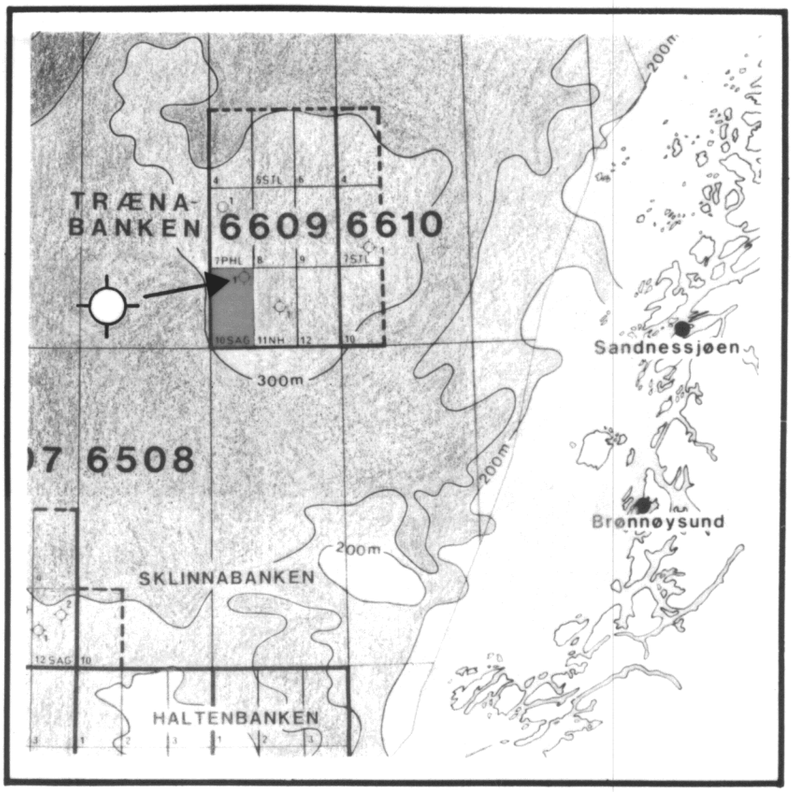
Saga
Petroleum a.s.



FINAL WELL REPORT

6609/10-1

February, 1984

Saga Petroleum a.s.

Licence	:	082
Partners	:	SAGA/STATOIL/NORSK HYDRO/ESSO
Date	:	FEBRUARY 1984
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FINAL WELL REPORT

6609/10-1

Norwegian Continental Shelf

Classification / Distribution

☐ Saga and partners

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ENCLOSURES

I	Composite Well Log
II	Formation Pressure Evaluation Sheet
IIIA/B	Core Description
IV	Computer Processed Interpretation

2. SUMMARY, WELL NO. 6609/10-1

2.1 Exploration

2.2 Operation

2.3 Testing and Formation Evaluation

2.1 Exploration

Well no: 6609/10-1

Saga Petroleum a.s.

The well 6609/10-1 was drilled as the fourth well on Trœnabanken. As a true wildcat, the objective of the well was to test the entire stratigraphic column between the seabed and into Upper Triassic. The primary target of the well was Jurassic Sandstones of the Nordland Ridge, and secondary objective was to test possible sand development in the Paleocene.

The well was spudded on August 2nd, 1983, in a waterdepth of 288 mRKB, and reached TD on August 23rd 1983. The well was plugged and abandoned as a dry well. After having penetrated 65 m of Triassic Red Beds drilling was stopped at 2167 mRKB. This meets the requirements to commitment depth as specified in the work programme.

Apart from the glaciomarine sands and silts of Pleistocene age at the top, the well proved mainly clay and claystone down to the Lower Jurassic Sandstone. In the Tertiary two unconformities were seen; a Late Miocene unconformity at 1312 m and a major unconformity at 1367 m, ranging in age from Early Eocene to Middle Miocene.

The Tertiary unconformably overlies the Late Cretaceous, which in the well is of Campanian-Early Maastrichtian age.

This Upper Cretaceous section rests unconformably on Middle Jurassic (Late Toarcian-Early Bajocian) claystones at 1605 m.

Beneath a Middle/Lower Jurassic unconformity at 1642 m the Lower Jurassic Sandstone (143 m thick), the Coal Unit (1785-1993 mRKB) and the Triassic Grey and Red Beds were penetrated.

The drilling proved the pressure to be hydrostatic throughout the entire well.

2.2 Operation

Well no: 6609/10-1

Saga Petroleum a.s.

36" section:

Well 6609/10-1 was spudded at 15:20 hrs., Aug. 2, 1983.

Used a 36" Varel bit for the first time, but due to slow rate of penetration the bit was pulled at 304m. Changed over to a 26" bit and drilled down to 361m where the bit was pulled due to repair work on kelly spinner.

Drilling with 26" bit also resulted in a low ROP, and the section was therefore drilled with a 17 1/2" bit down to 415m, and afterwards opened to 36", using a 26" bit with a 36" holeopener above it.

Ran 11 jts. of 30" csg. on Aug. 5th. Had to wash the string down 50m, to 413m, where it stopped, probably due to fill-up during the pumping- and washing-operation. When landing the casing, it was observed that the TGB had sunk approx. 1.5 m, probably due to washout around it from the pumping action.

Had to hold the casing in tension for 7 1/2 hrs. while waiting on cement. Ran the shallow gas stack on riser, and landed on the 30" housing, before drilling out the cement in casing and performing a leak-off test.

EMW showed 11.5 ppg which is probably way to high. This result may be explained by the viscous, non-sheared mud used in the test, which may give unreliable readings.

2.2 Operation

Well no: 6609/10-1

Saga Petroleum a.s.

26" section: Drilled 17 1/2" pilot hole to 668m, checked for flow and pulled out of hole to rig up for logging. Had to rerun the tool once due to tool-failure. Opened hole to 26", using an underreamer above the bit. Increased mudweight in hole to 10.6 ppg, and displaced riser to seawater. The flowcheck performed was negative. Ran a caliper log before pulling riser and shallow gas stack. Ran 31 jts. of 20" casing, and landed and cemented same on Aug. 10.

17 1/2" section: RIH with 17 1/2" BHA on August 13. Tag cement at 639m. The leak-off test showed EMW = 13.0 ppg. Kept the mudweight around 10 ppg during this section. Drilled down to setting depth for next casing, 13 3/8". Got some problem with the logging-equipment during the two log run. (1 1/2 hour lost time). Started to run 13 3/8" casing. Fished after a sledge hammer for 2 hours. (It dropped inside casing during the run). Continued to run 13 3/8" casing. Tight spot in the 17 1/2" hole at 1090m. Washed casing down to bottom. Lost mud during circ. Leak in annulus between 20" and 30". Cemented 13 3/8" csg. with 1050 sxs of 13 ppg lead and 500 sxs of 15.8 ppg. tail on August 16. Lost return during the job.

12 1/4" section: Drilled out cement and the 12 1/4" rathole on August 17th. Leak off test showed EMW to be 15.6 ppg. Drilled ahead with MW = 11.5 ppg. Made the first core from 1644m to 1655m with 100% recover. Cut core no. 2 from 1798m to 1808m with 91% recovery. Decreased MW to 10.8 ppg after core no. 2. Drilled down to TD at 2167m. Increased the MW to 10.9 ppg due to swabbing. POOH for logging. Final logging started on August 23th. The different casing sizes were cut and the plugs set, according to the program (see chap. 7.2 Abandonment Profile) before starting to pull the anchors.

"Treasure Saga" was ready to go for new location on August 30th at 10:30 hrs.

2.3 Testing and formation evaluation

Well no: 6609/10-1

Saga Petroleum a.s.

The well penetrated porous sands in the Lower Jurassic and in the Coal Unit. All sands are water bearing. Two cores were cut. A full suit of logs were run over the sand intervals.

The Lower Jurassic Sandstone, 1642-1785m, contains 54m of net sand with an average porosity of 26%.

The Coal Unit, 1785-1993m, has 26m of net sand with a porosity of 26%. Both formations have a significant shale content.

The sand intervals apparently belong to the same pressure regime. The formation pressure is approx. 170 bar at depth 1700m RKB.

No production test was performed.

3. GENERAL INFORMATION

3.1 Licence and General Well Information

3.2 Saga Personnel

3.3 Contractors Operation

3. GENERAL INFORMATION

3.1. Licence and general well information

Licence 082, allocated by Royal Decree on December 10th 1982, covers block 6609/10. The block is situated approximately 170 km west of Sandnessjøen (fig 3.1.). The size of the block is approximately 15 x 27.8 km. The area is 419.90 km^2.

GROUP MEMBERS	WORKING INTEREST	NET INTEREST
Saga Petroleum a.s.	10%	10%
Statoil	20%	50%
Esso	60%	30%
Norsk Hydro	10%	10%

Rig release from PL 074	:	July 31st, 1983
Spud date	:	August 2nd, 1983
TD date	:	August 23rd, 1983
Rig release from PL 082	:	August 30th, 1983
Completion status	:	Plugged and abandoned as dry well.
Final Location Coordinates	:	Latitude: 66°14'42.27"N Longitude: 09°14'59.50"E
Seismic position	:	Intersection seismic lines 8102-415 SP 3593 and 8102-208 SP 6340
Rig	:	Treasure Saga
RKB-MSL	:	26 m
MSL-Seabed (Water Depth)	:	262 m
RKB-Seabed	:	288 m
RKB-TD	:	2167 m (logger's depth) 2166 m (driller's depth)

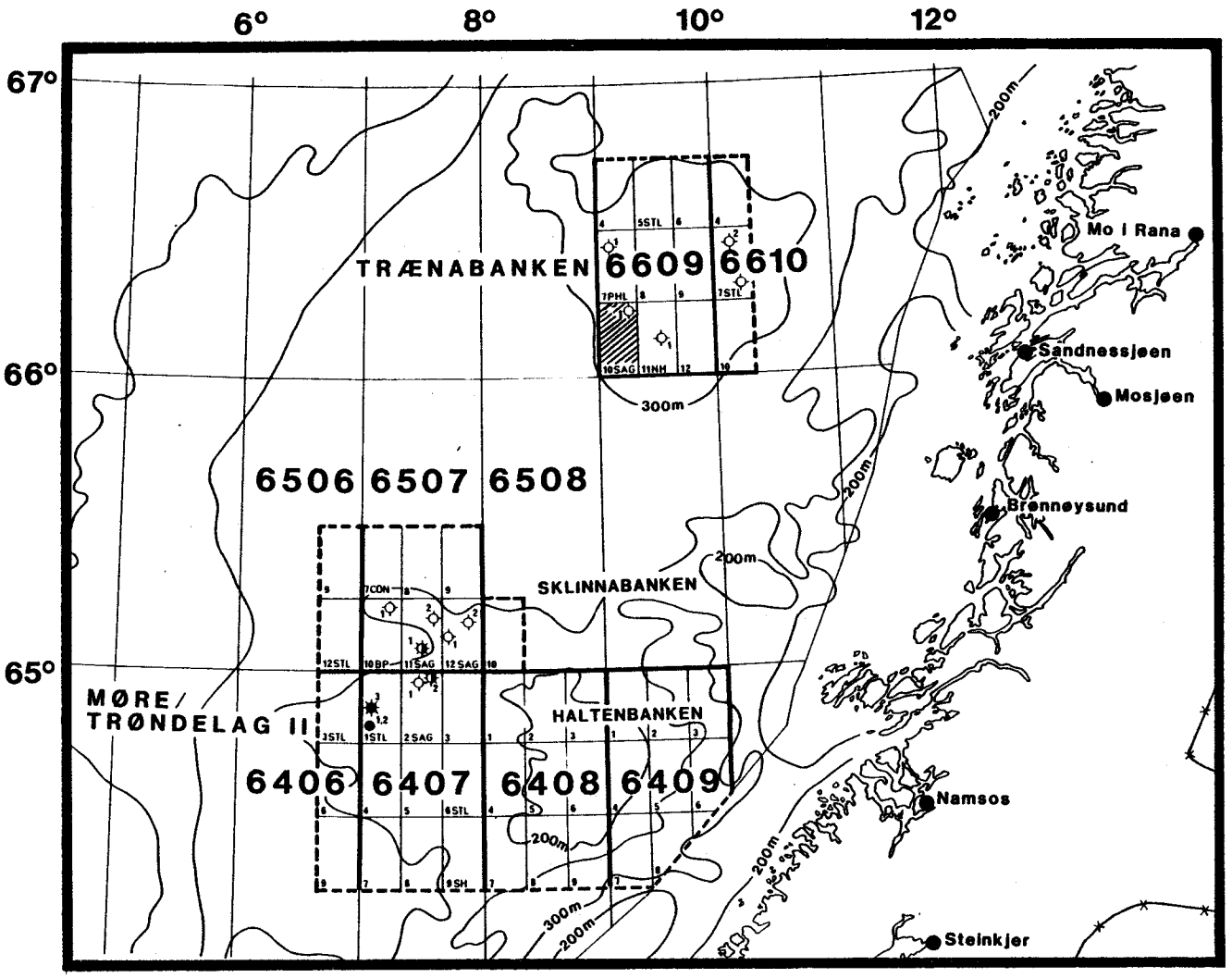


Fig. 3.1 Small - scale map of the block location

3.2. Saga Personnel

DRILLING

Onshore:

Vice President	
Drilling operations	: Reidar Nyvik
Superintendent	: Gene Gwynn
Drilling Manager	: Terje Vatn
Drilling Engineers	: Kristian Sirevaag
	Einar Framnes
	Rune Vik

Offshore:

Drilling Supervisors	: Wally Hrenyk
	: Dennis Hawkins
Assistent Supervisors	: Morten Sœbø
	Jan Petter Rød
	Henrik Kayser
	Tom Bjerke
	Jon Arne Aase
	Kjell Randulff
Drilling Engineer	: Øivind Holte

GEOLOGY

Onshore:

Senior Manager	: Nils B. Hollander
Licence Manager	: Werner Karlsson
	Terje Hagevang
Project Geologist	: Terje Solli
Project Geophysicist	: Brian Jepsen
Lab. Geologists	: Tore Haaland
	Waltraud Elser
	Hans O. Augedal
	Berit Ree

Offshore:

Well-site geologist	: Per Bakøy
	Waltraud Elser
	Øystein Jacobsen
	Amund Kleppe
	Tom Pettersen
	Terje Solli
	Hanne Øines

TESTING/RESERVOIR

Onshore:

Form. Eval. Manager	: Hallvard Høydalsvik
Reservoir Engineer	: Jan Kielland

3.3. Contractors operation

Drilling Contractor	: Wilh. Wilhelmsen
Mud Logging Services	: Exlog
Cement Services	: B.J. Huges
Mud Services	: Promud
Logging Services	: Dresser-Atlas
Casing Services	: Nor Casing
Cutting Services	: Stavanger Casing Crew
Coring	: X-L Oil Tool Company, Norway
Underreaming	: Servco
Supply boat	: "Nordfonn"/"Skandi Beta"
Stand-by boat	: "Stand-by Pioneer"
Helicopters	: Helicopter Service
Sub Sea	: FMC
Catering Service	: Wilh. Wilhelmsen

4. GEOLOGY/GEOPHYSICS AND FORMATION EVALUATION

4.1 Geographic and Structural Setting

4.2 Purpose of the Well

4.3 Sampling

- 4.3.1 Routine Samples
- 4.3.2 Conventional Cores
- 4.3.3 Sidewall Cores

4.4 Special Studies in Geology and Geophysics

4.5 Wireline Logs

4.6 Well Velocity Survey

4.7 Formation Temperature

4.8 Formation Pressure

4.9 Stratigraphy

- 4.9.1 Lithostratigraphic Summary
- 4.9.2 Biostratigraphic Summary
- 4.9.3 Stratigraphic History
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- 4.9.12 Hordaland Group Equivalent
- 4.9.13 Nordland Group Equivalent

4.10 Formation Evaluation

- 4.10.1 Hydrocarbon Indications
- 4.10.2 Core Analysis
- 4.10.3 Log Evaluation
- 4.10.4 Formation Pressure Measurements

4. GEOLOGY/GEOPHYSICS AND FORMATION EVALUATION

4.1 Geographic and Structual Setting

The wildcat well 6609/10-1 was drilled in the Trœnabanken area offshore Nordland.

The well is located in the extreme north of block 6609/10, near the crest of the A-beta structure (fig. 4.1.). The structure is a Base Cretaceous dip closure.

4.2. Purpose of the Well

As a true wildcat, the objective of the well was to test the entire stratigraphic column between the seabed and Upper Triassic.

The primary target was sandstones of Jurassic age.

Being a true wildcat well, secondary targets were possible sand developments in the Upper Cretaceous and the Paleocene sections.

4.3 Sampling

4.3.1. Routine Samples

The following routine samples were collected:

a) Six sets of wet ditch cuttings (á 1/2 kg).
b) Two sets of well-site washed and dried cuttings.

No returns:	Seabed (288 m)- 420 m
10 m intervals:	420 - 1250 m
5 m intervals:	1250 - 1500 m
3 m intervals:	1500 - 2166 m

In addition one set of canned composite wet samples were collected for geochemical analysis:

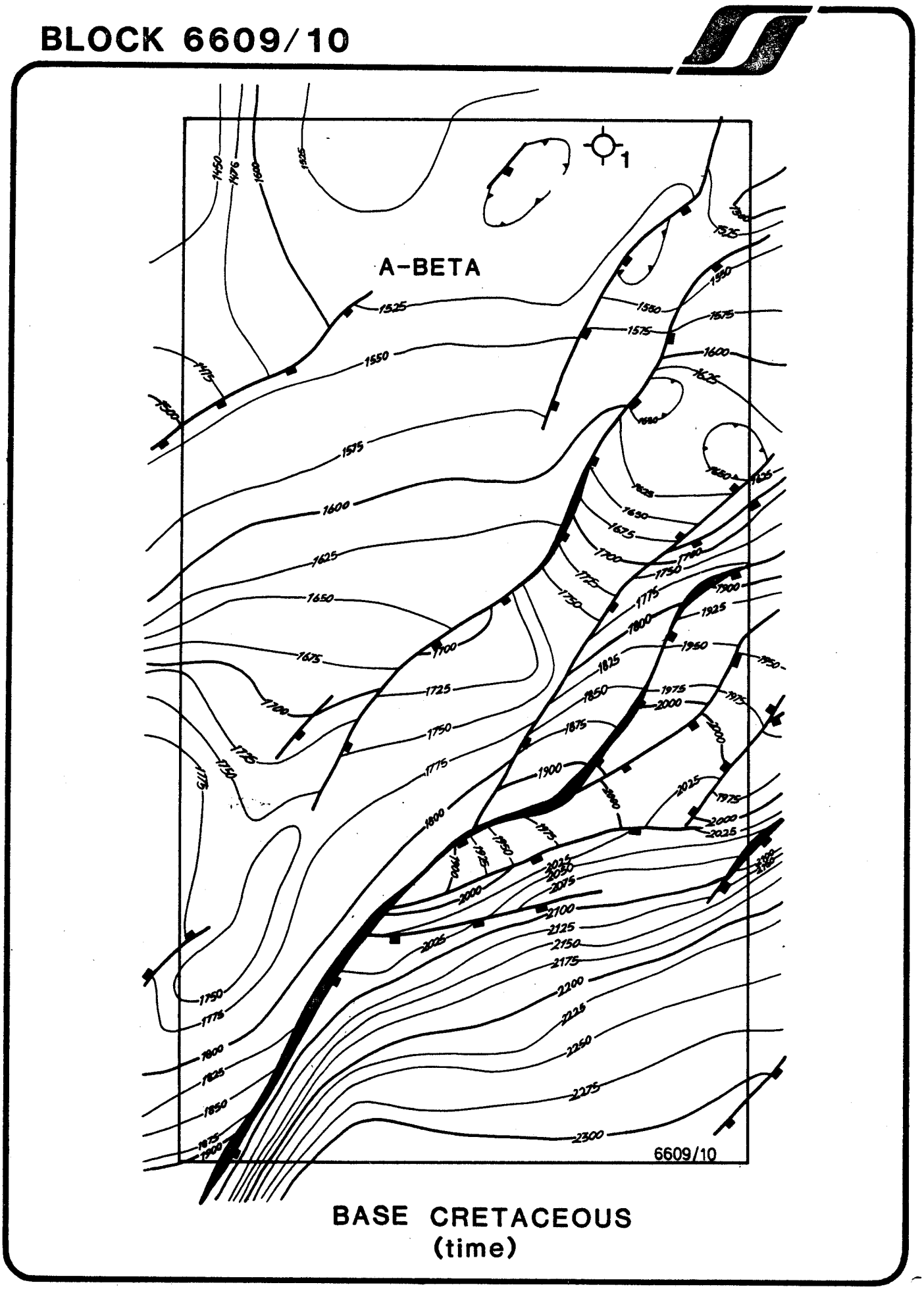


Fig. 4.1 Main structural elements 6609/10.

Base Cretaceous reflector, time-map.

20 m intervals : 420 - 1250 m
10 m intervals : 1250 - 1500 m
9 m intervals : 1500 - 2166 m

4.3.2. Conventional Cores

Two conventional cores were cut, one near the top of the Lower Jurassic Sand Unit and one near the top of the Coal Unit. Totally 21.9 m was cored with a recovery of 20.9 m.

Core no 1	Cut	: 1644 - 1655.5 m
	Recovered	: 11.5 m
	Recovery	: 100%
	Correction factor	: 0

Core no 2	Cut	: 1798.0 - 1808.4
	Recovered	: 9.4 m
	Recovery	: 90%
	Correction factor	: 0

All depths correspond to the GR-DIFL-LSBHC log, run 4C. The core descriptions are given in Enclosure IIIA and B and the core analysis in ch. 4.10.2.

4.3.3. Sidewall Cores

Three runs were made with the COREGUN, attempting a total of 100 sidewall cores (table 4.1.). All the cores were shot in the 12 1/4" hole.

Altogether 80 cores were recovered, while 19 were lost and 1 was a misfire, giving a recovery of 80%.

The geological descriptions are given in ch. 8.1.1.

4.4. Special Studies in Geology and Geophysics

The following studies/analysis are completed or in preparation:

Bio- and Lithostratigraphy
Paleoservices : Interval 420 - 2167 m (completed)

Organic Geochemistry
Institutt for Energiteknikk : Organic geochemical evaluation

Core Analysis:
Norsk Core Lab : Measurements of porosity, permability and grain density (completed)

Electric Logs:
Schlumberger : Corrected sonic log, synthetic seismogram and VSP (completed)

Mud Logging :
Exploration Logging : Final report, 6609/10-1 (completed)

Core study:
Saga : Core description (completed)

Sedimentological Study:
Saga : Interpretation of depositional environment of the reservoir rocks and evaluation of the reservoir properties (in prep).

