

HQPRESSURE SPECIFICATIONS

Revision 2.0, May 1996

1) DEFINITIONS

Operator	The oil company operating the license.
Service Company	The logging company performing log acquisition at well site.
Contractor:	A third party company given the task of capture pressure data, and supplying the quality controlled HQPRESS data base.
Well	The well drilled under one drilling permit, which can consist of multiple tracks. Reference is made to the publication: NPD-contribution No 33, June 1992.
Completion log	The Operator's paper log showing well-logs, geological zones, lithology etc.
Field Print	Term used to denote log print released on location or from the Service Company's computing centre when correction to the data is needed.
RFT/FMT	Generic name used for wireline formation tester log instruments, including modern "modular" testing tools (i.e. MDT and
Tape	Standard 9 track tape.
Cassette	8mm Cassette (Unix tar format).

2) WORK OVERVIEW - OBJECTIVE

The HQPRESSURE (High Quality Pressure) Data Base project aims to capture formation pressures and associated data for all exploration wells drilled on the Norwegian Continental Shelf, including:

- RFT/FMT pressure survey data
- DST production test data
- RFT/FMT sample test data

In these specifications, RFT/FMT sampling is referred to, and treated as a "production test".

The Leak Off Test (LOT), Formation Integrity Tests (FIT), Mini-Frac (LOTmin), "Lost Circulation" and "Kick" data will also be captured, in addition to the Operator's

interpreted Pore Pressure, Fracture Gradient and Overburden Gradient Profiles (hereinafter called “PP/FG/OB Profile”).

The RFT/FMT Field Prints and the Operator’s interpreted “PP/FG/OB Profile” plot will be optically scanned.

The RFT/FMT digital tapes will be “dumped” to disk and copied to Cassette using Unix Tar format.

It should be noted that pressure versus time processing is not part of the requirement.

Pressures measured using Production Logging Tools (PLT) will not be captured.

3) GENERAL SPECIFICATIONS

3.1) Reference

All pressure data shall be referenced to mdRKB (measured depth RKB).

TVD depths, when available, shall be referenced to TVDMSL (Mean Sea Level)

3.2) Units and Conversion

All pressures, gradients, temperatures, densities, flow-rates and depths will be captured and made available in the units originally recorded and presented in the source reports. The data will, however, be converted to common units as follows:

Depth units:	m. (meters)
Pressures:	BAR absolute
Density & Gradients:	g/cc
Temperature:	°C
Flow-rate:	m ³ / day

If no TVD depth references are reported by the Operator or the Service Company as part of the pressure survey data, the Contractor will not be required to add this information using other sources.

4) PRESSURE DATA FROM RFT/FMT

4.1) Data Source

A code (RFT_DATA_SOURCE) shall be used to identify from which source the pressure data has been obtained. The data capture should be done in the most efficient manner and from sources most accessible. In the case of pressure data from RFT/FMT, this might be from the summary “table” shown in the Operator’s Final Well Report or the “table” shown on the RFT Field Print. The

data presented in such “tables” may not be rigorously checked against the recorded “raw data” (i.e. the digital pressure v.s. time plots shown on the Field Print)

Only in the event that no pressure summary “tables” are available will data be extracted from the “raw” pressure v.s. time records shown on the RFT/FMT log.

RFT_DATA_SOURCE 1 = “Table” shown in Operator’s Final Well Report/
Discovery Report / Completion Report.
2 = Operators Completion Log
3 = “Table” shown on Field Print
4 = Pressure v.s. time records on Field Print
5 = QC’ed and updated 3rd party data (i.e. from OD
Ilgil database)
6 = Other, (Specify in comments)

4.2) Temperature Correction

In some instances pressure is presented without being calibrated or corrected for temperature effects. The Contractor will correct the pressure according to the calibration / temperature correction charts presented on the RFT/FMT field print.

A code RFT_TEMP_CORR is used to show whether or not the original pressure data has been temperature corrected.

4.3) Depth Correction

Depth corrections of RFT/FMT surveys are normally not required. Only in the event that depth discrepancies have explicitly been reported (for example in the “Remark Section” or in “Final Well Report”) should this depth discrepancy be corrected for.

When there is evidence that the distance between the Gauge and the Measuring Point (Snorkel) has not been accounted for, the Contractor will make proper corrections to the recorded pressure. (The RFT_DEPTH_CORR record will tell when contractor has made corrections.)

