

Greenland BMP - Exploration Drilling Guidelines

Introduction

The Greenland Bureau of Minerals and Petroleum (BMP) is responsible for the administration of regulations pertaining to exploration and production of petroleum in the Greenland offshore area. The BMP approves and supervises all drilling and related operations in Greenland especially with respect to safety and environmental issues.

These Exploration Drilling Guidelines have been developed to assist operators planning to conduct drilling operations within Greenland by providing information and explanation of the requirements contained in the *Greenland Minerals Resources Act*, and subordinate legislation.

The Exploration Drilling Guidelines have been developed to form a framework covering drilling activities offshore Greenland to ensure flexibility and clarity with the BMP. The Guidelines provide specific direction where the BMP have been given the authority to prescribe, provide guidance and approve drilling and related activities. The Exploration Drilling Guidelines align and follow how the BMP interprets the legislative requirements governing the offshore area as described in the Minerals Resources Act subordinate legislation and the Guidelines for Submitting Applications for Approval of Offshore Installations for Hydrocarbon Exploration in Greenland together with other accepted guidelines such as the Arctic Council Guidelines.

Much of the content material has been sourced from other agencies such as the Danish Energy Agency, to help formulate guidelines specific to requirements for Greenland exploration activities.

These Guidelines are a 'live' document and may be reviewed from time to time and updated when necessary.

Contact should be made with the BMP to confirm the status of any particular Guideline and any legislative requirements.

All requested hard copy submissions are to be accompanied with an electronic version. Submissions should be in English unless sections are required for public hearings, in which case the material is required to be translated into Greenlandic and Danish.

Glossary of Common Acronyms and Abbreviations

BOP - Blowout Preventer
COF - Certificate of Fitness
DOF - Declaration of Fitness
DPA - Drilling Program Authorization
DM – Drilling Manager
DST – Drill Stem Test
EL - Exploration License
HSE – Health, Safety and Environment
HUET - Helicopter Underwater Escape Training
IADC - International Association of Drilling Contractors
IWCF – International Well Control Forum
ID – Inside Diameter
LOC - Letter of Compliance
LTI - Lost Time Injury
MD – Measured Depth
MODU - Mobile Offshore Drilling Units
MSL – Mean sea Level
OD - Outer Diameter
OHS/OSH - Occupational Health and Safety
OIM - Offshore Installation Manager
POB - Personnel on Board
QHSE - Quality, Health, Safety and Environment
RT/KB - Rotary Table/Kelly Bushing
RTE – Rotary Table Elevation
RW - Restricted Work
SB - Seabed
SS – Sub sea
TVD - True Vertical Depth

Contents

1. Drilling Approval Procedures

1.1. Compliance – Certificate of Fitness

1.2. HSE Assessment

2. Approval to Drill Application

2.1. Sea Bed Site Survey

2.2. Drilling Programme

3. Drilling Records and Reports

4. Drilling Programme Requirements

5. Drilling operations

6. Safety Precautions and Drills

7. Abnormal Pressure and Hydrocarbon Detection

8. Well Testing

9. Explosives and Radioactive Materials

10. Well Termination

11. Sampling and Measurements

12. Reporting, Submissions and Storing of Samples

Appendix A – Exploration Drilling Process Flowchart

Appendix B – Exploration Drilling Process Checklist

Appendix C – Drilling Application Template

Appendix D – Termination Template

1.0 Drilling Approval Procedures:

Operators are required to obtain **Approval to Drill** a well from the **BMP** before commencing any drilling or well related activities. The BMP are the primary regulatory body to provide approvals necessary to conduct drilling operations in Greenland.

The BMP authorizes the operator to conduct an exploration drilling programme on a single well basis, to include all operations and activities ancillary to the program.

The Drilling Approval allows the operator to drill a particular well using the drilling and evaluation procedures described in the application and accompanying well programme.

Prior to authorizing and issuing Approval to Drill, the BMP has a duty to ensure that:

- The operator is a registered holder of the necessary licenses for exploration and exploitation of hydrocarbons in an offshore area.
- Satisfactory evidence of financial responsibility has been furnished in the form of Guarantee issued by the parent company and/or the ultimate owners of major shareholdings of the holder of the License
- A valid Certificate of Fitness has been obtained for the drilling installation
- Suitable standby vessel(s) will be provided complete with certification of fitness
- Ice breakers and other support vessels to be nominated have certification of fitness
- The Operator must have a recognized and documented HSE Management System
- An appropriate safety assessment of the operator's facilities, vessels, equipment, operating procedures, contingency plans and personnel has been conducted
- The requisite detailed drilling programme and rig documentation regarding the drilling programme and well evaluation has been submitted and approved
- An Environmental Impact Assessment (EIA) of the proposed programme has been conducted and approved by the BMP or delegated agency
- A Social Impact Assessment has been conducted and presented to the BMP
- Signed Declaration of Insurance form

1.1 Compliance – Fitness Certification

An operator is required to obtain and provide to the BMP a certificate of fitness for the drilling installation issued by one of the recognized Certifying Authorities, i.e., American Bureau of Shipping, Bureau Veritas, Det Norske Veritas or Lloyd's Register of Shipping. It is a requirement of the Executive Orders and a condition of the Drilling Permit that the certificate remain valid and in force throughout the drilling programme.

In respect to certification of the Drilling Equipment installed on the MODU, the BMP expects the equipment to conform to API and other accepted minimum industry standards. The Certifying Authority for the vessel may also assess the drilling equipment on the installation.

And rescue, a standby vessel will be provided and equipped in accordance with recognized international standards with respect to Stand-by Vessels and certified accordingly.

1.2 HSE Assessment

The safety of the proposed drilling programme is assessed by the BMP prior to the authorization of any drilling programme and 'Approval to Drill'. This assessment is made prior to issuing Drilling

Greenland BMP - Exploration Drilling Guidelines

Approval, to consider the safety of the programme by reviewing the system as a whole, including vessels, facilities, equipment, operating procedures and personnel.

Operators are expected to demonstrate they have a Safety Management System and to describe how safety management, including the co-ordination of the safety management programs of the major contractors, fits within the overall management of the program. The BMP expects operators to identify all hazards associated with a drilling programme and to ensure that appropriate measures are in place to manage and control the hazards.

The hazards which need to be examined include, but are not limited to, are:

- Blowouts
- Fires
- Explosions
- Heavy Weather
- Icebergs and Pack Ice
- Loss of Ballast Control
- Loss of Stability
- Helicopter Transportation
- Ship Collisions
- Structural Failure
- Dropped Objects
- H2S
- Man overboard

In addition, in line with the Safety Management System the following programmes need to be in place and demonstrable:

- Safety Programmes, such as STOP etc
- Permit to Work (PTW) programme
- Evacuation Systems and Programmes
- Maintenance Programmes
- Qualification and Certification of key personnel
- H2S Awareness and Emergency Response Planning

During the BMP's safety assessment, the BMP will pay particular attention to the various safety issues identified, in particular the BMP expects operators to demonstrate that the best practicable evacuation technology available is used on drilling installations.

The information which is typically requested to be submitted, or made available to the BMP, in connection with this review is listed in the Exploration Drilling Guidelines, Appendix A – Drilling Process Flowchart and Checklist

2.0 Approval to Drill Application

An application for a Drilling Approval may be made by completing and forwarding three (3) duly executed copies of the BMP Exploration Drilling Application submissions plus 1 electronic format copy together with a detailed drilling programme at least eight to twelve weeks prior to spudding the

well, although a longer period is preferred. The application must be signed by the operator's senior representative responsible for the programme.

The BMP will provide a well number when the Approval to Drill is authorized.