Table 4.1 Sidewall cores, attempted and recovered.

NO.	DEPTH	RECOVERY(%)	NO.	DEPTH	RECOVERY(%)
1	1270	100%	34	1610	Lost
2	1300	"	35	1615	70%
3	1327.5	"	36	1620	100%
4	1340	90%	37	1625	"
5	1355	100%	38	1630	60
6	1365	"	39	1633	"
7	1370	"	40	1637	50
8	1375	"	41	1638	10
9	1380	"	42	1641	Lost
10	1385	40%	43	1645	Lost
11	1390	100%	44	1654	Lost
12	1395	"	45	1660	Lost
13	1400	"	46	1665	100%
14	1410	"	47	1670	Lost
15	1422	70%	48	1675	Lost
16	1438	100%	49	1676.5	70%
17	1465	"	50	1690	Lost
18	1475	"	51	1700	50%
19	1485	"	52	1710	Lost
20	1495	"	53	1720	Misfire
21	1505	"	54	1730	60%
22	1515	"	55	1733.5	70%
23	1525	"	56	1736.5	60%
24	1535	"	57	1740.5	Lost
25	1545	"	58	1745	Lost
26	1555	"	59	1750.5	20%
27	1565	"	60	1755	Lost
28	1575	"	61	1759	40%
29	1585	"	62	1762	75%
30	1595	"	63	1767.5	20%
31	1600	"	64	1771.5	30%
32	1603	"	65	1775	Lost
33	1607	"	66	1780	Lost

NO.	DEPTH	RECOVERY	NO.	DEPTH	RECOVERY %
67	1786	65%	83	1950	100%
68	1794	Lost	84	1953	90%
69	1802	100%	85	1965.5	25%
70	1811.5	"	86	1986	60%
71	1817.5	80%	87	1997.5	100%
72	1823	40%	88	2007	15%
73	1826	50%	89	2010	15%
74	1833	75%	90	2024	20%
75	1854	100%	91	2029	100%
76	1865.5	30%	92	2041	15%
77	1872	60%	93	2057	80%
78	1885	70%	94	2071	100%
79	1887.5	10%	95	2089.5	100%
80	1901.5	Lost	96	2100.5	100%
81	1905	Lost	97	2103.5	20%
82	1935	Lost	98	2115	15%
			99	2132.5	10%
			100	2139	Lost

4.5. Wireline Logs

The wireline logs run in open and cased hole are listed in Table 4.2.

Table 4.2 Wireline Logs

Casing record	Hole size	Logged interval (mRKB)	Type of logs	Run no.	1983 date
30"	36"		GR to seabed		
20" 413 m	26" 17½" pilot hole to 668 m	413-667 400-667	DIFL-LSBHC-GR-SP CALIPER	1A 2A	07.08 09.08
13 3/8" 653 m	17½" to 1265 m	653-1265 653-1265	DIFL-LSBHC-GR-SP CDL-CNL-CAL-GR	3B 3A	15.08 15.08
1247 m 2167 m	12 1/4" to T.D.	300-1247 1246-2167 1246-2167 1246-2167 1246-2167 1246-2167 1600-2167	ACBL DIFL-LSBHC-GR-SP CDL-CNL-CAL-GR HRDIP COREGUN FMT SPECTRALOG VELOCITY SURVEY	4A 4C 4B 4A 4A,B,C 4A 4A	23.08 23.08 23.08 24.08 24.08 25.08 23.08 24.08

4.6. Well Velocity Survey

The checkshot survey and the vertical seismic profile survey were acquired and processed by Schlumberger.

A 200 cu. inch airgun without wave shape kit was used. The data was acquired in one run at TD. A total of 62 levels were shot successfully with an approximate shotspacing of 20 m.

The velocity and density data were used in the production of a synthetic seismogram. A frequency test with center frequencies of 20, 25, 30 and 35 Hz was carried out to find an optimal correlation to the seismic section. The best fit to the seismic line NH8102-415B at the well location was found for the primaries and short term multiples convolved with a 25 Hz minimum phase Ricker wavelet with the amplitudes in normal polarity. In fig. 4.2 this synthetic seismogram is spliced in the seismic section at the well location.

The vertical seismic profile was processed in the following sequence:

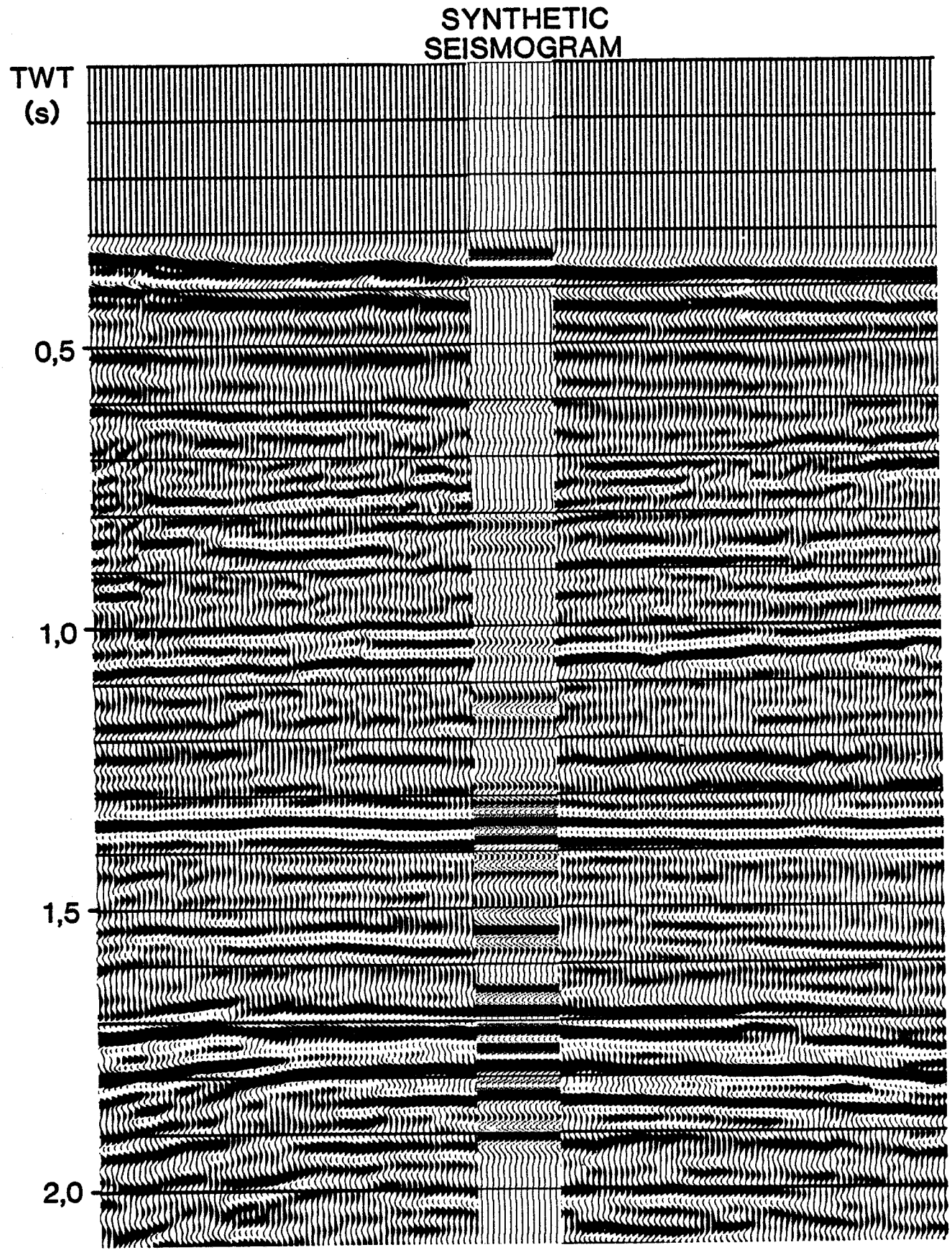
- -Bandpass filter
- -Time varying gain
- -Velocity filter
- -Automatic gain control
- -Time varying filter
- -Predictive deconvolution
- -Normal polarity

The VSP-processed data are shown in Figure. 4.3.

A seismic summary is given in Table 4.3. The travel-times to the different geological units and reflectors are also given on the composite well log.

Fig. 4.2

SYNTHETIC SEISMOGRAM 6609/10-1



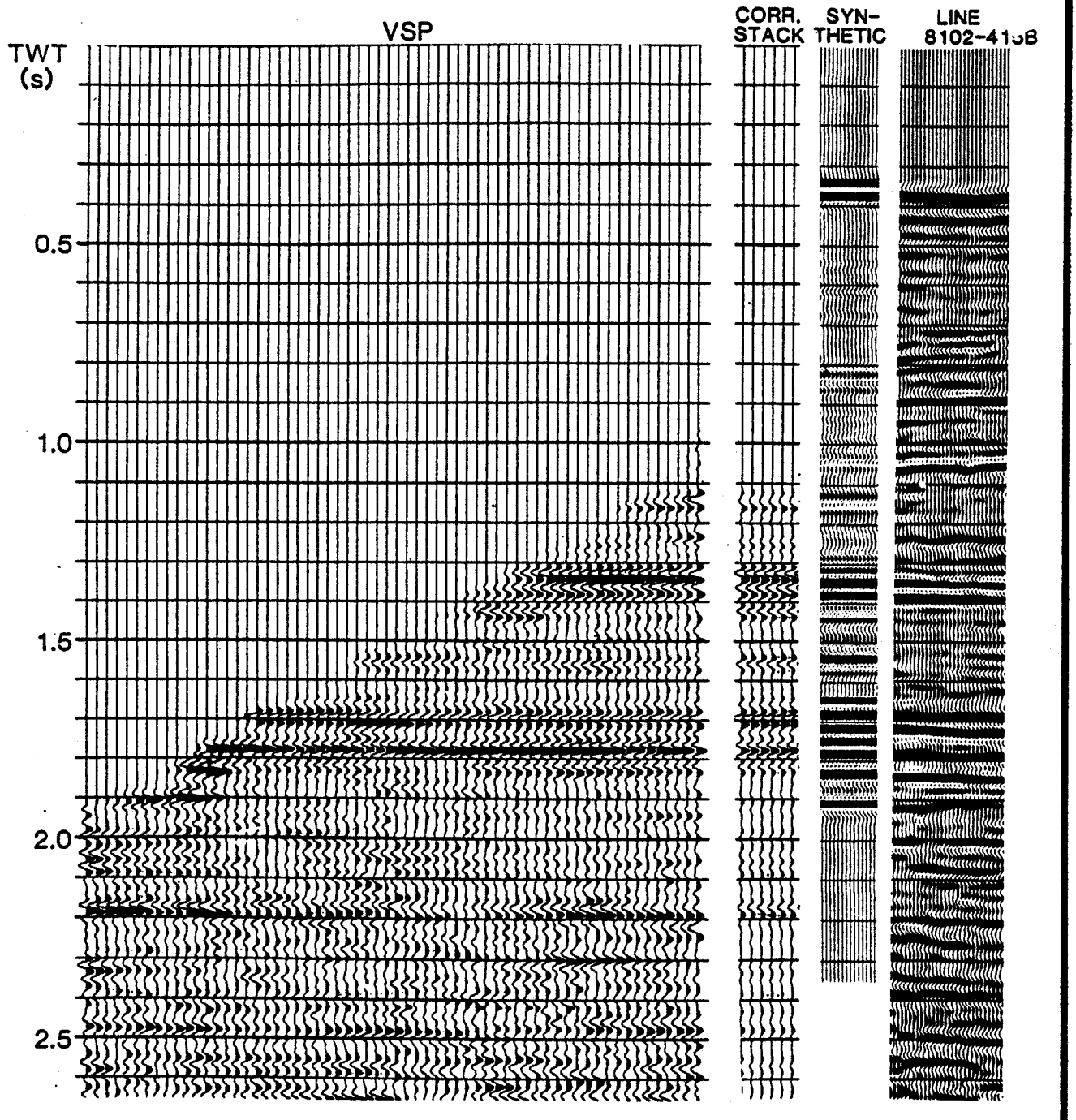


Fig. 4.3. The VSP and its corridor-stack shown with the synthetic seismogram (25HZ, minimum phase Ricker Wavelet, normal polarity) and a selection of seismic line NH8102-415B.

Table 4.3 Seismic summary

Reflector	Formation top	TWT (ms)	Depth (m RKB)	V int (m/s)
Seabed	Nordland	354	288	
				2170
Base Pleistocene		601	556	
				2408
	Hordaland	1229	1312	
				2245
	Intra Hordaland	1278	1367	
				2000
Top Balder	Balder	1316	1405	
				2246
	Lista/Sele	1373	1469	
				1951
Top Cretaceous		1414	1509	
				2182
Base Cretaceous	Middle Jur. Claystone	1502	1605	
				2643
Top L. Jurassic	Lower Jur. Sst.	1530	1642	
				2554
	Coal Unit	1642	1785	
				2471
Intra Coal		1676	1827	
				2594
	Grey Beds	1804	1993	
				2691
	Red Beds	1885	2102	
				2766
	TD	1932	2167	

4.7. Formation Temperature

As no production test was performed, static formation temperatures can only be estimated from Horner plots of the bottom hole temperatures recorded during wireline logging. However, this procedure could only be used for log run no. 4, as run 1 consisted of one log only and in run 3 the two logs showed the same bottom hole temperature (Table 4.4 and 4.5).

The mean temperature gradient from seabed to TD is approximately 31°C/km (Figure 4.4), which is somewhat lower than seen in the Haltenbank area.

Table 4.4. Average bottom hole temperatures (BHT) and static formation temperatures (Tf).

Depth (mRKB)	No of BHT readings	Average BHT °C	Tf °C
667	3	27	
1265	3	36.6	
	3	36.6	
2166	3	50	63.5
	3	54.5	
	3	60	
	3	45.5	

Table 4.5 Bottom hole temperatures recorded during wireline logging.

Log	Date	RUN no.	Btm log interval	Max rec. temp. (BHT)	Time since circ.(t)	Circulation time (t)
DIFL-LSBHC	07.08	1A	667	27°C	7	2
DIFL-LSBHC	15.08	3B	1265	36.6°C	6	2
CDL-CNL	15.08	3A	1265	36.6°C	12	2
DIFL-LSBHC	23.08	4C	2166	50°C	7	2
CDL-CNL	23.08	4B	2166	54.5°C	12	2
DIPLOG	24.08	4A	2166	60°C	20	2
FMT	25.08	4A	2166	45.5°C	4	2

Saga Petroleum a.s.

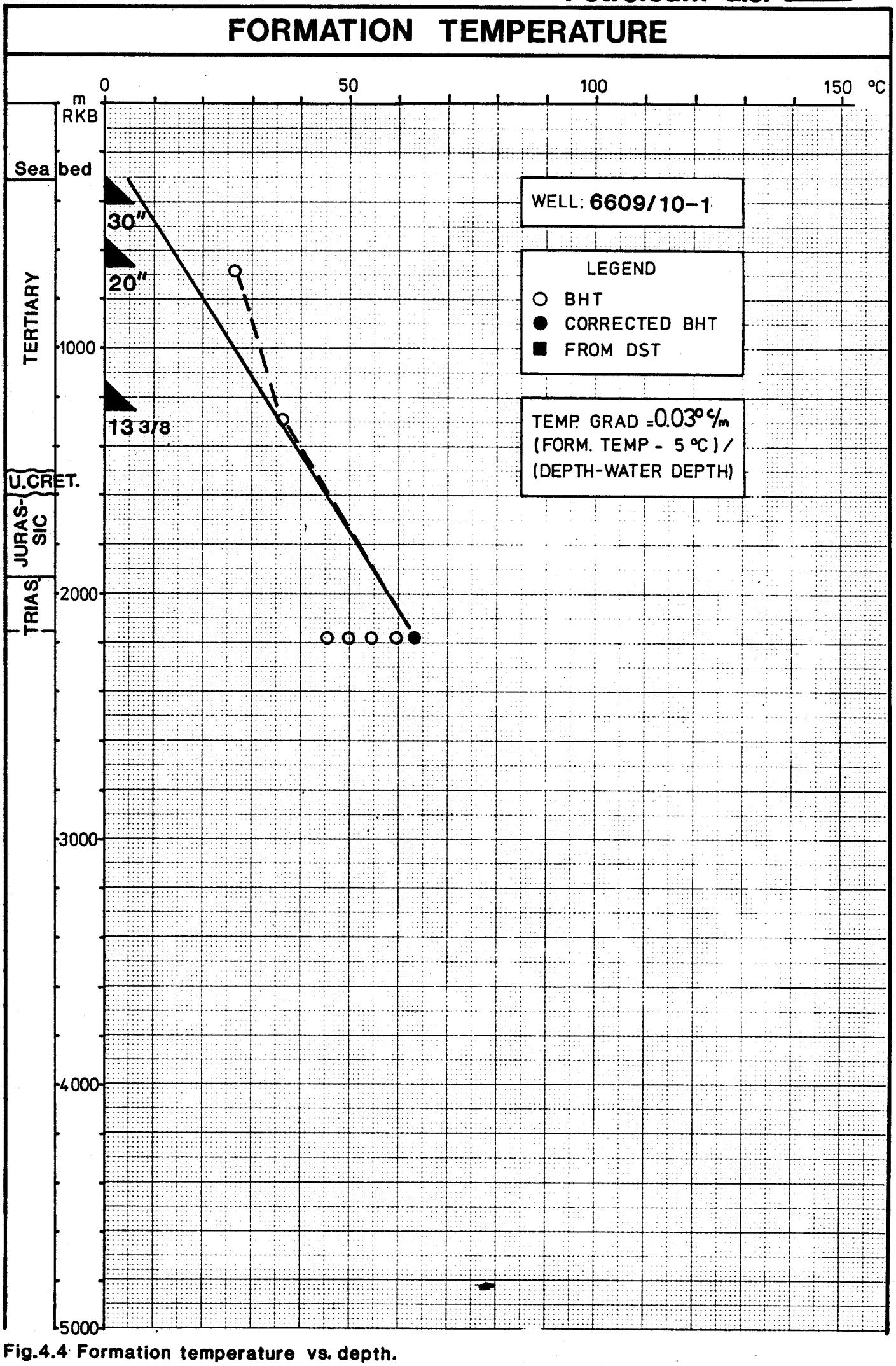


Fig.4.4 Formation temperature vs. depth.

4.8. Formation Pressure

The Formation Pressure Evaluation Sheet (Enclosure II) shows the most significant parameters in the pressure detection.

Mud weight, leak off tests results and FMT pressure readings versus depth are shown in Figure 4.5.

The pore pressure shows a normal hydrostatic gradient from the sea bottom to T.D. There is not detected any deviation from this throughout the well. The pressure gradient is estimated to be 1.02 g/cc e.m.w.

Three leak off tests were carried out:

1.38 g/cc at 413 m
1.56 g/cc at 653 m
1.87 g/cc at 1252 m

The mud weight between the 20" and 30" casing was 9.0 ppg (1.08 g/cc), between 13 3/8" and 20" casing 9.8 ppg (1.17 g/cc), between 13 3/8" casing and 1900 m 11.4 ppg (1.37 g/cc), and 10.6 ppg (1.27 g/cc) for the rest of the well.

Saga Petroleum a.s.

FORMATION PRESSURE

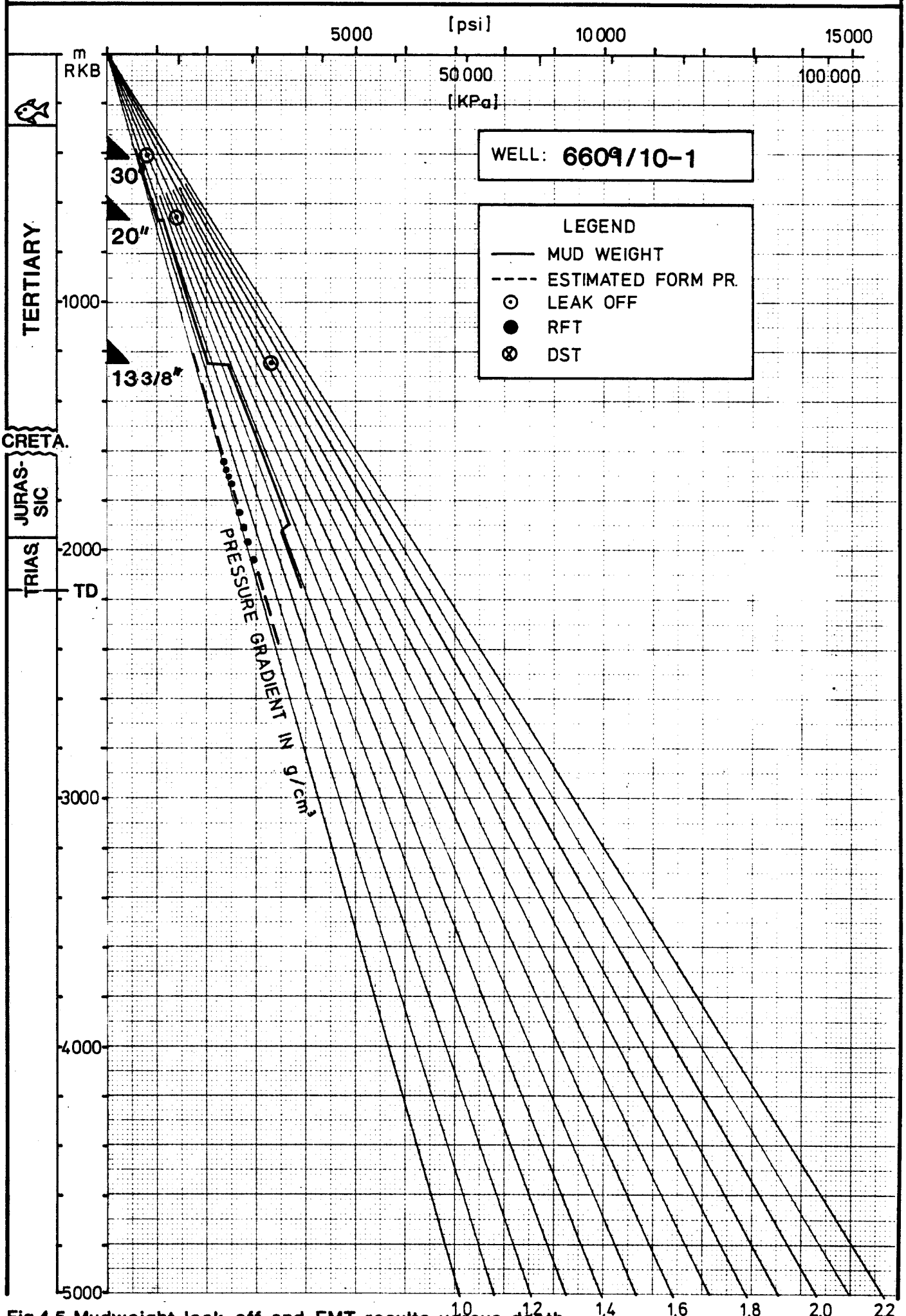


Fig.4.5 Mudweight, leak off and FMT results versus depth.

