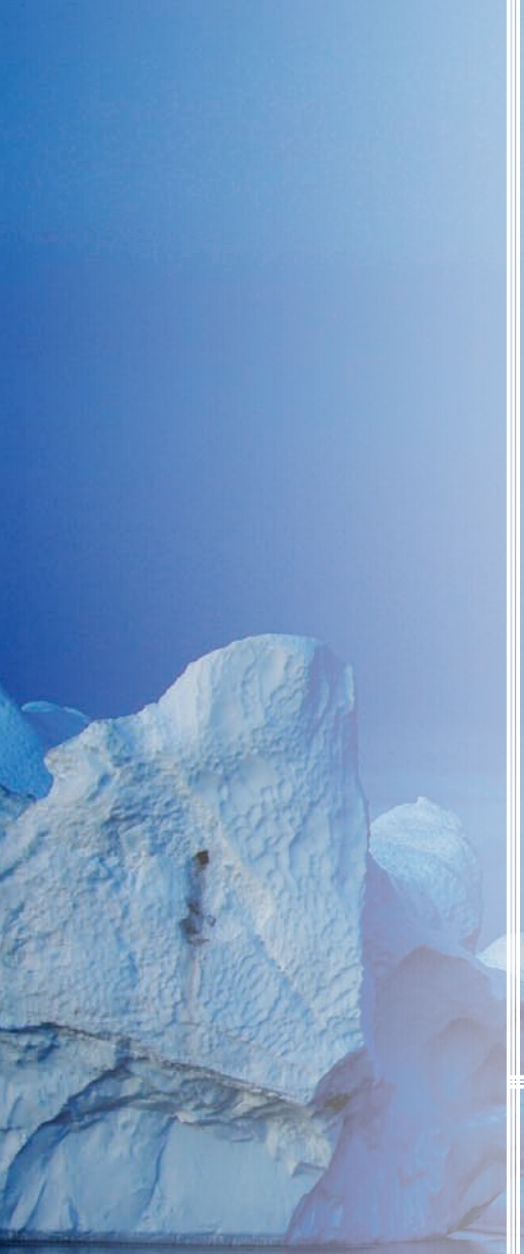

National Energy Board | Office national de l'énergie

NATIONAL ENERGY BOARD STAFF OBSERVATIONS OF THE CAIRN ENERGY DRILLING PROGRAM

Disko West Offshore Greenland - Sigguk Block

May 2011

Canada

National Energy Board
Office national de l'énergie

File OF-EP-Gen-AODR-GDOP 0101
30 May 2011

To: All Interested Parties

National Energy Board Staff Observations of the Cairn Energy Drilling Program

During the late summer of 2010, a National Energy Board (NEB) team (consisting of NEB staff members and a contractor) traveled to Greenland on the invitation of the Bureau of Minerals and Petroleum of Greenland to observe the offshore drilling activities being conducted by Cairn Energy PLC. The NEB team conducted two observation trips on board the Stena Forth drill ship and the Stena Don semi-submersible vessel in August 2010. The attached Report contains a summary of the team's observations.

The Board has authorized the publication of this Report as an account of the team's observations. This Report does not reflect the views of the Board nor should it stand as an endorsement of any current or possible processes used or actions taken by any company undertaking drilling activities.

The Report is being filed with the Arctic Offshore Drilling Review.

Yours truly,

E. Dutcher for

Anne-Marie Erickson
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CHAPTER 1

Background

In June 2010, Greenland's oil and gas regulator, the Bureau of Minerals and Petroleum (BMP), invited the National Energy Board (NEB) to observe inspections of the Cairn Energy Drilling Program. The BMP carried out the inspections off Greenland's west coast throughout the summer of 2010. The two regulators also signed a Memorandum of Understanding (MOU) and a Project Specific Agreement to facilitate their cooperation.

1.1 Memorandum of Understanding (MOU)

As set out in the MOU, the NEB and the BMP have agreed to share information on regulatory approaches and current events and to seek opportunities to cooperate. The regulators will share information on:

- Regulatory requirements, oversight approaches, processes, guidelines and best practices;
- Developments in their respective energy markets;
- Energy policy context in which each operates; and,
- Specific energy projects.

The MOU also indicated that the BMP and the NEB may enter into an activity-specific arrangement to set out the specific objectives and their roles with respect to a specific project. The BMP and the NEB entered into such an arrangement for the Cairn Energy Greenland Drilling Project, referred to in this report as the Project Specific Agreement.

