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DIRECTORATE**

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Guidelines for reporting of well data to authorities after completion (Blue Book)



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Prepared by	
Norwegian Offshore Directorate	
Contact information	Contacts
E-mail: postboks@sodir.no Telephone: +47 51 87 60 00 Address: P.O. Box 600, 4003 Stavanger Visiting address: Professor Olav Hanssens vei 10, 4003 Stavanger	Elin Aabø



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1. Introduction

Pursuant to the [Regulations to Act relating to petroleum activities](#) ("Petroleum Regulations") Section 46, the [Regulations relating to resource management in the petroleum activities](#), ("Resource Management Regulations") Section 30 and Section 31 and the [Regulations relating to materials and documentation in connection with surveys for and utilisation of subsea reservoirs on the continental shelf to store CO₂](#) ("CO₂ Documentation Regulations") Section 28 and Section 29, the licensees have a duty to report well data to the authorities. The majority of the data shall be reported to the Norwegian Offshore Directorate (NOD) through the Diskos National Data Repository (NDR).

The main objective of these guidelines is to clarify and provide additional information about the reporting requirements as referenced above.

Details on file names etc of the reported digital files are specified in [Table A-1](#).

When the data is reported to the NOD, the data will be available for use by the NOD and the licensee(s) according to entitlements in the Diskos NDR. The reported data will be kept confidential according to Section 85 of the Petroleum Regulations and Section 11-20 of the Regulations relating to exploitation of subsea reservoirs on the continental shelf for storage of CO₂ and relating to transportation of CO₂ on the continental shelf ("CO₂ Storage Regulations"). After the confidentiality period has expired, the data will be released by the NOD.

It is a basic requirement that all items contained in the Diskos NDR are clearly identified and are of known quality. Therefore, these guidelines are designed so that reported data are structured and labeled in a way that reflects their position in the Diskos NDR.

1.1. Regulatory requirements regarding delivery

The Diskos NDR is operated on behalf of the NOD by a Diskos Database Operator.

Data delivered to the Diskos NDR in accordance with the reporting requirements shall be in compliance with regulatory requirements for data delivery to the NOD.

It is expected that most operational issues encountered in fulfilling the regulatory requirements will be resolved by the licensee or their authorised representative and the Diskos Database Operator.

The licensee is responsible for ensuring that data are delivered to the Diskos NDR within the required timeframes and that they are of appropriate quality and completeness. There will be no formal 'approval' process involving the NOD. Any deviations from these regulations must be agreed between the NOD and the licensee.

These guidelines can never provide an exhaustive list of all conceivable geological and technical data types that are subject to the reporting requirements, but they constitute a detailed framework for the reporting of such data. The aim is to capture and store all useful data delivered to the operator from service companies, in addition to data generated by the operator (such as edited and, to a certain extent, interpreted data).



Interpreted data should not be reported in the same file as the original raw data due to data release mechanisms.

1.2. Reporting guideline principles

Throughout these guidelines the emphasis is on the use of 'good practice' rather than detailed and prescriptive processes. In other words, the focus is on the outcome of the process rather than its details. However, this in no way reduces the requirement for reporting high-quality datasets.

The licensee is responsible for all data deliveries, also in cases where the creator¹ of the data is a 3rd party company. All associated parameters and information (metadata) should be added to the data sets produced. If possible, this should be encoded, with attributes when appropriate, within an industry standard format. If this is not possible, then additional "Information Files" must be created which support the data (cf. Table A-1 for details).

All log data curves reported should include a complete set of attribute information. These attributes and their associated reference values are being developed for raw well-log data and are being published by the Energistics² and PPDM³ standards bodies.

The aim is to create data sets together with associated information that can be used to populate the Diskos NDR with as little intervention as possible, apart from the usual operational checks and QC processes.

1.3. General requirements for all reporting

All locations/positions must be referenced to the ED50 including the EPSG-Code used.
See [IOGT-report 373-07-02](#)

Reporting applies to all wellbores covered by the petroleum regulations and storage of CO₂ storage regulations.

Data reporting dates:

1. For data collected up to the time that drilling and logging are completed⁴, reporting must take place as soon as possible and no later than six (6) months after this date.
2. Data collected after that date (for example, production-log surveys or special core analysis data) must be reported no later than six (6) months after data has become available for the owner. These are maximum reporting periods – all data and reports are to be submitted as soon as these are made available to the operator.
3. In the event that the wellbore completion or abandonment is delayed, this must not delay reporting of other data. The additional information must be provided in a separate report when available (for example testing or delayed operation activity to hand over well

¹ This could be an acquisition contractor, a value-add interpreter or a contractor collating data sets for delivery to the NOD.

² www.energistics.org

³ PPDM – Professional Petroleum Data Management Association

⁴ Date when the drilling and logging activity is completed. For an exploration or observation wellbore it is the date when drilling or logging activity is completed. For a development wellbore it is the date when the wellbore is at total depth. A practical approach to this is to use the "Completed date" as noted in the NOD's fact pages.



to production).

4. In the event that reports listed in table A-1 are made on the basis of data from several wells, such reports shall be copied and indexed in Diskos to all wellbores involved. Such reports shall be reported no later than 6 months after they become available to the owner.

Datasets are divided into two main categories:

1. Non-interpreted data
 - Raw data
 - Other non-interpreted data
2. Interpreted data⁵

Different confidentiality periods apply for each of these groups according to Section 85 of the Petroleum Regulations and Section 11-20 of the CO₂ Storage Regulations.

1.4. Guidelines for all reporting to Diskos

- a) Information Files are used to carry information about dataset files such as their content, processing or acquisition parameters, data manipulations, etc. Wherever possible, this type of information should be encapsulated ("headers") within the data files in an industry standard format in such a way that it is readable by the Diskos NDR. However, it is acknowledged that there are only a few industry standards that support the addition of such further information; therefore, separate Information Files should be used (for example, for audit trail information for log-compositing). Table A-1 shows which Information files are mandatory, and in which cases an information file may cover several data files. Use of PDF format files is preferred for Information Files (although ASCII will be accepted for the time being).
- b) A hierarchical folder structure should be used when delivering data to the Diskos Database Operator (cf. Table A-1, column D). All files should be placed within a top-level directory identifying the well. This directory should be named by appending the [official well name](#) to the string "WELL_", but with the slash '/' or SPACE being replaced by an underscore '_' to accommodate directory-naming conventions, e.g. WELL_6506_12-A-1.

The next level in the folder hierarchy will comprise one sub-directory for each wellbore, named by concatenating the string "WB_", and the part of the official wellbore name that follows the mandatory space, and then the permit number. This is a 3 or 4-digit drilling permit number (xxxx) with no leading zeros, and an alphanumeric suffix, e.g. WB_Y1_1234-P1

'P-number' for development wells (xxxx-Pz)

⁵ For more information on which data qualifies as interpreted data, see NODs [Guidelines for Interpreted data](#)



'L-number' for exploration wells (xxxx-Lz)

'G-number' for other wells (xxxx-Gz)

'T-number' for test production (xxxx-Tz)

For more information about registration of wellbores, see [NOD website](#)

The numeric (z) indicates either re-entries or multilateral wellbores. For technical sidetracks the numeric (z) will be the same as the parent wellbore. Throughout this document, xxxx-Pz is used in examples.

The data folder structure is closely linked to the various data types, although a one-to-one relationship between folder and data type does not necessarily exist. The Table A-1 numbering, however, corresponds to the folder structure.

If possible, it is recommended that the data folders should be transmitted to the Diskos Database Operator as they become complete, thus facilitating the timely release of final well data.

Further details on the naming convention are provided in [Appendix A](#) and Table A-1. Also, each individual data set, as outlined in Sections 2 to 5 below, has filename information relevant to the data being reported.

- c) All geological well branches and sidetracks with unique NPDIDs shall be reported from kick-off to TD. For technical sidetracks: Reporting should cover all data that is part of the technical sidetrack, extending from TD backwards to the original kick-off point of the geological sidetrack. The Completion Plot and Completion Report covering the final technical sidetrack, shall be available and searchable on wellbore level and technical sidetrack level
- d) All files shall be clearly marked with the official wellbore name in the file header.
- e) The Norwegian Offshore Directorate standard for well reference shall be used, i.e. the NOD wellbore classification system and the [NOD guidelines for designation of wells and wellbores](#).
- f) Deletion/Replacement of Data. Only final quality-controlled data is to be submitted to the Diskos NDR, i.e. data sets that are described as "Preliminary" should not be reported. Such final data sets must not be deleted. If, however, the operator detects data sets or reports that are incorrect, then corrected versions must be submitted as soon as possible. In such cases the original data sets will be retained. The operator must provide a separate signed information file, 'REPLACEMENT_INF_#.ASC', with the following information:
 - Files to be replaced (including INF-files if any)
 - Reason for replacement ('Not valid' is NOT sufficient)
 - New data file

The new data sets should be numbered according to standard reporting requirements. The replacement information file should be reported in the same folder as the incorrect data and loaded together with the incorrect data to the DDB as information to the end users.

File replacements due to changes in data formats may be accepted for data technical reasons, even though only legal data formats (as stated in Table A-1) will be readability checked by the Diskos Database Operator. In such cases, previous data may be deleted after replacement, but the operator must document why replacement formats were



necessary.

- g) Renaming of wells. In cases where all data in a well must be reloaded, e.g. when changing a wellbore name, it is sufficient to provide a single information file explaining why data has been removed, and the new location. The information file must contain both the previous and the new (correct) wellbore name in an easily identifiable manner, and be reported in the wellbore folder. During loading, this information file will then be propagated to every archive object in the Diskos NDR wellbore data structure
- h) Generally, plots should be reported in mMD, but mTVD-indexed plots may be included additionally.

1.5. Logdata curve specific requirements

- a) Depth reference of all reported log data shall be given in relation to the rotary table drill-floor (DF) or rotary Kelly bushing (RKB) in measured depth (MD). The depth reference (DF or RKB) and its height above mean sea level (MSL) are mandatory information.
- b) Keep original (as recorded by the service company) values of:
 - Depth units: these should be meters for all new data.
 - Sampling rate including high sample rates (so-called fast channels). In other words, no re-sampling should be applied.
 - Curve mnemonics
 - Curve units. However, the use of volume fraction for porosities (including neutron) is recommended.
- c) The null data value shall be the service company standard of -999.25.

2. Raw data

2.1. Well-log data

2.1.1 Content

All raw well-log data recorded from all data acquisition passes in both open and cased-hole sections shall be reported, whether acquired by electric wireline (EWL), MWD/LWD methods (including time/depth based Drilling/Mud data), or associated surface systems (e.g. Mud log data). It should include all data curves as delivered to the oil company by the acquisition contractor.

All appropriate 'API Header' and support attribute information must be completed. See Appendix B-3.1 for details.

No additional editing, filtering, environmental or other corrections are to be applied to the data set delivered from the contractor.

All field prints at 1:200 and / or 1:500 scale (or key print sections) must be reported digitally. See Section 5.0 for further details.