4.9. Stratigraphy

4.9.1. Lithostratigraphic Summary

The lithostratigraphic subdivision (Table 4.6) of the encountered section in well 6609/10-1 is based on the lithology (cuttings, sidewall cores and conventional cores) and the wireline log response, supported by the biostratigraphic breakdown prepared by Paleoservices.

Table 4.6. Lithostratigraphic summary

Formation tops	Depth (mRKB)	Thickness	2 way TT (ms SRD)
NORDLAND GP EQV.	288	1024	353
HORDALAND GP EQV.	1312	93	1229
INTRA HORDALAND UNCONFORMITY	1367		1278
ROGALAND GP EQV.	1405	106	1316
BALDER FM EQV.	1405	64	1316
LISTA/SELE FM EQV.	1469	40	1373
SHETLAND GP EQV.	1509	96	1414
MIDDLE JURASSIC CLAYSTONE	1605	37	1502
LOWER JURASSIC SANDSTONE	1642	143	1530
COAL UNIT	1785	208	1642
COAL REFLECTOR	1827		1676
TRIASSIC GREY BEDS	1993	109	1804
TRIASSIC RED BEDS	2102	> 65	1885
TD	2167		

4.9.2. Biostratigraphic Summary

The biostratigraphic interpretation was prepared by Paleoservices. The study was based on cuttings and a total of 53 sidewall cores (1270 m - 2132.5 m) and five core chips.

Micropaleontological analysis were carried out at an average of 9 m intervals in the upper part of the well, and at a greater density below the Paleocene. 29 sidewall cores and two core samples were used in addition to the cuttings in the micropaleontological analysis.

A total of 59 samples (30 sidewall cores, 4 core chips and 23 ditch cuttings) have been examined for palynology through the interval 1475-2166 m.

No logs were available for Paleoservices during their study. Partly due to this and partly based on Sagas own examination of several samples, some of Paleoservices' boundaries have been slightly adjusted.

Table 4.7 A and 4.7 B give Saga and Paleoservices biostratigraphic summary, respectively.

Table 4.7 A Biostratigraphic Summary (SAGA)

Interval (mRKB)	Age	Thickness
420 - 556	Pleistocene	136
556 -1312	Late Pliocene	756
	Unconformity	
1312-1350	Late Miocene	38
1350-1367	Middle Miocene	17
	Unconformity	
1367-1395	(Early) Eocene	28
1395-1430	Basal Eocene	35
1430-1509	Late Paleocene	79
	Unconformity	
1509-1530	Campanian-? Early Maastrichtian	21
1530-1605	Campanian	75
	Unconformity	
1605-1642	Middle/Early Jurassic: Early Bajocian-Late Toarcian	37
	Unconformity	
1642-1900	Early Jurassic: Pliensbachian-Sinemurian - ? Hettangian	258
1900-1977	Hettangian	77
1977-2070	Late-Middle Rhaetian	93
2070-2167	Early Rhaetian	> 97

Table 4.7 B Biostratigraphic Summary (PALEOSERVICES)

Interval (mRKB)	Age	Thickness
420 - 560	Pleistocene	140 m
560 -1325	Late Pliocene	765 m
	Unconformity	
1325-1350	Late Miocene	ca 25 m
ca 1350-1355	Middle Miocene	ca 5 m
	Unconformity	
1355-1395	Eocene	40 m
1395-1460	Basal Eocene/Late Paleocene	65 m
1460-1500	Late Paleocene	ca 40 m
	Unconformity	
ca 1500-1615	Late Cretaceous:Campanian	ca 115 m
	Unconformity	
ca 1615-1647	Middle/Early Jurassic: Aalenian-Late Toarcian	ca 32 m
	Unconformity	
ca 1647-1900	Early Jurassic: Pliensbachian - Sinemurian-? Hettangian	ca 353 m
ca 1900-1977	Early Jurassic: Hettangian	77 m
1977-2037	Late Triassic: Late-Middle Rhaetian	60 m
2037-2166	Late Triassic: Early Rhaetian	29 m

4.9.3. Stratigraphic History

The well 6609/10-1 was drilled to a total depth of 2167m RKB, and proved the existence of a lithological sequence ranging in age from Early Rhaetian to Quaternary.

A litostratigraphic and biostratigraphic summary is given in section 4.9.1 and 4.9.2 respectively.

The relative subsidence profile (fig. 4.6) reflects the geodynamic development of the Nordland Ridge.

The lowermost stratigraphic unit defined in the well, the Triassic Red Beds, was deposited in a continental to transitional environment. Above this, from Middle Rhaetian to the Lower Jurassic Unconformity, there was a gradual change from a continental transitional to a more marine environment at the top. The subsidence was relative rapid during the Rhaetian and Lower Jurassic.

A hiatus is seen ranging in age from Middle Pliensbachian to Middle Toarcian.

During the Middle Jurassic Transgression there were deposited sand, silt and clay in a marine, sublittoral environment. The subsidence of the area was relative small compared to the Late Triassic-Early Jurassic.

Between Early Bajocian and Campanian no sediments were deposited in the area, indicating a long periode of subaerially exposure.

The Campanian and Early Maastrichtian clay were deposited in an upper bathyal environment. The subidence rate was slow, reflecting the position of the well at the Nordland Ridge.

An unconformity between Early Maastrichtian and Late Paleocene suggests a general regression in the area.

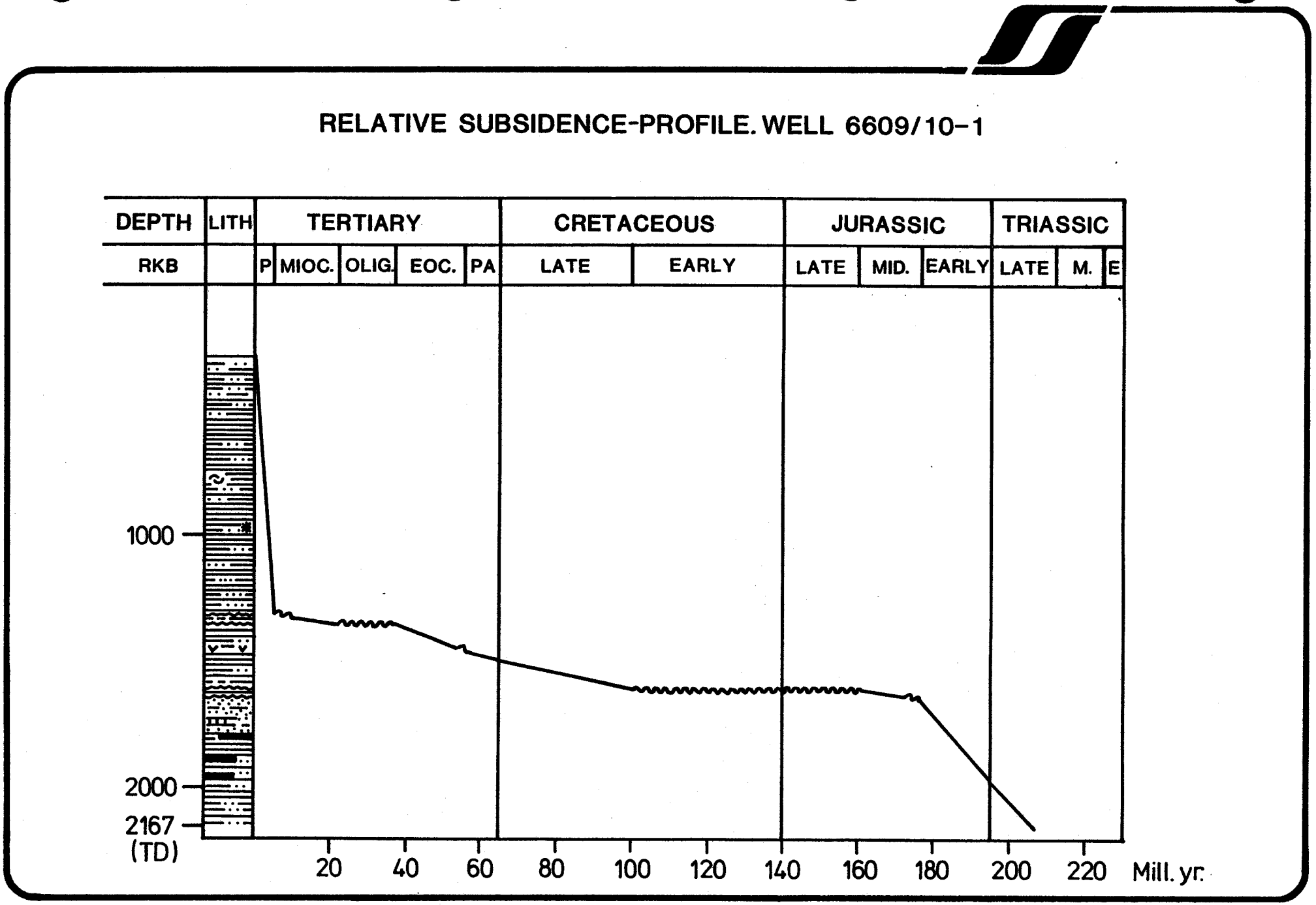

RELATIVE SUBSIDENCE-PROFILE. WELL 6609/10-1
DEPTH
RKB
LITH
TERTIARY
P
MIOC.
OLIG.
EOC.
PA
CRETACEOUS
LATE
EARLY
JURASSIC
LATE
MID.
EARLY
TRIASSIC
LATE
M.
E
1000
2000
2167
(TD)
20
40
60
80
100
120
140
160
180
200
220
Mill. yr.

Fig. 4.6.

The Late Paleocene and Early Eocene clays and tuffs were deposited in a bathyal to outer sublittoral environment. The subsidence rate was relatively small.

An unconformity is observed between Early Eocene to Middle Miocene.

Above this is deposited a silty clay in an outer sublittoral environment of Middle to Late Miocene age.

The Pleistocene shows a rapid subsidence with depostion of glaciomarine sands and sandy clays.

A simplified stratigraphic history of the well is given in Figures. 4.7 and 4.8.

WELL: 6609/10-1

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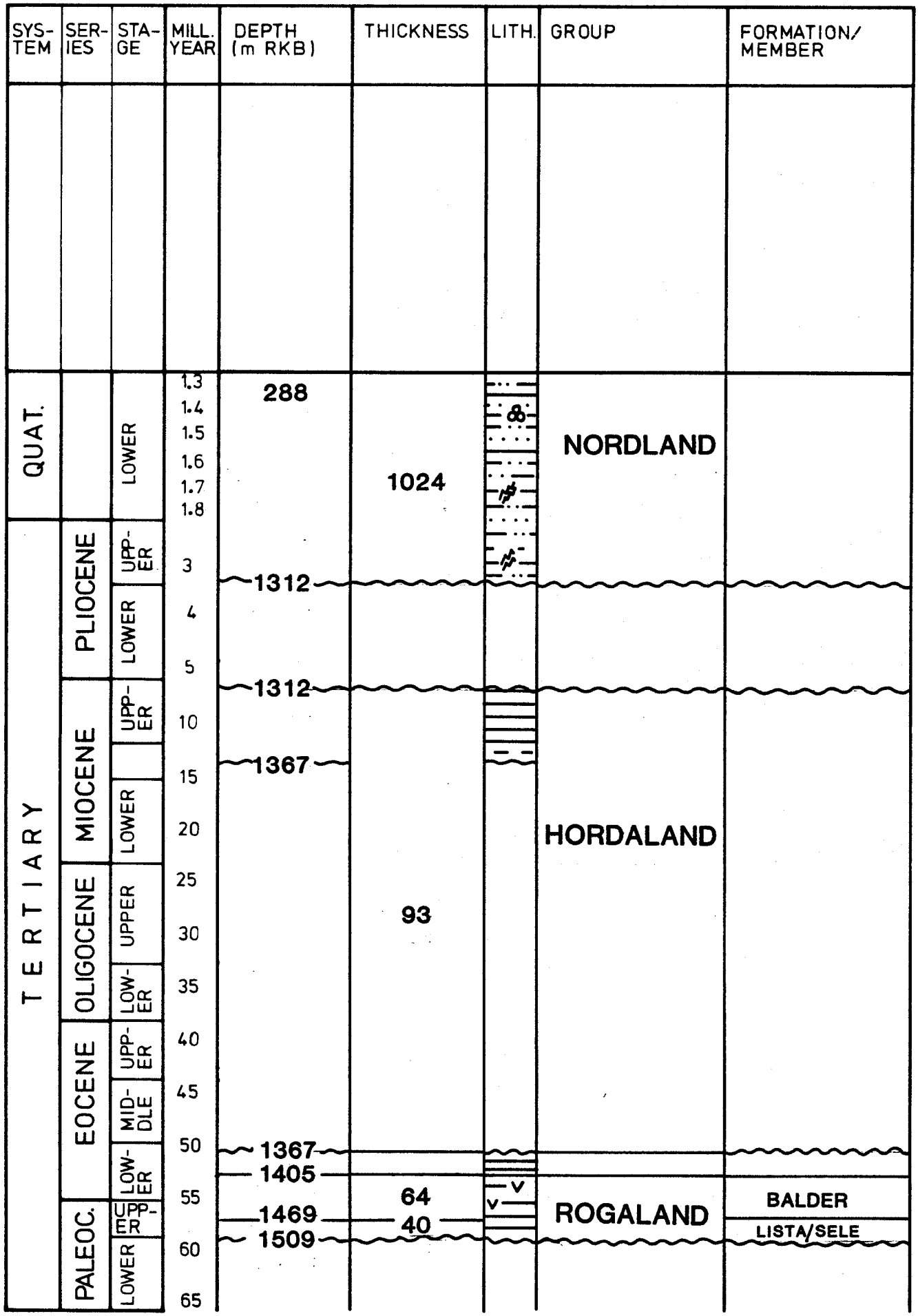


Fig. 4.7.

Saga Petroleum a.s.

WELL: 6609/10-1

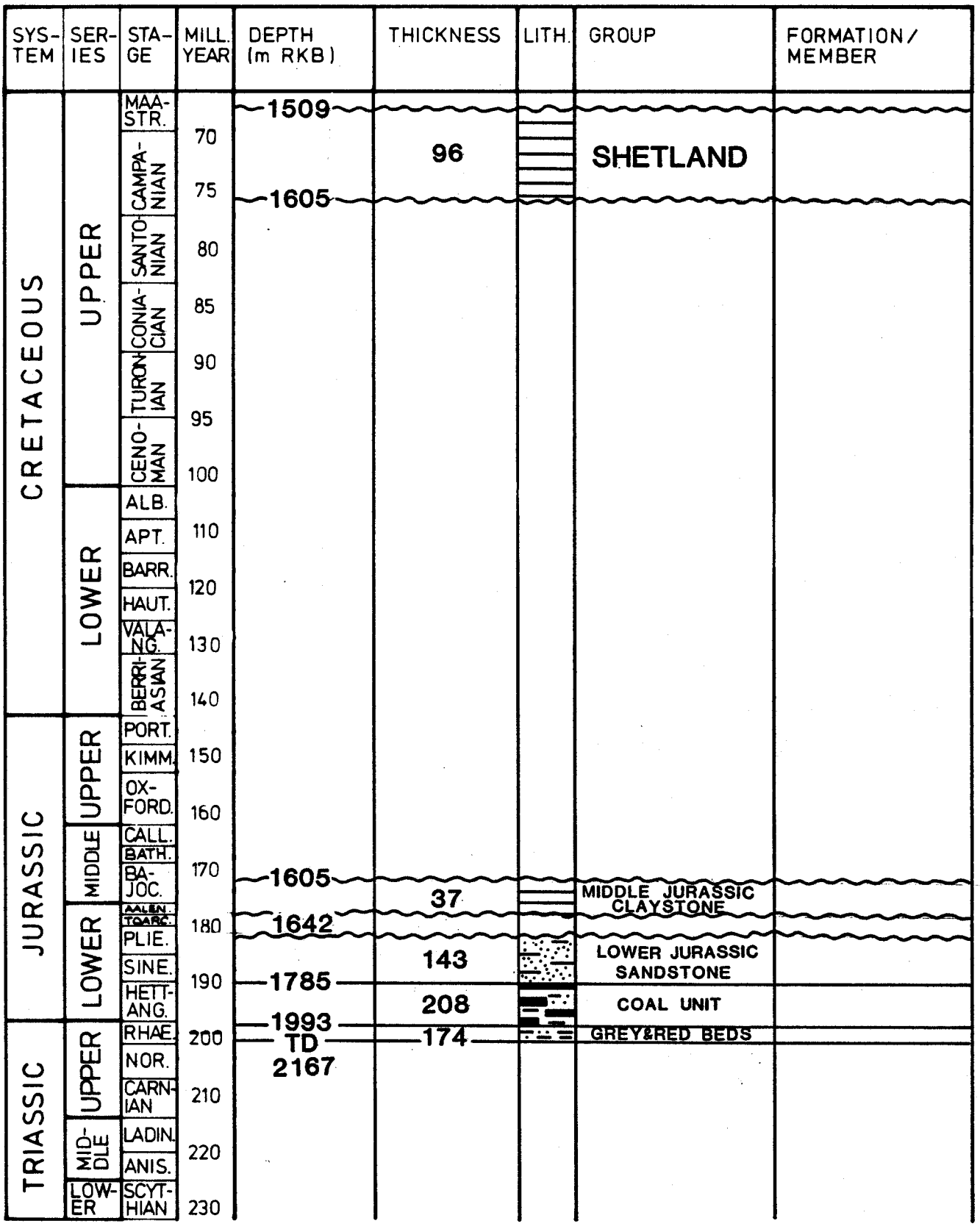


Fig. 4.8

4.9.4. Triassic Red Beds

Depth interval : 2102 - 2167 m (TD)
Thickness : Minimum 65 m
Age : Early Rhaetian

LITHOLOGY

The section from TD to 2102 is composed of siltstone with occasional shaly interbeds.

The siltstones are partly argillaceous. The colour is red brown to brown and light grey. The siltstones are hard and tight, micaceous and calcareous cemented. The shales are red brown - red, hard and tight, calcareous and micromicaceous.

UPPER BOUNDARY

The boundary to the overlying Grey Beds is marked mainly by the lithological change between the two units. The GR pattern of the overlying Grey Beds shows, however, a more irregular pattern than that of the Red Beds, and there is also an average higher delta t in the overlying Grey Beds.

4.9.5. Triassic Grey Beds

Depth interval : 1993 - 2102 m
Thickness : 109 m
Age : Early-Late Rhaetian

LITHOLOGY

The Triassic Grey Beds consists of alternating sand-, siltstone and shale. There is also a two meter thick limestone bed from 2010.5 - 2012.5 m.

The sandstones are light grey to clear, very fine - fine grained and well to moderately sorted. The grains are rounded to subangular. The sandstone is loose, slightly micaceous and non-slightly calcareous.

The siltstones are variegated light grey - grey and red brown - brown. They are argillaceous, occasional sandy, firm to hard, calcareous and micromicaceous.

The shales/claystones are often silty, medium - dark grey, firm, occasional soft and hard. The shales are micromicaceous and non calcareous.

UPPER BOUNDARY

The boundary to the overlying Coal Unit is defined at the base of the carbonaceous shale/coal sequence. The bottom of the lowest coal layer is situated at 1993 m. The log response of the Coal Unit is marked by the high interval transit time and low density of the coal layers. Apart from this feature, there seem to be no marked difference on the log response between the two units.

4.9.6. Coal Unit

Depth interval : 1785 - 1993 m
Thickness : 208 m
Age : Late Rhaetian - Sinemurian

LITHOLOGY

The Coal Unit consists of sandstones interbedded with siltstones and carbonaceous claystones which grades into coal. The sand beds usually show no fining or coarsening upward characters.

The sandstones are light grey to white, occasionally clear. The grain size varies from very fine to fine. The grains are described as subangular to subrounded. The sandstones are usually loose to friable. They are micaceous and often carbonaceous and non to slight calcareous.

The siltstones varies in colour from grey to brown. They are friable to firm and are usually carbonaceous.

The claystones are occasional silty, light to medium grey, soft, micromicaceous, carbonaceous and non calcareous.

The coal layers are black, often grading to carbonaceous claystones, brittle and often pyritic.

UPPER BOUNDARY

The top of the Coal Unit is defined at the top of the coal interbeds. 1785 m marks the top of these layers. Above this depth, the induction and the acoustic logs show several limestone beds interbedded with sand and silt.

4.9.7. Lower Jurassic Sandstone

Depth interval : 1642 - 1785 m
Thickness : 143 m
Age : Sinemurian - Pliensbachian

LITHOLOGY

The Lower Jurassic Sandstone is the main reservoir sand in this well. According to the lithology, it may be divided into two sub-units.

The upper part of the Lower Jurassic Sandstone, from 1642 - 1732 m (90 m) consists of sandstone. The sandstone shows the same lithology as above. On the logs this upper part shows a very calm, homogenous appearence. The GR is around 50 API and the acoustic log shows an interval transit time of around 120 mics/ft.

The lower part of the Lower Jurassic Sandstone from 1732 - 1785 m (53 m) consists of sandstone with minor limestones and clystones. The limestone beds are detected on the acoustic and resistivity logs as peaks to the right. The lithology of the sandstone is similar to the one higher up, but there is a tendency towards fine to medium grained sand. The sandstones are silty, clear, loose to firm and occasional micaceous. The clystones are predominantly moderate to dark grey, occasional greenish grey, subfissile, firm, micromicaceous and non calcareous.

UPPER BOUNDARY

The top of the Lower Jurassic Sandstone is defined on the GR, resistivity and acoustic logs by the limestone peaks in the Middle Jurassic Claystone above. There is also a general shift in the resistivity logs from around 0.8 - 1 ohmmeter in the Lower Jurassic Sandstone to 2 ohmmeter in the claystone above.

4.9.8. Middle Jurassic Claystone

Depth interval : 1605 - 1642 m
Thickness : 37 m
Age : Late Toarcian-Early Bajocian

LITHOLOGY

The Middle Jurassic Claystone is divided into two units. One upper claystone unit (1605-1632 mRKB) and a lower unit (1632-1642 mRKB) consisting of alternating sandstone, siltstone and carbonates.

The upper unit is composed of claystone, which is silty, light to medium grey, soft to firm, micaceous and non to slightly calcareous.