An example of the required format is provided in Appendix B

2.1 Seabed Site Survey

As part of the EIA and site survey requirements, the Drilling Application submission is preceded or accompanied by documentation showing that the operator has investigated the nature of the seafloor and underlying sediments to identify any potential surface or subsurface hazards such as shallow gas. These surveys are usually conducted using geophysical methods. An application to undertake such surveys should be made to the BMP at least 6 weeks in advance of any Well Site Survey.

The site survey with respect to drilling operations safety shall as a minimum determine:

- a) Foundation stability and anchor suitability
- b) Any limitations on positioning and anchoring of drilling MODUs and auxiliary crafts to avoid damage to pipelines, cables, etc. as well as unnecessary drilling risks.
- c) The possible presence of objects which might affect the drilling operation (boulders, wrecks, other wells, etc.).
- d) Possibility of penetrating gas bearing zones.
- e) Possibility of penetrating particularly weak zones.
- f) Possibility of penetrating zones with abnormal pressures.

2.2 Drilling Programme

A copy of the detailed drilling programme and site survey plan of the proposed well location must be provided with the Approval to Drill Application, as per Section 3.0.

The detailed drilling programme will state how the operations are to be conducted with specific emphasis on safety and environmental related issues.

Management of Change: Changes concerning safety and other substantial changes such as a major variance in casing setting depth or well TD (greater than +/- 50m), adding or deleting a casing string etc. would need consent from the BMP, relative to the existing drilling programme must not take place without prior consent from the BMP. In the case of emergencies the drilling programme may be altered without prior consent. In such cases, the BMP must be notified immediately of the changes and the reason for them.

3.0 Drilling Records and Reports

A 24 hour report summarizing the drilling and related operations, lithology and weather & sea conditions must be provided daily to the BMP covering activities up to 6am Greenlandic time of the reporting day. This report is required from the spud date until operations are terminated at the wellsite.

Greenland BMP - Exploration Drilling Guidelines

The format used by operators for their internal daily morning reporting purposes is normally acceptable for the BMP's monitoring requirements. A copy of the daily reporting format is to be presented to the BMP for confirmation of acceptance.

3.1 Weather Forecasts and Ice Reports

The BMP requests that a copy of the site-specific meteorological forecast and a report of ice conditions are to be provided daily to ensure the BMP is fully informed of the status of conditions in the event of an alert or an emergency situation.

3.2 Tour Sheets

One copy of the IADC Drilling Report Tour Sheets should be submitted weekly to the BMP.

3.3 MODU Movement

Before a MODU can either enter into or move between locations within Greenland territorial waters the BMP has to be notified and The MODU operator must report directly to the Greenland Command at the naval base in Kangilinnguit (under the Danish Ministry of Defence) when entering Greenland waters.

3.4 Significant Events and Hazardous Occurrences

Any serious injury, loss of life, significant event or hazardous occurrence must be reported to the BMP immediately. The reporting procedures for such events should be in accordance with the procedures established in the operator's contingency plan.

3.5 Well Evaluation and Data Acquisition

The requirements pertaining to well evaluation and data acquisition, including the submission of cuttings, cores and fluid samples are covered in more detail in Sections 7, 10 and 11, but in essence refer to:

- Drill Cuttings
- Cores
- Gas Content of Drilling Fluid
- Logs and Surveys
- Testing and Formation Samples

3.6 Formation Flow Tests

If the well is to be tested according to the approved tentative well test programme all relevant logs shall be submitted together with the test programme to the BMP for approval to test. Final well test programme shall, when applicable be submitted and be written approved separately by BMP prior to conducting any formation flow test.

Greenland BMP - Exploration Drilling Guidelines

Preliminary test results, including data such as flow rates, fluid type, gravity and other readily available information, should be reported to the BMP by telephone/email as soon as possible followed up by a complete written report of the test results.

3.7 Well Termination – Suspension or Abandonment

1 Copy of the proposed well termination program either suspension or abandonment must be forwarded at least 24 hours before termination operations are scheduled to commence in accordance with Section 9 of the Greenland BMP Exploration Drilling regulations and Section 8 of the BMP Licensing Process Flowchart. The well termination program must be consistent with the drilling regulations. The BMP's approval of the program is required prior to terminating any well.

Three (3) copies of the Well Termination Record form, each signed by the senior operator's representative responsible for the program, is required to be forwarded to the BMP within 21 days of the well termination date as specified by Section 8 of the BMP Licensing Flowchart.

A sample of the Well Termination Record is provided in Appendix C

3.8 Final End of Well Reports

The BMP requires three (3) copies of the Final End of Well Report plus 1 electronic format copy for exploratory and appraisal wells, the report is to be submitted within 90 days of the rig release date

4.0 Drilling Programme Requirements

The drilling programme shall (together with manuals) state unambiguously how the operations connected to the well are expected to be carried out. Parts of the information required concerning the drilling programme may be forwarded as separate appendices and, where relevant, reference may be made to other documentation material such as the operator's general operation manual, general safety regulations, general regulations for test production, etc.

The drilling programme must state whether hydrogen sulphide preparedness will be needed and if this is the case the programme must state how and when it will be established.

The programme shall contain the following:

- 4.1 The well number as per the BMP numbering system.
- 4.2 The name of the well. Wells not named by the operator will be named by the BMP
- 4.3 Name of operator and information on the operator's organisation in connection with the drilling operations.
- 4.4 Well surface location and maximum tolerance on this position. The location shall be given in geographical and Universal Transverse Mercator (UTM) co-ordinates.
- 4.5 Ownership and name of drilling rig.
- 4.6 Water depth, mean sea level (msl).
- 4.7 Expected rotary table elevation (RTE) above mean sea level (msl).
- 4.8 Estimated total well depth, positions for targets and planned well trajectory.
- 4.9 Depth and description of the anticipated geological horizons.

- a) Stratigraphic column showing and describing anticipated lithology as well as the planned casing points.
- b) Representative, interpreted seismic sections near the planned well (normally 2 intersecting lines).
- c) Depth and time structure maps showing primary and secondary prospects as well as time and possibly depth structure maps for other key horizons with a scale of not less than 1:25,000.
- d) The velocity functions used in the area.
- e) A prospect description of primary and secondary objectives, including geological model for timing of formation and migration of hydrocarbons, and volumetric calculations.

4.10 Casing Programme.

The programme shall contain:

- a) Diameter of drilled hole.
- b) Casing size.
- c) Weight and grade of casing plus type of connection.
- d) Planned casing setting depths.
- e) Casing Centralization Programme
- f) Casing Cementation Programme, including type of cement, weight, estimated height of cement behind the casing, and calculations of cement volumes and planned % excess
- g) Demonstration of the sufficiency of the casing string design with regard to burst, collapse, and tension. Reference may be made to Company Procedure for casing design calculation. In this case the parameters used in the design (pressure, cementing height, mud density etc.) must be stated.
- h) Procedure and minimum requirements for testing the formation strength after drilling out the individual casings, including calculations demonstrating that the required formation strength is sufficient for drilling to the next casing setting depth.
- i) Precautions to be taken if the required formation strength is not obtained.
- j) Casing integrity test procedures and plug bump pressures

4.11 Mud Programme

The programme shall contain the following:

- a) A detailed description of the types of drilling fluid to be used specifying density, rheological properties etc.
- b) A detailed description of the components of the drilling fluids. Reference may be made to relevant chemical data sheets.
- c) A detailed description of check equipment and procedures for the drilling fluid or reference to relevant standard, which will be, followed (e.g. API RP 13B).
- d) Procedure for monitoring the drilling fluid volume.
- e) A list of the quantities of safety related material (e.g. barite and cement) to be stored on the drilling rig during normal operations and an argumentation for these quantities.
- f) A plot of the mud programme and casing plan in relation to the expected porepressure and fracture gradient with depth (including most likely scenario, high and low side).
- g) Documentation for the calculations of the expected pressures and gradients.