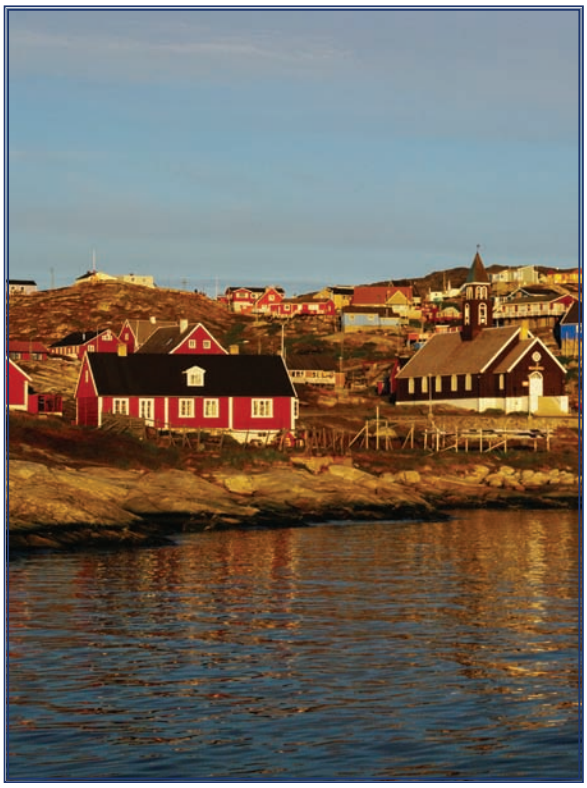
1.2 The Project Specific Agreement

With a Project Specific Agreement in place, the NEB team, which consisted of NEB staff and a contractor, would be able to observe drilling activities on the Cairn Energy Greenland Drilling Project. The NEB team was mainly interested in safety and environmental matters and, as they were observers only, they did not act as inspectors or advisors to the BMP. The agreement also allowed for the efficient exchange of information.

1.3 Observation Trips

The Cairn Energy Drilling Program was carried out by two ships: the Stena Forth and the Stena Don. The Stena Forth is a drillship and the Stena Don is a semi-submersible drilling, completions and workover vessel. Both ships are designed to work in harsh environments.

The first NEB team accompanied the BMP staff on their inspection of the Stena Forth and the Stena Don from 9-13 August 2010. The second NEB team accompanied the BMP during inspections of operations onboard the Stena Forth drillship between 27 August and 1 September 2010.



NOTE: *This map is intended for illustrative purposes only and is not drawn to scale.*

The first NEB team visited the BMP offices in Nuuk for four days for discussions with staff and the BMP Deputy Minister. The team also read approval documents, safety cases[1], ice management plans, oil spill response plans and safety management systems.

Examples of the material included:

- Health, Safety and Environment (HSE) Management Bridge Document between Cairn and Stena;
- Safety Cases for the two Stena rigs;
- The BMP's Approval of the Exploration Drilling Program; and,
- Social Impact Assessment of the Exploration Drilling Program.

During the inspections, the NEB team focused its observations on matters that may also be relevant to activities regulated under the Board's mandate, such as:

- Drilling activities;
- Contingency plans and emergency response activities;
- Security planning;
- Management systems;
- Company decision-making processes; and,
- Communications and organizational structures among company employees, contractors or agents.

1 In general, "Safety Case" refers to a documented demonstration that hazards have been identified, that risks have been assessed, and that comprehensive management systems and mitigating measures have been established that effectively reduce and control hazards and risks throughout all phases of the lifecycle. Some countries have defined "Safety Cases" within legislation.

CHAPTER 2

Observations

The following are factual observations by the NEB team of the Cairn Energy Drilling Program in Greenland.

While the NEB team was on board the rigs, the Stena Don and Stena Forth were approximately 75 km apart. The Stena Forth can travel at 22 knots once disengaged from drilling operations and the travel speed of the Stena Don is eight knots.

The crews on both rigs represented more than 20 different nationalities. English was the language of operation. Cairn Energy was the operator; Stena Drilling provided the drilling rigs and crews.

2.1 Ice Management

Not all ice presents the same degree of threat to a ship or offshore rig. To help understand the extent of ice threats, floating ice has been categorized by size. The Canada Coast Guard web site provides the following information about ice:

Growler: Smaller piece of glacier ice than a bergy bit, often transparent, but appearing green or almost black in colour, extending less than 1 m above the sea surface. It has a length of less than 5 m and normally occupies an area of about 20 m^2.

