.48333	2377.5
86	28u	.0	29.60556	5.57222	2377.5
87	28u	.0	29.69444	5.66111	2377.5
88	28u	.0	29.78333	5.75000	2377.5
89	28u	.0	29.87222	5.83889	2377.5
90	28u	.0	29.96111	5.92778	2377.5
91	28u	.0	29.93889	5.90556	2377.5
92	28u	.0	29.95800	5.91667	2377.4
93	28u	.0	29.95278	5.91944	2377.6
94	28u	.0	30.04167	6.00833	2377.5
95	28u	.0	30.13056	6.09722	2377.5
96	28u	.0	30.21944	6.18611	2377.5
97	28u	.0	31.64167	7.68833	2377.7
98	28u	.0	32.17500	8.14167	2377.9
99	28u	.0	32.70833	8.67500	2378.1
100	28u	.0	33.24167	9.20833	2378.1
101	28u	.0	33.86389	9.83056	2378.3
102	28u	.0	34.21944	10.13611	2378.3
103	28u	.0	34.75278	10.71944	2378.4
104	28u	.0	35.19722	11.16389	2378.5
105	28u	.0	35.73056	11.69722	2378.6
106	28u	.0	36.26389	12.23056	2378.5
107	28u	.0	36.77500	12.74167	2378.6
108	28u	.0	37.30833	13.27500	2378.6
109	28u	.0	37.75278	13.71944	2378.6
110	28u	.0	38.28611	14.25278	2378.6
111	28u	.0	38.73056	14.69722	2378.4
112	28u	.0	39.26389	15.23056	2378.4
113	28u	.0	39.79722	15.76389	2378.5
114	28u	.0	40.33056	16.29722	2378.3
115	28u	.0	40.77500	16.74167	2378.2
116	28u	.0	41.30833	17.27500	2378.2
117	28u	.0	41.75278	17.71944	2378.2
118	28u	.0	42.28611	18.25278	2378.2
119	28u	.0	42.81944	18.78611	2378.2
120	28u	.0	43.26389	19.23056	2378.4

DRAGDEN WELL : 6407/5-5
 FROD. TEST FT-10 STRAIN GAUGE 25389 (SAW DATA)
 TIME ZERO IS 1036 HRS 27/10/85

SEQUENCE OF EVENTS

PAGE- 4

PWT	PER	PRODUCTION RATE	CUMULATIVE TIME SINCE INITIAL CONDITIONS	TIME SINCE START OF PERIOD	PRESSURE OBSERVED
		stb/d	hours	hours	psi
121	2Bu	.0	43.78722	19.76389	2378.4
122	2Bu	.0	44.30856	20.27222	2378.5
123	2Bu	.0	44.79000	20.71667	2378.6
124	2Bu	.0	45.31944	21.28611	2378.7
125	2Bu	.0	45.76389	21.73056	2378.7
126	2Bu	.0	45.83078	21.81544	2378.9
127	2Bu	.0	46.29722	22.29389	2378.9
128	2Bu	.0	46.74167	22.70833	2378.9
129	2Bu	.0	47.27500	23.24167	2379.0
130	2Bu	.0	47.36389	23.33056	2379.1
131	2Bu	.0	47.45278	23.41944	2379.0
132	2Bu	.0	47.54167	23.50833	2379.1
133	2Bu	.0	47.63056	23.59722	2379.1
134	2Bu	.0	47.71944	23.68611	2379.0
135	2Bu	.0	47.69722	23.66389	2379.0
136	2Bu	.0	48.07500	24.04167	2379.1
137	2Bu	.0	48.25278	24.21944	2379.1
138	2Bu	.0	48.43056	24.39722	2379.1
139	2Bu	.0	48.60833	24.57500	2379.1
140	2Bu	.0	48.78611	24.75278	2379.1
141	2Bu	.0	48.96389	24.93056	2379.1
142	2Bu	.0	49.14167	25.10833	2379.1
143	2Bu	.0	49.31944	25.28611	2379.0
144	2Bu	.0	49.49078	25.41944	2379.0
145	2Bu	.0	49.46389	25.40056	2379.1

DRAUSEN WELL : 4407/9-5
 PROD. TEST #7-ID BRAIN GAUGE 25369 TIDE CORRECTED
 TIME ZERO IS 1036 HRS 27/10/55

SEQUENCE OF EVENTS

PNT	PER	PRODUCTION RATE	CUMULATIVE TIME SINCE INITIAL CONDITIONS	TIME SINCE START OF PERIOD	PRESSURE OBSERVED
		stb/d	hours	hours	psi
1	0	.0	.00000	.00000	2379.5