4.12 Logging programme, containing information on types of logs to be run and intended intervals.

Greenland BMP - Exploration Drilling Guidelines

- 4.13 Programme for taking geological samples, including a coring programme, the sample and coring programme shall include:
- Expected number and total volume of samples
 - Description and handling and storage of samples
 - Analytical programme to be performed on site and to be performed later.
 - Coring criteria
- 4.14 Tentative well test programme. Final well test programme shall, when applicable be submitted and be approved separately.
- 4.15 Well survey programme measuring the well depth, inclination and direction.
- 4.16 Well Control Measures, etc.
- A list of the blow-out prevention equipment available onboard the drilling MODU, specifying manufacturer, size, working pressure, and arrangement. Information regarding the BOP control system and redundancy.
 - Procedure for kick control, stating i.e., the data and calculations which by routine are updated to ensure the necessary background for handling emergency situations. Information on how blow-out preventers, measuring equipment, drilling fluid circulation and mixing equipment are expected to be used under such conditions.
 - Programme for drills in connection with equipment as mentioned in sections 4.16.a and 4.16.b above.
 - Programme for pressure testing of blow-out preventers and casing at different stages in the drilling operations.
 - Programme for hanging off drilling string and 'emergency quick disconnect procedures
- 4.17 Abnormal pressures.
- An evaluation of the possibilities of encountering overpressured zones with the well in question. This should be based on seismic data and/or experience from neighbouring wells.
 - A description of methods and procedures to be used for detecting any overpressure in the well.
- 4.18 An evaluation of the possibilities of encountering zones with poisonous gases with the well, including description of methods for detecting and handling of same.
- 4.19 An evaluation of the possibilities of encountering gas pockets in the well in question based on seismic data and experience from neighboring wells, including the possibility of encountering shallow as well as deep gas pockets.
- 4.20 A list of any other possible significant deviations from the geological/drilling prognosis which may be encountered during the drilling of the well, (e.g. saltzones, swelling clay, high pressured zones, faults) and information on precautions planned in this connection.
- 4.21 A summary sequence of all operations including an estimate of the time required for the different main operations (typical as a time versus depth curve i.e. drilling curve). The summary shall give a general description of the operations, including information on any special safety related requirements (caused by e.g. possible gas pocket or abnormal pressure).
- 4.22 Information regarding function, name, address and nationality of the contractor companies to be employed for the well in question. Information about companies carrying out less critical functions may be forwarded just before the start of the drilling operation.

Greenland BMP - Exploration Drilling Guidelines

- 4.23 Tentative programme for plugging the well and for re-establishing the well site. This programme may be submitted at a later stage. Final programme must be submitted for separate approval.
- 4.24 Description of preparedness for handling hydrogen sulphide and other dangerous gases including information on equipment, supplies, training and drills
- 4.25 Contingency plan for use in the event of major accidents or emergency situations regarding safety as well as environment.

5.0 Drilling Operations

- 5.1 During drilling operations, all necessary steps shall be taken to prevent explosion, blowouts, pollution, or other damage. Safety related equipment shall be installed as drilling operations progress and shall comply with the following requirements. Apart from possible drilling when setting the conductor pipe and surface casing, drilling must not be carried out before blowout preventers/diverter system and related equipment have been installed and tested.
- 5.2 The well must be cased. The casing shoes shall - with due consideration of geological conditions - be set at depths sufficient to ensure complete control of the well at all times.
- a) Conductor pipe (casing) shall be set at such a depth below seabed that unconsolidated formations are supported and a stable hole ensured for initial drilling operations. Cement must be to seabed and a means of top filling annulus must be provided.
- b) Surface casing shall be installed in such a manner to provide a good anchorage for the subsea wellhead and support of the blow-out preventers. Surface casing shall be cemented to seabed. After running and installation of the BOPs and riser, all rams and connections shall be function and pressure tested to pressures approved by the BMP and following internationally accepted procedures.
- c) Intermediate casing shall be installed and cemented in such a way that full control of the well is maintained at all times. The cementing and centralization programmes shall endeavour to secure that all zones containing hydrocarbons as well as all intervals with abnormal pressures are isolated. Prior to drilling out from intermediate and subsequent casings, a complete blow-out preventer function and pressure test will be conducted to pressures approved by the BMP and following internationally accepted procedures.
- d) Production casing must be cemented as stipulated as above for the intermediate casing.
- e) A liner must be cemented over its full length. When placing and cementing the liner, consideration shall be given to the best possible isolation of hydrocarbon bearing and/or abnormally pressured zones.
- 5.3 The use of cement bond log or temperature survey must be run when critical tops of cement (TOCs) are required for intermediate and production casing isolation. The cementation of production casing and liners must be checked with cement bond logging in situations where the cement job is suspect.
- 5.4 Casing strings shall be of such a diameter, weight and grade, as well as designed and installed in such a way that they can withstand any mechanical and chemical influence which may be expected in the well during drilling, testing, and stimulation.
- 5.5 After the casing strings have been installed and cemented, they shall be pressure tested in accordance with the approved drilling programme. For each casing the pressure test shall be adapted to the internal pressure to which the casing may be exposed.

Greenland BMP - Exploration Drilling Guidelines

- 5.6 The installation of used casings is not permitted unless these have been adequately tested and inspected in advance by an independent inspection company and satisfactory strength of pipes and connections can be documented.
- 5.7 Pressure testing of the formation strength below the casing shoe shall be performed in accordance with the approved drilling programme.
- 5.8 It must be possible to handle drilling fluid loss or to increase the fluid density without delay. During routine operations sufficient spare amounts of mud mixing materials must therefore be stocked on the platform/well site. Furthermore a sufficient stock of chemicals for handling possible hydrogen sulphide must be available (if hydrogen sulphide is expected).
- 5.9 Before the drill string is pulled out of the hole the well shall be observed and found to be stable. During tripping the well shall be monitored carefully for fluid loss/gain.
- 5.10 During drilling, the drilling fluid reconditioning equipment shall be used to the necessary extent to separate gas and cuttings from the fluid.
- 5.11 The density of the drilling fluid shall be tested regularly and at least every hour.
- 5.12 Oil based mud or mud containing chemicals which can be particularly detrimental to the health or environment, can only be utilised when approval is given by the BMP, (approval by other authorities may also be necessary).
- 5.13 The disassembly or other maintenance of blow-out preventers may take place only when the well is secured against blow-out by a minimum of 2 independent and tested barriers, accepted by the BMP in general or specifically.
- 5.14 Every 14 day pressure or operational testing of the blow-out preventers and connected pressure control equipment shall be carried out and after disassembly, as well as when drilling operations or other conditions make it reasonable.
- 5.15 The hydrostatic pressure in the well may only in connection with testing be reduced to such a level that the formation fluid can flow to the borehole.
- 5.16 During drilling operations the Licensee is required at all times and with necessary accuracy to keep track of the well trajectory. Measurements which determine inclination and azimuth shall be taken at intervals securing the necessary knowledge of the well course. For deviated wells the measurements shall be taken at intervals not exceeding 100 m, while bigger intervals and possibly omission of azimuth determination can be accepted in the case of almost vertical wells. Such measurements shall be carried out while drilling below the surface casing or from another specified depth approved or required by the BMP.