The sandstone in the lower unit is argillaceous, medium grey, very fine grained, moderate to well sorted, subangular to subrounded grains, occasionally very micaceous and non calcareous. The limestone is buff white to grey, firm to hard and microcrystalline.

UPPER BOUNDARY

The boundary to the Upper Cretaceous Shetland Group Equivalent above is marked by a decrease in the GR and resistivity logs. The acoustic log shows a shift, to higher interval transit times in the Upper Cretaceous.

4.9.9. Shetland Group Equivalent

Depth interval : 1509 - 1605 m
Thickness : 96 m
Age : Campanian-?Early Maastrichtian

LITHOLOGY

The Shetland Group Equivalent in the well consists of silty claystone. It is medium grey, soft to firm, micromicaceous and non to very calcareous.

UPPER BOUNDARY

The boundary to the overlying Tertiary Lista/Sele Fm Eqv. is marked by a decrease in the GR, resistivity and interval transit time.

4.9.10. Lista/Sele Formation Equivalent

Depth interval : 1469 - 1509 m
Thickness : 40 m
Age : Late Paleocene

LITHOLOGY

The Lista/Sele Fm. Eqv. consists of a silty claystone. It is medium grey, firm, mainly sticky, micromicaceous and non to slightly calcareous.

UPPER BOUNDARY

The upper boundary is marked by a decrease in the interval transit time in the overlying Balder Fm. Eqv. The Balder Fm. Eqv. is also seen to have a slightly higher resistivity.

4.9.11. Balder Formation Equivalent

Depth interval : 1405 -1469 m
Thickness : 64 m
Age : Late Paleocene - Basal Eocene

LITHOLOGY

The Balder Fm. Eqv. consists mainly of claystone with minor tuff, limestone/dolomite, siltstone and trace of sand and glauconite.

The claystones are occasionally silty, medium to dark grey, firm, micromicaceous and non calcareous.

The tuffaceous materiale is white to light grey with spots of dark obsidian.

The siltstones are medium to blue grey, friable to firm, micaceous and non to slightly calcareous.

UPPER BOUNDARY

The overlying Hordaland Gp. Eqv. is marked by a decrease in the resistivity and an increase in the interval transit time compared to the Balder Fm. Eqv.

4.9.12. Hordaland Group Equivalent

Depth interval : 1312 - 1405 m
Thickness : 93 m
Age : Early Eocene and Middle - Late Miocene

LITHOLOGY

The Hordaland Group Equivalent consists of clays/claystones. They are occasionally slightly silty, grey to grey green in colour, occasionally dark brown grey, soft to firm, occasionally micaceous, glauconitic, pyritic and non to slightly calcareous. There is a major unconformity in the Hordaland Group at 1367 m, probably corresponding to an Oligocene unconformity observed in several Haltenbanken wells.

UPPER BOUNDARY

The upper boundary is marked by an increase in the GR and resistivity and a decrease in the interval transit time in the Nordaland Gp. Eqv.

4.9.13. Nordland Group Equivalent

Depth interval : 288 - 1312 m
Thickness : 1024 m
Age : Pliocene - Pleistocene

LITHOLOGY

The Nordland Gp. Eqv. consists of clays with trace of sand from 556 to 1367 m. The clays are silty, medium grey in colour, soft, occasionally sticky and slightly calcareous. There are traces of glauconite in the sand.

From the 30" casing at 413 m to 556 m the lithology is sand alternating with silt. The sand is clear, occasionally white and light red, very fine to very coarse grained, poor sorted and angular to subangular. The silt is arenaceous and argillaceous, light grey, soft and calcareous.

Rock fragments are abundant throughout.

4.10 Formation Evaluation

4.10.1 Hydrocarbon Indications

There were not detected hydrocarbons during the drilling of well 6609/10-1.

The gas readings in the upper part of the well, down to about 1150 m, showed a background gas level of 0.3-0.4 % Cl.

From 1150 m to 1370 m the background gas dropped steadily to 0.08%. Below 1370 m the gas values dropped off dramatically to zero and remained at this level for the rest of the well.

4.10.2 Core Analysis

In the Lower Jurassic Sandstone one core (1644,5-1655,5m RKB) was cut. The data from the conventional core anaysis on the core are listed in Table 4.8. The main results are summarized in Table 4.9.

Porosity, grain density and horizontal air permeability were measured on two samples pr. meter over this core. Fluid saturation and vertical air permeability were measured on one sample pr. meter. Additionally the influence from the overburden pressure was determined on five core plugs. The quality of all measurements is, however, questionable. Because of the poor consolidation, the plugs had to be taken at a frozen state. In a waterfilled sand this will cause an expansion of the pore volum.

The core is composed of unconsolidated sand alternating with silt layers. The sands are held together by dispersed clay. The grain size is fine to very fine.

The average porosity measured in the sands is 36% and the horizontal air permeability 122mD. The ratio between vertical and horizontal permeability is approx. 0.2. A plot of core porosities versus horisontal air permeabilities is shown in Fig. 4.9.

For those samples, on which the effect of the overburden pressure was determined, porosity and permeability were measured at atmospheric conditions and at four hydraulic loading pressures. The results are listed in Table 4.10. They indicate that the overburden pressure from the overlaying formation causes a porosity reduction of 2 p.u. This corresponds to a compaction factor of 0.94. The permeabilities are reduced with 30-40% accordingly.

One core (1798.0-1807,5m RKB) was cut in the Coal Unit. This core contained mainly shale. Only a few very thin sand layers were recognized. No analysis was carried out on this core.

Table 4.8. Well 6609/10-1, Conventional Analysis Core 1

DEPTH m RKB	HORIZONTAL PERM mD	VERTICAL PERM mD	POROSITY %	GRAIN DENSITY g/cc
1644.00	46.0		37.3	2.76
1644.25				
1644.50	43.0	19.0	32.0	2.68
1644.75				
1645.00	9.7		32.3	2.66
1645.25				
1645.50	133.0		38.1	2.67
1645.75		9.6		
1646.00	87.0		36.6	2.69
1646.25				
1646.50	102.0		36.1	2.67
1646.75				
1647.00	73.0		35.8	2.70
1647.25				
1647.50	265.0	28.0	38.1	2.69
1647.75				
1648.00	111.0		37.0	2.69
1648.25				
1648.50	141.0		35.2	2.69
1648.75				
1649.00	42.0		36.2	2.69
1649.25				
1649.50	122.0		37.0	2.68
1649.75				
1650.00	35.0	71.0	34.4	2.69
1650.25				
1650.50	91.0		36.7	2.67
1650.75				
1651.00	107.0		35.8	2.67
1651.25		23.0		
1651.50	506.0		39.3	2.67
1651.75				
1652.00	160.0		37.2	2.67
1652.25				
1652.50	184.0		36.2	2.67
1652.75				
1653.00	350.0	47.0	38.9	2.68
1653.25				
1653.50	66.0		34.1	2.67
1653.75				
1654.00	53.0		35.7	2.68
1654.25				
1654.50	2790.0		43.0	2.67
1654.75				
1655.00	1640.0		35.7	2.68
1655.25				

Table 4.9. Main results from the analysis of core 1, 6609/10-1

Cored Interval	1644.0-1655.5m RKB
Formaton	Lower Jurassic
Recovery	100 per cent
Porosity;	
average	36 per cent
range	34.4-43.0 per cent
Horizontal Permeability	
geometric average	122mD
range	9.7-2790mD
Vertical Permeability	
geometric average	27mD
range	9,6-71mD
Average Grain Density	2,68 g/cc

Table 4.10. Porosity and Permeability measured under overburden conditions.

SAMPLE NUMBER	OVERBURDEN PRESSURE (PSI)	POROSITY %	PERMEABILITY MD	GRAIN DENSITY
11	0	35.2	93	2.64
	200	35.5	75	2.68
	1000	34.4	65	
	2000	33.0	57	
	2700	32.3	51	
15	0	37.0	242	2.63
	200	37.4	267	2.65
	1000	35.6	266	
	2000	34.6	184	
	2700	33.7	176	
17	0	34.4	74	2.67
	200	34.5	73	2.68
	1000	33.4	62	
	2000	32.6	54	
	2700	32.3	49	
21	0	33.0	35	2.65
	200	34.1	34	2.70
	1000	33.0	29	
	2000	32.2	26	
	2700	31.9	24	
23+	0	36.6	68	2.64
	200	34.9	66	2.64
	1000	33.8	60	
	2000	33.0	54	
	2700	32.5	51	

\+ Sample appears to have collapsed slighly during measurements.

PERMEABILITY VERSUS POROSITY

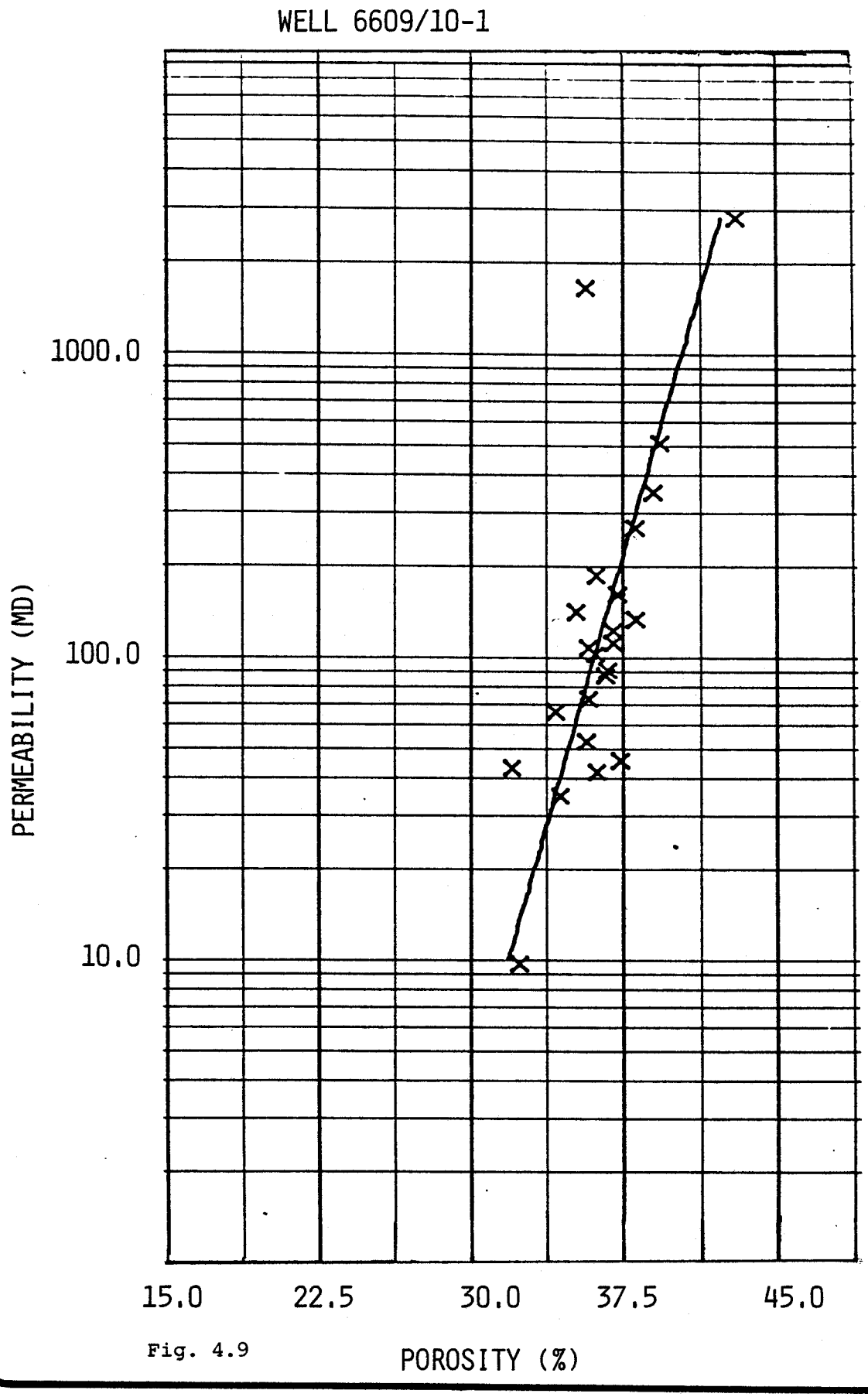


Fig. 4.9

4.10.3 Log Evaluation

The Lower Jurassic Sandstone and the Coal Unit were analysed using Saga's in-house computer programme. The main results of the analysis are presented in Table 4.11. A trace plot of porosity and water saturation is given in Enclosure IV. All sands are water bearing.

The Lower Jurassic Sandstone, 1642-1785m RKB, contains 54m net sand with an average porosity of 26%, and an average shale content of 27%. The main part of the interval is composed of alternating thin sand and silt layers. The logs can not differentiate between the layers. In the sand layers the porosity is significantly higher and the shale content significantly lower than the average values calculated from the logs.

The Coal Unit, 1785-1993m RKB, has 26m net sand with an average porosity of 26% and a shale content of 20%. The remaining of this formation is a mixture of coal layers, shale and siltstone.

The following set of Dresser Atlas logs were used as input to the petrophysical evaluation:

GR-DIFL-ACBHC-SP
GR-CDL-CNL-CAL

The hole was in good condition so corrections applied for borehole effects are relatively small.

The matrix density was taken from core analyses. Water resistivity was found using the Highle plot. Due to high shale content the accuracy of these values are questionable. The shale constants were found from a 3 dimensional plot of CDL, CNL and GR.

The model chosen for the analysis uses GR as shale indicator, CDL-CNL crossplot for porosity determination and ILD as Rt. The water saturations were estimated using of the Indonesia equation. This equation gave a good fit in the waterbearing sands.

FORMATION	INTERVAL (MRKB)	GROSS	NET*M	N/G	AVG Ø NET SAND %	AVG VSH %	AVG SW	NET PAY
L. JURASSIC	1642 - 1785	143	54	0,38	26	27	100	0
COAL UNIT	1785 - 1993	208	26	0,13	26	20	100	0

* CUT OFF VALUES : POROSITY = 12%
VSHALE = 45%

INPUT PARAMETERS

RW	= 0.11 OHMM AT 115 °F	N	= 2.0
RHOM	= 2.68 G/CC	RSH	= 2.0 OHMM
GRSS	= 60 API	RHOSH	= 2.35 G/CC
GRSH	= 140 API	PHINSH	= 42 L.P.U.
M	= 1.8		

Table 4.11

4.10.4 Formation Pressure Measurements

The formation pressure was measured from 1375-2042m RKB with the Dresser Atlas FMT tool. The pressure data are listed in table 4.12 and plotted versus depth in Fig. 4.10.

The FMT measurements gave a water gradient (0.100 BAR/m). The formation pressure is 169.8 bar at 1700m RKB. The sand intervals belong to the same pressure regime.

Table 4.12 FMT-pressure measurements, 6609/10-1

Depth, m RKB	Hydr. mud pr. psi	Form. pr. psi
1421.7	2737	-
1654.0	3187	2408
1675.0	3232	2437
1700.0	3280	2475
1705.0	3290	2485
1730.0	3337	2521
1855.0	3573	2705
1909.0	3676	2775
1973.0	3795	2872
2402.0	3928	2967

The pressures are corrected for temperature.

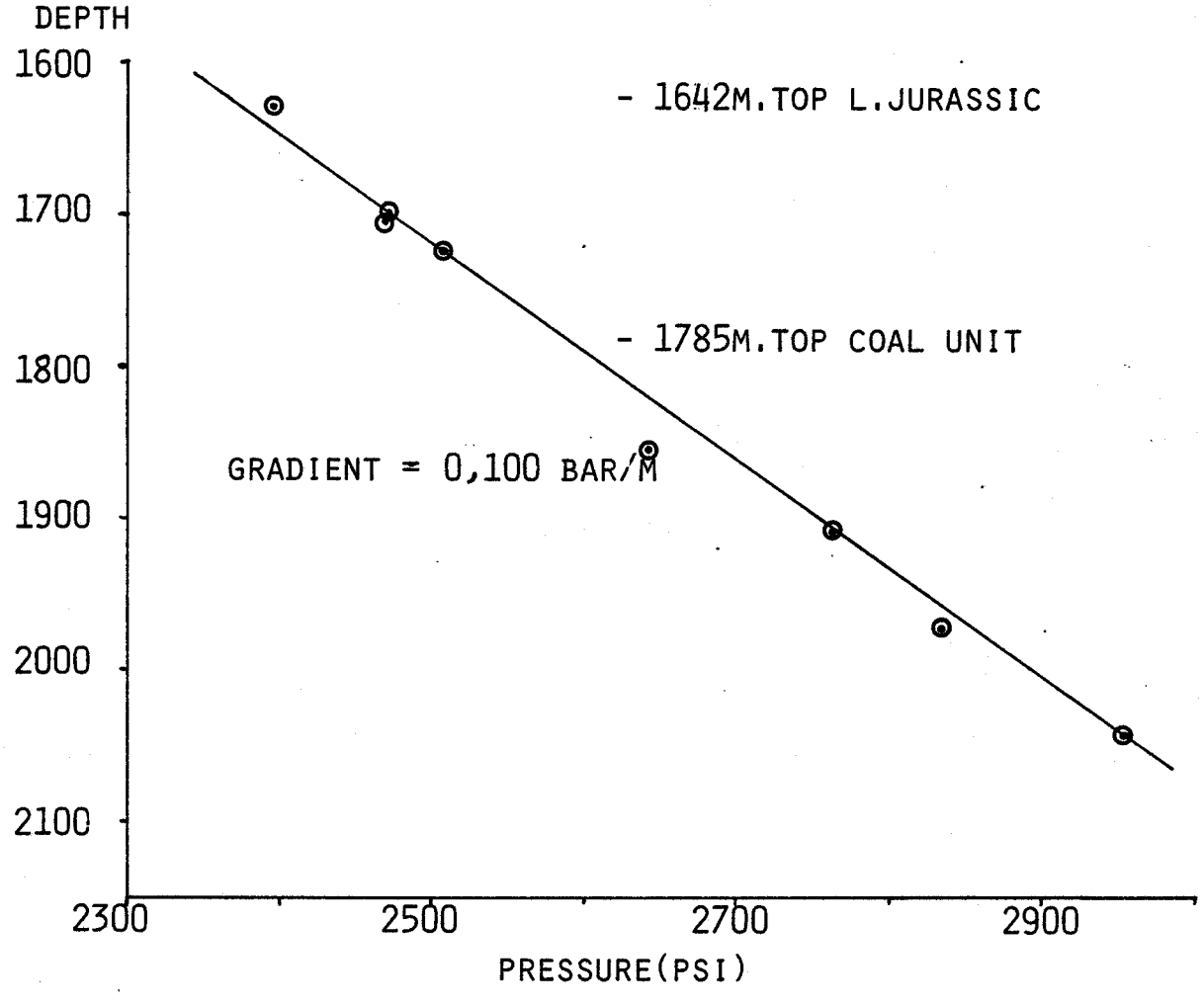

WELL 6609/10 - 1
FMT PRESSURE VERSUS DEPTH
DEPTH
1600
1700
1800
1900
2000
2100
- 1642M.TOP L.JURASSIC
- 1785M.TOP COAL UNIT
GRADIENT = 0,100 BAR/M
2300
2500
2700
2900
PRESSURE(PSI)

Fig. 4.10

5. DRILLING DATA

5.1 Bit and String Data

5.1.1 Bit Record

5.1.2 Bottom Hole Assemblies

5.1.3 Rotating Hours vs. Drilled Depth

5.2 Mud Data

5.2.1 Mud Properties, Daily Report

5.2.2 Mud Materialed Used

5.3 Casing Data

5.4 Cement Data

5.5 Deviation Data

5.5.1 Horizontal Projection

5.5.2 Vertical Projection

5.6 Formation Leak off Test Data

5.7 Rig Time Distribution

5.7.1 Drilled Depth vs. Rig Time

5.7.2 Daily Rig Time Distribution

5.1.1. Bit Record

Well no: 6609/10-1

Saga Petroleum a.s.

