



Capricorn

NON-TECHNICAL SUMMARY

Environmental Impact Assessment, 3D
Seismic Survey Programme for Pitu,
Offshore West Greenland

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NON-TECHNICAL SUMMARY

This document comprises the Non-Technical Summary (NTS) of the Environmental Impact Assessment (EIA) for a 3D seismic survey and associated activities in the *Pitu* Licence Block, west Greenland. The intention of this document is to briefly describe the project, present conclusions on preferred options and alternative solutions, summarise potential impacts and mitigation measures and highlight any remaining uncertainties.

THE PROJECT

The Project encompassed by this EIA is a 3D seismic survey of approximately 35 days duration. This will involve a survey vessel, a support vessel, and two chase vessels. The survey is scheduled to take place in the *Pitu Licence Block* and is planned to start around mid August 2011, depending on ice conditions.

The 3D seismic survey will employ an underwater energy source (airgun) and towed receivers to map subsurface features. The required size and power of the airgun array is determined by geophysicists with consideration of geological conditions and the depth below the sea floor to which the seismic energy must penetrate.

OPTIONS AND ALTERNATIVES

Conducting a seismic survey is considered to be a necessary precursor to exploratory drilling and any eventual exploitation of hydrocarbon resources. Other types of geophysical survey such as gravity and magnetic surveys may be carried out in addition to seismic surveys; however, neither of these methods can provide the detailed subsurface mapping which is possible through interpretation of seismic data.

Without seismic data it is considered impractical to investigate an area for future hydrocarbon development. The vessel and equipment for the survey are selected based on operational requirements and the environment in which the survey is being carried out (such as arctic waters), with consideration given to vessel availability and cost. The size of the airgun array is determined based on the required signal strength and depth of penetration needed to achieve the survey objectives.

SUMMARY OF POTENTIAL IMPACTS AND MITIGATION MEASURES

The *Pitu* licence block encompasses water depths of between approximately 100 and 900 m. The key sensitivities and constraints are assessed to be the presence of marine mammals, seabirds, other sea users and marine and coastal habitats.

The aspects of the survey which may impact on this environment are routine emissions to air (from the vessel engine), routine discharges to sea (grey water, treated sewage and macerated food waste), underwater sound (primarily from the airguns), physical interaction of the Project (with shipping or tourist vessels) and the risk of an abnormal situation (spillage or emergency such as vessel or iceberg collision) leading to an environmental release.

Screening and scoping has been undertaken to define the scope of the assessment and 'screen out' any issues whose impact on the environment would be so small as to be considered 'not significant'. For example, impacts to seabed organisms from the 3D seismic survey have been screened out due to the lack of any direct impact from survey activities and the water depth at the survey location. Other issues (those that are anticipated to be potentially significant) are subsequently carried forward to the next stage of the EIA and assessed accordingly taking into account the proposed mitigation measures.

The impact assessment has identified sources of potential impacts and associated activities alongside the receptors that could be affected. It has also predicted and evaluated the impacts, taking into account mitigation. *Table 1* summarises the key environmental aspects of the 3D seismic survey activities and the evaluated significance of potential environmental impacts.

Mitigation measures to be implemented by the Project include use of more environmentally friendly alternatives such as solid-state streamers, robust operating procedures for key tasks such as waste management and refuelling, notification to other sea users, on-board effluent treatment, compliance with applicable legislation and good industry standards, use of two Marine Mammal Observers and implementation of an Emergency Response Plan.

In order to minimise the potential impacts of underwater sound on marine fauna, it is recommended that the appropriate guidelines by NERI (National Environmental Research Institute, Denmark) and the JNCC (Joint Nature Conservation Committee, UK) are complied with when using an airgun array as a seismic source. All marine mammal and seabird sightings will be recorded during the survey and the results made available to the Greenland authorities along with other key data from the survey (HSE incidents, waste transfers, interaction with other sea users etc).

The scale of potential impacts from the 3D seismic survey is also limited by the short duration of the survey, which is scheduled to last for 35 days.

In many cases it will be the subcontractor (eg vessel operator, seismic survey crew) that will be required to implement the prescribed mitigation measures. The subcontractor has been selected in accordance with Capricorn's tender evaluation process and the Company's standard HSE Contractor Management procedures to ensure selection of a contractor competent to provide the services with appropriate technical and operational capabilities and HSE performance standards.

Following mitigation and coupled with the short duration of this survey and the relatively low-impact nature of the survey operations, it is concluded that all residual impacts associated with the 3D seismic survey will be of either minor or no significance, except for potential impacts to cetaceans from noise which are considered a moderate impact; there will be no residual impacts of *Major* significance.

Table 1 *Significance Evaluation Assessment Results*

Environmental Impact	Major	Moderate	Minor	Not Significant
Planned Events				
Noise				
Cetaceans				
Pinnipeds				
Fish				
Air Emissions				
Air quality				
Discharges to Sea				
Water column quality				
Marine ecology				
Physical Presence				
Fishing				
Unplanned Events				
Spills				
Marine ecology			Potentially	
Ice edge ecosystem			Potentially	
The coastal environment			Potentially	

Cumulative impacts have also been assessed. Based on the time and location of the survey, the lack of existing oil and gas production, limited overlap with shipping activity and the distance between other oil and gas exploration activities in west Greenland, the potential for cumulative impacts is small and, in the worst case, will be limited to potential long range effects on marine mammal populations from underwater sound over a short period.

UNCERTAINTIES

The exact timing of the survey is dependant on the ice conditions at the survey site. The survey requires ice free waters. As such the estimated start of the survey is mid August; this EIA therefore assesses impacts from the 3D seismic survey to receptors over the likely operating window.

It is recognised that despite ongoing studies by organisations such as NERI, the Danish Meteorological Institute (DMI) and Greenland Institute of Natural Resources (GINR), the environment offshore Greenland remains relatively unstudied and there are gaps in our environmental knowledge of the area, particularly for the deeper waters a long way (ie >150 km) offshore. Any uncertainties or gaps in the baseline data used have been highlighted within the EIA. Where uncertainties have been identified which may significantly

influence the assessment of impacts, the precautionary principle has been applied.

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