2	1Dd	7000.0	.51944	.51944	2322.8
3	1Dd	7000.0	2.53056	2.53056	2327.0
4	1Dd	7000.0	3.50278	3.50278	2326.9
5	1Dd	7000.0	5.56111	5.56111	2327.0
6	1Dd	7000.0	6.52778	6.52778	2327.1
7	1Dd	7000.0	7.52500	7.52500	2327.4
8	1Dd	7000.0	8.51667	8.51667	2327.6
9	1Dd	7000.0	9.51111	9.51111	2327.8
10	1Dd	7000.0	10.50000	10.50000	2328.0
11	1Dd	7000.0	12.50833	12.50833	2328.0
12	1Dd	7000.0	14.54444	14.54444	2328.2
13	1Dd	7000.0	15.55278	15.55278	2328.3
14	1Dd	7000.0	16.52500	16.52500	2328.3
15	1Dd	7000.0	17.49722	17.49722	2328.5
16	1Dd	7000.0	18.51389	18.51389	2328.6
17	1Dd	7000.0	19.53889	19.53889	2328.7
18	1Dd	7000.0	20.49444	20.49444	2329.0
19	1Dd	7000.0	20.51667	20.51667	2328.6
20	1Dd	7000.0	21.49167	21.49167	2328.6
21	1Dd	7000.0	22.49167	22.49167	2328.8
22	1Dd	7000.0	23.91389	23.91389	2328.9
23	1Dd	7000.0	24.00278	24.00278	2328.9
24	1Dd	7000.0	24.02500	24.02500	2328.9
25	1Dd	7000.0	24.03056	24.03056	2328.8
26	1Dd	7000.0	24.03333	24.03333	2328.5

27	2Bu	.0	24.03611	.00278	2348.0
28	2Bu	.0	24.03889	.00556	2374.3
29	2Bu	.0	24.05000	.01667	2375.2
30	2Bu	.0	24.09444	.06111	2375.8
31	2Bu	.0	24.18333	.15000	2376.2
32	2Bu	.0	24.27222	.23889	2376.4
33	2Bu	.0	24.36111	.32778	2376.5
34	2Bu	.0	24.45000	.41667	2376.6
35	2Bu	.0	24.53889	.50556	2376.6
36	2Bu	.0	24.62778	.59444	2376.6
37	2Bu	.0	24.71667	.68333	2376.7
38	2Bu	.0	24.80556	.77222	2376.9
39	2Bu	.0	24.89444	.86111	2376.8
40	2Bu	.0	24.98333	.95000	2376.9

DRAQUEEN WELL : 6407/S-E
 PROD. TEST PT-10 STRAIN GAUGE PRESS. TIDE CORRECTED
 TIME ZERO IS 1936 HAS 07/10/65

SEQUENCE OF EVENTS

PWT	PER	PRODUCTION RATE	CUMULATIVE TIME SINCE INITIAL CONDITIONS	TIME SINCE START OF PERIOD	PRESSURE OBSERVED
		stb/d	hours	hours	psi
41	2Bu	.0	25.07222	1.03889	2376.9
42	2Bu	.0	25.16111	1.12778	2376.9
43	2Bu	.0	25.25000	1.21667	2376.9
44	2Bu	.0	25.33889	1.30556	2377.0
45	2Bu	.0	25.42778	1.39444	2377.1
46	2Bu	.0	25.51667	1.48333	2377.1
47	2Bu	.0	25.60556	1.57222	2377.1
48	2Bu	.0	25.69444	1.66111	2377.2
49	2Bu	.0	25.78333	1.75000	2377.1
50	2Bu	.0	25.87222	1.83889	2377.2
51	2Bu	.0	25.96111	1.92778	2377.1
52	2Bu	.0	26.05000	2.01667	2377.2
53	2Bu	.0	26.13889	2.10556	2377.3
54	2Bu	.0	26.22778	2.19444	2377.3
55	2Bu	.0	26.31667	2.28333	2377.3
56	2Bu	.0	26.40556	2.37222	2377.3
57	2Bu	.0	26.49444	2.46111	2377.3
58	2Bu	.0	26.58333	2.55000	2377.3
59	2Bu	.0	26.67222	2.63889	2377.3
60	2Bu	.0	26.76111	2.72778	2377.4
61	2Bu	.0	26.85000	2.81667	2377.3
62	2Bu	.0	26.93889	2.90556	2377.4
63	2Bu	.0	27.02778	2.99444	2377.4
64	2Bu	.0	27.11667	3.08333	2377.5
65	2Bu	.0	27.20556	3.17222	2377.4
66	2Bu	.0	27.29444	3.26111	2377.5
67	2Bu	.0	27.38333	3.35000	2377.5
68	2Bu	.0	27.47222	3.43889	2377.5
69	2Bu	.0	27.56111	3.52778	2377.5
70	2Bu	.0	27.65000	3.61667	2377.5
71	2Bu	.0	27.73889	3.70556	2377.5
72	2Bu	.0	27.82778	3.79444	2377.6
73	2Bu	.0	27.91667	3.88333	2377.5
74	2Bu	.0	28.00556	3.97222	2377.5
75	2Bu	.0	28.09444	4.06111	2377.6
76	2Bu	.0	28.18333	4.15000	2377.5
77	2Bu	.0	28.27222	4.23889	2377.5
78	2Bu	.0	28.36111	4.32778	2377.6
79	2Bu	.0	28.45000	4.41667	2377.5
80	2Bu	.0	28.53889	4.50556	2377.5
81	2Bu	.0	28.62778	4.59444	2377.6
82	2Bu	.0	28.71667	4.68333	2377.6
83	2Bu	.0	28.80556	4.77222	2377.6
84	2Bu	.0	28.89444	4.86111	2377.6
85	2Bu	.0	28.98333	4.95000	2377.6
86	2Bu	.0	29.07222	5.03889	2377.6