4.4) Comments and Remarks

Some of the data is made available as digital “codes” (i.e. Tight= 1) since some commercial software analysis packages do not easily handle “alpha-numerical” characters.

4.4.1) The Contractor will not be required to analyse the result to judge the quality of each pressure test. The Contractor will however capture this

information when made available from the Operator and/or Service Company. In order to maintain consistency, the Contractor may need to modify the information using the following codes:

RFT_P_COMMENT 0 = L (Lost Seal or Tool mechanical problems)
 1 = T (Tight)
 2 = F (Fair permeability)
 3 = G (Good Permeability)
 4 = E (Excellent Permeability)
 5 = U (Uncertain quality)
 6 = S (Supercharge)
 7 = I (Incomplete test, pressure still increases
 at the end of test.)

This information is reported in both digital code and ASCII form as RFT_P_COMMENT_DIG and RFT_P_COMMENT_ASCII records.

4.4.2) In addition to the basic data (i.e. Company, Date, Run No. etc.) given in the RFT/FMT Field Print header, the following information shall be captured:

- Mud Density (RFT_MUD_DENSITY) as shown on the RFT/FMT Field Print.
- A complete record of the “remark section”. (RFT_REM_SECTION)

4.4.3) RFT_GEN_COMMENTS. In this General Comments section, the Contractor, reports all relevant information pertaining to the data set. Deviation from standard processing procedures made by Contractor are also detailed.

4.5) Quality Checks

4.5.1) If pressure summary “tables” are available from both the Operator (i.e. Final well Report) and the Service Company (i.e. Field Print), then the Operators data should be considered the primary source of information. Both tables must, however, be checked against each other and discrepancies particular to depths and formation pressures, reported in the “RFT_GEN_COMMENTS” section.

The number of RFT/FMT pressure tests reported by the Operator should normally be equal to the number shown on the Field Print. Any missing RFT/FMT tests must be added to the Operators data.

4.5.2) A plot of pressure (BARA) versus depth (TVDMSL or mdRKB) will be produced for each well. Comparison with similar plots made available from the Service Company or Operator will be made and discrepancies accounted for and/or reported under the RFT_GEN_COMMENTS section.

4.6) Permeability / Mobility

Only when permeability and mobility results are presented by the Operator or the Service Company, shall this data be captured. These data types are marked with (*) in the Appendix section.

5) PRODUCTION TEST DATA FROM DST & RFT/FMT

The pressures and associated data shall be captured for all DST's and wireline RFT/FMT sample tests.

Only the main test result will be captured. It is beyond the scope of this project to capture the finer details associated with a complete production test sequence.

Minimum Requirement:

- Perforation interval
- Formation Pressure (LBU)
- Formation Pressure (Extrapolated)
- Temperature
- Reference Depth for reported Pressures
- Brief Comment production test

Appendix 1 and Table 1 shows the requirements in more details

Information regarding the RFT/FMT fluid sample test (i.e. size tank, problems encountered etc.) are reported as TST_RFT_SAMPLE_COMMENT.

6) LOT, FIT, Mini-Frac, "Lost Circulation", "Kick" & Mud Weight

The requirement for LOT, FIT, Mini-Frac, "Lost Circulation" and "Kick" data collection is detailed in Appendix 1 and Table 1.

The Mud Weight reported on the "Daily Drilling Reports" (also summarized in the Final Well Report) shall be part of the HQPRESS database.

7) Pore-Pressure / Fracture Pressure / Overburden Gradient Data.

The operators present their prognosis for pore pressure and overburden gradient prior to drilling. This "PP/FG/OB Profile" is often presented on a one-page graph. These data is often updated after drilling and presented in the Final Well report.

The pore pressure, mud weight and overburden gradients shown on the “PP/FG/OB Profile” plot shall be digitized and made available as digital records. Minimum digitizing resolution (sample rate) is 1 data sample per 100 m.

It shall be noted whether the curves represent *prognosis* before drilling or has been *updated* after the tests/drilling have been completed.

The “PP/FG/OB Profile” plot shall, in addition, be optically scanned.

8) OPTICAL SCAN

The RFT/FMT Field Print and the Operator’s interpreted “PP/FG/OB Profile” plot shall be optically scanned.

The optical scans are made with a minimum resolution of 200 dpi, two gray tones, black & white. (Note: a higher than 200 dpi scan resolution might be necessary for optimum Header and Calibration legibility). In the cases where legibility of the scan can not be obtained due to poor quality Field Print, this shall be registered and reported under the RFT_GEN_COMMENTS section. Special attention is drawn to the header and calibration records and its legibility.