6.0 Safety Precautions and Drills

- 6.1 During the operations there must be preparedness for handling escape of poisonous gases (e.g. in case of a kick). This preparedness can be omitted in cases where it prior to the operation and be demonstrated that no hydrogen sulphide or other poisonous gases can be met in the well. If hydrogen sulphide or other poisonous gases are encountered all necessary safety precautions shall be taken to prevent accidents and the BMP shall be notified.
- 6.2 At the end of each shift, the off going crew shall -each within his area of responsibility - inform the oncoming crew of any defects that have been detected but not repaired. The off going crew shall furthermore inform the incoming crew about the working conditions and changes that have taken place. The incoming crew shall make certain that the equipment is in satisfactory condition.
- 6.3 For each drilling crew, pit level drills shall be carried out at least once a week.
- 6.4 For each drilling crew, weekly drills shall be carried out covering precautions to be taken in the event of kick.
- 6.5 For each drilling crew training and drills concerning handling of hydrogen sulphide shall be conducted to the degree relevant.
- 6.6 Safety meetings and drills shall be recorded.
- 6.7 During inspection, inspectors from the BMP may in consultation with the operator require drills as mentioned in items 5.3, 5.4 and 5.5 to be conducted.

7.0 Abnormal Formation Pressure and Hydrocarbon Detection

- 7.1 Monitoring and registration of data for evaluation of formation and pore pressures and for determination of hydrocarbon content in relation to the drilling fluid density, drilling rate, etc. shall be carried out from the drive/conductor pipe shoe from a jackup drilling unit and from the surface casing from a floating drilling unit and shall be continued till the well has been plugged.
- 7.2 Recognized measuring methods, parameters, and calculation methods shall be used at all times in evaluation of the possibility of encountering abnormal pressures.

8.0 Drill Stem Test (DST)

Penetrated formations with potentially important hydrocarbon shows, must if possible be testes. Test production shall be carried out in such a way that as much relevant information as feasible is obtained concerning fluids produced, production capacity of the formation and possibly the size of the reservoir. At the discretion of the Operator, when relevant for the evaluation of the hydrocarbon

Greenland BMP - Exploration Drilling Guidelines

content and/or production mechanism, test production shall be carried out from water bearing zones, which may have connection to the hydrocarbon bearing formations

8.1 Before a well test can be carried out all relevant logs shall be submitted together with the test programme to the BMP for approval to test. See item 2.4.5

8.2 The well test, perforating, hydraulic fracturing, acidizing or other chemical treatment of the well may only take place when special safety precautions, relevant for the operation, are observed. The above-mentioned operations shall normally be started and preferably take place in daylight. The well test is not to take place when safety is adversely affected by weather and wind conditions.

Test production in open hole is normally not allowed if the packer is in direct contact with the formation.

Test production shall be performed in such a way that the well is not damaged unnecessarily.

Caution shall be exercised to prevent accidental escape of chemicals and hydrocarbons to the environment.

8.3 Before start-up of test production, the drilling rig shall be specially prepared for the operation:

All necessary fire precautions shall be taken. The fire fighting equipment shall be ready for immediate use.

Valves, lines, and vessels in the entire production test system and where relevant blow-out preventers shall be pressure and function tested.

Where relevant stand-by, nearby vessels and aviation authorities shall be alerted if the intended test and likelihood of flaring.

Before the operation commences, all persons who are to participate in the test operation shall take part in a safety meeting.

8.4 Well perforation may be carried out by experienced personnel only. Extreme caution shall be exercised to prevent accidental firing of perforating guns when either loading or retrieving 'fired' guns.

Perforation of an exploration well shall take place under safety conditions corresponding to daylight (e.g. illumination of equipment, manning and possibilities for safe evacuation) where possible.

8.5 If radio transmitters or other equipment may constitute a hazard in connection with the use of explosives, this equipment must not be used while such operations are in progress. Non drilling

related radio equipment, e.g. transmitters onboard vessels, helicopters and radio stations, which are not at a safe distance from the drilling site must be considered. The burners are to be ignited by remote control systems only.

9.0 Explosives and Radioactive Materials

9.1 Explosives Materials

9.1.1 Explosives work shall be carried out under supervision by approved explosives supervisors.

9.1.2. The explosives supervisors need to have a valid certificate and have sufficient experience in this field

9.1.3 Explosives work shall be carried out in accordance with the approved safety and health plan for work on the drilling rig.

9.1.4. Detonators, prima cord and perforation charges for the perforating guns shall be stored in suitable and approved metal containers constructed for explosives storage.

9.1.5 Detonators, prima cord and perforation charges shall be stored separately. Detonators and explosives may not be stored together.

9.1.6 The explosives magazines shall be located such that the detonation wave does not move directly out towards critical areas on the drilling rig or drilling ship.

9.2 Radioactive materials and equipment containing radioactive materials

9.2.1 Radioactive materials shall be stored in an approved way and handled by specially trained personnel only.

9.2.2 The license holder needs to register all movements /use of radioactive materials in a radioactive in/out pit control book. The license holder needs to send a copy of the movements once a week.

9.2.3 Persons who are working with radioactive materials need to have a valid certificate and have sufficient experience in this field.

9.2.4 Work with radioactive materials shall be carried out in accordance with the approved safety and health plan for work on the drilling rig.

9.2.5 The license holder need to have work description regarding the handling of radioactive

10.0 Termination of Wells (Suspension or Abandonment)

Greenland BMP - Exploration Drilling Guidelines

Prior to the abandonment of a well the hole must be plugged according to procedure approved by the BMP in the well termination submission.

- 10.1 Normally, an exploration well shall be abandoned permanently when drilling operations as well as relevant logging and test production have been carried out. Under special circumstances the BMP may permit a well to be abandoned temporarily without permanent plugging. To obtain such permission the Licensee must submit an application indicating how and when the well is to be abandoned permanently or operations will be resumed. Furthermore, the application must describe the responsibility and supervision situation during the temporary abandonment.
- 10.2 Application for permission to stop operations and to plug (permanently or temporarily) and abandon a well, shall together with a copy of essential logs and other relevant documentation material, if any, be available to the BMP at least 24 hours before estimated commencement of the actual abandonment activities.

In the application, the Licensee shall give the reasons for the planned plugging and specify how the plugging will take place and how the plugs will be checked. The well site condition after the abandonment and procedures for verification of this must furthermore be stated.

- 10.3 In cases where the well is uncased opposite permeable zones, plugging shall be carried out so that there can be no flow of fluid through the hole (normally by cementing at least 50 m below and above the individual zones).
- 10.4 Where there is an open hole below the deepest casing, a cement plug shall be placed in such a manner that it extends at least 50 m above and below the casing shoe. The top of the cement plug shall be located by load testing. Where the condition of the formation makes cementing difficult, a mechanical plug may be positioned in the casing, within 50 m from the shoe as an alternative to the cement plug below the shoe. In addition, a cement plug, at least 50 m long shall be placed on top of this plug. The performed plugging of the open hole section shall be pressure tested for sufficient time and with enough differential pressure to detect a possible leak or mechanical failure of the plug.
- 10.5 Perforated zones must be plugged with cement so that no fluid flow to or from the well is possible. Where possible perforated intervals shall be isolated with cement plugs through the individual perforated zones and with 50 m long cement plugs below the lowermost perforation and above the uppermost perforation. Alternatively the perforated zones can be isolated by a combination of a mechanical plug squeeze cementing of the perforations and cement plugging above the mechanical plug.
- 10.6 If a liner has been used, a cement plug shall be placed in such a manner that the plug extends 50 m above and below the point of suspension. Alternatively a mechanical plug followed by a 50 m long cement plug can be set just above the liner hanger. The top of the plug shall be located by load testing and the plug shall be pressure tested as specified in item 9.4.