A 'Logging Summary' document must be created for each well. This document shall contain summary information for ALL well-logging operations in the well. The information content is described in Appendix B-3.1. Please refer to the 'LOGGING SUMMARY (Template)' sheet in Table A-1.

2.1.2 Quality

All standard well-site QC procedures are to be applied and any issues that arise should be noted in the 'Remarks' section of the header.

All header data must be completed.

All operational factors that could impact the quality of the acquired data must be captured in the 'Remarks' section of the header. This includes information on borehole conditions, tool calibrations, and items not likely to be captured by other means if DLIS is not used (e.g. equipment numbers).

For the MWD raw composited data (created from individual bit runs) a FULL audit trail showing all operations carried out on data from the original bit runs (edits, shifts, splice points, etc.) must be included as an Information File.

2.1.3 Format and Structure

Please refer to Table A-1 for a listing of the naming, formats and structuring preferred for this data type.

To reduce the number of possible tool string permutations in the file name, the generic tool names in tool strings may be listed alphabetically. Also, since AUX and GR are always part of the tool strings, these could also be omitted, thereby shortening the tool strings. E.g., under these rules, the tool string GR-RES-DEN-NEU-SON-AUX should be rendered DEN-NEU-RES-SON.

The Logging Summary document should be reported in a PDF format file (PDF is preferred, otherwise an ASCII format file) and be called LOGGING_SUMMARY_#.PDF. It should be placed in a directory named WELLBORE_DOCUMENTS. If possible, include original log name from log header.

A strictly sequential file numbering scheme has been introduced, replacing the old standard under which both bit run (for MWD logs) and main/repeat run (for EWL logs) information was contained in the file name. According to the current numbering scheme, all run information must be located in both the associated information file and the logging summary file, thereby improving the detailing and the flexibility of the reporting.

Please note that the logging summary file should be cumulatively generated, i.e. just one (the latest) version of the file is to be stored (LOGGING_SUMMARY_1.PDF), incorporating all logging activities in the well. The previous version must be deleted. The only exception to this rule is in the event of a change in the data reporting contractor.

Further details on file naming are provided in Appendix A.



2.2 Core data

2.2.1 Quality

Any experimental conditions and procedures must be appropriately documented and contained in Information Files.

2.2.2 Content

All conventional core analysis data shall be reported, including porosities, permeabilities, saturations, matrix densities, and descriptive lithology text, as well as core photos (incl. any micrographs), appropriately grouped in convenient data sets.

Special core analysis (SCAL) data shall be reported, usually as a separate data set (since it is generally available much later than conventional core data). SCAL data includes relative permeability, capillary pressure, fluid property, electrical, clay activity, and wettability data.

Other core data such as petrography, sem, clay analysis and acoustic measurements must also be reported

All data shall be referenced on driller's depths, discretely sampled as measured and shall include appropriate core and plug index information.

Core gamma-ray data (continuously sampled) shall also be included.

2.2.3 Format and Structure

Please refer to Table A-1 for a listing of the naming, formats and structuring preferred for this data type.

2.2.4 Core photo

The generally agreed image format for core photo is TIF according to Table A-1. The resolution has to be minimum 9000 pix/m. The format and file names for mandatory reporting must be "open formats" as specified. In addition to the mandatory reporting, extra files in proprietary formats (like CORIMAG) can be reported.

2.3 Geochemical data

2.3.1 Quality

Any experimental conditions and procedures must be appropriately documented and contained in Information Files or in the NOD-GC-95 v.2.0 format if appropriate.

Where possible and appropriate, the analytical quality must be controlled by analyzing established reference samples according to Norwegian Geochemical Standard Samples and the results documented.

Analyses must be carried out according to the most recent version of "The Norwegian Industry Guide to Organic Geochemical Analyses" (NIGOGA; available at <http://www.sodir.no/>).



All geochemical data collected, must be reported according to the NPD-GC-95 v.2.0 data transfer format if possible.

2.3.2 Format and Structure

Please refer to Table A-1 for a listing of the naming, formats and structuring preferred for this data type.

2.4 Wellbore seismic data

2.4.1 Purpose

Wellbore seismic surveys are conducted mainly as a calibration standard for geophysical well logs and surface seismic. In addition, they may also be designed for near wellbore seismic imaging and in-situ seismic property analysis.

The term checkshot survey, or alternatively velocity survey, is used to denote the simplest wellbore seismic survey with the sole purpose of measuring vertical seismic velocities from the surface down to discrete geological layers.

The term VSP survey is now more commonly used and denotes any type of wellbore seismic survey where the full seismic wavefield is recorded and sampled in depth more regularly and denser than a checkshot survey. It can be thus considered as an enhanced modern checkshot survey.

There are different survey geometries for VSP which depend on the relative positioning of seismic sources and receivers. When both sources and receivers are relatively vertical inline then the survey is the well-known zero offset (ZO) VSP - in deviated wells the term normal incidence (NI) is used. When there are significant lateral offsets forming a range of 2D inline offsets then the survey becomes a walkaway (WA) VSP, which is somewhat similar to a 2D surface seismic survey. In the same analogy, the term 3D VSP is used when there is 3D areal coverage.

The naming of the raw datasets for the different survey geometries is listed in Table A-1.

The acquisition method may use wireline, logging while drilling or even permanent sensors in a well.

2.4.2 Content and Quality

The acquisition company's field print or report in PDF format documents the operation, equipment and recording parameters. The Raw Wellbore Seismic dataset shall be reported in fully populated SEGY format with original field records and channels in the headers, and with survey geometry merged.

When a VSP survey is acquired then the Final checkshot dataset is normally delivered by the processing company since it is integrated into the VSP processing workflow. It may also be a composite of survey runs (see 4.4.2 Time-depth-velocity (TZV) data)



2.4.3 Structure

Please refer to Table A-1 for a listing of the naming, formats and structuring preferred for these data types.

2.5 Mudlog data

2.5.1 Content and Quality

All mud, lithology description and hydrocarbon detection, formation fluid evaluation and drilling-dynamics data delivered to the well operator shall be reported. Typical content and structure are described in Appendix B, section 3.3

Where Mudlog data are collected 'mixed' with Formation Evaluation data, they should be separated into 'Mudlog' and 'Raw Well-log' sets. The Raw Well-logs shall be reported as per Section 2.1, the Mudlogs as per this section.

All relevant acquisition parameters (including drilling/surface logging parameters/hookload) and remarks should be included with the data files or in separate Information Files

2.5.2 Structure

Please refer to Table A-1 for a listing of the naming, formats and structuring preferred for this data type.

2.6 Cuttings data

2.6.1 Quality

Any experimental conditions and procedures must be appropriately documented, and contained in Information Files.

2.6.2 Content

Cuttings analysis data shall be reported, as well as cuttings photos and results from measurements (like XFR, XRD, TOC, QEMSCAN, SPECCAM).

2.6.3 Format and Structure

Please refer to Table A-1 for a listing of the naming, formats and structuring preferred for this data type.



2.6.4 Cuttings photo

The generally agreed image format for cuttings photo is TIF or JPEG according to Table A-1. The resolution has to be minimum 9000 pix/m. The format and file names for mandatory reporting must be “open formats” as specified. In addition to the image file, the raw cuttings photo file should also be stored in the DDB.

3 Other non-interpreted data

3.1 Well composite log

3.1.1 Definition

The Composite Log is defined as a set of curves, usually depth-matched and spliced (joined) so that measurements are available over the greatest possible depth interval within a given wellbore. Where necessary, composite curves will be created from different input curves (different contractors or physical measurement methods) spliced together. A deep resistivity curve created from a deep induction and deep laterolog curve would be such an example.

The Composite Log is NOT the graphical 'Composite' or 'Completion' Log that is created at the end of most wells showing, for example, log curves, formation tops, cored intervals, DST intervals, etc. This is reported graphically as a separate item (cf. Table A-1). The curves presented on this graphical Log are ideally the same as those in the digitally reported Composite Log, but this is not a requirement.

3.1.2 Purpose

The main purpose of this Composite Log is to provide quality, 'full-depth-range' well-log data to a wide range of E&P technical users. Typical usage would be for geological correlation.

It is recognized that other, more 'specialized' curves will also be processed at the same time as those contained in the Composite Log. These should be included in the 'Petrophysical Composite' described in Section 3.2.

Note that composited (and usually environmentally corrected) data prepared specifically for interpretation usage will be found in the 'Petrophysical Interpretation INPUT' data set detailed in Section 4.1.

3.1.3 Quality

The Composite is prepared to a standard that will allow reliable correlation work to be carried out. This means the removal of any artifacts that could cause false correlations and includes cycle-skip removal and a depth-matching accuracy appropriate to the geological formations.

For detailed guidelines, refer to the previous Reporting Requirements: (See Appendix E). The key points from these guidelines are summarized below (see section below entitled 'Guidelines for Compositing').

All work carried out must be documented in an Audit Trail that must be supplied as an Information File. It shall contain all edits, depth shifts, and splice depths applied, as well as any



comments on data quality.

3.1.4 Content

The Composite Log should contain all the primary measurements made in a given well/wellbore. Examples of primary measurements and associated standard curve names and curve types are listed in Appendix B-3.5.

A primary measurement may be composed of data taken from different physical tools (for example, it could be made from a combination of EWL and MWD measurements)

For each primary measurement, the 'best version' of that data available over a given depth interval should be used and the resultant spliced curve should cover the greatest possible depth interval. All information on edits, depth shifts, splice points or any other data manipulations should be contained in a suitably structured Audit Trail file.

3.1.5 Guidelines for Compositing

- All work should be done using 'good petrophysical practice', using the Reporting Requirement guidelines (See Appendix E) as the minimum standard. Data shall be 'cleaned-up' during the creation of the Composite Log. That is, sonic cycle skips should be removed, corrupted data due to tool sticking should be replaced by other data or (if no other data exist) by null (not zero) values, SP curves should be normalized etc.
- Depth shifting shall be carried out to ensure good correspondence of data curves within and between log runs. Shifting shall be carried out to an accuracy that reflects the underlying geology, typically 0.2 meter.
- For spliced data curves, where the source data is from different depth intervals: if there are sections with invalid or no data, then null (not zero) values should be inserted (no interpolation will be attempted unless the 'data gap' is larger than a geologically insignificant distance, typically up to 1 meter)
- No additional environmental corrections need be applied.
- Curve data recorded before "Pick-up" from the deepest logging run of each service (normally the final logging runs) shall be removed. Care must be taken to ensure the best assessment of valid formation data.
- Curve data recorded in casing for the shallowest logging run for each service shall be removed. Care must be taken to ensure that valid formation data are maintained. Clearly, data valid behind casing, such as GR, should be kept if it is the best version available.

3.1.6 Format and Structure

Please refer to Table A-1 for a listing of the naming, formats and structuring preferred for this data type.