DRAUSEN WELL : 640719-5
 PROD. TEST PT-10 STRAIN GAUGE 88369 TIDE CORRECTED
 TIME ZERO IS 1036 HRS 27/10/85

SEQUENCE OF EVENTS

FRT	PER	PRODUCTION RATE	CUMULATIVE TIME SINCE INITIAL CONDITIONS	TIME SINCE START OF PERIOD	PRESSURE OBSERVED
		stb/d	hours	hours	psi
81	2Bu	.0	29.16111	5.12778	2377.6
82	2Bu	.0	29.25000	5.21667	2377.6
83	2Bu	.0	29.33889	5.30556	2377.6
84	2Bu	.0	29.42778	5.39444	2377.8
85	2Bu	.0	29.51667	5.48333	2377.8
86	2Bu	.0	29.60556	5.57222	2377.7
87	2Bu	.0	29.69444	5.66111	2377.7
88	2Bu	.0	29.78333	5.75000	2377.7
89	2Bu	.0	29.87222	5.83889	2377.7
90	2Bu	.0	29.96111	5.92778	2377.8
91	2Bu	.0	30.05000	6.01667	2377.8
92	2Bu	.0	30.13889	6.10556	2377.8
93	2Bu	.0	30.22778	6.19444	2377.8
94	2Bu	.0	30.31667	6.28333	2377.8
95	2Bu	.0	30.40556	6.37222	2377.7
96	2Bu	.0	30.49444	6.46111	2377.8
97	2Bu	.0	30.58333	6.55000	2377.9
98	2Bu	.0	30.67222	6.63889	2378.0
99	2Bu	.0	30.76111	6.72778	2378.1
100	2Bu	.0	30.85000	6.81667	2378.1
101	2Bu	.0	30.93889	6.90556	2378.2
102	2Bu	.0	31.02778	6.99444	2378.2
103	2Bu	.0	31.11667	7.08333	2378.2
104	2Bu	.0	31.20556	7.17222	2378.3
105	2Bu	.0	31.29444	7.26111	2378.3
106	2Bu	.0	31.38333	7.35000	2378.3
107	2Bu	.0	31.47222	7.43889	2378.4
108	2Bu	.0	31.56111	7.52778	2378.3
109	2Bu	.0	31.65000	7.61667	2378.4
110	2Bu	.0	31.73889	7.70556	2378.4
111	2Bu	.0	31.82778	7.79444	2378.4
112	2Bu	.0	31.91667	7.88333	2378.4
113	2Bu	.0	32.00556	7.97222	2378.4
114	2Bu	.0	32.09444	8.06111	2378.4
115	2Bu	.0	32.18333	8.15000	2378.5
116	2Bu	.0	32.27222	8.23889	2378.5
117	2Bu	.0	32.36111	8.32778	2378.5
118	2Bu	.0	32.45000	8.41667	2378.5
119	2Bu	.0	32.53889	8.50556	2378.5
120	2Bu	.0	32.62778	8.59444	2378.6