NO	SIZE	MAKE	TYPE	JETS 32ND INCH	DEPTH OUT	METERS	HOURS	M/HR	ACCUM DRLG HRS	WT 1000 LBS	R P M	VERT DEV	PUMP PRESS	PUMP RATE GPM		MUD			DULL. COND.				FORMATION REMARKS
																WT.	VIS.	W.L.	T	B	G	OTHER	
1	36"	VAREL	V3A	6 x 1"	304	15	8	1.9	8	5/10	70	2 1/4	500	355	355	SPUD MUD			1	1			
2	26"	HTC	OSC 3A	3 x 22	361	57	9.5	6.0	17.5	10/12	120/170	1 3/4	2400	529	529				2	2	I		
3	17 ½"	HTC	OSC 3A	2 x 24 1 x 22	415	54	3	18.0	20.5	10/12	120/170	1 3/4	2400	529	529				1	3	I		
RR 2	26"	HTC	OSC 3A	2 x 24 1 x 22	415	111	15 ½	7.2	-	5/15	100/120	-	2200	529	529				3	3	I		Opened hole to 36" w/holeoper
RR 3	17 ½"	HTC	OSC 3A	2 x 24 1 x 20	668	267	15	17.8	33.5	5/20	130	3/4 1/4	2200	556	555	9.4	55	-	3	6	I		Drilled cement from 401m-413
4	17 ½"	SMITH	DSJ	3 x 24	668	Underreaming 0/12					120	-	2200	450	450	9.6	52	-					
5	17 ½"	HTC	x 3A	1 x 24 2 x 22	1177	509	27	18.8	60.5	10/30	120	1/2	3100	530	530	GEL			6	4	1/8		Clay, sand
RR 4	17 ½"	SMT	DSJ	1 x 24 2 x 22	1265	88	5	17.6	65.5	20/40	120	0	3100	529	529	GEL			4	5	I		" "
6	12 ¼"	HTC	xDG	1 x 15 2 x 16	1644	379	27 ½	13.7	93	30/40	80/90	0	3100	323	323	11.5	53	17½	5	4	I		" "
7	12 1/4"	X-L	CB303		1655,5	11,5	4	2.8	97	20/25	70	0	CORING						10	%			Sand
8	12 1/4"	HTC	XDG	3 x 15	1798	142.5	10	14.2	107	25/45	80/100	0	3100	318	318	11.4	45	16½	5	5	I		"
9	12 1/4"	X-L	CB502		1808	10	7 ½	1.3	114½	0/28	CORING								10	%			Sand/silt
10	12 1/4"	HTC	J22	3 x 15	2167	359	43	8.3	157½	45/50	80/90	½	2800	296	296	10.6	43	18½	3	4	I		Sandstone/day/silt/coal

5.1.2. Bottom Hole Assemblies

Well no: 6609/10-1

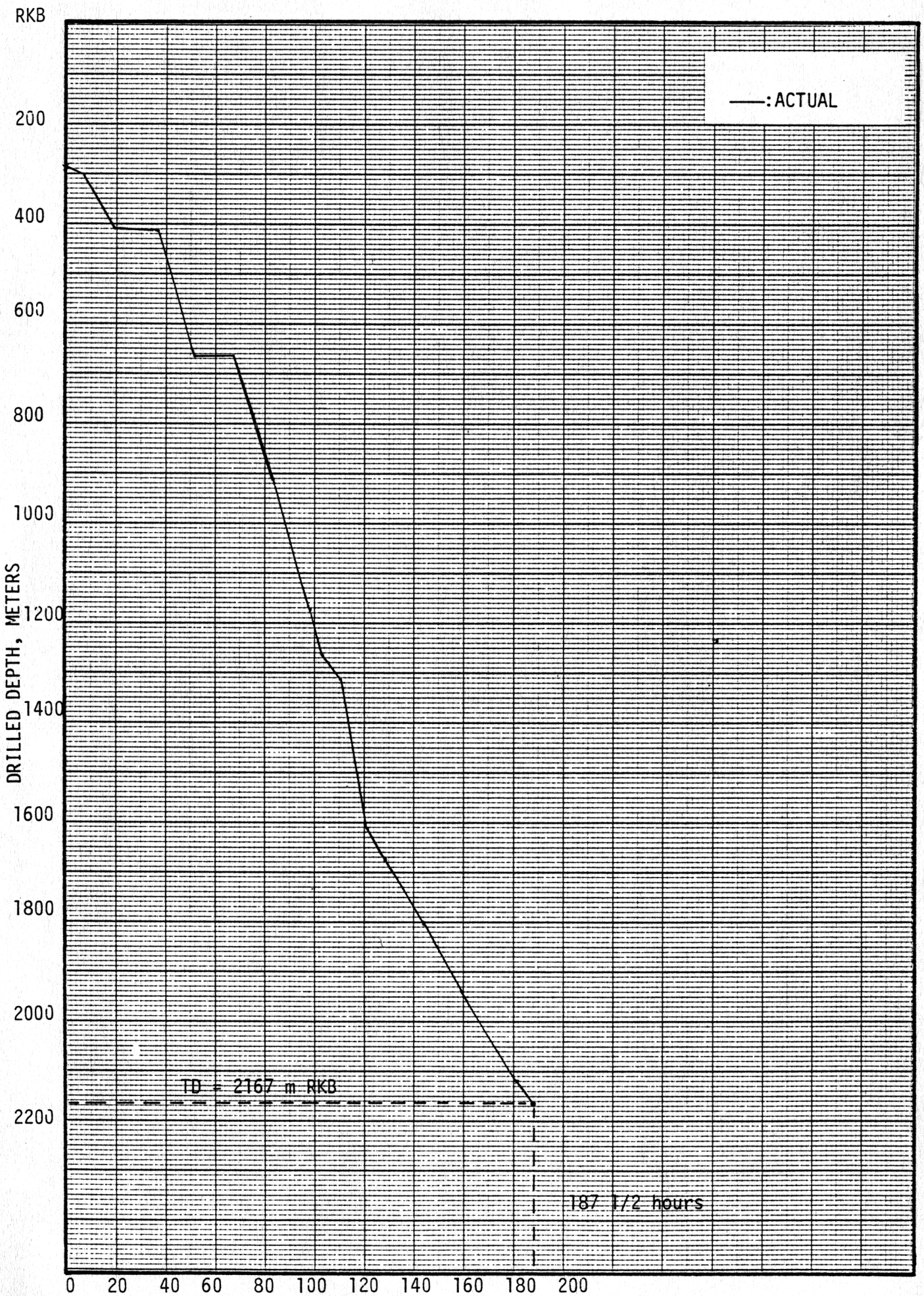
Saga Petroleum a.s.

BIT SIZE	DEPTH INTERVAL			DESCRIPTION	COMMENTS
36"	289	-	304	Bit - x/o - 36"NB stab - 9 1/2"DC - 36"stab - x/o - 20 x 8"DC - x/o - HWDP - dart sub - HWDP to surface.	Opened 26" section to 304 m and 17 1/2" to 415 m, to 36" using holeopener
26"	304	-	361	Bit - bit sub - x/o - 18 x 8"DC - x/o - HWDP - dart sub - 12 x HWDP	
17½"	361	-	415	Bit - bit sub - 9 1/2"DC - stab - x/o - 17 x 8"DC - x/o - HWDP - dart sub - 17 x HWDP	
26" & 36"	304	-	415	Bit - 36"holeopener - bit sub - 9 1/2"DC - x/o - 17 x 8"DC - x/o - HWDP - dart sub - 17 x HWDP	
17½"	401	-	668	Bit - bit sub w/float - 2 x 9½"DC - stab - x/o - 17 x 8"DC - x/o - 15 x HWDP	
17½"- 26"	401	-	668	Bit - u.reamer - bit sub w/float - 2 x 9½"DC - x/o - 17 x 8"DC - x/o - 15 x HWDP	
17½"	639	-	1177	Bit - bit sub w/totco ring - 1 x 9½"DC - 1 x 17½"string stab - x/o - 14 x 8"DC 1 x 7 3/4" heavy hitter jar - 3 x 8"DC - x/o - 1 x 5"HWDP - dart sub - 14 x 5" HWDP	
17½"	1177	-	1265	Bit - bitsub - 1 x 9½" monel - 2 x 9½"DC - stb - x/o - 14 x 8"DC - 1 x 7 3/4"Jar 3 x 8"DC - x/o - 1 x 5"HWDP - dart sub - 11 x 5" HWDP	
12 1/4"	1219	-	1644	Bit - 12 13/16" NB.stab - 1 x 8" monel - stab - 2 x 8"DC - stab - 15 x 8"DC - 1 x 7 3/4"Jar - 3 x 8"DC - x/o - 1 x 5" HWDP - dart sub - 11 x 5" HWDP	
12½"coreh.	1644	-	1655,5	COREHEAD - 12 1/4"NB.stab - 1 x 8" corebarrel - stab - 1 x 8" corebarrel - stab - 1 x 8" safety joint - x/o - 15 x 8"DC - jar - 3 x 8"DC - x/o - 1 x 5" HWDP - dart sub - 11 x 5" HWDP.	
12 1/4"	1655,5	-	1798	Bit - 12 13/16"NB.stab - 1 x 8" monel - stab - 2 x 8"DC - 15 x 8"DC - 1 x 7 3/4"jar 3 x 8"DC - x/o - 1 x 5"HWDP - dart sub - 11 x 5" HWDP	
12 1/4"	1798	-	1808	Corehead - 1 x 12 1/4"NB.stab - 1 x 8" corebarrel - 1 x 12 1/4"stab - 1 x 8"core-barrel - 1 x 12 1/4"stab - 1 x 8" safety joint - x/o - 15 x 8"DC - 1 x 7 3/4"Jar - 3 x 8"DC - x/o - 1 x 5" HWDP - dart sub - 11 x 5" HWDP.	Low penetration !
12 1/4"	1808	-	2167	Bit - 1 x 12 13/16"NB.stab - 1 x 8" monel - 1 x 12 13/16" stab - 15 x 8"DC - 1 x 7 3/4" Jar - 3 x 8"DC - x/o - 1 x 5" HWDP - dart sub - 11 x 5" HWDP	

5.1.3. Rotating Hours vs. Drilled Depth

Well no: 6609/10-1

Saga Petroleum a.s.



5.2.1. Mud Properties,Daily Report

Well no: 6609/10-1

Saga Petroleum a.s.

DATE 1983	HOLE SIZE INCHES	DEPTH METERS	MUD WEIGHT ppg	P.V.	Y.P.	GEL STRENGHT	n	K	WATER LOSS	pH	ALKALINITY Pf/Mf	Ca+ ppM	CL- ppM	SAND %	SOLIDS %	COMMENTS
2/8	36"	303	Water	-	-	-	-	-	-	-	-	-	-	-	-	Spud in
3/8	36"	400	"	-	-	-	spud	in	-	-	-	-	-	-	-	"
4/8	36"	415	"	-	-	-	-	-	-	-	-	-	-	-	-	"
5/8	36"	413	"	-	-	-	-	-	-	-	-	-	-	-	-	36" csg runned
6/8	17½"	451	8,9	11	30	25/30	0,34	4,9	N/C	10,7	.1/.15	560	6800	TR	9	Drill thr.cmt sho
7/8	17½"	668	9,4	12	30	25/30	0,36	4,4	N/C	9,8	.1/.15	580	7000	TR	9	Start. logging
8/8	26"	668	9,6	12	30	25/30	0,36	4,4	N/C	10,0	.15/.3	560	12400	TR	9	Drill w/26" U.R.
9/8	26"	668	10,6	12	30	25/30	0,36	4,4	N/C	10,0	.14/.3	560	12400	TR	10	Pooh.Pull b.& r.
10/8	20"	653	9,6	10	30	20/25	0,32	5,38	N/C	10,4	.17/.35	560	12400	-	10	Run 20"waiton wea
11/8	20"	653	9,5	11	20	20/25	-	-	-	10,4	.17/.35	560	12400	-	10	Run bop & riser
12/8	20"	653	9,5	8	18	8/10	-	-	-	10,4	.17/.35	560	12400	-	10	Pull bop,run bop
13/8	17½"	927	9,7	7	20	8/14	0,24	5,38	35,0	10,0	.05/.10	440	9000	0,2	10	Test bop. drill
14/8	17½"	1177	10,2	13	36	22/26	0,12	18,03	23,0	10,2	.05/.10	240	7000	0,25	11	Drill cmg bit
15/8	17½"	1265	9,9	9	28	7/15	-	-	30,0	9,6	.05/.10	320	8000	TR	10	Drill. log
16/8	13 3/8"	1265	9,8	11	29	11/16	-	-	26,0	10,3	.05/.10	260	7000	TR	10	Run csg.
17/8	12 1/4"	1352	11,5	12	36	18/22	L0,18	13,45	35,0	10,8	.1/.2	1200	7500	0,75	14	Drill
18/8	12 1/4"	1638	11,5	21	31	12/15	L0,.17	9,04	17,5	10,1	.05/.15	1360	8000	,5	16	Drill
19/8	12 1/4"	1722	11,5	14	35	10/30	L0,34	5,75	19,5	9,8	.05/.2	1400	8600	,5	17	Drill cut core
20/8	12 1/4"	1807	11,4	13	16	11/15	L0,11	9,21	16,5	9,9	.05/.2	1320	7000	,4	17	Drill cut core
21/8	12 1/4"	1947	10,8	11	18	6/8	L0,30	3,65	16,5	10,3	.05/.15	1400	6200	TR	12	Core, drill
22/8	12 1/4"	2130	10,6	12	18	9/10	L0,19	L 6,63	18,5	9,9	.05/.15	1240	6800	TR	12	Drill
23/8	12 1/4"	2167	10,9	10	16	11/15	M ,469	M1,39	25	9,4	.05/.15	1360	8500	0,2	13	Drill log
		L = Low K + N														
		M = Medium K + N														

5.2.2. Mud Materials used

Well no: 6609/10-1

Saga Petroleum a.s.

MATERIAL	UNIT	36" HOLE	26" HOLE	17 1/2" HOLE	12 1/4" HOLE	8 1/2" HOLE	5 7/8" HOLE	TOTAL
Bent.	M/T	4						
Milgel	50 kg	84						
Caustic	25 kg	7						
Lime	40 kg	8						$ 3968,75
Bent	M/T		25					
Barite	M/T		44					
Caustic	25 kg		20					
Unical	25 kg		16					
Soda Ask	50 kg		1					
Bicarb.	50 kg		1					$ 20196,66
Barite	M/T			20				
Bent.	M/T			22				
Caustic	25 kg			14				
Unical	25 kg			10				
Soda Ask	50 kg			4				
M.D.	55 gal			1				
Drispac S/L	50 cb			7				$ 16224,14
Gypsum	40 kg				138			
Caustic	25 kg				39			
Safe gel	25 kg				99			
Barite	M/T				161			
Bent.	M/T				15			
Drispac Reg.	50 lb				2			
Drispac S/L	50 lb				16			
Unical	25 kg				145			$ 51211,90
						Total		$ 91600,45

5.3. Casing Data

Well no: 6609/10-1

Saga Petroleum a.s.

SIZE	DATE RUN	GRADE	NO OF JOINTS	TOTAL LENGTH	WEIGHT	COUPLINGS	SHOE DEPTH	FLOAT COLL DEPTH	CENTRALIZERS	REMARKS
INCHES				M	LBS/FT		M-RKB	M-RKB	JOINT NO.	
30	5/8	B	11	129.26	309	Vetco "Squnch"	413	-----		
20	9-10/8	x-56	31	370.23	133	Vetco "LS"	653	-----	Bow centr. at 650 m Poz. centr. at 400 m at 388 m	Planned to run 4 bar type centr. but was unable to get them installed around the joint connections.
13 3/8	16/8	N-80	82	962.34	72	Buttress	1247	-----	Bow centr. at 1245, 1235, 1232, 1212 and 1200 m. Poz. centr. at 648 and 636 m.	

5.4. Cement Data

Well no: 6609/10-1

Saga Petroleum a.s.

DATE	JOB DESCRIPTION	SHOE DEPTH M-RKB	CEMENT TYPE	SLURRY WEIGHT PPG	VOLUME USED SACKS	ADDITIVES gps	MIX WATER gps	LOSSES BBLS	REMARKS:
5.8.83	30" csg.	413	Lead:"G"	13.0	1175	0.45 gpsA-3L	10.97		Lost the seawater supply due to electical failure.
			Tail:"G"	16.0	577	0.40 gpsA-7L	5.09		Had to use firehoses to supply the water. This delayed the whole cementing operation, and no cement return to seabed was seen after this. Pumped 20 BBLS of seawater ahead of cement. Having pumped the cement, it was displaced with 55 BBL of seawater. Waited on cement to dry for 7½ hrs.
10.8.83	20" Csg.	653	Lead:"G"	13.0	1343	0.40 gpsA-3L	10.92		Pumped 10 BBL of seawater ahead of cement.
			Tail:"G"	15.9	500	0.25 gpsA7-L	5.15		Displaced the cement, using 54 BBL of seawater. The calculated lead clurry colume was reduced by 30 BBL, since cement return was observed while pumping the lead. Float held when bleeding off pressure.
16.8.83	13 3/8" Csg.	1247	Lead:"G"	13.0	1050	2.25% GEL+ 0.2 gal/sx D-31LN	10.35		Lost return during the job. Displaced with mud and bumped float w/ 2900 psi. Had a flow in 20" - 30" annulus. After cemented in 13 3/8" - 20" annulus it stopped flowing in the 20" - 30" annulus. Washed BOP and riser with seawater. POOH w/ csg running tool.
			Tail:"G"	15.8	500	0.2 gal/sx D-19LN 0.1 gal/sx D-31LN 0.02 gal/sx R-12L			

5.4. Cement Data

Well no: 6609/10-1

Saga Petroleum a.s.

DATE	JOB DESCRIPTION	SHOE DEPTH M-RKB	CEMENT TYPE	SLURRY WEIGHT PPG	VOLUME USED SACKS	ADDITIVES	MIX WATER	LOSSES BBLS	REMARKS:
26.8.83	Cmt plug no1	1710-1590	"G"	15.9	283	3 Ghs R-12L	33.4BBls fresh water	-	-
"	" " no2	1297-1197	"G"	16.0	237	-	28 BBLS sea water	-	-
"	Cmt plug no3	970-870	"G"	16.0	239	-	28.2BBLS sea water	-	Pumped 10 bbls water ahead. Mixed and pumped 239 sxs cmt at 16 ppg. Sea water req. was 28 bbls. Pumped 1.5 bbls water behind. Displaced with 42 bbls.
27.8.83	Squeezing	555	"G"	16.0	381	-	45 BBLS sea water	-	RIH with open ended drill pipe. Squeezed cement with max 1400 psi through perforatings at 555 m. Left 50 m cmt inside casing (555 - 505 m).
29.8.83	Cmt plug no4	485-300	Neat	16.0	470	-	55.4BBLS sea water	-	

5.5. Deviation Data.

Well no: 6609/10-1

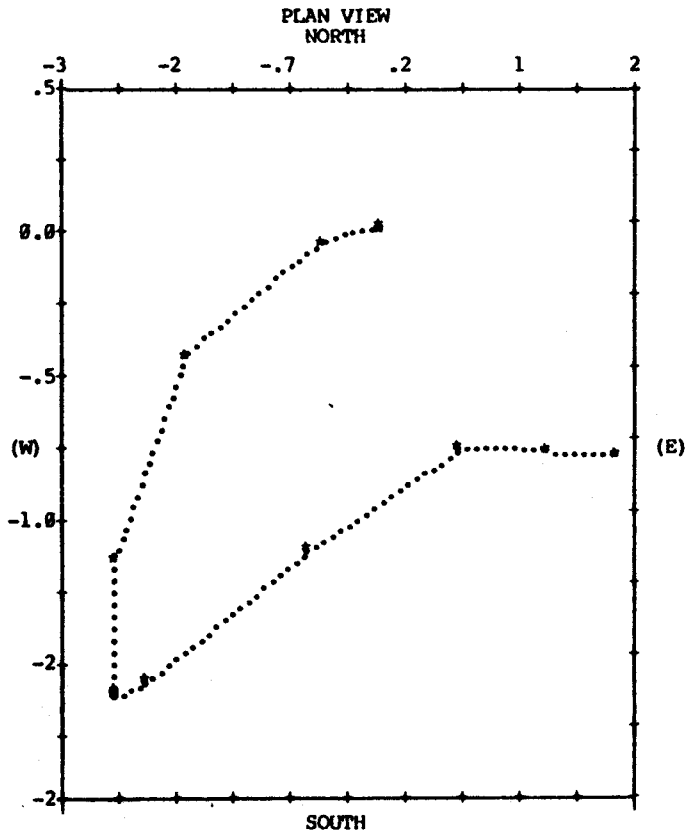
Saga Petroleum a.s.

Measured Depth M-RKB	True Vertical Depth M-RKB	Inclination Deg. from Vertical	Azimuth 0-360°	Dog leg °/30m	Position +N(m) -S(m)	Position +E(m) -W(m)
303	303,93	2 1/4°	Totco			
315	314,92	1 1/2°	"			
361	360,90	1 3/4°	"			
415	414,87	1 3/4°				
525	524,84	3/4°	"			
668	667,84	1/4°	"			
767	766,84	0°	"			
870	869,84	1/2°	S 80 W		13,60	0,40
976	975,83	3/4°	S 63 W		14,76	0,41
1072	1071,82	1/2°	- S -		15,80	0,43
1177	1176,82	0°			16,26	0,43
1265	1264,82	0°			16,26	0,43
1379	1378,82	0°			16,26	0,43
1473	1472,82	0°			16,26	0,43
1569	1568,82	0°			16,26	0,43
1644	1643,82	0°			16,26	0,43
1741	1740,82	0°			16,26	0,43
1798	1797,82	1/2°	N 80 E	0,26	16,31	0,67
1902	1901,81	1°	N 65 E	0,15	16,71	1,97
1997	1996,80	1/2°	- E -	0,19	16,98	3,17
2103	2102,80	1/4°	S 85 E	0,07	16,95	3,87
2167	2166,80	3/4°	- E -	0,24	16,93	4,42

5.5.1. Horizontal Projection.

Well no: 6609/10-1

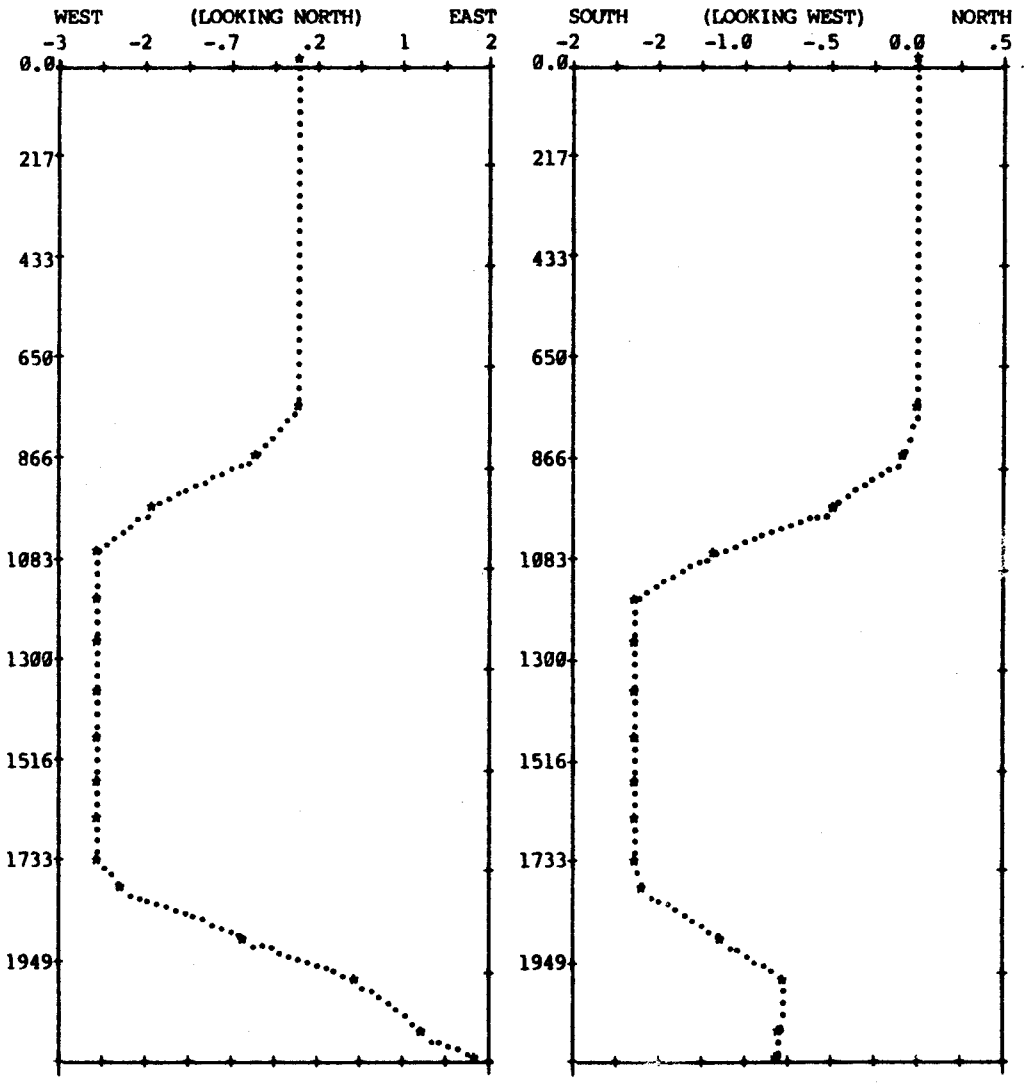
Saga Petroleum a.s.