- 10.7 In the innermost casing a cement plug must be placed from the shoe depth of the previous casing and 100 m up.
- 10.8 It must be ensured that no communication from down hole formation to the sea-bed/surface via any casing annulus is possible.
- 10.9 A cement plug, at least 100 m long, shall be placed near the surface.
- 10.10 The total weight of the cement plugs in the well and the weight of the fluid between the plugs shall ensure that as a minimum the system is in balance with any pressure which may develop in the borehole.
- 10.11 When a well is abandoned the original state of the well site shall be re-established. No obstacles that can cause damages to fishing equipment may be left on the seabed. Drill cuttings shall be handled according to OSPAR and the London Convention. When abandoning a well, the condition of the well site shall be verified. Obtained documentation shall be submitted to the BMP. Where reasonable departure from this requirement may be approved by the BMP (approval by other authorities may also be necessary).

11. Sampling and Measurements

11.1 When drilling is in progress, the Licensee shall take cuttings of all lithologies from all geological formations penetrated. The sampling shall commence immediately after return of the drilling fluid is established. The interval between the samples shall not exceed 10 m. However, when drilling in formations which may contain hydrocarbons, the intervals shall not exceed 3 m.

11.2 When preparing the drilling programme and during drilling operations, the Licensee should aim at obtaining sidewall cores from intervals where it is relevant, e.g. for dating of geological horizons, determination of lithology or evaluation of the potential reservoir or source rock. The Licensee shall carry out relevant analyses e.g. petrographic, clay mineralogy, micro palaeontologic and palynologic, based on the sidewall cores taken.

11.3 The Licensee - with due consideration of safety aspects - shall aim at obtaining core information from all potentially significant hydrocarbon bearing reservoirs. Sufficient coring shall be done to ensure satisfactory information for the evaluation of the reservoir and the necessary analyses shall be performed.

11.4 When preparing the drilling programme and during drilling operations the Licensee shall see that sufficient logs are run in the well to obtain satisfactory geologic, geophysical, hydrocarbon and stratigraphic information from the layers penetrated.

11.5 When essential for the evaluation of the hydrocarbon potential or whenever measurement of the formation pressure in another way might give valuable information the Licensee shall attempt to carry out pressure measurements and take fluid samples from relevant penetrated horizons.

11.6 Penetrated formations with potentially important hydrocarbon shows must - if possible - be test produced. (se 7.0)

12. Reporting, Submission and Storing of Samples

The BMP must receive certain samples as well as reports on results from surface and downhole measurements and all analysis carried out on samples from the borehole. BMP may at any time request additional data as available and produced by the operator.

12.1 While drilling the reporting shall among others include the following:

- a) A "Mud, Pressure and Temperature Log", shall be sent to the BMP together with the open hole logs from the given hole section. The BMP will forward the logs as required to the appropriate body for review. Final logs have to be forwarded to the BMP when the well has reached final depth.
- b) "Well Site" geological report, as well as core descriptions, if any, shall be forwarded continuously to the BMP.
- c) A "Drilling Mud Report", shall be forwarded to the BMP after termination of drilling operations.
- d) Ordinary wire line logging and Logging While Drilling (LWD): 1 transparent and 1 paper copy for each printed scale (normally at least 1:200 and 1:1000) of all log runs shall be forwarded to the BMP. Logs where the raw data are recorded on magnetic tape must be sent to the BMP in a standard format which can be read by the BMP without difficulties (LAS/LBS and/or ASCII formats for well log data, and LIS/TIF and/or TAP/NTI for raster images). The data shall be forwarded as a copy of the tape and on a CD. A table of contents must follow the tape and CD. Edited magnetic tapes must be sent to the BMP in the same way together with a verification list and a paper log of the tape/CD contents. The material must be forwarded immediately after preparation.
- e) Directional surveys: The results from surveys shall be forwarded to the BMP when they are available.
- f) Composite, processed and interpreted logs, including parameter listing, shall together with a processing report and a justification for choice of parameters be submitted to the BMP.
- g) Vertical seismic profile (VSP). One set of standard processed results on paper must be forwarded to BMP together with a magnetic tape and CD with a detailed description of the format used and the data contained.

12.2 Samples (cuttings, cores, fluids).

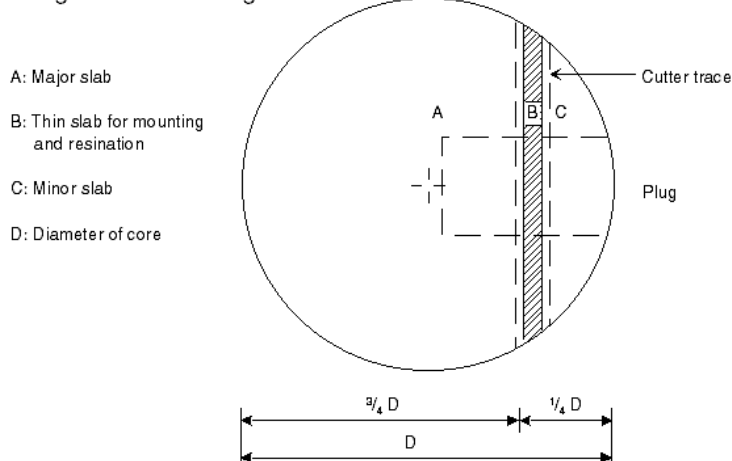
12.2.1 The following geological types and quantities of samples are to be forwarded to the BMP:

- a) Cuttings. A set of washed and dried samples, taken at the same intervals as samples for the Licensee's own use, shall be forwarded to the BMP Core Storage Facilities upon termination of drilling operations. All samples shall be stored at the BMP Core Storage Facilities at a fee determined by BMP to cover the cost.

Greenland BMP - Exploration Drilling Guidelines

- b) Cuttings. Wet samples, taken at the same intervals as samples for the Licensee's own use, shall be forwarded to the BMP Core Storage Facilities not later than 2 weeks after they have been taken. From each sample interval the sample size shall be at least 1000 g.
- c) Sample (1 litre) of the drilling fluid from the inlet side taken after each qualitative change of additives and before test production. Further samples must be taken to ensure intervals of not more than 300 metres (drilled depth) between consecutive samples.
- d) Side wall cores. Remaining material shall be stored at the BMP Core Storage Facilities not later than one year after the well is completed. If samples are prepared for paleo-analysis, one set of paleontologic or palynologic slides (original or extra set) shall be forwarded to BMP after the analysis is completed.
- e) Cores. The material shall be stored at the BMP Core Storage Facilities not later than one year after completion of the well. This time period may upon request be prolonged by the BMP. When the cores are stored the Licensee may freely inspect the material and may - after consulting the BMP - take samples for further analysis. The core material shall from when it is taken till it is stored at the BMP be stored in such a way that representatives from the supervising authority at the Licensee's expense have unimpeded access to inspect the material in so far as it is reasonable and to take samples for additional analysis. Cores shall be used to obtain information concerning the specific layers penetrated and in the long-term establishment of general information on the Greenland subsoil. It is therefore important that core material be kept as intact as possible. Samples should be sawed or drilled out. The BMP can at any time require special procedures to be followed in connection with handling of and sample taking from cores. Unless another procedure is agreed with the BMP the following shall be used:
- Core chips: To avoid unnecessary damage of the core material only essential chips should be taken. Chips, which are not immediately needed, shall be taken by sawing or drilling (e.g. reference samples). If it is necessary to take chips at the well site (e.g. for quick paleontological dating) this shall be done with care and the chips shall whenever possible be taken where the core already is broken.
- Drilling of plugs: A 1 inch diameter horizontal plug shall be taken for each, 0.3 m of core. At the same depth a supplementary plug (normally 1½") may be taken for special core analysis. Furthermore a 1inch diameter vertical plug may be taken for each 1.5 m core. The BMP may when justified require additional plugging to be done by the Licensee.
- Slabbing of cores: For each 1 m core a 15 cm long, undisturbed section shall be wax-sealed and stored. For the remaining core material eccentric slabbing - as shown below - shall be performed.