Bergy bit: A piece of glacier ice, generally showing 1 to less than 5 m above sea-level, with a length of 5 to less than 15 m. Normally, about 100-300 m^2 in area.

Iceberg: A massive piece of ice of varying shape, protruding 5 m or more above sea-level, which has broken away from a glacier, and which may be afloat or aground. May be described as tabular, domed, pinnacled, wedged, dry-docked, or blocky. Sizes of icebergs are small, medium, large, and very large.

Ice island: floating piece of ice broken from an ice shelf, often 40-50 m in thickness, with a higher freeboard than sea ice, and exhibiting undulating surface rolls.

Calving: The breaking away of a mass of ice from a glacier, ice wall, ice front, or iceberg.

The BMP required at least two vessels be assigned full time to each rig to conduct ice spotting, identification and towing or ice redirection operations. A radar system was used on each drilling rig for identifying and tracking ice movement before the ice came in range of the drilling operations. The air support craft would also inform the rigs if ice was spotted in the area during crew change flights.

Drilling activities on the rigs would be closed down if icebergs were spotted within a “T time”, which is the time it takes to pull the drill string out of the wellbore in order to move off location.

Provincial Aerospace Ltd. (PAL) from Newfoundland and Labrador was the ice management company used on both rigs. PAL was using the same "no ice contact" policy at Disko West as has been in place on the Grand Banks offshore Newfoundland and Labrador for many years.

The NEB team was advised that discussions between Cairn Energy, the BMP, Stena and PAL took into account the project specific risk assessment including the following factors:

- currents;
- wind direction and force;
- disconnect time (includes time to cease the current operation);
- iceberg patterns (present and predicted);
- sea conditions;
- iceberg characteristics; and,
- any other real or perceived threats.

Additional discussions centred around using Ice Breaker capability to "ram" the smaller growlers in order to reduce the size and potential hazard to the rig. They also found that early season drills and practices enabled ice management vessel personnel to become familiar with techniques used in netting, moving ice using propeller washing or water cannons and towing. Also discussed was the situation of one rig having numerous ice threats while the other would have none. This would mean that the ice monitoring vessels assigned to one location were kept idle and unable to respond to the threats at the other location. The BMP planned to evaluate the minimum vessel requirement to determine the feasibility of allowing vessels capable of towing ice to assist the other rig when needed.

2.2 Well Control and Well Barriers

The well control system, barriers and Blow Out Preventer (BOP) configuration on the Cairn Energy operations conformed to the NORSOK D-010 Well Integrity in Drilling and Well Operations standard. This standard requires tested and verifiable primary and secondary barriers in place at all times. According to the standard, the BOPs must be function-tested every week and tested to maximum section design pressure every two weeks. As well, the BOPs must be function-tested before drilling out surface casing, tested to maximum section design pressure before drilling out deeper casing or liners, and tested to tubing string test pressure before any well testing.

The NEB team was advised that the BOPs in the rigs were capable of being activated hydraulically, electrically, acoustically, and by the Remotely Operated Vehicle (ROV). Further, the BOP was designed to automatically close should all else fail. That means the blind rams and shear rams would close if communications with the rig via the full time monitoring failed.

The acoustic transmitter was available in an evacuation location so that it could be taken with a crew member if it became necessary to abandon the rig. The acoustic transmitter could be attached to a supply vessel when evacuating the rig and the sound transmitted to the BOP would activate the system and close the rams.

The NEB team was informed that the ROV crews were using imperial units, while the rig crew was using metric units. In addition, the sonar locators for the rig and ROV were different and incompatible. This was remedied through telephone communications between the ROV shack and the bridge.

2.3 Relief Well Capability

The Cairn Energy Drilling Program had two rigs on location drilling different wells by the same contractor. Cairn Energy suggested two rigs because they were drilling offshore in remote, deep water locations with no other rigs in the area. The BMP supported this plan.

The proposal to have two rigs to be in the same area simultaneously for relief well drilling capability was incorporated in the BMP approval document. The document outlined two conditions regarding the relief well capability: if one rig had to operate its BOP for any reason, the other rig would cease drilling and shift into stand-by mode and prepare to move into a location to drill a relief well; and, only one rig was allowed to drill into a hydrocarbon zone at a time.

2.4 Emergency Response

The BMP has an emergency operations centre (EOC) set up in Nuuk. The BMP Emergency Response Group coordinates the efforts of the Greenland authorities if there is an incident in the petroleum sector. For a drilling project, this group includes members from the BMP, the police, the Greenland Command, representatives from the media and the Ministry of Health, and, for a drilling project, the company's in-country representative.