9) RFT/FMT FIELD TAPES

The Service Companies typically use special purpose tape format when recording the RFT/FMT data to tape. The Contractor is not required to decode and process these RFT/FMT field tapes. The tapes shall however be “dumped” to disk and copied to Cassettes using Unix tar format for future reference and archival.

10) THE PRODUCT

10.1) HQPRESS data will be supplied using Microsoft Excel version 5.0 or newer. One separate file for each well.

The data shall be presented in a consistent and pre-described manner making data transfer to other software applications possible.

All data records detailed in Appendix 1 shall be captured whenever available.

Example of possible data format and layout is shown in enclosed table, Table 1.

The table show only the data after conversion to common units. A separate table is used to show the data in the units originally reported.

- 10.2) The optical scan of the RFT/FMT Field Prints and the Operator's interpreted "*PP/FG/OB Profile*" plots are supplied on 8 mm Cassette using Unix Tar format.
- 10.3) The "dump" of the RFT/FMT digital tapes is supplied on 8 mm Cassette using Unix Tar format.

APPENDIX 1

GENERAL HEADER RECORDS

COMPANY	Operator Name
WELL	Well Name
KB	Distance (in units: meters) between "Log Measured From" (i.e. RKB) and Permanent Datum (i.e. MSL, mean sea level)

PRESSURE DATA FROM RFT/FMT

HEADER

RFT_SERV_CO	Service Company
RFT_SERV	Service Name (i.e. RFT, MDT MFT, etc.)
RFT_DATE	Date Logging
RFT_RUN_NO	RFT Run Number
RFT_STRGAUGE_NO SERIAL	Gauge serial no., Strain.
RFT_STRGAUGE_NO SERIES	Gauge series no., Strain
RFT_HPGAUGE_NO SERIAL	Gauge serial no., HP
RFT_HPGAUGE_NO SERIES	Gauge series no., HP
RFT_STRGAUGE REF_PRESS	Reference Pressure Strain Gauge, 1= Absolute, 2= Gauge
RFT_HPGAUGE REF_PRESS	Reference Pressure HP Gauge, 1= Absolute, 2= Gauge
RFT_UNITS_FIELD RECORD	1=BAR, 2=PSI.....
RFT_MUD_DENSITY	Mud Density (in units: g/cc) as reported in Log Header
RFT_DATA_SOURCE	Code used to indicate from where pressure date is obtained
RFT_TEMP_CORR	Flag (<i>Yes/No</i>) telling when contractor has temperature corrected the pressure data.
RFT_DEPTH_CORR	Flag (<i>Yes/No</i>) telling when contractor has accounted for the depth differences between snorkel and pressure gauge.
RFT_REM_SECTION	All information in "Field Print Log Header Remark Section"
RFT_GEN_COMMENTS	Contractors General Comments

DIGITAL RECORDS - PER PRESSURE TEST

RFT_TEST_NO	Test Number
RFT_FILE_NO	Corresponding Tape/Film file no.
RFT_MDRKB_RFT	Measured Depth (MDRKB)
RFT_TVDSS_RFT	Depth TVD, Mean Sea Level
RFT_TVDRKB_RFT	Depth TVD, Rotary Kelly Bush

STRAIN GAUGE

RFT_SP_HYD_B	Hydrostatic Pressure Before
RFT_SP_HYD_A	Hydrostatic Pressure After
RFT_SP_RES_LBU	Last reading, Build-up pressure
RFT_SP_RES_EXP	Formation Pressure (Extrapolated)
RFT_ST_RES	Formation Temperature

HP GAUGE

RFT_HP_HYD_B	Hydrostatic Pressure Before
RFT_HP_HYD_A	Hydrostatic Pressure After
RFT_HP_RES_LBU	Last reading Build-up pressure
RFT_HP_RES_EXP	Formation Pressure (Extrapolated)
RFT_HT_RES	Formation Temperature
RFT_OFA	1=Gas, 2=Oil, 3=Water, Code for "optical fluid analyzer"
RFT_P_COMMENT_DIG	Digital record of Pre-Test Remarks (see sect. 4)
RFT_P_COMMENT_ASCII	ASCII record Pre-Test Remarks (see section 4)
<i>PERMEABILITY/MOBILITY</i>	
* RFT_P_FLOW	Pretest Flowing Pressure
* RFT_TIME_BU	Time Build-up
* RFT_VOL_PRETEST	Volume Pretest Chamber.
* RFT_PERM_INDEX	Permeability/Mobility Index