3.2 Additional composited data (petrophysical composite)



3.2.1 Purpose

To preserve 'specialist' composited data curves that may be created for a well but which do not fall into the 'standard' Composite (Section 3.1) or the 'Interpreted Data Input' data sets (described in Section 4.1). These data may have additional work done such as environmental or bed thickness corrections. This data set would normally be used by petrophysicists. Operators must report this data set to preserve value-added work.

3.2.2 Quality

Similar quality guidelines apply to the compositing work as described in Section 3.1.3 above. All work that is carried out must also be documented in an Information File.

Operationally, it is expected that both the 'standard' Composite Log and this 'specialized' Composite Log would normally be created in the same process but split into 2 data sets for reporting purposes. This ensures that the same depth shifting is applied to both data sets – an important quality requirement.

3.2.3 Content

Data that are not part of the 'Composited' or 'Interpretation Input' data sets may include

- additional composited resistivity, NMR or other specialized curve data
- composited data at high sampling rates for thin-bed analysis
- a good guide is to include all 'presentation curves' from log prints (apart from those already included in the 'standard' composite). If quality curves such as tension or cable speed are included (not a requirement), information must be included in the Information Files to show which data curves they refer to.

3.2.4 Format and Structure

Please refer to Table A-1 for a listing of the naming, formats and structuring preferred for this data type.

3.3 Wellbore trajectory data

3.3.1 Purpose

This data set is the final wellbore trajectory, approved by the operator according to the company quality requirements. This should be the primary source of data for all subsequent activities that require wellbore positional information, including the True Vertical Depth. Any interpolation of wellbore positions should be based on this data set. All users, whether oil company or external service providers, should use this as their reference data set.

3.3.2 Content and Quality

The final wellbore trajectory should be based on concatenated individual directional surveys



(magnetic and/or gyro) or parts of surveys acquired along the wellbore including relevant parts in parent wells. This data set should include actual survey data delivered by the well surveying contractor, including supporting information:

- Company and well information (i.e., parent well name, kick-off point, date of extraction)
- Surface and bottom hole reference data (location, measured depth, TVD)
- Well Reference Point (start of survey measurements)
- Trajectory calculation method and depth reference
- Survey program with tool type and error model
- Azimuth reference (Grid North or True North)
- Grid convergence, Map zone and Geo Datum

The data should start at the well reference point, and should not contain dummy points, except:

- Projection to TD, marked as such
- A dummy at surface when inclination is non-zero (curved riser or deviated guide, for example)

Only one set of final wellbore trajectory data should exist. Typical minimum content and structure are described below.

3.3.3 Format and Structure

Please refer to Table A-1 for a listing of the naming, formats and structuring preferred for this data type. Data must be reported in an ASCII structure to be agreed with the NOD.

For each wellbore, only one file shall be delivered, and it should contain Survey name having suffix “Definitive”. Such files show the original survey measurements (measured depth, inclination, and azimuth) and the computed wellbore trajectory data (such as TVD, geographical coordinates, local position offsets, and dogleg severity) at the original survey depths. Scale factor to correct coordinates for earth curvature should be applied.

The internal structure of the file should be divided into two parts. Part 1 shall contain key wellhead attributes along with necessary parameters for interpreting wellbore survey data, including azimuth reference. Part 2 shall provide the survey list.

Part 1

Wellbore name, Survey name, Well header location in UTM and geographical coordinate pairs, UTM zone, reference (KB) elevation MD, water depth, geodetic datum, system datum (e.g. mean sea level), kick-off depth, total depth (mMD), and North reference, survey program etc.

Part 2

Survey listing with the following mandatory columns in the data set:

- Measured depth along borehole (MD)
- Inclination (deviation angle from vertical)
- Azimuth (direction relative to North reference)
- True Vertical Depth (TVD relative to depth reference)
- Local X- and Y- offsets
- Grid coordinates (UTM Northing and Easting)
- Geographical coordinates (latitude and longitude)



- Dogleg severity (degrees/30m)

3.4 Core data

3.4.1 Purpose

Conventional core data matched to the well logs is often used in calibrating petrophysical analyses.

3.4.2 Content

Conventional core data curves shifted to Logger's Depth, including shift information. These should be the same data curves as contained in the raw, un-shifted (Driller's Depth) data set. As with the original raw core data, depths will be discretely sampled (i.e., no re-sampling to regular depth increments should be undertaken). These data will not normally be corrected for overburden pressure. However, if they are corrected, then both the uncorrected and corrected sets must be reported as separate data files with suitable documentation, reported in an information file.

Content and structure, including standard curve type designations and references, are described in Appendix B chapter 3.2, table B-3-2 A and B-3-2 B.

3.4.3 Format and Structure

Please refer to Table A-1 for a listing of the naming, formats and structuring preferred for this data type.

3.5 Processed wellbore seismic data

3.5.1 VSP

3.5.1.1 Purpose

Raw Wellbore Seismic requires various degrees of processing before it is workstation ready. The initial step for VSP data is the checkshot velocity analysis, described in 4.4.2 Time-depth-velocity (TZV) data. Basic processing, often described as 1D processing, is then carried out to produce the corridor stack. A summary plot of the end result together with well log synthetics and seismic is called the Interpreters composite, or sometimes the 3-way tie.

Advanced processing is made on 2D or 3D VSP and involves the analysis of the recorded compressional and shear wavemodes. Generally, a structural image is the result of standalone VSP processing. Often the advanced processing is a part of an integrated special study, for example, to improve understanding of velocity anisotropy, seismic amplitude attenuation and reflection amplitude variation with angles.



3.5.1.2 Content and Quality

All processing methods, parameters and remarks shall be documented in a PDF format processing report. The seismic data output from the sequential processing workflow shall be delivered in fully populated SEG-Y format (as described in the Yellow Book and table S1), including survey geometry. It is important that polarity and domain (such as two-way-time or depth etc.) is described in the header.

Basic 1D processing is expected for each well with VSP, derived from the zero-offset component.

Advanced surveys may be processed to 2D or 3D seismic images and with associated 2D or 3D property models. Relevant time picks and angles should be stored in the SEG-Y format extended headers.

3.5.1.3 Format and Structure

Please refer to Table A-1 for a listing of the naming, formats and structuring preferred for this data type.

3.5.2 Time-depth-velocity (TZV) data

3.5.2.1 Content and Quality

A final checkshot data table of depth-time and velocity attributes shall be delivered in ASCII (LAS preferred). Only high-quality data at original depth samples shall be included. The method to pick and correct the times vertically to seismic datum will be fully reproducible from the table attributes and header alone.

When processing contractor has worked with well logs for checkshot calibration and synthetic seismic generation, this will be reported as computed datasets in LAS format. It is normally expected that input well logs are edited and extended to seismic datum and are presented in original well log measured depth. The synthetic seismic inputs and products are generally indexed in two-way-time and presented in LAS format as seismograms.

3.5.2.2 Format and Structure

Please refer to Table A-1 for a listing of the naming, formats and structuring preferred for this data type. LAS 2.0 is the recommended format for the geophysical composite curves which for guidance include standard curve type designations, as described in Appendix B-4.5.

3.5.3 Time-depth-velocity (TVD) data

3.5.3.1 Quality

All processing information and remarks should be captured in Information Files.

For spliced data curves, where the source data is from different depth intervals, if there are sections with invalid or no data then it is normal to use interpolation or estimation methods to



create a continuous data set over the entire interval of interest. Such methods should be reported in Information Files.

3.5.3.2 Content

The following data types should be included as available:

- Calibrated sonic and density curves
- Derived calculations such as acoustic impedance, reflectivity and synthetic seismograms (with appropriate documentation in the data or Information Files)
- Time/depth/velocity measurements (for example check-shot data)
- Drift data: the difference between interval integrated sonic and check level times
- Estimated Q-factor from ref. point (source/ref. geo) to every VSP level

Two data sets may be presented as two separate files: one indexed on measured depth (any TVD data used must come from the definitive TVD set for the well) and the other indexed on time.

Typical content and structure, including standard curve type designations, are described in Appendix B-4.5.

3.5.3.3 Format and Structure

Please refer to Table A-1 for a listing of the naming, formats and structuring preferred for this data type. LAS 2.0 is the recommended format for velocity logs.

4 Interpreted data

This section outlines the requirements for reporting interpreted well data.

4.1 Petrophysical interpretations

4.1.1 Purpose

The data contain the final petrophysical interpretation(s) for the well, structured and named in a way that is understandable by any technical E&P user. The key to achieving this is the generic Curve Type (ENERGISTICS-PWLS standard) that must accompany each computed curve.

4.1.2 Quality

The 'Petrophysical Interpretation Input'⁶ data set must be accompanied by information about

⁶ From version 13.1 of Table A-1, Petrophysical Interpretation Input (dataset-ID 08.01) is categorized as non-interpreted data (ref. [Guidelines for interpreted data](#)).



the source(s) for the curves included, and any additional preparations: editing, depth matching, environmental and other (e.g. bed-thickness) corrections. Curves will usually be taken or derived from the well composite logs described in sections 3.1 and 3.2, that are already accompanied by information about preparatory work (information files 01.02 WLC_COMPOSITE_INF and 01.06 WLC_PETROPHYSICAL_COMPOSITE_INF). The 'Petrophysical Interpretation Output' data set must have associated, separate deliveries containing processing Method (08.09 WLC_PETRO_COMPUTED_METHOD) and Input Parameters (08.08 WLC_PETRO_COMPUTED_PARAMETERS).

Other associated information regarding the interpretation process will be stored in Information file (08.03 WLC_PETRO_COMPUTED[_INPUT|OUTPUT]_INF).

4.1.3 Content

Petrophysical interpretations should be reported for all reservoir and other zones of interest. For discovery wellbores, the data shall be consistent with the interpretation presented in the Discovery Evaluation Report (Resource Regulations § 31).

The data shall contain INPUT data, with all the curves used as input to the reported Petrophysical Output data set, and OUTPUT data, with all relevant interpreted output curves. INPUT and OUTPUT data must be delivered as separate files.

The petrophysical interpretation shall be accompanied by a data file providing input parameters and a data file providing processing methods.

The petrophysical interpretation should be accompanied by a combined information file, giving details of the source(s) and any additional preparations of the curves used as input, as well as reference to the associated parameter and method files.

An appropriately scaled graphical depth plot of the final interpreted (often including key input) curves should be reported. See Section 5 for details.

Typical content and structure, including curve types, are described in Appendix B-4.1.

4.1.4 Format and Structure

Please refer to Table A-1 for a listing of the naming, formats and structuring preferred for this data type.

4.2. Formation pressure data

4.2.1 Purpose

A set of build-up formation and wellbore hydrostatic pressures for fluid gradient, type and



contact determination should be reported. Pressures are normally those determined by inspection of pressure build-up at acquisition time, but more formal techniques may be used (for example, Horner Build-up Analysis). In either case, the method should be documented.

4.2.2 Content

Data curves corresponding to the operator's interpreted formation and hydrostatic pressure before/after the test shall be included for all tests attempted. It is expected that curves for date of test, and fluid type (Gas, Oil/gas mixture, Oil, Water, Uncertain fluid) and official formation names should be included.