5.5.2. Vertical Projection.

Well no: 6609/10-1

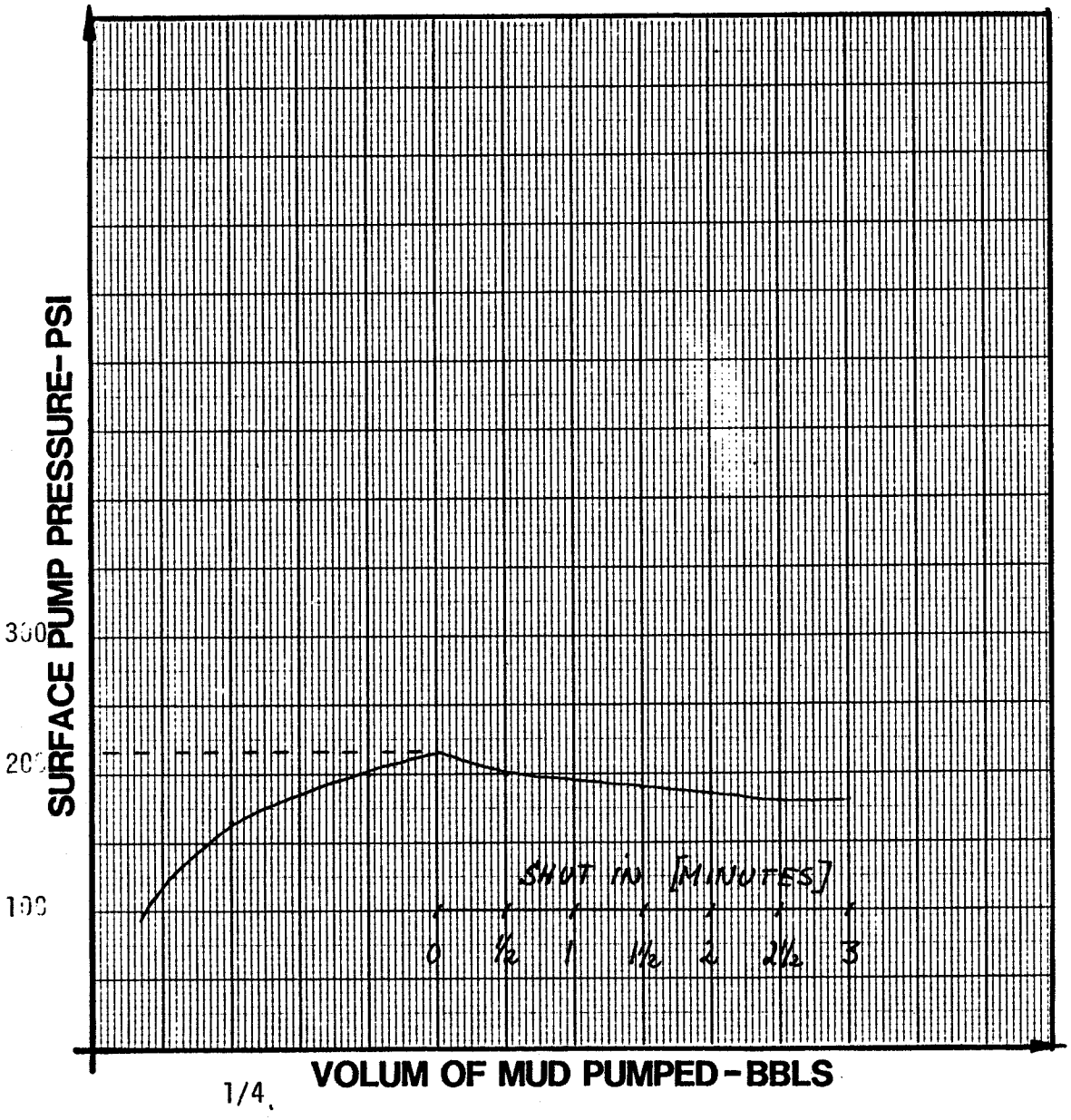
Saga Petroleum a.s.



5.6. Formation Leak off Test Data

Well no: 6609/10-1

Saga Petroleum a.s.



WELL	:	6609/10-1
DATE	:	7/8.1983
CONTRACTOR	:	W.W.
RIG	:	"Treasure Saga"
PUMPING UNIT	:	BJ
DRLG.SUPV.	:	Hrenyk, Bjerke

CSG. SIZE	:	30"
CSG. SHOE DEPTH	:	413 m
WATER DEPTH	:	288,5 m
HOLE SIZE	:	17 1/2"
HOLE DEPTH	:	416 m
MUD WEIGHT	:	9 ppg in hole,8,55 in choke
PUMP RATE	:	1/4 bbl/min.
VOLUME PUMPED	:	5/8 bbl
VOLUME RECOVERED	:	
FORMATION TYPE	:	Clay
LEAK OFF PRESS	:	200
SHUT-IN PRESS	:	215
SHUT-IN TIME	:	3 min.

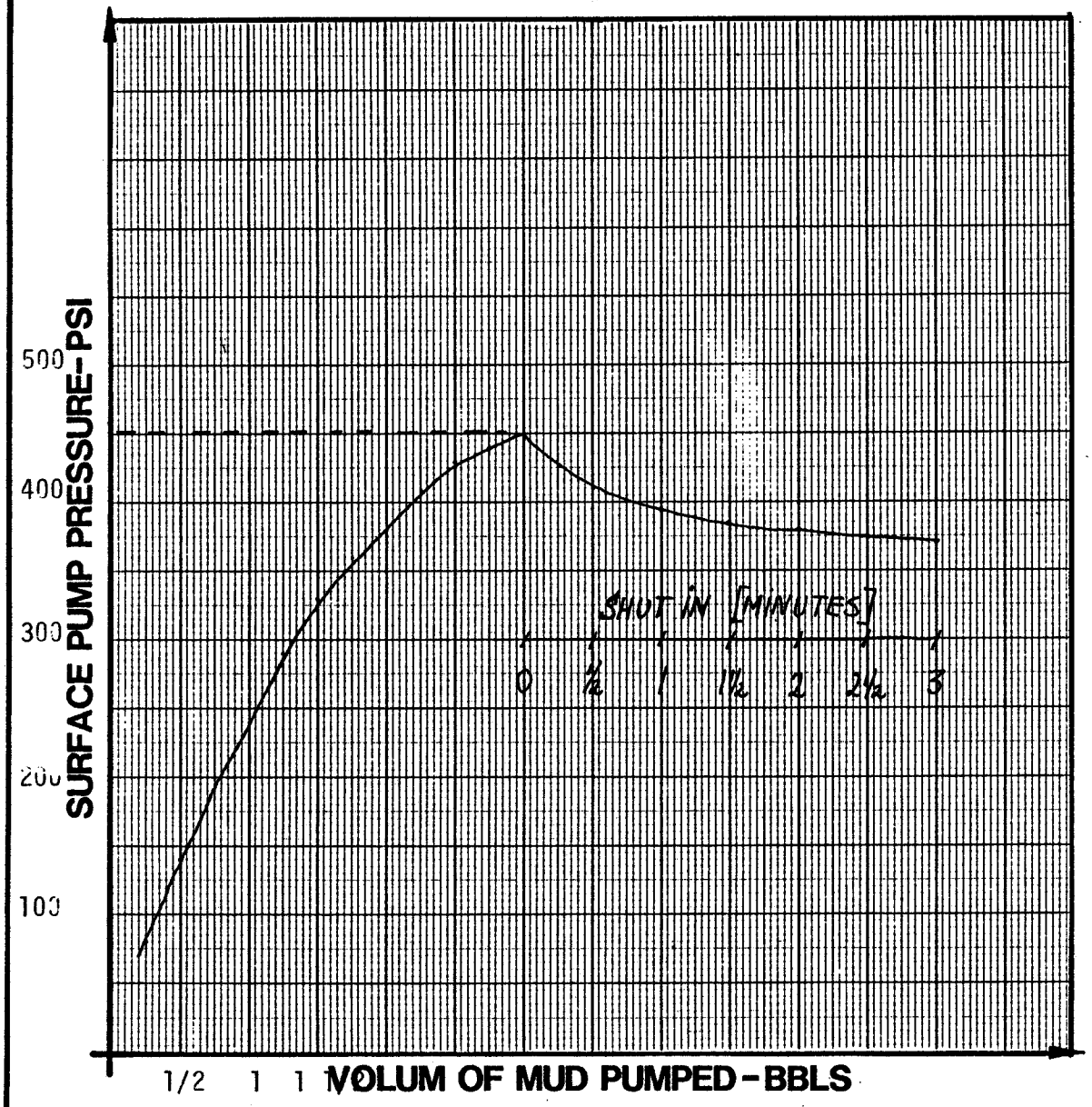
EQV. MUD WEIGHT AT CSG. SHOE: 11,5 ppg

Bbls	Pressure	Bbls	Pressure
1/4	165		
1/2	200		
5/8	215		
		1/2 min	200
		1 min	195
		1 1/2 min	190
		2 min	185
		2 1/2 min	180
		3 min	180

5.6. Formation Leak off Test Data

Well no: 6609/10-1

Saga Petroleum a.s.



WELL	:	6609/10-1
DATE	:	13/8.1983
CONTRACTOR	:	W.W.
RIG	:	"Treasure Saga"
PUMPING UNIT	:	BJ
DRLG.SUPV.	:	Hrenyk, Bjerke

CSG. SIZE	:	20"
CSG. SHOE DEPTH	:	653 m
WATER DEPTH	:	288,5 m
HOLE SIZE	:	17 1/2"
HOLE DEPTH	:	673 m
MUD WEIGHT	:	9,5 ppg
PUMP RATE	:	1/2 bbl/min.
VOLUME PUMPED	:	3 bbl
VOLUME RECOVERED	:	1 1/2 bbl
FORMATION TYPE	:	Clay
LEAK OFF PRESS	:	385
SHUT-IN PRESS	:	450 psi
SHUT-IN TIME	:	3 bbl

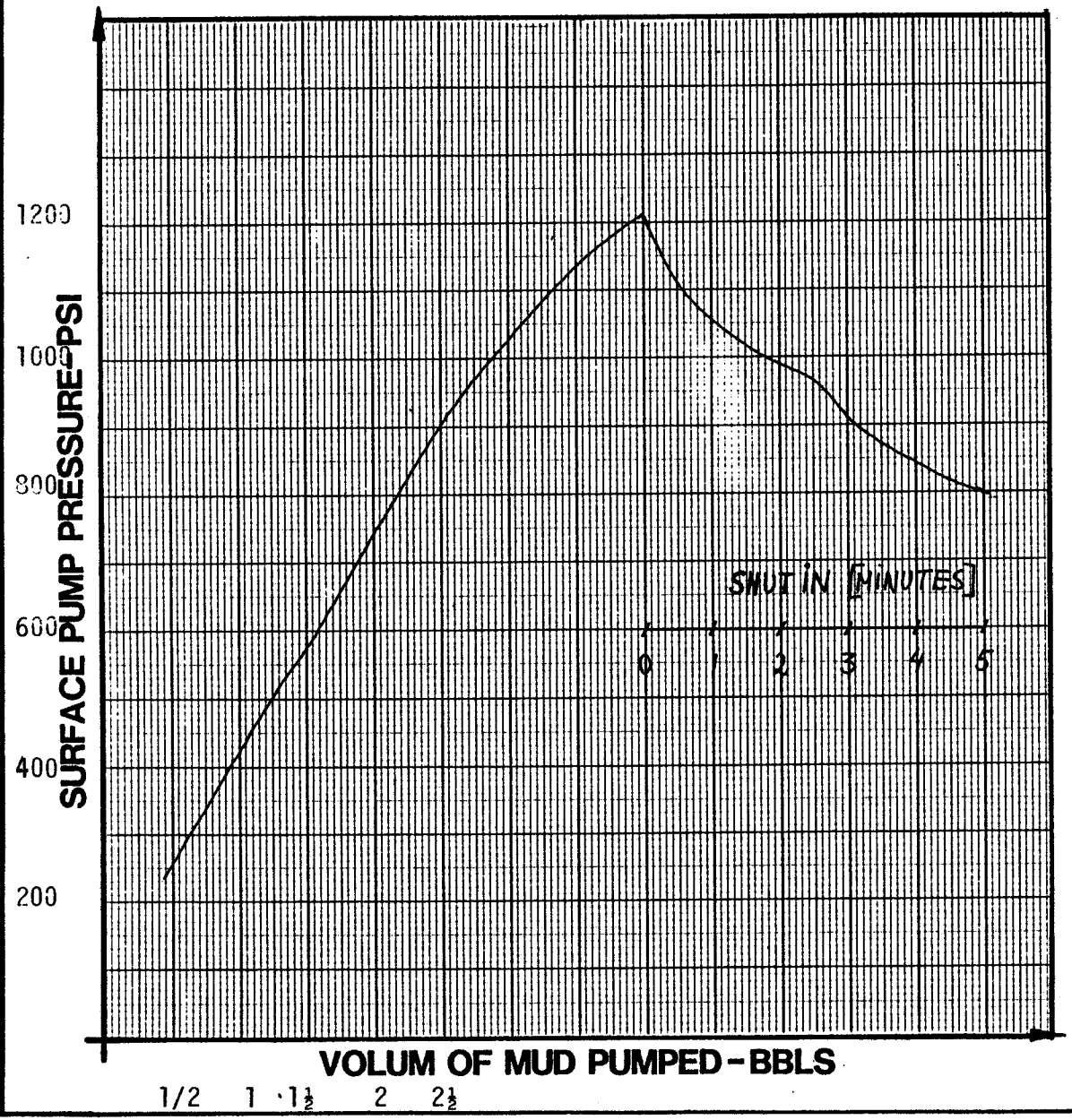
EQV. MUD WEIGHT AT CSG. SHOE: 13 ppg

Bbls	Pressure	Bbls	Pressure
1/4	80	2 3/4	440
1/2	140	3	450
3/4	190		
1	240	1/2 min	410
1 1/4	290	1 min	395
1 1/2	330	1 1/2 min	385
1 3/4	360	2 min	380
2	380	2 1/2 min	375
2 1/4	410	3 min	370
2 1/2	430		

5.6. Formation Leak off Test Data

Well no: 6609/10-1

Saga Petroleum a.s.



WELL	:	6609/10-1
DATE	:	17/8.1983
CONTRACTOR	:	W.W.
RIG	:	"Treasure Saga"
PUMPING UNIT	:	BJ
DRLG.SUPV.	:	Hrenyk, Bjerke

CSG. SIZE	:	13 3/8"
CSG. SHOE DEPTH	:	1247 m
WATER DEPTH	:	288,5 m
HOLE SIZE	:	12 1/4"
HOLE DEPTH	:	1270 m
MUD WEIGHT	:	11,4 ppg
PUMP RATE	:	1/2 bbl/min.
VOLUME PUMPED	:	4 bbl
VOLUME RECOVERED	:	1,5 bbl
FORMATION TYPE	:	50 % clay, 50 % sand
LEAK OFF PRESS	:	910 psi
SHUT-IN PRESS	:	1210 psi
SHUT-IN TIME	:	4 1/2 m

EQV. MUD WEIGHT AT CSG. SHOE: 15,6 ppg

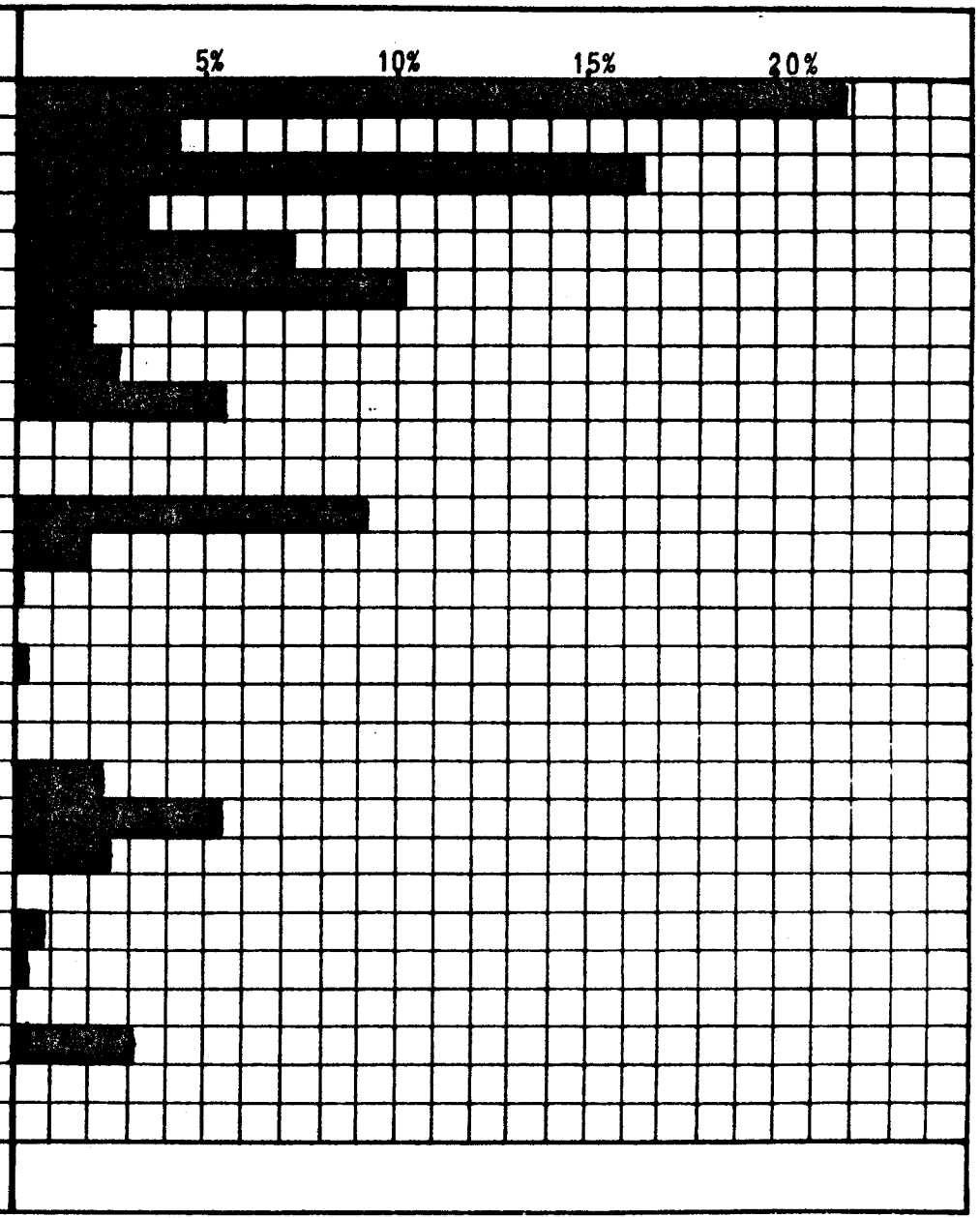
Bbls	Pressure	Bbls	Pressure
1/2	250	1/2 min	1110
1	420	1 min	1050
1 1/2	580	1 1/2 min	1020
2	740	2 min	990
2 1/2	910	2 1/2 min	970
3	1030	3 min	900
3 1/2	1140	3 1/2 min	870
4	1210	4 min	850
		4 1/2 min	820
		5 min	800

5.7. Rig Time Distribution

Well no: 6609/10-1

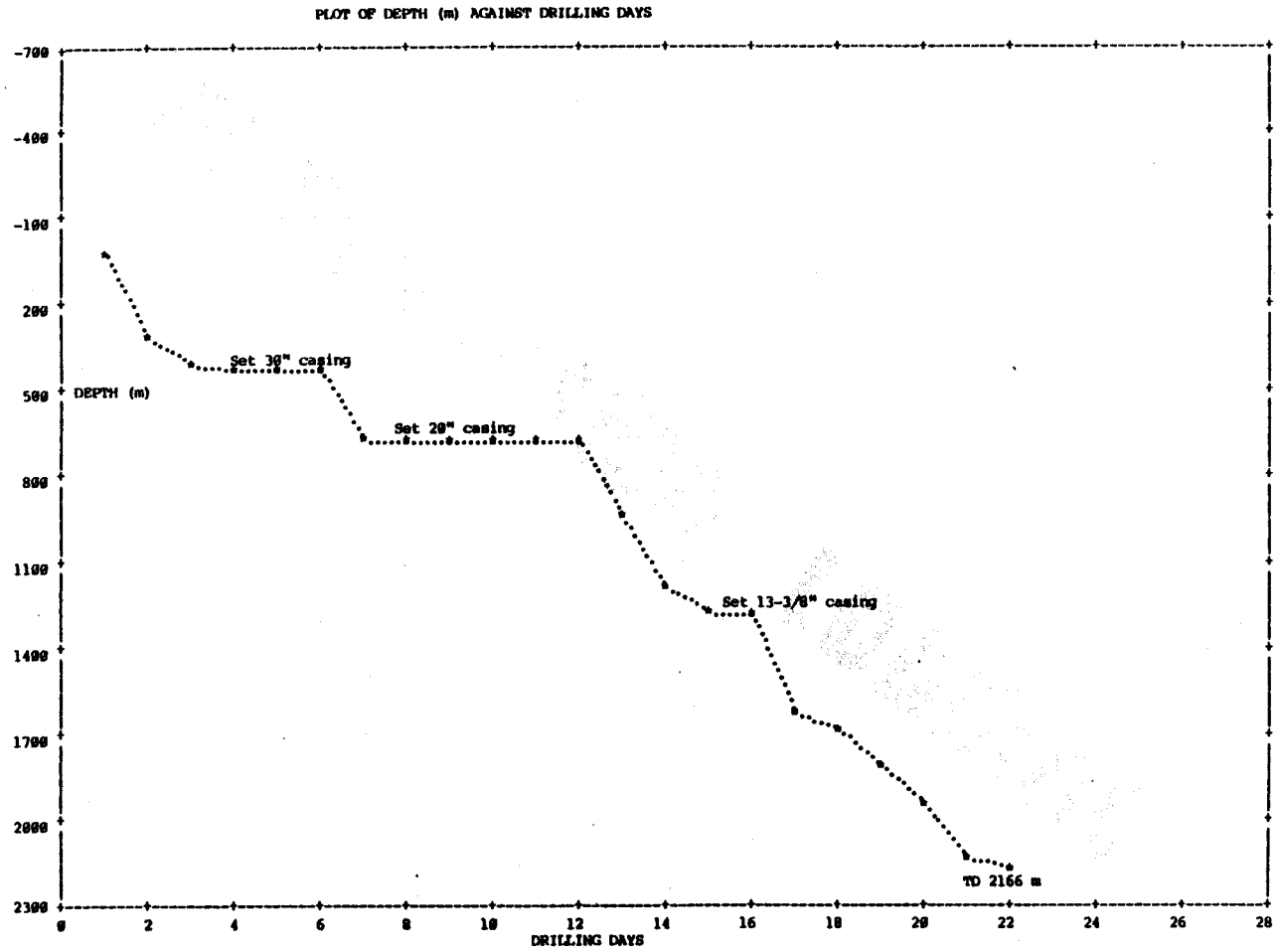
Saga Petroleum a.s.