The oil spill response equipment for the drilling project was divided into three Tiers:

- Tier 1 provided for minor spills. Equipment to control these spills was kept on board the drill units and on standby vessels in the area;
- Tier 2 provided for medium spills and consisted of additional equipment located at the company shore base in Aasiaat, Greenland as well as on board the support vessels; and,
- Tier 3 provided for large spills and consisted of further additional equipment including major booms and dispersants, located in Southampton, England. This equipment is available for any maritime emergency. A stockpile was reserved for the Cairn Energy Drilling Program.

Safety equipment, firefighting equipment and Tier 1 oil spill response kits were located throughout the work areas on both rigs. Evacuation paths were clearly marked with yellow paint and glow-in-the-dark directional arrows. Many of the walkways and handrails were heated in order to avoid accumulation of ice or snow, which could hamper an evacuation.

Emergency response drills were conducted weekly and a different segment of the crew were required to remain at the evacuation site to participate in additional drills, such as life boat exercises.

Standby vessels were also equipped with Tier 1 oil spill response equipment consisting of booms, dispersement arms and skimmers. The crews had been recently trained by the equipment manufacturer. The training included a full deployment exercise at the start of the drilling program. Fully equipped medical facilities were available on both rigs staffed with a qualified nurse and doctor. A medical professional was on duty for each 12-hour shift.

Helicopters were available for crew transport, small cargo transport and medevac operations. The fleet consisted of two Sikorsky 92 (S-92) and one Sikorsky 61 (S-61) helicopters. One of the S-92 helicopters was equipped for medevac or rescue operations; however, any could be used for this purpose. All helicopters had full redundancy (redundancy means duplication of critical components or controls, such as having two engines or backup systems), and the S-92 helicopters had de-icing capability.

These helicopters could be modified to include Search and Rescue (SAR) equipment such as side mounted winches and SAR technicians. Cairn identified helicopter requirements, including lifting capabilities for medevacs from supply craft that do not have helicopter deck capabilities. There is a strong possibility for fog to develop over water areas. These conditions may affect and limit helicopter support.

2.5 Security

An exclusion zone of 500 m around the rigs was established by the Greenlandic Government. This is in accordance with the United Nations Convention on the Law of the Sea of 10 December 1982 which states that the country in whose waters the rig is working may establish and enforce an exclusion zone around the rig of up to 500 m.

During the team's second observation trip to the Stena Forth, an environmental non-government organization (ENGO) operated a vessel in the area around the rigs. Four members of the ENGO boarded the sub structure of one of the rigs. Less than 48 hours later a storm with severe winds and waves up to 6 m battered the platform and forced a rescue of ENGO members using ropes and baskets lowered from the deck of the Stena Don.

The International Maritime Organization security levels were in use on the rigs and all crew members were trained on the proper responses to a security threat. Operations ceased when the ENGO members entered the area and the Danish military and police forces were mobilized. No hostile actions were taken, no equipment was damaged and no confrontations between crews of the rig and the ENGO members occurred. The ENGO members were subsequently arrested.

CHAPTER 3

Regulatory Regime

The Act on Greenland Self-Government was adopted by the Danish Parliament on 19 May 2009 and came into force on 21 June 2009. The Act establishes that the Greenland Self-Government authorities can assume responsibility for the mineral resource area and will thereby have the legislative and executive powers in the mineral resource area. The field of responsibility of mineral resources is stated in List II in the Schedule to the Act and provides that fields of responsibility will be transferred to the Greenland Self-Government authorities at times fixed after negotiation with the central authorities of the Realm (of Denmark). For a better understanding of the transfer of responsibilities, refer to the Mineral Resources Act and the "Explanatory Notes to the Mineral Resources Act" available at: http://www.bmp.gl/administration/legal_foundations.html

In the petroleum sector, the BMP is using the Norwegian Regulations and Standards. The BMP also considered Canada's regulatory regimes and have relied on the Canadian-Newfoundland and Labrador Offshore Petroleum Board Environmental Impact Assessment as a template for a drilling program. It has also adopted aspects of the NEB's Emergency Management System.