It is desirable that the quality of the pressure test be estimated as “Lost Seal”(0), “Tight Formation”(1), “Poor Permeability”(2), “Good Permeability”(3) and “Very Good Permeability”(4). This is entered into a curve or text string ‘curve’ called QUAL. Other information on the test (such as ‘SEAL FAILURE’, ‘SUPERCHARGED’, ‘GOOD TEST’) should be put in a text string ‘curve’ called ‘REM’. Typical content and structure, including standard curve type designations, are described in Appendix B-4.3 (incl. Table B-4.3) and the key values listed there are expected to be included.

An appropriately scaled graphical depth plot (TVD MSL) of the final interpreted (often including key input) curves should be reported. See Section 5 about digital log images. Fluid information is recommended to be included with colour code, Gas=red, Oil/gas mixture=orange, Oil=green, Water=blue, Uncertain=grey.

4.2.3 Format and Structure

Please refer to Table A-1 for a listing of the naming, formats and structuring preferred for this data type.

4.3. Final well report

In addition to all digital datasets outlined in table A-1, a final report is to be submitted in respect of all types of wells. This report can, if the license operator finds it practical, be submitted as two separate pdf documents, a Drilling Operations part (dataset 14.31) and a Geology part (dataset 14.33). In addition, a Discovery Evaluation Report (dataset 14.24) is to be submitted for exploration wells where hydrocarbons have been discovered.

4.3.1 Content

The contents of the final reports are:

- a) general information, the geographical position of the well, its purpose and result,
- b) lithostratigraphic description and indications of hydrocarbons, if any,
- c) overview of logs, core intervals and fluid samples,



- d) description of conventional cores and side wall cores,
- e) results from testing, if any,
- f) for exploration wells: updated prospect map,
- g) overview of type of mud, commercial name, producer, base (oil/water), additives and an evaluation of the possible effect of the drilling mud on collected data,
- h) digital format of all geological and reservoir technical data, where type of data and format correspond to the Norwegian Offshore Directorate's guidelines on digital reporting of well data, including a composite log with interpreted formation tops in depth and time, a pressure evaluation log and a formation evaluation log,
- i) temperature logs shall indicate measured and corrected value, and all relevant data for determination of local geothermal gradients in a well at thermal equilibrium,
- j) all depths shall be related to the drill floor/ rotary table (RKB), and the logs shall indicate measured depth (MD) and true vertical depth (TVD). Information enabling the conversion of measured depth into vertical depth, as well as the wellbore geometry, shall also be included,
- k) biostratigraphic range charts in digital format are to be enclosed with the biostratigraphic report. Preferred file formats are StrataBugs or S.I.S. (Stratigraphic Information System).

4.4. Prognosis and result form

Prognosis and result from wildcat wells and development wells with discoveries shall be reported directly to the NOD on a [specific form](#). For more information, see www.sodir.no

4.5. Discovery Evaluation Report

A discovery evaluation report is to be submitted in respect of exploration wells where hydrocarbons have been discovered. Separate reports on biostratigraphy, geochemistry and other special studies shall be submitted separately.

4.5.1 Content of the Discovery Evaluation report

The content of the Discovery Evaluation report is:

- a) results from data collected from test activities. Should contain relevant test data such as P_i (initial reservoir pressure), PI_i (initial productivity index), S (skin factor), permeability, fluid contacts if any, effects resulting from stimulation and evaluations relating to formation strength,
- b) overview of fluid samples with test intervals, test number, type of test (production test, RFT, MDT etc.) fluid type, and an evaluation of whether the tests are representative of the tested formations,



c) geological and reservoir technical results, including ac) description of method of petrophysical analysis bc) reservoir geological updating, including updated seismic velocity functions cc) updated depth charts of petroleum bearing structures in case of significant deviations from the prognosis dc) results from PVT analyses,

d) results from core analyses,

e) size of petroleum deposit if any, indicated by P10, P-expected and P90 to the extent possible.

4.5.2 Discovery outlines

In addition to the Discovery Evaluation report, a shapefile containing the outlines for the discovery shall be reported directly to the NOD.

5. Digital images⁷ of interpretation logs

5.1. Purpose

To act as an easily accessible archive record of the digital data recorded at acquisition time and a record of the graphical representation.

For modern computer-generated acquisition systems, where graphical images are created directly from the digital data, there are increasingly fewer good business reasons to maintain graphical images of simple curve data since these can easily be re-generated from the data. However, not all users (especially non-expert ones) will have access to, or have the expertise to use, the specialized graphical plotting packages required. For this reason, there is a requirement to report the FULL graphical image of each recorded well log. This situation will be kept under review as newer technologies (e.g. XML) allow generic and easy-to-use methods for graphically presenting curve data. High sample-rate well-log data prints created by what are often referred to as 'wellbore image' tools should be reported graphically if the data are in a 'final' state. This would include cement-bond prints, dipmeter plots, and some borehole image plots where the raw data image is usable without further processing (such as speed correction). Where further processing is required to create a usable image, it should be the processed image that is reported.

5.1.1 Content and Format

Please refer to Table A-1 for a listing of the naming, formats and structuring preferred for this data type.

⁷ Note that the digital image will normally be created directly by a computer system for newly acquired data, and this is the preferred method for producing the digital image. As a minimum, a 300-dpi image is required. Optical scanning of a hard-copy item may be necessary where the original graphical image is created by 'traditional' methods' (for example, some final well-composite logs). In this case, a higher resolution, such as 400-dpi, should be used to prevent data loss.



6. Reports and datasets

All reports and datasets relating to one or several wells that the operator has and shares with licence partners are to be reported. This also applies to reports compiled or received on data acquired after completion date. A list of such reports is provided in Table A-1 (separate excel-document). The table also explains naming conventions for the file names and how they should be organized for transmittal to Diskos. The datasets are to be accompanied by information files as specified in table A-1. Datasets related to more than one well can be submitted to Diskos once, but will be loaded and linked to each of the wells included. The confidentiality period is counted either from the completion date for the wellbore or from the date when the report was made. This is specified further in Table A-1.

Individual reports on biostratigraphy, geochemistry and other special studies shall be submitted separately. In this context, "special studies" incorporates all important reports, information files and datasets that are normally shared with production licence partners. This also includes studies for more than one well.

In addition to the data reporting requirements according to Section 30 of the Resource Management Regulations and Section 28 of the CO₂ Documentation Regulations, the final version of the Drilling Program (Dataset ID 14.13) shall always be reported to Diskos NDR. For development wells, the Drilling Program Document may cover several wellbores. These will be copied and indexed to all relevant wellbores in Diskos.



Appendix A - Diskos File Naming Convention and File Structure for Well Data Files

1.0 Purpose

A file naming convention serves to inform a user of the contents of a file without special applications to examine the file contents. As such, it should be possible to identify files within standard file/directory browsers used by common operating systems. The file name is NOT intended to replace or augment information contained in the file that may be used by database loading applications. The name contains no format information: that is the purpose of the file extension.

2.0 Conventions

A set of naming conventions is given below for 'standard' situations. There are many data files, especially graphical or Information Files where the content is such that a standard name is not appropriate. In such cases, the file name should be chosen so that it clearly conveys the file contents.

3.0 File Name Structure

File names should have the same basic structure:

NAME(Content Information).EXTENSION

The use of UPPER-CASE characters throughout is mandatory.

- All files are consistently numbered (versioned), starting with '_1' on first occurrence, to ensure correct versioning.

The extension gives information about the format of the file. The following codes are recommended:

- DLIS, LIS, or SEG Y for industry standard binary formats (encapsulated for disk storage where appropriate)
- LAS or SPWLA for such 'standard' ASCII formats
- ASC for other non-standard ASCII files
- For 'general industry standard' graphics files, use the commonly adopted extensions: PDF, (Adobe's 'Portable Document File'), or TIF (here .TIF is 'Tag Image File Format' and NOT 'Tape Image File' as sometimes used for encapsulated log data files).

For specific examples, including 'Content Information' see Table A-1.



Appendix B - Content Information for Specific Datasets

1.0 Purpose

This Appendix shows what specific attributes (information fields) need to be populated for each of the data sets being reported to Diskos.

2.0 Layout

Each specific data set is referenced using the same number used in the main sections of this document. For example, Raw Well-log data that is in Section 2.1 is also in 2.1 in this Appendix. Exceptions are where both raw and computed data share the same basic contents and structure (core and wellpath data). In these cases, the raw data section number is used.

Note: This Appendix makes reference to the use of 'Curve Type' as a generic alias name for specific data curves. Reference values for Curve Type for RAW Well-logs (RAW only at this stage) are the subject of the ENERGISTICS PWLS project. This project is working with TWO related Curve Type attributes: a 'Curve Type' and a 'Property Type' (based on Schlumberger work). It is an abbreviated version of the 'Curve Type' that is used throughout this document.

Also note that lists of Curve Types and other attributes contained in many of the tables in this Appendix may be subject to on-going standards initiatives (ENERGISTICS SIG work). The intention is to maintain these tables as a 'local' Norwegian reporting standard in the short-term. If they are adopted by a global standards organisation, these local standards will be modified where appropriate.

3.0 Raw data

3.1 Well-log data

In addition to using well-log naming standards at the acquisition stage, service companies should be encouraged to unify the way in which these standards are encoded into industry standard formats, particularly DLIS, the recommended delivery format.

3.1.1 Header data

All standard API well-log header data must be completed and coded into the acquisition data format. If this is not possible due to format limitations, or commonly used write and read applications, then a separate ASCII Information File, in an NOD-approved format, should be used.

Particular attention should be paid to filling in the following:

- The NOD well naming convention shall be used as the main header entry
- Remarks should be fully populated
- Service (the tool/software combination used for acquisition)
- Program Version (the acquisition software version)



3.1.2 Other Key Attributes

The following Table B-3.1.2 A shows other Key Attributes that should be populated. These attributes will facilitate the creation of standard data sets within target databases.