		HOURS	%
DRILLING RELATED OPERATIONS	DRILLING	156	21.9
	REAMING, UNDERREAMING & WASHING	30	4.2
	TRIPPING	119	16.7
	CIRC. AND COND. OF MUD	23½	3.3
	RUN & CEMENT CASING	51½	7.2
	HANDLING OF BOP & RISER	72	10.1
	PRESSURE TESTING. BOP & RISER	14¼	2.0
	DEVIATION SURVEYS	19	2.7
	MISC.	39½	5.6
FORMATION EVALUATION			
	LOGGING	65	9.1
	CORING	14	2.0
	FORMATION PRESSURE & LEAK OFF TESTING	1½	0.2
	PRODUCTION & DRILL STEM TESTING		
	COLLECTION OF SAMPLES	2½	0.4
	MISC.		
	MOVING	16½	2.3
	ANCHOR HANDLING & POSITIONING	39	5.5
	PLUG & ABANDONMENT	18½	2.6
	RIG REPAIR & MAINTENANCE	5½	0.8
	FISHING	2	0.3
	WELL CONTROL & HOLE PROBLEMS		
	WOW	22	3.1
	MISC.		
	SUM	711	100.0



5.7.1. Drilled Depth vs. Rig Time
Well no: 6609/10-1

Saga Petroleum a.s.



5.7.2. Daily Rig Time Distribution

Well no: 6609/10-1

Saga Petroleum a.s.

	DAYS FROM START OF REPORTING	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	
	DATE	31.7	1.8	2.8	3.8	4.8	5.8	6.8	7.8	8.8	9.8	10.8	11.8	12.8	13.8	14.8	15.8	16.8	
	DRILLING			7½	12	1		1	14						17	14½	4½		71½
	REAMING, UNDER REAMING & WASHING					15½				14½									30
	TRIPPING			4	6	5½	½	3	3½	2½	2	3½			2	6½	2½	2½	44
	CIRC. & COND. OF MUD					1			3½	½	3				½	1	1	½	11
	RUN & CEMENT CASING						23	2			7 1/6	6½						11½	50½
	HANDLING OF BOP & RISER							10½			8½	½	21	18			1½		60
	PRESSURE TESTING. BOP & RISER							1½					3	2	3			2½	12
	DEVIATION SURVEYS			1	1	1			1						1	2	½		7½
	MISC.			3			½	6	1		½			4			7½	4½	27
	LOGGING								½	6½	2½						6½		16
	CORING																		
	FORMATION PRESSURE & LEAK OFF TESTING								½						½				1
	PRODUCTION & DRILL STEM TESTING																		
	COLLECTION OF SAMPLES																		
	MISC.																		
	MOVING	4½	12																16½
	ANCHOR HANDLING & POSITIONING		12	8½															20½
	PLUG & ABANDONMENT																		
	RIG REPAIR & MAINTENANCE				5													½	5½
	FISHING																	2	2
	WELL CONTROL & HOLE PROBLEMS																		
	WOW											13½							13½
	MISC.																		
	SUM	4½	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	388½

5.7.2. Daily Rig Time Distribution
Well no: 6609/10-1

Saga Petroleum a.s.

	DAYS FROM START OF REPORTING	18	19	20	21	22	23	24	25	26	27	28	29	30	31				
	DATE	17/8	18/8	19/8	20/8	21/8	22/8	23/8	24/8	25/8	26/8	27/8	28/8	29/8	30/8				
	DRILLING	7½	21	4	9	14½	22	6½										84½	
	REAMING, UNDER REAMING & WASHING																		
	TRIPPING	12½		10½	4½	4		4½	½	5	13½	11	3½	5½				75	
	CIRC. & COND. OF MUD	1½	1	1½	1			3½		2½	1½							12½	
	RUN & CEMENT CASING													1				1	
	HANDLING OF BOP & RISER											5½	6½					12	
	PRESSURE TESTING. BOP & RISER	2																2	
	DEVIATION SURVEYS		2	1	2	1½	2				2½	½						11½	
	MISC.			½	½	1				½	1½	1½		7				12½	
	LOGGING							9½	23½	16								49	
	CORING			5	6	3												14	
	FORMATION PRESSURE & LEAK OFF TESTING	½																½	
	PRODUCTION & DRILL STEM TESTING																		
	COLLECTION OF SAMPLES			1½	1													2½	
	MISC.																		
	MOVING																		
	ANCHOR HANDLING & POSITIONING													8	10½			18½	
	PLUG & ABANDONMENT										5	5½	5½	2½				18½	
	RIG REPAIR & MAINTENANCE																		
	FISHING																		
	WELL CONTROL & HOLE PROBLEMS																		
	WOW												8½					8½	
	MISC.																		
	SUM	24	24	24	24	24	24	24	24	24	24	24	24	24	10½			322½	

6. OPERATIONAL DATA

6.1 Equipment Failure Report

6.2 Anchor Pattern

6.3 Helicopter and Charter Flights

6.4 Accident Report

6.5 Daily Operating Conditions

6.1. Equipment Failure Report

Well no: 6609/10-1

Saga Petroleum a.s.

DATE	DESCRIPTION OF EQUIPMENT	LOST RIG TIME(HRS)	DESCRIPTION OF FAILURE	CAUSE, REASON	COMMENTS AND RECOMMENDATIONS
			NO FAILURES REPORTED		

6.2 Anchor Pattern

Well no: 6609/10-1

Saga Petroleum a.s.

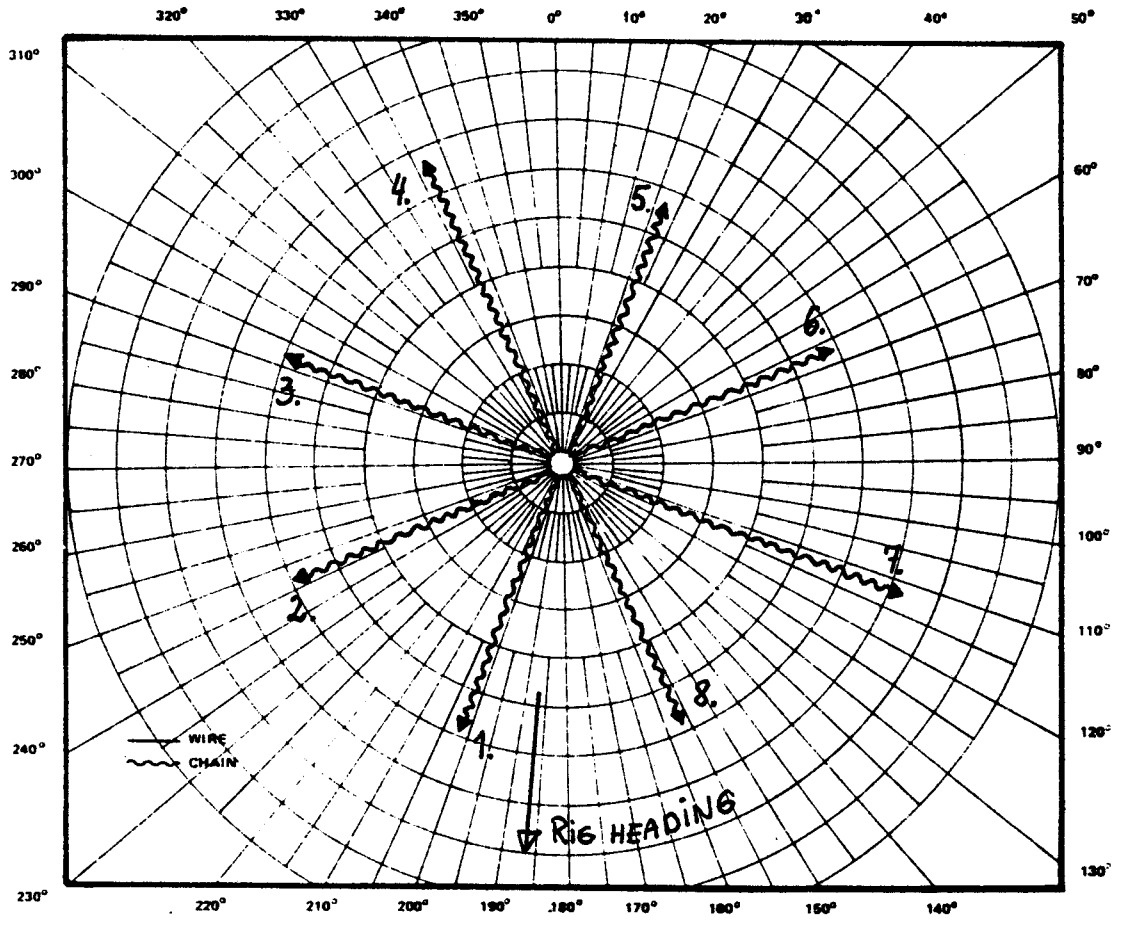
ANCHOR NO	1	2	3	4	5	6	7	8
COMPASS DIRECTION	202°	247°	292°	337°	022°	067°	112°	157°
CHAIN/WIRE ON DRUM (M)	1700	1700	1700	1700	1700	1700	1700	1700
LENGTH OF WIRE/CHAIN OUT	1170	1195	1175	1310	1150	1175	1430	1183
MAX.INITIAL TENSION (KIPS)	205	205	205	210	205	210	205	210

REMARKS: No piggy-backs out. A grapple line is laid out from anchor no. 2, since there was no wire attached to the chase ring.

Rig heading: 186°

Water depth: 263 m

Rig position: N 66° - 14' - 42.6"
E 09° - 14' - 59.3"



6.3 Helicopter and Charter Flights

Well no: 6609/10

Saga Petroleum a.s.

NO OF FLIGHT		FLIGHT ROUTE	PASSENGERS		DESCRIPTION OF CARGO	REMARKS
			OUT	IN		
8	SCHEDULED HELICOPTER FLIGHTS	BNN - T. Saga	172	176		
4	SCHEDULED CHARTER FLIGHTS	SVG - BNN	32	25	Mailbags	
8	Extra Helicopterflights	BNN-T.Saga	35	35	Nav. Equipment, Spare Parts, Anchor Equipment.	
1	" Charterflight	SVG-BGN-BNN	10	-		Partnair

6.4 Accident Report

Well no: 6609/10-1

Saga Petroleum a.s.

DATE	TYPE OF PERSONNEL	LOCATION OF ACCIDENT	WORK OPERATION	INJURY	DESCRIPTION OF ACCIDENT INJURY	CAUSE OF ACCIDENT/INSURY	REMARKS	INS. REP.?
					NO ACCIDENTS REPORTED			

6.5. Daily Operating Conditions

Well no: 6609/10-1

Saga Petroleum a.s.

DATE	MAX WIND		MAX SEAS		MAX SWELL			MAX VESSEL MOVM.			VESSEL HEADING	VESSEL OFFSET	ANCHOR TENSION		RISER DATA			REMARKS
	SPEED KT	DIR DEG	HEIGHT M	DIR DEG	HEIGHT M	DIR DEG	PERIOD SEC	HEAVE M	ROLL DEG	PITCH DEG	DEG	%WD	MIN TONS	MAX TONS	TENS	BJ ABGLE	BJ PRESS	
2/8	32	NW	3,0	NW	-	-	8	0,4	1,0	2,0	180	-	80	135				
3/8	23	SSE	4,0	SW	-	-	6	0,4	2,0	2,0	180	-	56	120				
4/8	20	SSE	2,5	SW	-	-	7	0,3	2,0	2,0	180	-	57	112				
5/8	13	W	2,5	S	-	-	7	0,3	1,5	1,5	180	-	60	113				
6/8	18	S	2,5	S	-	-	7	0,2	1,6	1,0	180	-	58	120	188000			
7/8	16	SW	2,6	SSW	-	-	6	0,2	1,3	1,0	180	-	62	117	216000			
8/8	24	SW	3,8	SW	-	-	7	0,5	2,0	2,0	180	-	63	121	216000			
9/8	28	SW	5,6	SW	-	-	9	1,0	5,0	4,0	180	-	63	127				Riser disconnected
10/8	23	SW	4,6	SW	-	-	8	0,7	5,0	4,5	180	-	62	119				" "
11/8	16	NW	3,3	W	-	-	8	0,5	2,5	1,5	180	-	57	115	317000			
12/8	21	NW	4,5	NW	-	-	8	0,5	3,0	2,5	180	-	50	118	296000			
13/8	20	WNW	4,3	WNW	-	-	8	0,8	2,5	3,0	180	-	54	117	296000			
14/8	23	SE	3,4	WNW	-	-	8	0,5	1,5	2,0	180	-	54	115	292000			
15/8	29	SSW	5,1	SW	-	-	8	1,1	4,0	3,0	180	-	55	121	294000			
16/8	21	NW	3,8	SW	-	-	8	0,7	4,0	3,0	180	-	53	118	295000			
17/8	18	NW	3,8	WNW	-	-	8	0,6	2,5	3,0	180	-	48	118	305000			
18/8	15	SSW	1,8	SW	-	-	7	0,5	1,5	1,0	180	-	53	115	302000			
19/8	16	WSW	1,9	SW	-	-	8	0,4	1,5	1,3	180	-	53	116	310000			
20/8	20	SSE	2,1	SSW	-	-	10	0,2	1,5	1,2	180	-	54	116	320000			
21/8	30	SSE	1,5	SSW	-	-	7	0,4	1,5	1,0	180	-	54	112	325000			
22/8	33	W	3,2	W	-	-	7	0,4	2,5	1,3	180	-	54	120	321000			
23/8	26	W	3,3	NW	-	-	7	0,7	2,5	1,5	180	-	53	119	318000			
24/8	18	SSW	3,8	SSW	-	-	8	2,2	2,5	1,6	180	-	52	115	348000			
25/8	20	W	3,0	W	-	-	8	0,8	3,0	1,8	180	-	54	117	328000			
26/8	23	SSE	1,9	W	-	-	8	0,4	2,0	1,5	180	-	51	114	334000			
27/8	45	W	9,1	W	-	-	10	2,1	5,0	2,5	180	-	58	145	330000			
28/8	35	W	7,2	W	-	-	9	1,7	4,5	2,0	180	-	66	137	295000			
																		29/8, Started deballasting/anchor-handling

7. WELL PROFILES

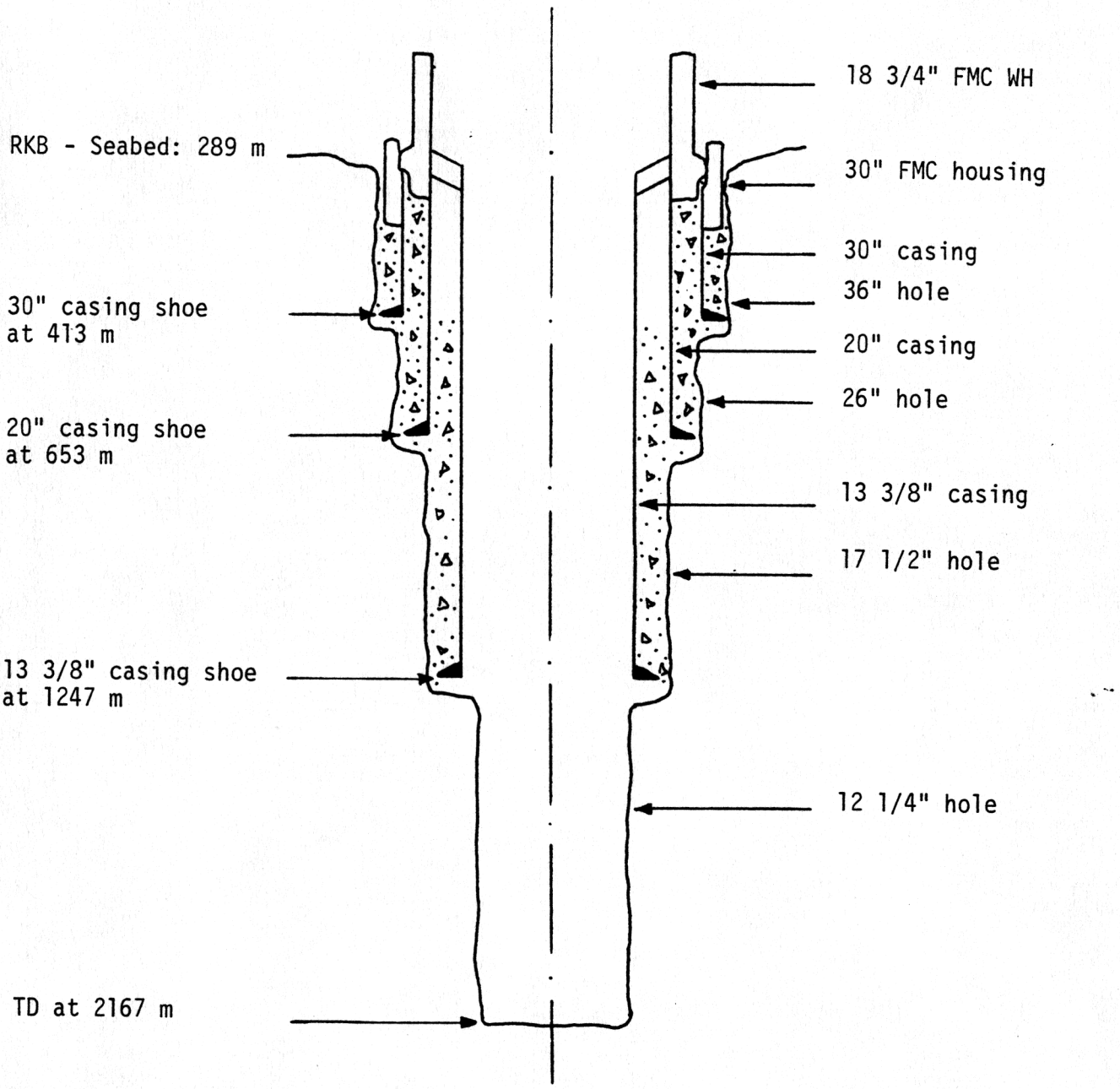
7.1 Welbore Schematic

7.2 Abandonment Profile

7.1 Wellbore Scematic.

Well no: 6609/10-1

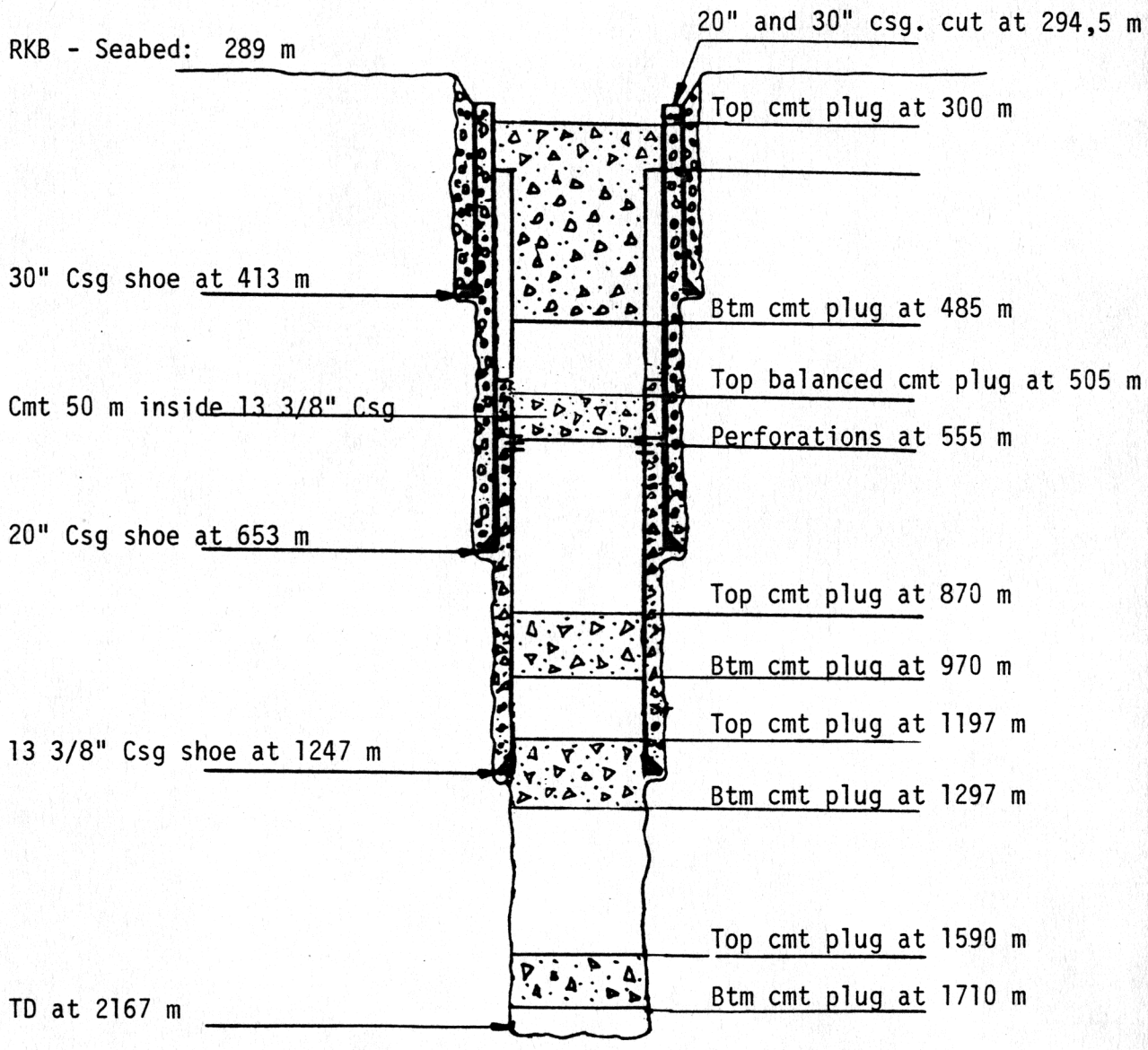
Saga Petroleum a.s.



7.2 Abandonment Profile.

Well no: 6609/10-1

Saga Petroleum a.s.