DRAUSEN WELL : 6407/9-5
 PROD. TEST PT-10 STRAIN GAUGE 85389 TIDE CORRECTED
 TIME ZERO IS 1036 HRS 27/10/85

SEQUENCE OF EVENTS

PNT	PER	PRODUCTION RATE	CUMULATIVE TIME SINCE INITIAL CONDITIONS	TIME SINCE START OF PERIOD	PRESSURE OBSERVED
		stb/d	hours	hours	psi
121	2Bu	.0	43.79722	19.76389	2378.6
122	2Bu	.0	44.30556	20.27222	2378.6
123	2Bu	.0	44.75000	20.71667	2378.6
124	2Bu	.0	45.31944	21.28611	2378.7
125	2Bu	.0	45.76389	21.73056	2378.6
126	2Bu	.0	45.85278	21.81944	2378.7
127	2Bu	.0	46.29722	22.26389	2378.7
128	2Bu	.0	46.74167	22.70833	2378.7
129	2Bu	.0	47.27500	23.24167	2378.8
130	2Bu	.0	47.36389	23.33056	2378.9
131	2Bu	.0	47.45278	23.41944	2378.8
132	2Bu	.0	47.54167	23.50833	2378.9
133	2Bu	.0	47.63056	23.59722	2378.8
134	2Bu	.0	47.71944	23.68611	2378.8
135	2Bu	.0	47.89722	23.86389	2378.8
136	2Bu	.0	48.07500	24.04167	2378.8
137	2Bu	.0	48.25278	24.21944	2378.8
138	2Bu	.0	48.43056	24.39722	2378.9
139	2Bu	.0	48.60833	24.57500	2378.9
140	2Bu	.0	48.78611	24.75278	2378.9
141	2Bu	.0	48.96389	24.93056	2378.9
142	2Bu	.0	49.14167	25.10833	2378.9
143	2Bu	.0	49.31944	25.28611	2378.9
144	2Bu	.0	49.45278	25.41944	2378.9
145	2Bu	.0	49.46389	25.43056	2378.9

HORNER ANALYSIS
PERMEABILITY ANALYSIS

Period (0 if no more) (1) ? > >2
 Period range = 27 145
 Horner begin point (27) ? >>32
 Horner end point (145) ? >>60

CALCULATED FORMATION AND WELLBORE PARAMETERS

Period 2
 Selected semi log straight line segment 32 to 60
 Fitted semi-log slope (psi)/(stb/d) -.12574-003
 Flow Capacity, mD.ft 887824.
 Permeability, mD 5514.437
 Extrapolated (pseudo) pressure psi .2378+004
 No. of points fitted 29
 Correlation coefficient -.988

Period (0 if no more) (3) ? > >2
 Period range = 27 145
 Horner begin point (27) ? >>65
 Horner end point (145) ? >>130

CALCULATED FORMATION AND WELLBORE PARAMETERS

Period 2
 Selected semi log straight line segment 65 to 130
 Fitted semi-log slope (psi)/(stb/d) -.27101-003
 Flow Capacity, mD.ft 411936.
 Permeability, mD 2558.610
 Extrapolated (pseudo) pressure psi .2379+004
 No. of points fitted 65
 Correlation coefficient -.987

Period (0 if no more) (3) ? > >0

SKIN ANALYSIS FOR DRAWDOWN PERIODS

Permeability, mD (2559.) ? > >5514

Period (0 if no more) (1) ? > >
 Period range = 2 26
 Horner begin point (2) ? >>3
 Horner end point (26) ? >>7

Drawdown period 1
 Selected semi log straight line segment 3 to 7
 Initial (pseudo) pressure psi .2379+004
 Extrapolated (pseudo) pressure psi .2320+004
 Total skin 51.129
 No. of points fitted 5

Total skin fitted for period 1	51.125
Average skin	51.
No. of points fitted	1

RADIUS OF INVESTIGATION TABLE, R_{inv} (feet)

$n \setminus j$	1	2
1 1	6074.	
2 1	6714.	6248.

$R_{inv}(n,j)$ is the radius of investigation, at the end of period n , of the pressure transient induced by the rate change which took place at the start of period j .

Base Permeability, mD	5514.020
Hydraulic Diffusivity, $mD \cdot \text{psi}/cP$.183+010

MULTI-RATE PRESSURE TRANSIENT DURATION TABLE, DT (hours)

$n \setminus j$	1	2
1 1	24.0	
2 1	43.5	25.4

$DT(n,j)$ is the duration, at the end of period n , of the of the pressure transient induced by the rate change which took place at the start of period j . Note that the duration of the last period may have been extended so as to reach beyond the start of semi-steady state (if finite reservoir).

RATE CHANGE HISTORY (INDUCING PRESSURE TRANSIENTS)

Rate change at start of period 1, stb/d	7000.000
Rate change at start of period 2, stb/d	-7000.000