Table B-3.1.2 A Key Attributes		
Attribute Name	Values	Comments
Tool String Attributes		These are attributes at the Tool String level that are inherited by all tools and curves from that tool string. In some database implementations, these attributes may be set at the Tool, Log (curve set) or Curve level.
GENERIC TOOL STRING	Created from Tool Types (see entry below) present in tool string using concatenation rules	E.g. DEN-NEU-GR
TOOL STRING	Tool String name as it appears on well-log print headers (usually from the HIDE attribute in LIS/DLIS)	
TECHNICAL TOOL STRING	Created from the service company Tool Names present in the tool string using concatenation rules.	
Tool Attributes		These are attributes at the Tool level that are inherited by all curves from that tool. In some database implementations, these attributes may be set at the Curve level.
TOOL MNEMONIC	Supplied by service company, see also ENERGISTICS-PWLS	Example: CNT-H (Schlumberger) or CN-2446XA (Baker)
TOOL DESCRIPTION	Supplied by service company, see also ENERGISTICS-PWLS	
TOOL GROUP NAME	Supplied by service company, see also ENERGISTICS-PWLS	Example: CNT (Schlumberger) or CN (Baker)
TOOL MARKETING NAME	Supplied by service company, see also ENERGISTICS-PWLS	



TOOL TYPE	see also ENERGISTICS-PWLS	Example: NEU for Neutron
OPERATION MODE	see also ENERGISTICS-PWLS	Values are Wireline or MWD
Curve Attributes		
CURVE NAME	Service company/tool specific	
CURVE DESCRIPTION	Supplied by service company, see also ENERGISTICS-PWLS	
CURVE BUSINESS VALUE	see also ENERGISTICS-PWLS	
CURVE TYPE SHORT	see also ENERGISTICS-PWLS	Curve Type Short is a token-based classification using 2 to 4 character tokens with 'dot' separators. They map 1-to-1 with the Curve Type Long, which is the same as Schlumberger's 'Property Type'
CURVE TYPE LONG	see also ENERGISTICS-PWLS	The Curve Type Long is a full-length text classification which maps 1-to-1 on the Curve Type Short.
CURVE UNIT TYPE	see also ENERGISTICS-PWLS	

3.1.3 Logging Summary Document

Please refer to the 'LOGGING SUMMARY (Template)' sheet in Table A-1 for an example.

Please note that the logging summary file should be cumulatively generated, i.e. just one (the latest) version of the file should be stored (LOGGING_SUMMARY_1.PDF), incorporating all logging activities in the well. The previous version should be deleted.

3.2 Core data

Raw and Computed Core Data

This section concerns defining Curve Types for conventional core data (also known as routine core analysis – RCA).

Accompanying information, such as experimental confining pressures, saturation/de-saturation methods and drying, cleaning and fluid extraction methods should be included, in Information Files if necessary.



Table B-3.2 A Curve Types for Conventional Core Analysis Data				
Unit Type	Curve Type	Unit	Data Type	Description
concentration	OPT_MUD	ppm	float	Concentration of oil phase tracer concentration in mud sample
concentration	OPT_PLUG	ppm	float	Concentration of oil phase tracer concentration in core plug
concentration	WPT_MUD_DEU	ppb	float	Concentration of water phase tracer in mud sample
concentration	WPT_MUD_TRI	dpm/ml	float	Concentration of water phase tracer in mud sample
concentration	WPT_PLUG_DEU	ppb	float	Concentration of water phase tracer in core plug
concentration	WPT_PLUG_TRI	dpm/ml	float	Concentration of water phase tracer in core plug
density	BRINE_DENS	g/cm3	float	Sodium chloride equivalent density from salt extraction analysis
density	GRDENS_H	g/cm3	float	Core grain density horizontal
density	GRDENS_V	g/cm3	float	Core grain density vertical
depth measure	DEPTH_ORIGINAL	m	float	Original measured depth
diameter	DIAM_H	cm	float	Plug diameter horizontal
diameter	DIAM_V	cm	float	Plug diameter vertical
length	LENGTH_H	cm	float	Plug length horizontal
length	LENGTH_V	cm	float	Plug length vertical
logical	CORE_NO	unitless	integer	The number of the cored interval
logical	CORE_RUN	unitless	string	Core run - user input
logical	SAMPLE_NO	unitless	string	Rock sample ID (E.g ID of cuttings sample. ID of core plug etc.)
mass	GRAIN_LOSS	g	float	Weight of grains lost between water extraction and routine measurements
mass	WEIGHT_DRY	g	float	Weight of clean and dry sample
mass	WEIGHT_DRY_MET	g	float	Weight of dry plug after methanol cleaning



Guidelines for reporting well data to authorities after completion (Blue Book)

mass	WEIGHT_FRESH	g	float	Weight of fresh and uncleaned plug
mass	WEIGHT_SALT	g	float	Salt weight extracted per plug
percent	OPT_INVASION	%	float	Percent oil phase tracer invasion
percent	WPT_INVASION	%	float	Invasion of water phase tracer
permeability	KGH	mD	float	Core permeability horizontal gas
permeability	KGHE	mD	float	Extrapolated gas permeability at $1/P_m = 1$
permeability	KGV	mD	float	Core permeability vertical gas
permeability	KGVE	mD	float	Extrapolated gas permeability at $1/P_m = 1$
permeability	KLH	mD	float	Core permeability horizontal Klinkenberg
permeability	KLV	mD	float	Core permeability vertical Klinkenberg
porosity	PORH	v/v	float	Core porosity horizontal He
porosity	PORSUM	v/v	float	Fluid summed porosity
porosity	PORV	v/v	float	Core porosity vertical He
pressure	1_PM_H	1/bar	float	Horizontal $1/P_m$ - Mean pressure in the sample during permeability measurement
pressure	1_PM_V	1/bar	float	Vertical $1/P_m$ - Mean pressure in the sample during permeability measurement
pressure	NCP_PERM	bar	float	Net confining pressure during permeability measurement
pressure	NCP_POR	bar	float	Net confining pressure during porosity measurement
salinity	BRINE_SAL	ppm	float	Brine salinity from salt extraction analysis
saturation	SO_DS	v/v	float	Core oil saturation Dean Stark
saturation	SO_DS_TC	v/v	float	Core oil saturation Dean Stark tracer corrected
saturation	SO_RT	v/v	float	Core oil saturation Retorte
saturation	SO_UNKNOWN	v/v	float	Core oil saturation unknown method
saturation	SW_DS	v/v	float	Saturation of water. Volume water/volume pore. Dean Stark
saturation	SW_DS_TC	v/v	float	Saturation of water. Volume water/volume pore. Dean Stark tracer corrected
saturation	SW_RT	v/v	float	Saturation of water. Volume water/volume pore. Retorte



saturation	SW_UNKNOWN	v/v	float	Saturation of water. Volume water/volume pore. Unknown method
unitless	AUTHOR	unitless	string	Author name
unitless	CLEANING	unitless	string	Type of cleaning process
unitless	CON	unitless	string	Consolidated/Unconsolidated/ Poorly consolidated/Unknown
unitless	COUNTRY	unitless	string	Country code (E.g NO)
unitless	DATA_SOURCE	unitless	string	Data source
unitless	DATE	unitless	string	YYYY-MM-DD
unitless	DRYING	unitless	string	Type of drying process
unitless	EXP_METH_PERM	unitless	string	Permeability condition
unitless	EXP_METH_POR	unitless	string	Porosity measurement methods
unitless	LABO	unitless	string	Lab name
unitless	LITH_DESC	unitless	string	Core lithological description. "No Description" to be used as null value
unitless	NCP_TYPE	unitless	string	Type of plug confining pressure
unitless	OID	unitless	string	ID of data or dataset. Generally used by the operator as an internal ID
unitless	ORI	unitless	string	Plug orientation
unitless	PLUG_CONDITION_ AFTER_TEST_H	unitless	string	Type of plug condition after test horizontal
unitless	PLUG_CONDITION_ AFTER_TEST_V	unitless	string	Type of plug condition after test vertical
unitless	PLUG_MOUNTING	unitless	string	Type of plug mounting
unitless	REMARKS	unitless	string	Remarks
unitless	REPORT	unitless	string	Name of report (E.g Final report Core Analysis Well: 7219/8-2)
unitless	SAMPLING_METHOD	unitless	string	Method used when acquiring a sample
unitless	SAMPLING_SITE	unitless	string	Site of sampling e.g. laboratory or wellsite
unitless	SCF	unitless	float	Salt correction factor from salt present in water
unitless	SITE	unitless	string	Wellname (E.g 6707/10-2 S)
unitless	SOLVENT	unitless	string	Applied cleaning chemicals



unitless	SOURCE_DS_PV	unitless	string	Comment on type of Dean Stark pore volume measurement
unitless	TITLE	unitless	string	Type of experiment
unitless	TYPE	unitless	string	Plug or sample type
volume	BV	cm3	float	Bulk volume measured
volume	GV	cm3	float	Grain volume. Determined with the core plug in a matrix cup with no confining pressure applied
volume	PV	cm3	float	Pore volume
volume	PV_DS	cm3	float	Grain loss corrected PV applied for Dean Stark calculation
volume	VW_BRINE	cm3	float	Salt corrected volume of brine from Dean Stark
volume	VW_DEST	cm3	float	Volume of distilled water from Dean Stark

Table B-3.2 B Reference Values for Curve Types for Conventional Core Analysis Data	
Curve Type	String To Be Used
CLEANING	Dean Stark
CLEANING	Flooding methanol
CLEANING	Flooding refined oil and water
CLEANING	Flooding solvent cold below 60 degC
CLEANING	Flooding solvent hot above 60 degC
CLEANING	No cleaning
CLEANING	Not applicable
CLEANING	Soxhlet cold below 60 degC
CLEANING	Soxhlet hot above 60 degC
CLEANING	Soxhlet submerged above 60 degC
CLEANING	Soxhlet submerged below 60 degC
CLEANING	Unknown
CON	Consolidated
CON	Friable



CON	Not applicable
CON	Unconsolidated
DRYING	Critical point drying
DRYING	Drying in core holder
DRYING	Humidity drying at 60 degC and 40 humidity
DRYING	Miscible displacement
DRYING	No drying
DRYING	Not applicable
DRYING	Oven drying above 60 degC
DRYING	Oven drying above 90 degC
DRYING	Oven drying at 60 degC
DRYING	Oven drying below 60 degC
EXP_METH_PERM	Not applicable
EXP_METH_PERM	Other
EXP_METH_PERM	Pressure decay
EXP_METH_PERM	Pulse decay
EXP_METH_PERM	Steady-state
EXP_METH_POR	Boyles helium unspecified - historical data
EXP_METH_POR	Not applicable
EXP_METH_POR	Other
EXP_METH_POR	Saturation and weight
EXP_METH_POR	Vbulk (caliper) and Vpore (He in coreholder)
EXP_METH_POR	Vbulk (Hg) and Vpore (He in coreholder)
EXP_METH_POR	Vgr (He) and Vbulk (caliper)
EXP_METH_POR	Vgr (He) and Vbulk (Hg)
EXP_METH_POR	Vgr (He) and Vpore (He in core holder)
LITH_DESC	<free text>
LITH_DESC	No Description
NCP_TYPE	Hydrostatic



NCP_TYPE	Not applicable
NCP_TYPE	Triaxial
ORI	Axial horizontal plug
ORI	Axial vertical plug
ORI	Horizontal along bedding
ORI	Horizontal and vertical plug
ORI	Not applicable
ORI	Unknown
ORI	Vertical perpendicular on bedding
PLUG_CONDITION_AFTER_TEST_H	Consolidated
PLUG_CONDITION_AFTER_TEST_H	Damaged friable
PLUG_CONDITION_AFTER_TEST_H	Intact friable
PLUG_CONDITION_AFTER_TEST_H	Loose sand
PLUG_CONDITION_AFTER_TEST_H	Unknown
PLUG_CONDITION_AFTER_TEST_V	Consolidated
PLUG_CONDITION_AFTER_TEST_V	Damaged friable
PLUG_CONDITION_AFTER_TEST_V	Intact friable
PLUG_CONDITION_AFTER_TEST_V	Loose sand
PLUG_CONDITION_AFTER_TEST_V	Unknown
PLUG_MOUNTING	Mounting in heat shrink
PLUG_MOUNTING	Mounting in heat shrink w screens
PLUG_MOUNTING	Mounting in metal jacket w screens
PLUG_MOUNTING	Mounting in screens
PLUG_MOUNTING	No mounting
PLUG_MOUNTING	Not applicable
SAMPLING_METHOD	Drill with air
SAMPLING_METHOD	Drill with brine
SAMPLING_METHOD	Drill with fresh water
SAMPLING_METHOD	Drill with liquid nitrogen