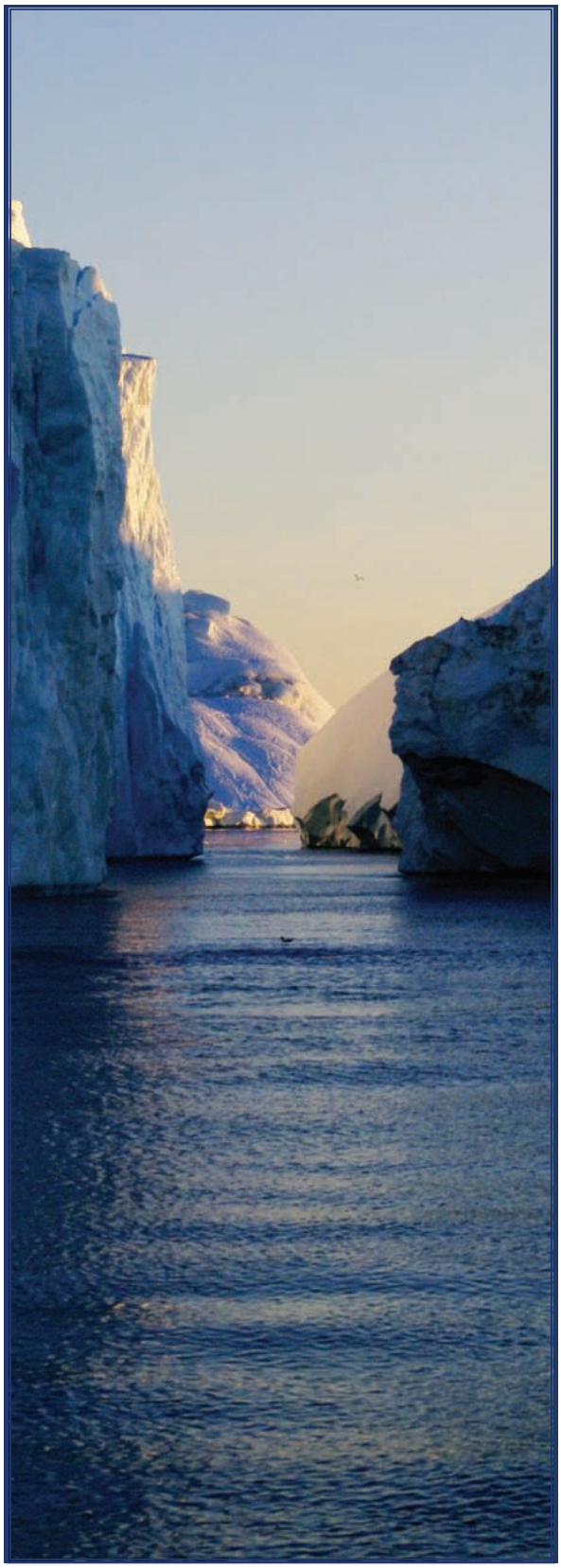
The BMP based its review and approvals on the Norwegian regulatory regime. This regime is frequently referenced for offshore operation outside of the Norwegian sector of the North Sea.

3.1 BMP Decision Process

The BMP staff described the discussions with the company undertaken during the decision process for this drilling program. The discussions lasted several months and consisted of weekly meetings either face-to-face or via videoconference. The BMP's areas of discussion were:

- Drilling contractor's safety management system and other HSE systems;
- Oil spill response plan;
- Safety case; and,
- Certifying authority requirement to authorize a certificate of fitness for the two rigs.

Through this process, the BMP addressed its concerns and granted the drilling program approval to Cairn Energy.



3.2 Regulatory Oversight

According to BMP and Cairn Energy, the level of inspection and regulatory oversight for the Cairn Energy Drilling Program was much higher than typical for the North Sea, particularly in the Norwegian sector. BMP and Cairn Energy held discussions about standards and requirements prior to approval.

The BMP inspectors conducted crew visits and rig tours, observed activity on the rigs, and reviewed procedures, documents and records. They conducted interviews with key Cairn Energy and Stena personnel concerning their roles, responsibilities and accountabilities with respect to the authorization document and legislated requirements.

3.3 Communications and Decision-Making Processes

The Offshore Installation Manager had ultimate responsibility for the safe operation of the rig. Each rig had one company representative onboard to vet all decisions so that the representative had direct influence over the decisions made with respect to the project. Drilling management conducted daily status and operational videoconferences with Cairn Energy Head office. The BMP staff in Nuuk, Greenland participated in the conferences to ensure they received timely project status updates.

CHAPTER 4

Conclusion

The NEB team observed two offshore rig inspections carried out by the BMP. As a result, the NEB team developed a better understanding of the two country's respective regulatory requirements, oversight approaches, processes and guidelines. The NEB team also developed a better understanding of deep offshore drilling activities and the challenges faced by operators in a northern environment.