Longitudinal slabbing of core



Further work can be carried out after the programme for the work has been discussed with the BMP. All core material (i.e. the wax-sealed sections, part A, B and C together with plugs) shall be stored at the BMP as soon as practicable and at the latest 1 year after completion of the well. Part B shall be glued in a tray or a section of plywood by the Licensee. Permission must be obtained from the BMP if cores are to be stored outside the BMP Core Storage Facilities.

- f) Gases and hydrocarbon seepages: Gases and or liquid hydrocarbons escaping from cores must be sampled and kept in appropriate, tight containers. Sampling should be carried out *in duplo*, and one duplicate sample must be forwarded to BMP Core Storage Facilities as soon as possible.
- g) Non destructive logging of the core shall be undertaken (i.e. spectral gamma ray, susceptibility, density, velocity etc.) either onboard the drilling vessel/the support vessel or later when the core is taken onshore.
- h) Samples of formation fluid from each test produced interval. If possible, 2 litres of all produced liquids. When samples of separator gas are taken for PVT-analyses, a corresponding sample shall be taken and forwarded to the BMP Core Storage Facilities. Whenever possible, the fluid samples shall be sent in containers which can be retained by the BMP. If the containers shall be returned the Licensee and the BMP must agree on the time from which rental may be charged to the BMP. The Licensee must furthermore cover all transport costs.
- i) With the exception of samples mentioned above and unless agreed otherwise with the BMP, a duplicate of all samples shall be forwarded to the BMP Core Storage Facility

12.2.2 Marking. All samples collected by the Licensee shall bear a label stating name of the well and depth (depth interval) from which the sample is taken. The label must be made in a way that ensures permanent sample identification.

12.2.3 Packing. The samples must be packed so that the possibility of long-term identification and storage is ensured. Fluid samples from formation and production tests f) and c) and samples of drilling mud shall be packed so that quality and quantity are not affected during transportation.

Greenland BMP - Exploration Drilling Guidelines

12.3 Reports on analyses of samples from the borehole. Copies of descriptions and reports shall be forwarded to the BMP, including, among others, the following information:

- a) Reports on stratigraphic, sedimentologic and paleontologic analyses.
- b) Core descriptions.
- c) High resolution colour photos of all cores shall be submitted. The photos are to be taken immediately after cutting. Each photo shall show well name, core number, depth, and scale as well as top and bottom data. Furthermore, a copy of all other photos from the handling of core material (e.g. taking of plugs) must be forwarded.
- d) Conventional core analyses.
- e) Special core analyses.
- f) Petrophysical measurements of core material.
- g) Qualitative and quantitative water analysis if formation water is produced.
- h) PVT report indicating qualitative and quantitative composition of fluid samples from any test productions.
- i) Reports on source rock analyses.

12.4 Reports on Production Test.

12.4.1 Reports containing pressure and temperature profiles in the well and at the surface as well as separator conditions, choke size, operational sequence, production rates and cumulative production.

12.4.2 For all test productions a summarising and concluding report shall be prepared. The report must be forwarded to the BMP not later than 4 months after the termination of the well. The report shall as a minimum comprise the following information:

- a) Information on the individual test productions, including perforating pattern and interval, description of any stimulations, or other operations performed to stabilise or increase production.
- b) A listing of measured data used for analysing the production test.
- c) A listing of non-measured parameters used in the analysis of the test production and a documented explanation for the choice of parameters.
- d) A listing of calculated values from the test production, including among others permeability, extrapolated pressure, radius of investigation, and flow efficiency.
- e) All type curves and plots used for analysing the test productions indicating match point.
- f) A detailed discussion of the achieved results and interpretations hereof.

12.5 Final reporting: At the latest 6 months after the completion of a well the following reports shall be forwarded:

12.5.1 Summarising technical/geological report at least containing:

- a) Listing of the well's principal data, name, position in geographical and Universal Transverse Mercator (UTM) co-ordinates, drilling rig, water depth/ground level, reference level, operator, contractor, dates of the included operations, total time spent, and total depth of the well indicating geological age at TD.
- b) Summary of the progress of drilling operation, stating technical problems, if any, and discussion hereof.
- c) Summary of all geological information obtained during the drilling operation.
- d) Listing of installed casings and results of cementing.

Greenland BMP - Exploration Drilling Guidelines

- e) Detailed description including layout drawing of the well status when completing the operation.
- f) Composit log with main information from the well stating at least core- and test intervals, position of casings, cement and plugs together with lithology and selected logs.

12.5.2 One set of summary accounts for economy and for time split into main operations shall be forwarded to the BMP.

12.5.3 A discussion of the results obtained, time spent, and economy related to expectations to be forwarded in one copy to the BMP.

Greenland BMP - Exploration Drilling Guidelines

Appendix A - Exploration Drilling Process Flowchart

Phase Description	Activity	Reference Legal & Guidelines	Remarks
0	Pre-Licensing	SEIA - Strategic Environmental Impact Assessment	BMP undertakes large regional and baseline studies before any specific licensing rounds, funding comes from subsequent licensees. Information from SEIAs is available to all interested parties.
1	Pre-Qualification Licensing	Operator Approval for Licensing	Letter of Invitation On BMP website <ul style="list-style-type: none"> Operators need to meet BMP requirements Estimated approval timing?
1	Licensing	License Submission & Approval	<ul style="list-style-type: none"> As defined in Letter of Invitation Minerals Act; Part 5, sub-section 16 Minerals Act; Part 6, sub-section 24 <ul style="list-style-type: none"> Financial Security HSE Management is to recognised international standards Insurance - Proof of Cover, Declaration of Insurance Technical Competence
2	Pre-Investigations	Site specific EIA - Environmental Impact Assessment	<ul style="list-style-type: none"> Defined in License Award Document. Mineral Resources Act, Part 15, sub-section 73-75 Executive Orders - Chapter 17 BMP Guidelines for preparing EIA 16th May 2006 <ul style="list-style-type: none"> BMP to Approve before seismic operations can commence Some sections of the EIA require translation of docs in English, Greenlandic and Danish. Basically Greenlandic and Danish where public hearings are required - consult BMP for further clarification. Estimated approval process timing - 3 months
2	Pre-Investigations	SIA - Social Impact Assessment	<ul style="list-style-type: none"> BMP Guidelines for SIA Mineral Resources Act; Part 16, sub-section 76-78 <ul style="list-style-type: none"> SIA to be undertaken in parallel with EIA, but not a combined submission Some sections of the SIA require to be translated into English, Greenlandic and Danish as stated above - consult BMP for further clarification. SIA Guidelines located in Minerals section of BMP website with reference to petroleum activities in guidelines
2	Pre-Investigations	EIA & SIA Report Public Announcement	<ul style="list-style-type: none"> Mineral Resources Act, Part 15, sub-section 75 Minerals Resources Act; Part 16, 76-78 Executive Orders - Chapter 17, Section 74 <ul style="list-style-type: none"> This may include public hearing/s in addition to publication Estimated timing for process?
2	Pre-Investigations	Seismic Operations	<ul style="list-style-type: none"> Defined in License Award Document Submission document and standard application guidelines on BMP website under Application Procedures <ul style="list-style-type: none"> Seismic can only start after completion of EIA BMP to Approve Estimated timing for approval?
2	Pre-Investigations	Geophysical Analysis	As per License Agreement