SAMPLING_METHOD	Drill with mineral oil
SAMPLING_METHOD	Not applicable
SAMPLING_METHOD	Punching
SAMPLING_METHOD	Rotary drilled sidewall plugs
SAMPLING_METHOD	Scoop
SAMPLING_METHOD	Sidewall plug percussion
SAMPLING_SITE	Laboratory
SAMPLING_SITE	Wellsite
SOLVENT	Cleaning only using chloroform
SOLVENT	Cleaning only using methanol
SOLVENT	Cleaning only using toluene
SOLVENT	Cleaning using sequences of methanol/toluene
SOLVENT	Cleaning using sequences of methanol/toluene/chloroform
SOLVENT	Other
SOURCE_DS_PV	From neighbouring plug
SOURCE_DS_PV	Measured on actual sample
SOURCE_DS_PV	Not applicable
TITLE	Routine analysis data
TYPE	Center axial plug
TYPE	Composite core samples
TYPE	Core chip
TYPE	Crushed sample
TYPE	Cuttings samples
TYPE	End trim from plug
TYPE	Side wall core
TYPE	Standard horizontal or vertical plug
TYPE	Whole core sample



3.3 Mudlog data

This section defines Curve Types for standard mudlog data. This includes drilling dynamics, mud, lithology and hydrocarbon data (Table B-3.3.1 A). Section 3.3.3 covers Lithology coding

When Advanced Mud gas is acquired, the measurements will cover a wider range of molecules compared to standard mud gas, and due to the nature of an advanced system, several deliveries reading the same gas species will be received. In Table B-3.3.2 A, naming standards for the most common measured hydrocarbon species and CO₂ are described. The different suffixes stated in Table B-3.3.2 B relate to the different stages of correction that are available with an advanced mud gas system. Recommended curve mnemonics are defined by a combination of the curve prefix (Table B-3.3.2 A) and suffix (Table B-3.3.2 B).

3.3.1 Curve Types for standard Mudlog Data

Table B-3.3.1 A Curve Types for standard Mudlog Data		
Curve Type	Description	Comment
Mud Data		Mud circulation densities, flows and pressures are under Drilling Dynamics data
MUD.RES.	Mud resistivity	
MUD.RES.IN.	Mud resistivity - inflow	
MUD.RES.OUT.	Mud resistivity - outflow	
MUD.DEN.	Mud density	
MUD.FLOW.IN.	Mud flow – inflow	
MUD.FLOW.OUT.	Mud flow – outflow	
Drilling Dynamics Data		
BIT.SIZE.	Bit size	
DEPTH.	Depth	Probably of little direct use in this context since this implies wireline depth
DEPTH.BIT.	Bit depth	
DEXP.	Drilling exponent	
BIT.VEL.	Drilling penetration rate	
MUD.DEN.ECD.	Effective Mud Circulation Density at TD	
MUD.FLOW.	Mud flow	



MUD.FLOW.IN.	Mud flow – inflow	
MUD.FLOW.OUT.	Mud flow – outflow	
MUD.PRES.	Mud pressure	
MUD.PRES.BTHL.	Mud pressure - bottom hole	
MUD.PRES.SRF.	Mud pressure - surface	
PRES.	Pressure	
PRES.PUMP.	Pressure – mud pump	
ROP.	Rate of Penetration	
RPM.	Revs per minute	
RPM.BIT.	Revs per minute - drill bit	
RPM.BIT.CUM.	Revs per minute - drill bit, cumulative	
TIME.	Time	
TIME.BIT.	Time - on bit	
TIME.CRC.	Time – circulation	
TIME.CRC.TOT.	Time - total circulation time	
TIME.CRC.BTUP.	Time – bottoms-up circulation time	
TORQ.	Torque	
TVD.DRIL.	TVD depth from driller	
VOL.	Volume	
VOL.TANK.	Tank Volume	
WGT.	Weight	
WOB.	Weight on bit	
WGT.HK.	Hook load	
Gas and Hydrocarbon Data		
GAS.	Gas	
GAS.C1.	Gas-methane	
GAS.C2.	Gas-ethane	
GAS.C3.	Gas-propane	



GAS.C4.	Gas – iso butane	
GAS.C5.	Gas – iso-pentane	
GAS.C6.	Gas – iso-hexane	
GAS.TOT.	Total gas	
GAS.RAT.	Gas ratio	
GAS.RAT.C12.	Gas ratio – methane/ethane	
GAS.RAT.C13.	Gas ratio – methane/propane	
HYD.SHOW	Hydrocarbon show data	Text
Lithology Data		
LITH.	Lithology	NOD Codes (see Section 3.3.3)
LITH.DESC.	Lithology description	

3.3.2 Curve types for Advanced mud gas data

Table B-3.3.2 A Advanced mud gas mnemonics prefix See mnemonics suffix in table B-3.3.2 B	
Curve-prefix	Description
BEN	Benzene
C1	Methane
C2	Ethane
C2s	Ethane+Ethene
C3	Propane
iC4	Iso-propane
nC4	n-butane
iC5	Iso-pentane



nC5	n-pentane
nC6	n-hexane
nC7	n-heptane
CO2	Carbon dioxide
MCH	Methyl-cyclo-hexane
TOL	Toluene

Table B-3.3.2 B Advanced mud gas mnemonics suffix See mnemonics prefix table B-3.3.2 A	
Curve-suffix	Description
_in	In
_out	Out
_cor	Recycling correction
_f	Extraction Efficiency correction (EEC) + Recycling correction

3.3.3 Lithology Coding

The mudlog interpreted lithology description must be coded and assigned a unique number at each depth according to the NOD "official" lithology definition and nomenclature, a copy of which is shown below. It is assumed that a lithology-type that starts at depth1 has a constant code until a new lithology type starts at depth2 (> depth1). In this way, the lithology descriptions are represented by one continuous depth indexed, regularly sampled curve, which can then be handled similarly to any of the curves from the mudlog. The lithology description of the cuttings, the one representing the "average" description of the cuttings directly from the mud returns, does not need to be digitised.

NOD Coding System



A digital code has been assigned to the main lithologies as shown. Lithology = (Main lithology * 10) + cement + (modifier / 100). Example: Calcite cemented silty micaceous sandstone: (33 * 10) + 1 + (21 / 100) = 331.21.

Main Lithologies		Cements		Modifiers	
None	0	None	0	None	0
Conglomerate (general)	10	Calcite	1	Concretions general	10
Grain supported conglomerate	11	Dolomite /Ankerite	2	Calcite concretions	11
Muddy congl.	12	Siderite	3	Dolomite concretions	12
Muddy, sandy, congl.	13	Quartz	4	Siderite concretions	13
Sandy congl.	14	Kaolinite	5	Ooid / pisolite	14
Conglomeratic sandstone	15	Illite	6	Tuffite	15
Conglomeratic muddy sandstone	16	Smectite	7	Bitumenous	16
Sedimentary breccia	20	Chlorite	8	Glauconite	17
Sandstone	30			Halite pseudomorph	18
Clayey sandstone	31			Pyrite	19
Muddy sandstone	32			Siderite	20
Silty sandstone	33			Mica	21
Siltstone	40			Kaolinite	22
Sandy siltstone	41			Carbonaceous	23
Fossil siltstone	45			Chamosite	24
Mudstone	50			Phosporite	25
Sandy mudstone	51			Argillaceous	26
Conglomeratic mudstone	52			Calcareous	27
Fissile mudstone	55			Chert	28
Claystone	60			Sulphate	29



Sandy claystone	61				Arenaceous	30
Silty claystone	62				Bioclastic	31
Shale	65				Chalky	32
Silty shale	66				Ferruginous	33
Limestone	70				Fossils	34
Dolomitic limestone	72				Plant Remains	35
Dolostone	74				Lignite	36
Calcareous dolostone	76				Feldspar	37
Chalk	78				Fissile	38
Marl	80				Silty	39
Gypsum	85				Dolomite	40
Anhydrite	86					
Gypsum / Anhydrite unspecified	87					
Halite	88					
Salt, general	89					
Coal	90					
Brown coal	91					
Volcanic rock gen.	92					
Intrusive rock gen.	93					
Silicic plutonic rocks	94					
Mafic plutonic rocks	95					
Dykes and sills gen.	96					
Metamorphic rocks gen.	97					



3.5 Composite well logs

This section defines the Standard Curve Names and Curve Types to be used for Composited Well-log data. Note that because the Standard Curve Names are generic, there is nearly always a one-to-one correspondence with the Curve Type. The defined curve list in Table B-3.5 is not exhaustive; other curves can be included in Composite Well-log Data.

Table B-3.5 A Standard Curve Names and Curve Types for Composited Well-log Data		
Standard Curve Name	Curve Type	Description/Comment
Primary		
AC	AC.	Sonic
ACS	ACS.	Sonic share
BS	BS.	Bit Size
CALI	CALI.	Caliper
DEN	DEN.	Density
GR	GR.	Gamma Ray
NEU	NEU.	Neutron
RDEP	RES.DEP.	Deep Resistivity
RMED	RES.MED.	Medium or Shallow resistivity*
RMIC	RES.MIC.	Microresistivity
SP	SP.	Spontaneous Potential
Secondary		
PEF	PEF.	Photoelectric Factor
DENC	DENC.	Density correction
K	K.	Potassium
TH	TH.	Thorium
U	U.	Uranium
ROP	ROP.	Rate of penetration

* For normal composite usage, differentiation between medium and shallow resistivities is not necessary



4.1 Computed well log data

This section defines the 'Recommended Standard Curve Names' and Curve Types to be used for Computed Well-log data. Given that commercial software often imposes curve names, it is not the intention to modify them if they are pre-assigned: curve name recommendations are there to be used in the **absence of any other system-imposed names**.

For input sets to computed data sets, the same Curve Types as for Raw Well-logs should be used (Appendix B-2.1).

For computed output curves, is important that computation methods and parameters are reported, together with any analysis comments.