PRODUCTION TEST DATA FROM DST & RFT/FMT

HEADER

TST_SERV_CO	Service Company
TST_TYPE	Type Test (i.e. DST or RFT/FMT sample)
TST_DATO	Test Dato
TST_GAUGE_TYPE	Gauge Type
TST_RUN_NO	Run No. (i.e. RFT/FMT)
TST_SOURCE	Data Source
TST_CHOKE_SIZE	DST choke size
TST_COMMENT	Comments, (i.e. quality, problems, etc)
TST_RFT_SMPL_COMMENT	RFT/FMT Fluid Sample Remarks

DIGITAL RECORDS - PER PRODUCTION TEST

TST_NO	Test Number
TST_PERF_TOP	Top perforation interval
TST_PERF_INT_BOT	Bottom perforation Interval
TST_P_RES_LBU	Formation Pressure (Last build up) from DST
TST_P_RES_EXP	Formation Pressure (Extrapolated) from DST
TST_T_RES	Temperature
TST_REF_DEPT	Reference Depth for Pressure and Temperature
TST_GAS_RATE	Gas flow rate
TST_COND_RATE	Condensate flow rate
TST_OIL_RATE	Oil flow rate
TST_WATER_RATE	Water flow rate
TST_HIGH_RATE	Highest total flow rate
TST_DURATION	Test Duration
TST_GAS_DEN_S	Gas Density, Surface
TST_COND_DEN_S	Condensate Density, Surface
TST_OIL_DEN_S	Oil Density, Surface
TST_WATER_DEN_S	Water Density, Surface
TST_WATER_SALIN	Water salinity
TST_GAS_DEN_R	Gas Density, Reservoir

TST_COND_DEN_R	Condensate Density, Reservoir
TST_OIL_DEN_R	Oil Density, Reservoir
TST_WATER_DEN_R	Water Density, Reservoir

LOT, FIT, Minifrac, "Lost Circulation" "Kick" & Mud Weight Data

LOT_SOURCE	Data Source
LOT_DEPTH	Depth
LOT_GRADIENT	Gradient
LOT_PRESSURE	Measured Pressure
LOT_MW	Mud weight measured during LOT
LOT_COMMENT	Comment
FIT_SOURCE	Data Source
FIT_DEPTH	Depth
FIT_GRADIENT	Gradient
FIT_PRESSURE	Measured Pressure
FIT_MW	Mud weight measured during FIT
FIT_COMMENT	Comment
MIN_FRAC_SOURCE	Data Source
MIN_FRAC_DEPTH	Depth
MIN_FRAC_GRADIENT	Gradient
MIN_FRAC_PRESSURE	Measured Pressure
MIN_MW	Mud weight measured during MIN
MIN_FRAC_COMMENT	Comment
LCIRC_SOURCE	Data Source
LCIRC_DEPTH	Depth
LCIRC_VOLUME	Volume mud lost
LCIRC_MW	Mud weight measured during "Lost Circulation"
LCIRC_COMMENT	Comment
KICK_SOURCE	Data Source
KICK_DEPTH	Depth
KICK_SIDPP	Shut-in drillpipe pressure at surface during "Kick"
KICK_VOLUME	Volume gained ("produced")
KICK_MW	Mud weight measured during "Kick"
KICK_PRESSURE	Estimated pore pressure (SIDPP + MW)
KICK_COMMENT	Comment
MUD_SOURCE	Depth
MUD_DEPTH	Depth
MUD_DENSITY	Mud Weight
MUD_SOURCE	Data Source

Pore Pressure / Fracture Gradient / Overburden Gradient Data From Operator's Interpreted Data

PPFGOG_SOURCE	Data Source
PPFGOG_TYPE	Prognosis or Updated
PPFGOG_PP_METHOD	Method used estimated pore pressure (i.e. "depth", "equivalent", "d'exponent")

PPFGOG_DEPTH
PPFGOG_PP_GRAD
PPFGOG_FG_GRAD
PPFGOG_MW_GRAD
PPFGOG_OB_GRAD
PPFGOG_COMMENT

Depth
Digitized Pore Pressure Gradient
Digitized Fracture Gradient
Digitized Mud Weight Gradient
Digitized Overburden Gradient
Comment.