8. APPENDIX

8.1. Sample Description

8.1.1. Sidewall Core Description

8. APPENDIX

8.1. Sample Description

8.1.1. Sidewall Core Description

Depth: mRKB	
1270	Clay/claystone, grey - greygreen, soft, calcareous.
1300	Clay/claystone, grey, soft, calcareous.
1327.5	Sandstone, silty, red, fine - medium, moderate - well sorted, loose, glauconitic, slightly calcareous.
1340	Siltstone, brown, soft, trace of mica, slightly calcareous.
1355	Siltstone, brown, soft - sticky, micaceous, calcareous.
1365	Clay/claystone, silty, dark brown, soft, slightly calcareous.
1370	Clay/claystone, green, soft, non calcareous.
1375	Clay/claystone, slightly silty, laminated, greygreen, soft, slightly calcareous.
1380	Clay/claystone, grey - greygreen, soft, slightly calcareous.
1385	Claystone, grey - greygreen, soft - firm, non - slightly calcareous.
1390	Claystone, silty, variegated green grey, green, brown, firm, micaceous, non calcareous.
1395	Claystone, silty, variegated green grey, green, brown, firm, micaceous, non calcareous.

1400 Claystone/shale, dark browngrey, firm, subfissile, micaceous, pyritic and non calcareous.

1410 Siltstone, medium grey, loose - firm, micaceous, non - slightly calcareous.

1422 Claystone, medium - dark grey, occasional white with black speckles (tuff), firm, micromicaceous, non calcareous.

1438 Claystone, silty, medium - dark grey, firm, micromicaceous, non calcareous.
Trace: sand, clear - white, very fine.

1465 Claystone, silty, medium grey and white with black speckles (tuff), firm, micromicaceous, non calcareous.

1475 Claystone, silty, light - medium grey and green grey, firm - sticky, micromicaceous, non - slightly calcareous.

1485 Claystone, silty, medium grey, firm - sticky, micromicaceous, non - slightly calcareous.

1495 Claystone, silty, medium grey, firm - sticky, micromicaceous, non - slightly calcareous.

1505 Claystone, silty, medium grey, firm - sticky, micromicaceous, non - slightly calcareous.

1515 Claystone, silty, light green - grey, firm, micromicaceous, non calcareous.

1525 Claystone, silty, light grey - green, occasional brown, micromicaceous, glauconitic, calcareous.

1535 Claystone, light - medium grey, soft - firm, blocky, micromicaceous, non calcareous.

1545 Claystone, light - medium grey, soft - firm, blocky, micromicaceous, non calcareous.

1555 Claystone, silty, predominantly medium grey - green grey, occasional brown - red brown, soft - firm, bery calcareous.

1565 Claystone, silty, medium grey - green grey, soft - firm, micaceous, glauconitic, non - slightly calareous.

1575 Claystone, silty, light - medium grey, firm, non - slightly calcareous.

1585 Claystone, light - medium grey, firm, non - slightly calcareous.

1595 Claystone, silty, medium grey, firm, non calcareous.

1600 Claystone, silty, medium - dark grey, soft - firm, non calcareous.

1603 Claystone, silty, medium - dark grey, soft - firm, non calcareous.

1607 Claystone, silty, variegated brown - yellow brown, green yellow, soft, micaceous, non calcareous.

1610 LOST

1615 Claystone, silty, light - medium grey, soft, micaceous, non - slightly calcareous.

1620 Claystone, silty, light - medium grey, soft - firm, micaceous, non - slightly calcareous.

1625 Claystone, silty, light - medium grey, soft - firm, micaceous, non - slightly calcareous.

1630 Sandstone, massive, argillaceous, medium grey, very fine, subangular - subrounded, moderate - well sorted, micaceous, non calcareous, fair visible porosity, no shows.

1633 LOST

1637 Sandstone, laminated, argillaceous, very fine, subangular - subrounded, moderate - well sorted, very micaceous, non calcareous, fair visible porosity, no shows.

1638 Limestone, buff white - grey, firm - hard, microcrystalline.

1641 LOST

1645 LOST

1654 LOST

1660 LOST

1665 Sandstone, massive, light green - green, very fine, moderate - well sorted, loose, subangular - subrounded, micaceous, non calcareous, good visible porosity.

1670 LOST

1675 LOST

1676.5 Sandstone, massive, light green - green, very fine, moderate - well sorted, loose, subangular - subrounded, micaceous, non calcareous, good visible porosity.

1690 LOST

1700 Sandstone, clear - white, fine - medium, well sorted, subangualr, loose, micaceous, slightly - non calcareous, trace of heavy minerals.

1710 LOST

1720 MISFIRE

1730 Sandstone, laminated, silty, clear, fine, well sorted, subangular - subrounded, loose, micaceous, slightly calcareous, trace of heavy minerals.

1733,5 Limestone, silty, light grey - white, loose.

1736.5 Sandstone, silty, quartz, clear - grey, fine, well sorted, loose - friable, subangular - subrounded, calcareous, trace of heavy minerals.

1740.5 LOST

1745 LOST

1750.5 Limestone, silty, white - grey, firm - loose.

1755 LOST

1759 Limestone, arenaceous, white - grey, firm - loose.

1762 Sandstone, silty, quartz, clear, fine - medium, well sorted, subangular - subrounded, loose, micaceous, calcareous, heavy minerals.

1767.5 Sandstone, silty, quartz, clear, fine - medium, moderate - well sorted, subangular - subrounded, loose, very micaceous, very calcareous.

1771.5 Sandstone, quartz, clear, fine - medium, moderate - well sorted, subangular - subrounded, loose, slightly - non calcareous, trace of mica and heavy minerals.

1775 LOST

1780 LOST

1786 Coal, black, brittle.

1794 LOST

1802 Siltstone, carbonaceous, grading to coal, grey - black, friable.

1811.5 Coal, black, brittle.

1817.5 Pyrite, yellow, fine, crystalline, very hard.

1823 Siltstone, brown, firm, splintery, calcareous.

1826 Clystone, silty, grey, non calcareous.

1833 Coal, black, brittle.

1854 Sandstone, quartz, clear, fine - medium, moderate - well sorted, subangular - subrounded, loose, non calcareous.

1865.5 Sandstone, argillaceous, quartz, clear, very fine - fine, moderate sorted, subangular - subrounded, very loose, micaceous, carbonaceous, non calcareous, fair visible porosity.

1872 Claystone, slightly silty, light grey, very soft, carbonaceous, micaceous, non calcareous.

1885 LOST

1887.5 Sandstone, light grey - white, very fine - fine, occasional coarse, moderate sorted, subangular - subrounded, micaceous, kaolin, pyrite, calcareous, fair visible porosity.

1901.5 LOST

1905 LOST

1935 LOST

1950 Sandstone, argillaceous, light grey, very fine - fine, moderate sorted, subangular - subrounded, micaceous, slightly carbonaceous, non - slightly calcareous, moderate - fair visible porosity.

1953 Coal, argillaceous, black, soft - firm, grading to organic rich shale.

1969.5 Sandstone, very argillaceous, medium grey, very fine, poor - moderate sorted, subangular - subrounded, very micaceous, poor porosity.

1986 Sandstone, light grey, very fine, subangular - subrounded, loose - friable, very micaceous, non calcareous, fair visible porosity.

1997.5 Shale, medium gray, soft - firm, micromicaceous, non calcareous.

2007 Limestone, arenaceous, brown - red brown, hard - very hard, micaceous.

2010 Shale, silty, medium - dark gray, firm - hard, micaceous, non calcareous.

2024 Shale, silty, medium - dark gray, firm - hard, micaceous, non calcareous.

2029 Siltstone interbedded with claystone
Siltstone: argillaceous, red brown - brown, hard, calcareous and dolomitic cemented.
Claystone: medium grey, soft, slightly calcareous, micaceous.

2041 Siltstone interbedded with shale/claystone,
Sandstone: light grey, clear, very fine - fine, well sorted, subrounded - rounded, very loose, poor - fair porosity.
Shale/claystone: silty, medium - dark grey, soft - firm, micaceous, slightly calcareous.

2057 Shale/claystone, silty, medium - dark grey, soft -firm, micaceous, slightly calcareous.

2071 Sandstone, light grey, clear - white, very fine - fine, moderate - well sorted, subangular - subrounded, loose, micaceous, non calcareous, good visible porosity.

2089.5 Shale interbedded with siltstone,
Shale: brown - red brown, firm, micaceous, very calcareous.
Siltstone: sandy, light grey - green grey, micaceous. calcareous.

2100.5 Shale, silty, light - medium grey, firm, micromicaceous, non calcareous.

2103.5 Siltstone, argillaceous, light - medium grey, firm - hard, micromicaceous, non calcareous.

2115 Siltstone, argillaceous, brown - red brown, hard, micaceous, very calcareous.

2132.5 Siltstone, argillaceous, brown - red brown, hard, micaceous, very calcareous.

2139 LOST

STATOIL-NORSK HYDRO-ESSO

Saga

Saga Petroleum a.s.

COMPOSITE WELL LOG

WELL 6609/10-1 SCALE 1: 500

COUNTRY	NORWAY	T.A. DATE	AUG 31st 1993
AREA	TROMS	COMPLETION STATUS	Plugged and abandoned as a dry hole
OPERATOR	Saga PETROLEUM A.S.	RIG	TREASURE SAGA
LONGITUDE	18E	LOCATION COORDINATES	
DATE SPUDDED	AUG 31st 1993	LATITUDE	66 14' 43.07"N
RIG RELEASED	AUG 31st 1993	LONGITUDE	18 13' 18.92"E

ELEVATIONS	
RKB-MEAN SEA LEVEL	25m
RKB-SEA FLOOR	358m
WATER DEPTH	333m
TOTAL DEPTH	2185m Drillers depth 2183m Loggers depth

DRILLING CONTRACTOR: M. MOLAUGHLIN

MUD LOGGING SERVICE: EXPLORATION LOGGING

CASING	HOLE SIZE(in)	HOLE SIZE	INTERVAL (meters)
30"	410	36"	358-410
20"	655	26"	410-655
13 3/8"	1041	17 1/2"	655-1041

LOCATION MAP



WIRELINE LOGS



BOTTOM HOLE ASSEMBLY

BIT	DRILLED	HOURS	WOB	RPM	PUMP PRESS	FLOW RATE
1	36"	1	5	60	1000	1000
2	26"	1	5	60	1000	1000
3	17 1/2"	1	5	60	1000	1000

DATUM: 0 (MSL) RIG: TREASURE SAGA DATE: 15th 10th



WIRELINE LOGS

LITHOLOGIC DESCRIPTION

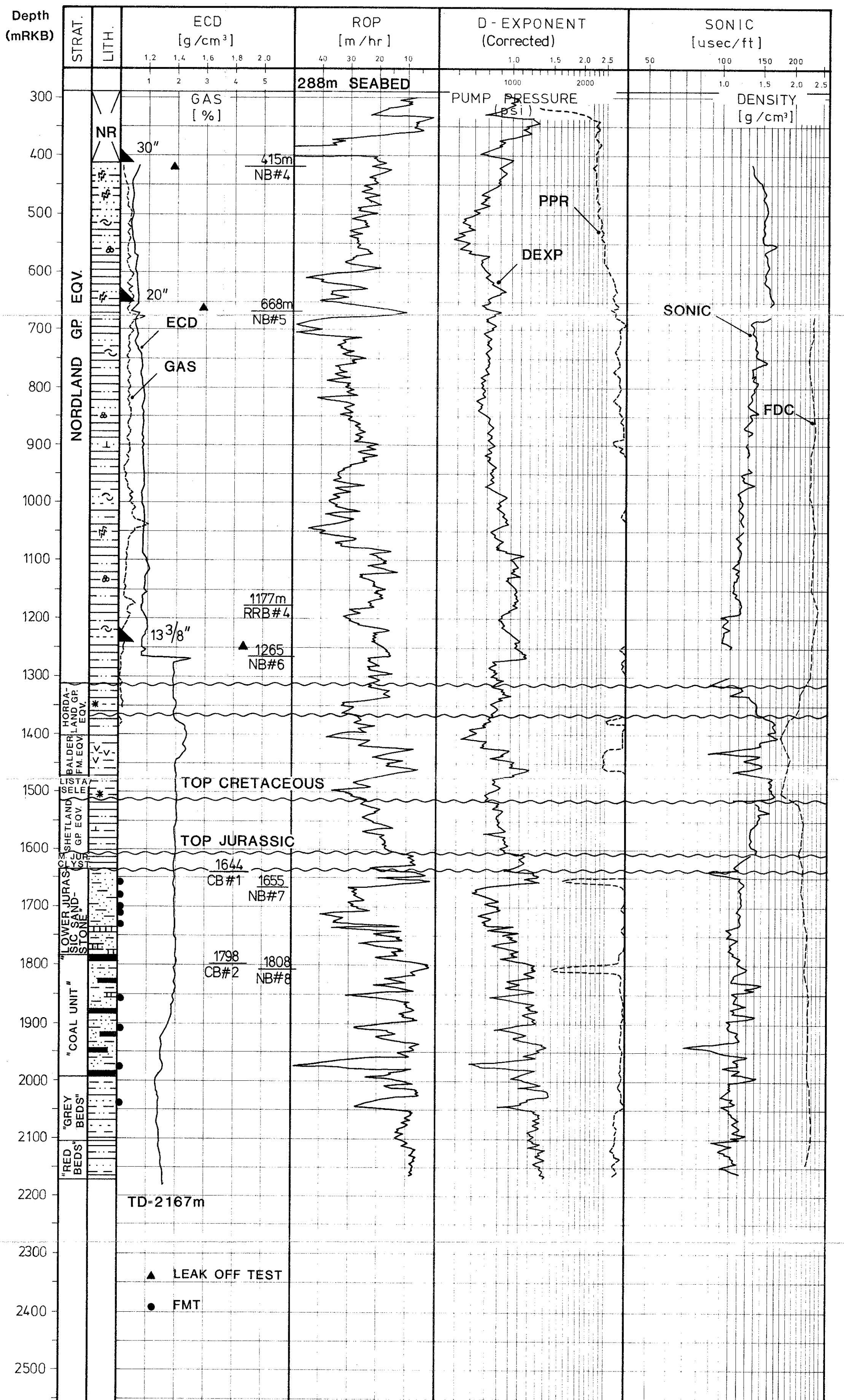


Saga Petroleum a.s.

Enclosure II

Well 6609/10-1

FORMATION PRESSURE EVALUATION SHEET



4174/05-8890331/F

SAGA PETROLEUM A.S. ENCLOSURE III B

SPECIAL CORE DESCRIPTION

FIELD / BLOCK : 6609/10
CORE NO. : 1
FORM : L. JURASSIC SANDSTONE

AREA : TRÆNA
WELL : 6609/10-1
INTERVAL : 1644-1655,5m

SCALE : 1:25
DATE : 10/1-84
GEOLOGIST : B.Ree,H.O. Augedal

4174/05-8903411

GEOLOGICAL SYMBOLS

LITHOLOGY:
- SANDSTONE
- SILTSTONE
- CLAYSTONE
- SHALE
- CONGLOMERATE
- BRECCIA
- LIMESTONE
- DOLOMITE, ANKERITE
- CHALK
- MARL
- SALT
- ANHYDRITE
- VOLCANICS
- COAL
- METAMORPHIC BASEMENT
- GNEOUS BASEMENT

MINERALOGY:
- CALCITE CEMENT
- DOLOMITE / ANKERITE CEMENT
- SIDERITE
- GLAUCONITE
- C CARBONACEOUS
- CHERT
- K KAOLINITE
- M MICA
- P PYRITE

BIOGENIC STRUCTURES:
- BIOTURBATION IN GENERAL
- BURROWS
- PLANT ROOTS

BOUNDARIES:
- EROSIVE UNCONFORMITY
- ABRUPT NON EROSIVE
- TRANSITIONAL

FOSSILS
- MACROFOSSILS IN GENERAL
- MICROFOSSILS IN GENERAL
- SHELL DEBRIS

FRACTURES AND FAULTS:
- FAULT IN GENERAL
- CLOSED JOINTS
- OPEN JOINTS

REMARKS:
W Carbonized wood

SEDIMENTARY STRUCTURES:
- PARALLEL LAMINATED
- WAVY / LAMINATED BEDDING
- FLASER BEDDING
- LENTICULAR BEDDING
- CROSS BEDDING (LARGE SCALE IN GENERAL)
- THROUGH CROSSBEDDING
- CROSS BEDDING (SMALL SCALE)
- HERRING BONE CROSS BEDDING
- RIPPLES IN GENERAL
- CONVOLUTED BEDDING
- DESICCATION CRACKS
- LOAD CASTS
- SLUMPING

CORE | MAIN ENVIRONMENT | SUB ENVIRONMENT | CORE DEPTH | LITHOLOGY, GRAIN SIZE AND SEDIMENTARY STRUCTURES (CLAY, SILT, SAND: VF F M CRS VCRS, GRANULE, PEBBLE) | SEQUENCE | SEDIMENTARY STRUCTURES: MECHANICAL STRATIFICATION (MASSIVE, BEDDED, LAMINATED, GRADED, IRR.), LENTICULAR, CROSS BEDDED, LOW ANGLE 10°-20°, HIGH ANGLE >20°, RIPPLE MARKS, CHEMICAL CONCRETIONS, NODULES etc., BIOGENIC STRUCTURES, TRAILS etc. | SORTING: VERY WELL, WELL, MODERATE, POOR | CONSTITUENTS: CARBONATE CALCITE(FOSSILS) DOLOMITE(ANKERITE), GLAUCONITE, MICA CHLORITE (K MISCH) (M), PYRITE, ROOT/ORGANIC FRAGMENTS, INTERSTITIAL KAOLINITE (K), CARBONACEOUS MATERIAL (M), CARBONACEOUS MATERIAL (LAMINATED), PALEODATA / FOSSILS, COLOR, ZONES WITH CORE DAMAGE | REMARKS

1644
1645
1646
1647
1648
1649
1650
1651
1652
1653
1654
1655

1 INTERTIDAL
MIXED TIDAL FLAT
SANDY TIDAL FLAT

Start of core # 1: 1644 m
Correction factor: 0 m
Sorting is evaluated on an average to be moderate - poor

Laminated very fine waxy (and lenticular) sand and silt in interval 1644 - 1652.5 m

Microfaults

Climbing ripples

Scattered coal fragments

Water escape structures

Syn sedimentary slumping

Coal fragments

End of core # 1: 1655.5 m

SAGA PETROLEUM A.S.

ENCLOSURE III A

SPECIAL CORE DESCRIPTION

FIELD / BLOCK: 6609/10
CORE NO.: 2
FORM: COAL UNIT

AREA: TRÆNA
WELL: 6609/10-1
INTERVAL: 1798-1807,5m

SCALE: 1 : 25
DATE: 10/1-84
GEOLOGIST: B.Ree,H.O.Augedal

4174/05-889033/

GEOLOGICAL SYMBOLS

LITHOLOGY:
- SANDSTONE
- SILTSTONE
- CLAYSTONE
- SHALE
- CONGLOMERATE
- BRECCIA
- LIMESTONE
- DOLOMITE ANKERITE
- CHALK
- MARL
- SALT
- ANHYDRITE
- VOLCANICS
- COAL
- METAMORPHIC BASEMENT
- IGNEOUS BASEMENT

MINERALOGY:
- CALCITE CEMENT
- DOLOMITE / ANKERITE CEMENT
- SIDERITE
- GLAUCONITE
- C CARBONACEOUS
- CHERT
- K KAOLINITE
- M MICA
- P PYRITE

BIOGENIC STRUCTURES:
- BIOTURBATION IN GENERAL
- BURROWS
- PLANT ROOTS

BOUNDARIES:
- EROSIVE/ UNCONFORMITY
- ABRUPT NON EROSIVE
- TRANSITIONAL

FOSSILS:
- MACROFOSSILS IN GENERAL
- MICROFOSSILS IN GENERAL
- SHELL DEBRIS

FRACTURES AND FAULTS:
- FAULT IN GENERAL
- CLOSED JOINTS
- OPEN JOINTS

SEDIMENTARY STRUCTURES:
- PARALLEL LAMINATED
- WAVY / LAMINATED BEDDING
- FLASER BEDDING
- LENTICULAR BEDDING
- CROSS BEDDING (LARGE SCALE IN GENERAL)
- THROUGH CROSSBEDDING
- CROSS BEDDING (SMALL SCALE)
- HERRING BONE CROSS BEDDING
- RIPPLES IN GENERAL
- CONVOLUTED BEDDING
- DESICCATION CRACKS
- LOAD CASTS
- SLUMPING

REMARKS:
W Carbonized wood

CORE | MAIN ENVIRONMENT | SUB ENVIRONMENT | CORE DEPTH | LITHOLOGY, GRAIN SIZE AND SEDIMENTARY STRUCTURES (CLAY, SILT, SAND: VF F M CRS V.CRS, GRANULE, PEBBLE; Φ: 8 4 3 2 1 0 -1 -2 -6) | SEQUENCE | SEDIMENTARY STRUCTURES: MECHANICAL STRATIFICATION (MASSIVE BEDDED, LAMINATED, GRADED (B,L,I), FLASER and LENTICULAR, CROSS BEDDED, CONV. ANGLE LOW < 20°, HIGH ANGLE > 20°, RIPPLE MARKS), CHEMICAL CONCRETIONS, NODULES etc., BURROWS, BIOTURB. etc. | SORTING: VERY WELL, WELL, MODERATE, POOR | CONSTITUENTS: CARBONATE CALCITE(C)SIDS(S) DOL.(D) ANKERITE(A), GLAUCONITE, MICA DETRITAL (M) CHLORITE (C), INTRAFORMATIONAL PEBBLES, INTERSTITIAL KAOLINITE (K), CLAY, CARBONACEOUS MATTER (M) CARBONIZED WOOD (W), PYRITE | PALEODATA / FOSSILS | COLOR | SAMPLE NUMBER | REMARKS

2 | FLOODPLAIN | OVERBANK MUD AND CREVASSE SPLAY SAND

1798 1799 1800 1801 1802 1803 1804 1805 1806 1807

Start of core # 2: 1798 m
Correction factor: 0 m

Vadose pisolithes?
Siderite nodules?

Minor laminations with very fine sands and coal fragments in a claystone

End of core # 2: 1807.5 m

4174/05-8903314

ENCLOSURE IV

saga

C.P.I.

COMPUTER PROCESSED INTERPRETATION

WELL: 6609/10-1

INTERVAL: 1632 - 1975 mRKB

INPUTPARAMETERS

RW	=	0.11 OHM AT 115 F
RHOM	=	2.68 G/CC
GRSST	=	60 API
GRSH	=	140 API
M	=	1.8
N	=	2.0
RSH	=	2.0 OHM
RHOSH	=	2.35 G/CC
PHINSH	=	42 L.P.U