Table B-4.1 A Standard Curve Names and Curve Types for Computed Well-log Data		
Standard Curve Name	Curve Type	Description/Comment
Undefined	DIP.	Calculated Dip
Undefined	FLAG.	Flag
FCOL	FLAG.COAL.	Coal Flag
FDOL	FLAG.DOL.	Dolomite Flag
FLIM	FLAG.LIM.	Limestone Flag
FSND	FLAG.SND.	Sand Flag
Undefined	FVOL.	Fluid Volume
Undefined	VOLF.HYD.	Hydrocarbon Volume
Undefined	VOLF.HYD.FM.	Formation Hydrocarbon Volume
Undefined	VOLF.HYD.FZO.	Flushed Zone Hydrocarbon Volume
Undefined	LITH.	Lithology (description or code)
PERM	PERM.	Permeability
KRAT	PERM.RAT.	Permeability Ratio
POR	POR.	Porosity
PORE	POR.EFF.	Effective Porosity
PORT	POR.TOT.	Total Porosity
Undefined	SAT.	Saturation
Undefined	SAT.HYD.	Hydrocarbon Saturation



SH	SAT.HYD.FM.	Formation Hydrocarbon Saturation
SHR	SAT.HYD.FZO.	Flushed Zone Hydrocarbon Saturation
Undefined	SAT.WAT.	Water Saturation
SW	SAT.WAT.FM.	Formation Water Saturation
SXO	SAT.WAT.FZO.	Flushed Zone 'Water Saturation
DESC	TEXT.	Text Description
VMN	VOLF.MIN.	Mineral Volume
VDOL	VOLF.MIN.DOL.	Dolomite Volume
VLIM	VOLF.MIN.LIM.	Limestone Volume
VSND	VOLF.MIN.SND.	Sand Volume
VSH	VOLF.SH.	Shale Volume
Undefined	VOLF.WAT.	Water Volume
BVW	VOLF.WAT.FM.	Formation Water Volume
BVXO	VOLF.WAT.FZO.	Flushed Zone Water Volume

4.2 Time-depth-velocity data

This section defines the Curve Types for common Time/Depth/Velocity data (key values are in bold text).

Table B-4.2 A Curve Types for Time/Depth/Velocity Data		
Curve Type	Description	Comment
AC.	Acoustic	
AC.CLBR.	acoustic – calibrated	
AC.IMP.	acoustic impedance	
AC.ITT.	acoustic integrated slowness (time)	
AC.REFL.	acoustic reflectance	



AC.VEL.	acoustic velocity	
AC.VEL.ITV.	interval velocity	
AC.VEL.RAT.	acoustic velocity ratio	
DENS.	Density	
DENS.CLBR.	density – calibrated	
TIME.	Time	
TIME.ONE.	one-way time	
TIME.TWO.	two-way time	

4.3 Formation pressure data

This section defines the Curve Types for common Formation Pressure data (key values are in bold text).

Table B-4.3 A Curve Types for Formation Pressure Data		
Curve Type	Description	Comment
DEPTH.MD.	Measured (along-hole) depth	
DEPTH.TVDSS.	True Vertical Depth Subsea	
GRAD.	Gradient	
GRAD.FLU.	Gradient - fluid	
GRAD.FLU.GAS.	Gradient - fluid - gas	
GRAD.FLU.OIL.	Gradient - fluid - oil	
GRAD.FLU.WAT.	Gradient - fluid - gas	
GRAD.NAME.	Gradient name	
MOBL.	Mobility	
MOBL.OIL.	Oil mobility	
PERM.	Permeability	
PERM.FPT.	Permeability from FPT (Formation Pressure Tool)	
PERM.FPT.BU.	Permeability from FPT –	



	buildup	
PERM.FPT.DD.	Permeability from FPT – drawdown	
PRES.	Pressure	
PRES.FM.	Pressure - formation	
PRES.FM.BU.	Pressure - formation - build-up	
PRES.FM.EXT.	Pressure - formation - extrapolated	
PRES.FM.HRN.	Pressure - formation - Horner	
PRES.HDR.	Pressure - hydrostatic	
PRES.HDRA.	Pressure - hydrostatic - after	
PRES.HDRB.	Pressure - hydrostatic - before	
TEST.NUM.	Test Number	
TEST.QUAL.	Test Quality	
TEST.TIME.	Test buildup time	



Appendix C - Data Formats for Text Data and Documents

This Appendix contains notes and guidance on formats for ASCII or text data, as well as for documents (text, graphics or mixed). Formats shall be either PDF, ASCII or other approved graphical formats (specified elsewhere in these Requirements), other proprietary formats are not accepted.

All text documents should be delivered in PDF.

Table A-1 provides additional instructions on naming of files and structure for the digital files which are to be submitted to Diskos for loading. The filters and sorting functionalities in the spreadsheet can also be used to give an overview of the data types and assist in navigating in the Diskos NDR front end, to locate the data when these have been loaded into the database.



Appendix D - Definitions

TABLE D-1 Definitions	
Item	Definition
Cased-hole Log	A log recorded in its entirety in cased-hole (that is, no open-hole section)
Composite Log	A log composed of individual logging runs spliced together, including Repeat Sections and "Down-logs" where necessary, to form the most <u>accurate</u> and <u>complete</u> record of key measurements such as example, sonic, density, neutron and various resistivities. Logging run data may be either wireline, MWD or both.
Field Print	A graphical representation of the data curves and supporting information such as headers, tool diagrams and calibration records. Usually created on two depth scales, 1:200 and 1:500
Hybrid Curve	A log-curve, possibly created from individual log-curves of the same curve type, but from different physical measuring devices spliced together to form the most accurate and complete record of some primary measurement. The Hybrid curve names were used to identify the 'best' curves available. This convention has been dropped in favour of grouping all 'best' curves in the 'Composite Log'
Mud Log	The collection of mud, hydrocarbon, lithology and drilling-related data, traditionally using surface sensors, often combined with downhole measurements (MWD/LWD)" Standard Mud Gas: a service that is present on most wellbores drilled and is using a gas extractor that runs under ambient conditions with no control of degassing temperature. The primary purpose of this service is well control. Advanced Mud Gas: a service that can be run upon request and is generally run alongside a standard mud gas service. An advanced service provides degassing under constant thermodynamic conditions, including constant volumes and mud agitation, as well as high and stable degassing temperatures. A fully corrected advanced mud gas data set is in terms of composition representative of the actual formation fluid for the measured and corrected compound range.
MWD Logging	The collection of formation and other drilling-related data using down-hole sensors located on the drill string. The term is intended to include LWD Logging.
Operator	The oil company that operates a licence.
Raw Log	Operator's official release of original field logs recorded by the Service Companies. It may contain data curves that have been corrected or had some processing applied.
Service Company	A company that provides services under contract to another company, usually an oil company. In the context of this document, the service company will be either an acquisition or data processing company.
Well	The well drilled under a drilling permit, which may consist of multiple tracks.
Well Completion	The Operator's graphical log showing primary well-logs, geological zones,



Log	lithology cored intervals, DSTs etc.
Wireline logging	The collection of formation data using downhole sensors conveyed by electrical wireline



Appendix E - Well-log Compositing Procedures

It is the operator's responsibility to provide a complete and high quality ensured composite log data set (See Blue Book section 3.1).

This data set is neither the MWD raw composite log (provided by the contractor) described in section 2.1.2, nor the graphical composite/completion log (provided by the operating company). Two sets of data should be generated:

Petrophysical Composite data set:

- Includes all logging curves presented on field prints in original increments
- All NMR & High Resolution data
- Data at high sampling rates for thin-bed analysis
- MWD data depth shifted to match EWL data (if needed) & vice versa
- No editing applied to the curves except
 - Constant/straight lines are removed in top/bottom of the log curves
 - First readings (EWL data)/last readings (MWD data) are removed between runs
- MWD & EWL data runs are merged from top to TD in separated files

Composite data set:

The input logs used is taken from the petrophysical data set. The Composite set is defined as a set of curves, usually depth-matched and spliced so that measurements are available over the greatest possible depth interval within a given wellbore.

The Composite set should contain all the primary measurements made in a given well/wellbore. Examples of primary measurements and associated standard curve names and curve types are listed in Appendix B-3.5. These logs should be the best version of the logs presented/generated in the petrophysical composite set.

- Includes Standard curves in 0.1524m (6 inch) increment
 - GR (API)
 - RDEP, RMED & RMIC (OHMM)
 - CALI & BS (IN), DEN & DENC (G/CC), PEF (B/E) & NEU (V/V)
 - AC & ACS (US/FT)
 - K, TH & U (% & ppm, respectively)
 - ROP (m/h)
- Includes the best data from MWD & EWL, merged from top to TD
- Logs are edited for washouts & casing effects
- First readings (EWL data) & Last readings (MWD data) are removed at the top/bottom of logged interval
- Might be used as CPI input

The general procedure for finalizing both data sets should follow the steps below.



1. Raw logs

Raw logs (MWD and EWL) that have passed the high-quality assurance procedure should be used as input for compositing; see section 2.1 for details.

Not all raw logs need to be merged into a composite log. The compositing of logs specifically excludes the following services:

- Sonic/acoustic waveform traces (note: The log recorded in combination with the waveform data (i.e. gamma-ray, etc.) and logs derived from the waveform data (i.e. Δt compressional and shear, etc.) shall be included when available).

- Formation Image logs.

- Formation pressure data.

- VSP and velocity data.

- Cased Hole logs such as production and cement bond logs (although Open Hole logs recorded in casing may have valid formation data which may be used for compositing and/or as depth reference for MWD logs).

2. Depth shifting

The gamma-ray of the induction log will serve as the preferred base log assuming that this log is on depth with the deep induction. Should the induction log be unavailable, the first gamma-ray run in hole will normally become the reference log. In severe "stick & pull" conditions, the gamma-ray least affected should be selected as reference.

The sonic/acoustic, density/neutron, dual laterolog and gamma-ray spectral log, etc., when recorded separately, may initially be depth-shifted through gamma-ray – to gamma-ray correlations. A subsequent check will be made to ensure that the sonic/acoustic, laterolog deep, density/neutron, etc. are within the established depth tolerances when compared to the induction deep log.

Depth shifting of log data is viewed as critical and must be performed when depth discrepancies between log traces in excess of 0.5 m occur (excluding local depth discrepancies observed in a "stick & pull" situation occurring over shorter intervals, i.e. in severe borehole conditions where the logging instrument often gets stuck and subsequently jumps free. In these intervals, data is likely lost and cannot reliably be corrected for).

The 0.5-metre tolerance is intentionally set with the objective of obtaining robust, quality-controlled and consistent depth shifts that minimize the need to load the raw data.

Both block (linear) and continuous (dynamic) depth-shifts are acceptable.

It is important that depth-shifted logs provided on digital tapes are in agreement with the depth shifts shown on the operator's completion log, in order to maintain consistent depth reference with the established formation tops.

3. Tie-ins and merging

All logs (MWD/EWL) should be on depth prior to merging.

- Merging when overlap section exist:



Tie-in each subsequent logging run by comparing the gamma-rays in the overlap sections and make depth-shifts when necessary. The depth shifts used for tie-ins shall only be applied locally and close to the merge point.

Each log from one service run will be individually merged with logs from similar service runs. The merge depth should be selected where the two curves reads approximately the same values ("Steps" should be avoided, if possible).