Greenland BMP - Exploration Drilling Guidelines

Phase Description		Activity	Reference Legal & Guidelines	Remarks
3	Operator Approval	Operator Approval to Conduct Operations	<ul style="list-style-type: none"> • Defined in License Award Document • Mineral Resources Act, Part 6, sub-section 26 • Mineral Resources Act, Part 18, sub-section 86 	<ul style="list-style-type: none"> • Confirmation or reconfirmation of prequalified operators technical competence. • Operator must be able to demonstrate to BMP their capability and competence to operate in harsh remote offshore Arctic locations
4		Consultation Period		<ul style="list-style-type: none"> • Clarification of requirements and submission formats etc eg. EIA and SIA - Social Impact Assessment
5	Exploration Drilling Phase: Pre-Planning	EIA - Environment Impact Assessment	<ul style="list-style-type: none"> • Defined in License Award Document. • Mineral Resources Act, Part 15, sub-section 73-75 • BMP Guidelines for preparing EIA 16th May 2006 • BMP - Guidelines for submitting applications for approval of offshore installations for hydrocarbon exploration in Greenland with particular emphasis on HSE • Executive Orders: Chapter 17 • Arctic Oil & Gas Guidelines • OSPAR Guidelines 	<ul style="list-style-type: none"> • NERI to review EIA on behalf of BMP, inclusive of drilling fluid selection and cuttings discharge plans • Estimated approval timing - 6 weeks • Guidelines found on BMP website
5	Exploration Drilling Phase: Pre-Planning	SIA - Social Impact Assessment	<ul style="list-style-type: none"> • BMP Guidelines for SIA • Mineral Resources Act; Part 16, sub-section 76-78 	<ul style="list-style-type: none"> • SIA to be undertaken in parallel with EIA, but not as a combined submission • SIA Guidelines located in Minerals section of BMP website with reference to petroleum activities in guidelines
5	Exploration Drilling Phase: Pre-Planning	Ice Studies	<ul style="list-style-type: none"> • License documentation • Executive Order Chapters 4 & 7 	<ul style="list-style-type: none"> • Included in EIA
5	Exploration Drilling Phase: Pre-Planning	Site Survey pre drilling activities	<ul style="list-style-type: none"> • License documentation • Executive Order Chapters 4 & 7 	<ul style="list-style-type: none"> • Included in EIA • Submission to BMP at least 6 weeks ahead of planned activity
5	Exploration Drilling Phase: Pre-Planning	Approval of MODUs	<ul style="list-style-type: none"> • BMP - Guidelines for submitting applications for approval of offshore installations for hydrocarbon exploration in Greenland with particular emphasis on HSE • Act on Working Environment in Greenland • Executive Orders: Chapter 3, Section 9 • Executive Orders: Chapter 4 • Executive Orders: Chapter 6 Sections 23,24 & 25; Chapter 8 Section 30 and 32 • Executive Orders: Chapter 9 Section 36, Item 2 and Sections 44 and 45 • Executive Order Section 32, chapter 8 • Mineral Resources Act; Part 17, sub section 79 	<ul style="list-style-type: none"> • Focused on HSE and technical safety of the installation for working offshore Greenland • BMP are the authority once on location • Danish Maritime are the authority during navigation

Greenland BMP - Exploration Drilling Guidelines

Phase Description	Activity	Reference Legal & Guidelines	Remarks
6 Exploration Drilling Phase: Operations	Drilling Approval Application to Conduct Operations	<ul style="list-style-type: none"> Mineral Resources Act; Part 15, sub-section 73 1 and Part 16, sub-section 76 1 and Executive Orders Chapter 7 26 and Chapter 6, 23 to 25 must be completed before submission can be made Mineral Resources Act; Part 17 sub-section 79 Executive Orders Chapter 4 BMP Exploration Drilling Guidelines 	<ul style="list-style-type: none"> EIA and SIA Approvals required before Drilling Application Approvals can be considered Drilling Approval Application submitted at least 6 weeks ahead of planned activity BMP to review, approve/decline application. Presentation to BMP Detailed Drilling Programme BMP to initiate an independent technical review using contracted third party services on a 'call out' contract.
7 Exploration Drilling Phase: Well Testing	Well Test Application and Approval to Test	<ul style="list-style-type: none"> Mineral Resources Act: Part 17 subsections 79 and Part 18 sub-section 86 Executive Orders: Chapter 4 BMP Exploration Drilling & Well Test Guidelines 	<ul style="list-style-type: none"> Well Test Programme submission to BMP for approval Submission at least 7 days ahead of planned activity Flaring consent
8 Exploration Drilling Phase: Well Termination	Well Suspension or Abandonment Application and Approval	<ul style="list-style-type: none"> Executive Orders and Exploration Drilling Guidelines Mineral Resources Act: Part 18 sub-section 86 Mineral Resources Act: Parts 10 sub-sections 42, 43 and 44 	<ul style="list-style-type: none"> BMP to approve termination programme Submission at least 24 hours before termination Final Termination Record form to be submitted to the BMP within 21 days of termination
9 Exploration Drilling Phase: Well Data Analysis	Review and Analysis of Exploration data	<ul style="list-style-type: none"> As per License Agreement, Article 18 Mineral Resources Act: Part 18 sub-section 86 (4) 	<ul style="list-style-type: none"> Operator to deliver evaluation report within 90 days from release of rig

Greenland BMP - Exploration Drilling Guidelines

Appendix B - Process Check List for Guidance Only

Phase Description		Activity	Submit to BMP	Make available to BMP	Obtain from BMP
1	Licensing and Pre-Qualification	Open Letter of Invitation from BMP			X
1		Qualification as Operator Submission	X		
1		<i>Required company name, details and structure</i>	X		
1		<i>Ability to conduct proposed activities</i>	X		
1		<i>HSE Organisation and Management System</i>	X		
1		<i>Financial Capability to meet minimum requirements</i>	X		
1		<i>Insurance - Proof of Cover</i>	X		
1		License Approval			X
2	Pre-Investigation	Site specific EIA	X		
2		Submission to conduct seismic activities	X		
2		Approval to conduct seismic activities			X
3	Operator Approval	Technical Qualification as Operator to undertake drilling activities offshore Greenland in harsh remote Arctic locations			X
4		Consultation with BMP on forward plans	X		
5	Exploration Drilling pre-planning	EIA Submission and Approval			X
5		Environment and Eco System Review			
		<i>Seabed Site Survey</i>	X		
		<i>Drilling Fluid Selection and Cuttings Discharge Plans</i>	X		
		<i>Ice Management Plan</i>	X		
		<i>Oil Spill Contingency Plan</i>	X		
		<i>Relief Well Contingency Plan</i>	X		
5		<i>Risk Assessment</i>	X		
5		<i>Contingency Planning including relief well</i>	X		
5		<i>Emergency Response Planning</i>	X		
5		Ice Studies	X		
5		SIA (Social Impact Assessment) Submission and Approval	X		X