Merge depths will be selected visually. Every effort will be made to eliminate the "end & beginning" of a logging run at the splice between runs (i.e. the casing and the "before pickup" responses). It is stressed that "automatic" splicing cannot be accepted where often a valid response from one run is replaced with invalid data from another run.

The preferred merge depth, assuming everything equal, is to splice the logs at its deepest possible point in an overlap section between runs. This ensures that the uppermost run is emphasized.

- b) Merging when overlap section does not exist:
No tie-in or depth shifting will take place over intervals where no overlap exists between successive logging runs and where both open hole and cased hole log data is missing unless other indications such as badly marked cable has been found to cause depth discrepancies.

The merging of two open-hole sections, therefore, often results in a gap between two logging runs. The editing requirements for the gap interval are described in the editing section below.

4. Data editing

4.1 Petrophysical composite set

Depth shifted and merged logs are joined in sub files with original increments. Minimal editing is performed in order to keep the data as original as possible

Editing may be applied to the data sets such as removal of constant/straight lines in top/bottom of logs and first readings (EWL data)/last readings (MWD data).

4.2 Composite set

A selected number of logs already depth shifted, merged and organized in the petrophysical composite set are used to generate the composite set. The 'best version' of these logs available (MWD and/or EWL) over a given depth interval should be used and the resultant spliced curve should cover the greatest possible depth interval.

Additional editing applied (if applicable):

- a) Invalid/bad data removal:
Check the information given in the "remark" section of the Field Print header and edit or replace all known bad/invalid data (including e.g. memory/delay problems).



b) Invalid/bad data replacement:

Sections of the main log featuring poor log quality, due to, for example, stick & pull or excessive cycle skips on the Acoustic/Sonic log shall be replaced by data from the repeat, reaming and down-log section(s) whenever improved accuracy and quality can be achieved.

Repeat section is defined more broadly here to include multiple logging runs over the same interval. (e.g. intermediate logging and subsequent final logging runs may log the same interval twice). The repeat and/or down-log section(s) often contain data from missing intervals in the main logged section. (Example: "Could not reach TD after logging the Repeat Section"). The main logged section will be edited to include this data in order to obtain a log that is as complete as possible.

c) Editing of gaps between logging runs:

The before "Pick-up" recordings for the lowermost logging run of each service (normally the final logging runs) shall be removed (the original raw data will contain the pre pick-up data; usually called first readings for EWL and last readings for MWD).

The part of the log recorded in casing for the uppermost logging run for each service shall be removed unless it contains the best version of valid formation data (e.g. GR behind casing on surface logging runs).

The merging of two open-hole sections may result in a gap between two successive logging runs. The first valid reading of the shallower run and the last valid reading of the deeper run must be identified. In general, invalid logging responses in the gap interval are removed.

The resistivity logs (recorded with present technology) are considered invalid in casing and should always be removed. The gamma-ray and the neutron logs, however, should normally be left intact. In the case of density and sonic/acoustic (array) logs, they respond, at times, correctly to the formation through casing, in which case the recording should be left intact.

Gaps in data curves of 1m or less may be straight-line interpolated. Larger gaps should contain null values.

d) AC/ACS editing:

Sonic/acoustic log is edited for cycle skips and noise. Cycle-skips are edited considering other log responses such as from density and resistivity logs. "Tight streaks" should, for example, be identified to ensure that incorrect sonic/acoustic editing is avoided. When the sonic / acoustic signal is affected by "noise", filtering may be used to improve the appearance.

e) SP editing:

The SP log needs to be shifted to eliminate mechanical shifts made by the logging engineer at the time of logging and to eliminate the shift between logging runs when spliced.



The SP scale shall also be normalized to a default 0-100 mV plot scale to encompass most of the SP log(s). Note: Original mV span must be maintained at all times.

All editing shall be reported in the audit/information file.

5 Output logs

5.1 Petrophysical composite set

The petrophysical composite set is generated to preserve 'specialist' composited data curves. This data set is not same as the interpreted data set (Section 4.1). A good guide is to include all 'presentation curves' from log prints.

The depth-shifting, tie-ins/merging and editing are of outmost importance and should be documented in detail in the petrophysical composite information file. In addition, remarks and log comments from both digital file(s) and field print(s) including cleaning, editing and correction details should be listed in the information file. This determines the degree of consistency and quality.

The output results should be in accordance with the requirements as listed in table A-1:

- WLC_PETROPHYSICAL_COMPOSITE_#. DLIS(,LAS,LIS)
- WLC_PETROPHYSICAL_COMPOSITE[_#[-#]]_INF_#. PDF(,ASC)

5.2 Composite set

A primary measurement may be composed of data taken from different physical tools (for example, it could be made from a combination of EWL and MWD measurements). For each primary measurement, the 'best version' of that data available over a given depth interval should be used and the resultant spliced curve should cover the greatest possible depth interval.

The depth-shifting, tie-ins/merging and editing are of outmost importance and should be documented in detail in the composite information file. In addition, remarks and log comments from both digital file(s) and field print(s) including cleaning, editing and correction details should be listed in the information file. This determines the degree of consistency/quality and the future usefulness of the established database.

The output results should be in accordance with the requirements as listed in table A-1:

- WLC_COMPOSITE_#. DLIS(,LAS,LIS)
- WLC_COMPOSITE[_#[-#]]_INF_#. PDF(,ASC)
- WLC_COMPOSITE[_MD][_TVD]_PLOT_#. TIF(,PDF,CGM)



Appendix F - Template for Final Well Position Report

Final Well Position Report

Wellbore Name: *Exploration wellbore/Development wellbore* **Date:**
Field: **Rig:**
Licence:

RECIPIENT:

COPY TO:

FROM
(Printed):

CONTROLLED
BY
(Printed):

Signature

Signature

Final Well Surface Position

Geographical Co-ordinates:

Latitude: DD° MM' SS.SS" N
 Longitude: DD° MM' SS.SS" E
 Spheroid:
 Datum:

UTM Co-ordinates:

Northing: X XXX XXX m
 Easting: XXX XXX m
 UTM Zone: XX N
 Central Meridian: XX E

Datum Shift Parameters WGS84 to ED50 (EPSG YYYY)

Deviation:

The surface position was observed to be X.X meter on a bearing of XXX.X° (G) from the intended location.

Accuracy:

± X,XX meters.



Appendix G - Template for Completeness report

[Table A-1](#) – See separate tab named COMPLETENESS (template)



Appendix H - Revision control matrix

Version 16.0	September 2025	Minor changes in Chapter 2.5 Mudlog data and Chapter 3.4 Core data Table B-3.2 has been replaced by new table B-3.2 A (Curve types for conventional Core Analysis Data). A new table B-3.2 B (Reference Values for Curve Types for Conventional Core Analysis Data) has been added. Appendix B, Chapter 3.3 Mudlog data has been updated to include also Advanced Mud Gas. A new Chapter 3.3.2 (Curve types for Advanced mud gas data) has been added and includes two new tables. Former Chapter 3.3.2, is now 3.3.3 Lithology coding.
Version 15.0	October 2024	Updated chapter 3.3 – Wellbore trajectory data Deletion of chapter 2.6 Wellpath data New chapter 4.5.2 Discovery outlines Deletion of chapter 3.4 Well Path Data in Appendix B Minor revisions in Chapter 3.5 in Appendix B
Version 14.1	January 2024	New template due to name change from Norwegian Petroleum Directorate (NPD) to Norwegian Offshore Directorate (NOD)
Version 14.0	October 2022	New template (NPD standard for guidelines) Revised text in introduction



		chapter with updated references to relevant regulations Revision control matrix moved to appendix H Changes in Table A-1 (separate file)
Version 13.0	September 2021	New chapter 2.7 – Cuttings data Revised text in chapter 4.1 – Petrophysical data and 4.2 Formation pressure data Changes in Table A-1 (separate file)
Version 12.0	September 2020	Modified text in chapter 1.5 c) to clarify reporting of T-sidetracks
Version 11.1	November 2019	Changed requirement for producing digital images from minimum 200-dpi to 300-dpi
Version 11.0	October 2019	Corrected reference to regulation in chapter 4.1.3 Removed the requirement of submitting pdf/A as previous stated in Appendix C Changes in Table A-1 (separate file)
Version 10.0	September 2018	New text in chapter 1 and 6 explaining how reports regarding more than one well shall be handled. New text (Chapter 6) about splitting Drilling Program into several documents Some clarifications on when the specified confidentiality period starts A new appendix G with a link to the completeness report template Removed requirements in chapter 6 for reporting site survey reports Removed unnecessary section



		about ASCII in Appendix C Updated the file containing table A-1
Version 9.1	January 2018	References to Resource Regulations are corrected to reflect the latest 2018-version chapters More about Multi Well Study reporting in Chapter 1, Chapter 1.4 and Chapter 6
Version 9.0	September 2017	Included reference to Resource Regulation §25 in the Introduction The three groups in chapter 1.4 are now reduced to two. A new chapter 2.2.4 have been introduced to specify reporting requirements for core photos Chapter 2.4 Wellbore seismic data has been modified according to a proposal from a working group of companies The name of chapter 3 has been changed to be called Other non-interpreted data Chapter 4.2 (Well path data) has been moved into Chapter 3 and become 3.3 Chapter 4.3 (Core data) has been moved into Chapter 3 and become 3.4 Chapter 4.4 (Processed wellbore seismic data) has been moved into Chapter 3 and become 3.5 Chapter 3.5 on Processed wellbore seismic data has been modified according to a proposal from a group of companies Included chapter 4.3 and 4.4 to specify expected content of Final Well Report and Discovery Report (Used to be called Well Evaluation Report)



		Modified the text of Appendix E (no change in the reality of the requirements) Made several changes in Table A-1. The latest Table A-1 is version 9.0
Version 8.0	September 2016	New line added in Chapter 1.4 for ED50 Corrected numbering of sections in Chapter 1.4 and 1.5 New section added in Chapter 6 on Site Survey reports Changes in Table A-1 (see separate Excel file) Removed Table 6.1 New appendix F on template for content in Well Positioning Report New text in Appendix C - Data Formats for Text Data and Documents
Version 7.0	September 2015	Revised Table 6.1 Reports and datasets. The table is now sorted according to data set ID. Table A-1 has been updated: Modified rows 2,15 and 2,16 Two new rows 15,08 & 15,09
Version 6.0	September 2014	The NPD has included decisions and advice from the Blue book meeting on 16 June 2014. The NPD has also made additional adjustments to the text, including splitting 1.4 into two parts (new 1.4 and 1.5)
Version 5.2. Rev 1	25 February 2013	The NPD has included decisions made in the Blue book meeting on 22 February 2013
Version 5.2 Rev 0	21 February 2013	The NPD has accepted minor improvements in the text (KRK)
Version 5.2	20 February 2013	Included all comments from Blue Book committee members as of



		13 February 2013
Version 5.1	22 January 2013	Draft document prepared by the NPD and sent to "Diskos" Blue Book Committee" for comments
Version 4.0 Rev 02	August 2006	This is the current version on the NPD's website - "Regulations" tab as of January 2013