Greenland BMP - Exploration Drilling Guidelines

Phase Description		Activity	Submit to BMP	Make available to BMP	Obtain from BMP
5		Operator to demonstrate Safety Management System	X		
5		Personnel Competence - Qualifications of Key Personnel		X	
		Personnel Organization Chart		X	
5		Helicopter Operations Approval	X		
5		<i>Helicopter Operations Plans</i>	X		
5		<i>Helicopter Operator Certification of Fitness</i>	X		
5		<i>Search and Rescue Plans</i>	X		
5		Approval of MODUs and support vessels helideck certs			X
5		Approval of Offshore MODU Installation			X
5		Permit for MODU to operate in Greenland waters			X
5		<i>HSE Compliance and Management System</i>	X		
5		<i>Technical safety of unit</i>	X		
5		Compliance - MODU Certification of Fitness	X		
		MODU Operability Envelope	X		
		MODU & Vessels - Liability 'P&I' Insurance Certificate	X		
5		Drilling Equipment - Certification of Fitness	X		
5		Standby Vessel - Certification of Fitness	X		
5		Ice Breakers and PSVs - Certification of Fitness	X		
5		MODU Emergency Plans		X	
5		<i>Ballast Control</i>		X	
5		<i>Emergency Riser Dis-connect</i>		X	
5		<i>Vessel Drive Off</i>		X	
5		MODU Management Systems		X	
5		<i>Vessel QHSE System</i>	X		
5		<i>PPM</i>		X	
5		<i>PTW</i>		X	
5		<i>Lifting Equipment and Appliances</i>		X	
5		<i>Vessel Operating Manual</i>		X	
5		Logistics Management Plan		X	
6	Drilling Operations	Drilling Programme Approval			X
		Detailed Drilling Programme	X		
		Drilling Fluid Selection and Cuttings Discharge Plans	X		
6		Seabed Site Survey for rig safety & location	X		
6		Ice Management Plan	X		
6		Oil Spill Contingency Plan	X		
6		Relief Well Contingency Plan	X		
6		Reporting Plan	X		
6		Emergency Evacuation Plan	X		
6		Emergency Contact List	X		
6		H2S Contingency Plan	X		

Greenland BMP - Exploration Drilling Guidelines

Phase Description		Activity	Submit to BMP	Make available to BMP	Obtain from BMP
7	Well Testing	Well Test Approval			X
7		Well Test Programme	X		
7		Flaring Consent	X		X
8	Well Termination	Approval to Suspend or Abandon Well			X
8		Termination Programme	X		
8		End of Well Report	X		
	Miscellaneous				
	Community Relations		Met	Notified	Hearing
		Contact with local Stakeholders			
		Municipality			
		Employers Organization - SIK			
		Employees Organization - GA			
		Fisherman and Hunters Association - KNAPK			
		Labour Office/Office for Unemployed			
		Emergency Services - Police/Fire/Medical			
		Greenland Coast Guard			
		Customs and Excise			
		Greenland Airport Authority/ Traffic Control			
		Danish Air Authorities			
		Port Authorities			
		Naval Authority			
		Media Management			

Appendix C – Drilling Application Template

Date:

Well Number:

Well Name:

Block No:

Well Type:

(Exploration, Appraisal, Development)

UTM Co-Ordinates:

Operator:

Operator Representative:

Contact Details:

MODU Name:

MODU Owner:

Water Depth m (msl)

RTE m above msl

Estimated Well Total Depth

Estimated Primary Target Depth

Estimated Secondary Target Depth

MD m	MDss m	TVD m	TVDss m

Estimated Primary Target Thickness

Estimated Secondary Target Thickness

	m
	m

Primary Target coordinates and Tolerance

Secondary Target coordinates and Tolerance

Outline Sequence of Events:

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Casing Programme

Hole Size/Casing Size (ins)	Casing Specification Weight, Grade and Connection			Planned Casing Setting Depth (m)		Designed LOT Value	Planned Casing Shoe Depth (m)	
	Wt	Grade	Conn	MD	TVD			

Cementation Programme

Casing Size	% OH Excess	BHST C	Planned TOC	Planned Shoe Depth	Weight ppg/SG	Job Description

Mud Programme

Hole Size	Mud Properties	
	Type	Mud Wt

Electric Logging Programme: MDW, LWD, Electric Line

Hole Size	Interval Section m	Logging Suites

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Mud Logging Programme

Hole Size	Sample Intervals m	Wet	Washed	Dry

Well Survey Programme

Hole Size	Section Intervals m	Type of Survey	Anti-collision Controls (if applicable)

BOPs - Well Control

Size	
Rating	
Manufacturer	
Ram Configuration	

BOP Pressure testing interval

Casing & Casing Seat Pressure Test Programme

Casing Size	Casing Test Press.	Casing Seat Press.	LOT or FIT?

Wellhead Details

Manufacturer:

Type:

Pressure Rating:

Formation and Frac Gradient Plots

Estimated Time/Depth Plot

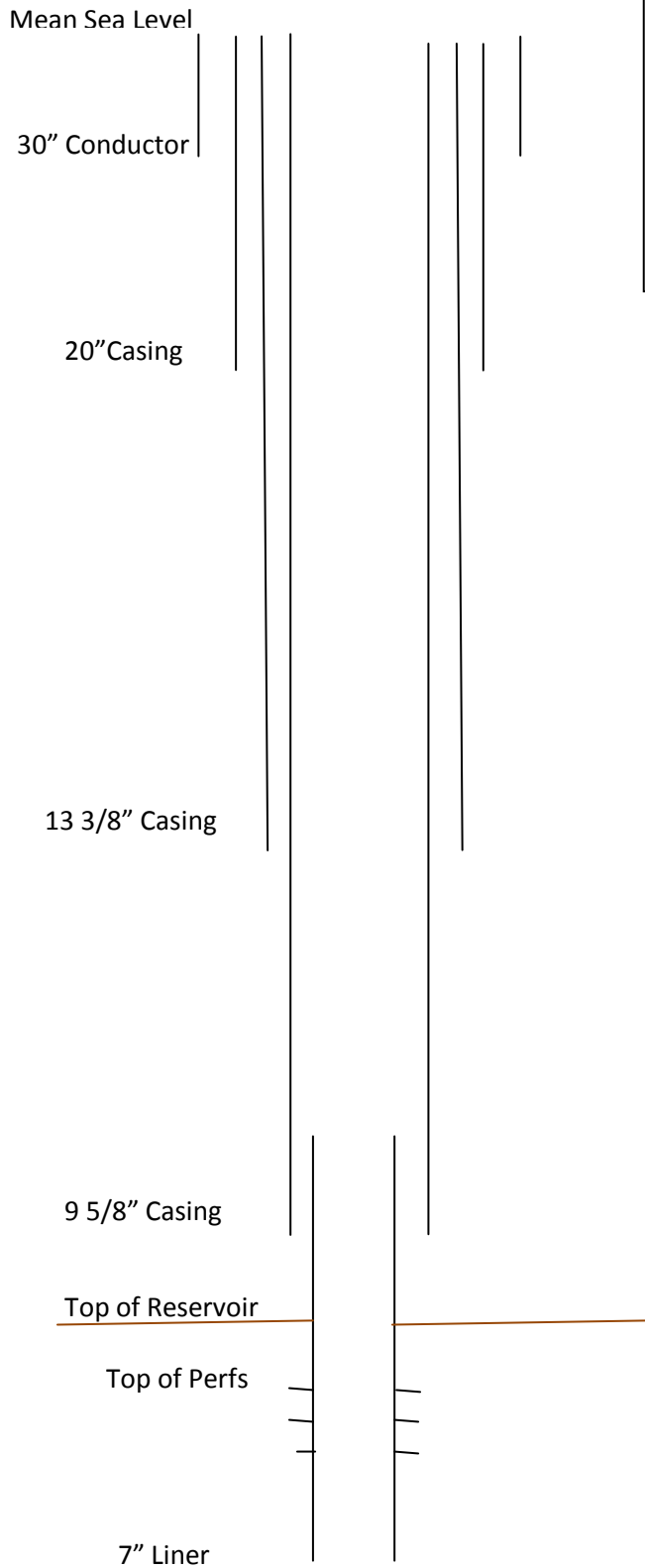
Well Schematic and Lithology Prognosis

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Shallow Gas Y/N? **Outline Risk**

Drilling Hazards Y/N?
Outline Risk

Appendix D - Well Termination Template Example



Depict the positions of all the plugs on a well schematic stating:

- Type of Plug
- Length of Plug
- Test and Type: Weight, pressure and/or inflow
- Annular fluid type and weight
- Well fluid type and weight