Esso Imperial Oil ExxonMobil bp

Beaufort Sea Exploration Joint Venture Drilling Program

PROJECT DESCRIPTION

Submitted to:
the Environmental Impact Screening Committee

Submitted by:
Imperial Oil Resources Ventures Limited

September 2013
Calgary, Alberta

BEAUFORT SEA EXPLORATION
JOINT VENTURE

Drilling Program

Project Description

Imperial Oil Resources Ventures Limited

September 2013

Acknowledgements

This Project Description has been prepared with the assistance of SL Ross Environmental Research Ltd. and Golder Associates Ltd. with contributions by IMG-Golder Corporation.

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JOINT VENTURE DRILLING PROGRAM
PROJECT DESCRIPTION

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September 9, 2013

Mr. Darrell Christie
Environmental Impact Screening Coordinator
Environmental Impact Screening Committee
107 Mackenzie Road, Suite 204
PO Box 2120, Inuvik, NT X0E 0T0

Dear Mr. Christie:

Re: Imperial Oil Resources Ventures Limited
Application to the Environmental Impact Screening Committee
for the Beaufort Sea Exploration Joint Venture Drilling Program

Imperial Oil Resources Ventures Limited (Imperial) hereby requests the Environmental Impact Screening Committee (EISC), under the Inuvialuit Final Agreement (IFA) environmental impact screening and review process, to conduct a screening of Imperial's proposed Beaufort Sea Exploration Joint Venture Drilling Program (the exploration program or the program).

To meet the requirements of the EISC's *Environmental Impact Screening Guidelines* of June 29, 2012, Imperial has:

- submitted an electronic project summary questionnaire to the EISC registry site
- prepared the enclosed Project Description

The content and format of the Project Description is consistent with Appendix F, Project Description Content Guide.

Imperial requests that the review of the exploration program proceed directly to Phase 2 of the screening process, as it is a development as defined by the IFA and not exempt from screening.

As operator of the exploration program, Imperial and its co-venturers in the Beaufort Sea Exploration Joint Venture (ExxonMobil Canada Ltd. and BP Exploration Operating Company Limited) believe that the program described in the Project Description can be carried out in a safe and environmentally responsible manner. Furthermore, the joint venture partners believe that the program will provide positive benefits for Inuvialuit and northern residents.

Imperial looks forward to working with the EISC and assisting the committee, as required, in reaching a screening decision. If you have any questions or requests please contact the undersigned.

Sincerely,

(original signed by)

Sherry Becker
Beaufort/East Coast Opportunity Manager
Beaufort Sea Exploration Joint Venture

Enclosures

BEAUFORT SEA EXPLORATION
JOINT VENTURE DRILLING PROGRAM
PROJECT DESCRIPTION

The title of the proposed development described in this Project Description for review by the Environmental Impact Screening Committee is the Beaufort Sea Exploration Joint Venture Drilling Program.

For information concerning the proposed development or this Project Description document contact:

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4.1.1 REGULATORY APPROVALS

The proposed Beaufort Sea Exploration Joint Venture Drilling Program (the exploration program or the program) consists of drilling one or more exploration wells within exploration licence (EL) 476 or EL 477. The ELs are located within the Canadian sector of the Beaufort Sea, more specifically in the Inuvialuit Settlement Region (ISR) in the Northwest Territories (NWT).

The major approval milestones for offshore wells in the ISR, as required in the *Canada Oil and Gas Operations Act* (COGOA) and under the Inuvialuit Final Agreement (IFA) include:

- this Project Description (PD) to be filed with the Inuvialuit Environmental Impact Screening Committee (EISC) and the National Energy Board (NEB)
- an Environmental Impact Statement (EIS), if required, to be filed with the Inuvialuit Environmental Impact Review Board (EIRB)
- a drilling operations authorization (OA) application to be filed with the NEB
- a benefits plan to be filed with Aboriginal Affairs and Northern Development Canada (AANDC) and provided to the NEB
- a well approval (WA) application to be filed with the NEB
- other ancillary applications or licences required for the exploration program

Table 4-1, summarizes the regulatory approvals required for the program. An overview of the regulatory approval process is shown in Figure 4-1.

Table 4-1: Program Required Regulatory Approvals

No.	Approval	Jurisdiction	Legislation	Contact	Planned Submittal Date	Expected Approval Date	Date Approval Required	Description and Notes
1	Screening by the Environmental Impact Screening Committee (EISC)	EISC	• *Western Arctic (Inuvialuit) Claims Settlement Act* • Inuvialuit Final Agreement (IFA)	EISC – Darrell Christie, EISC Coordinator AANDC – Conrad Baetz, Manager, North Mackenzie District	July 2013	September 2013 (two months to review and possibly refer to the EIRB)	September 2013	• The EISC will determine if the program should be referred to the EIRB. • The NEB will also receive the Project Description. The NEB might provide comment during the EISC screening and might elect to conduct an additional assessment.
2	Potential review by the Environmental Impact Review Board (EIRB) or the National Energy Board (NEB)	EIRB and NEB	• *Western* Arctic *(Inuvialuit) Claims Settlement Act* • IFA • EIRB and NEB Memorandum of Understanding	EIRB – Elizabeth Snider, EIRB Chair AANDC – Conrad Baetz, Manager, North Mackenzie District NEB – Céline Sirois Technical Leader, Environment	Early 2014	December 2014 (one year to review)	December 2014	• The Environmental Impact Statement (EIS) will be submitted to the EIRB. The EIRB will conduct a public review in accordance with the IFA and a public hearing is a possibility. • There is an opportunity for common terms of reference with the NEB if a coordinated assessment is possible. If a coordinated assessment is not possible, the EIS will be submitted to the NEB along with the drilling operations authorization (OA). • The NEB will consider the EIRB's report and recommendations during its CEAA, 2012 determination and its consideration of the drilling OA.
3	*Canadian Environmental Assessment Act, 2012* (CEAA, 2012) determination Note: based on proposed amendments to the *Regulations Designating Physical Activities*, April 19, 2013	NEB	• the CEAA, 2012 • Canada *Oil and Gas Operations Act* (COGOA) under the jurisdiction of the NEB • EIRB and NEB Memorandum of Understanding	NEB – Céline Sirois, Technical Leader, Environment	December 2014	December 2015 (one year)	December 2015	• There is an opportunity for common terms of reference with the EIRB, if a coordinated assessment is possible. • An NEB public hearing is a possibility in addition to an EIRB's hearing. • The NEB must wait for the EISC and EIRB recommendations before it makes its determination.

Table 4-1: Program Required Regulatory Approvals (cont'd)

No.	Approval	Jurisdiction	Legislation	Contact	Planned Submittal Date	Expected Approval Date	Date Approval Required	Description and Notes

4	Drilling operations authorizations (OA)	NEB	• COGOA under the jurisdiction of the NEB
			• the *NEB's Filing Requirements for Offshore Drilling in the Canadian Arctic*, December 2011
				NEB – Hearing Manager (to be determined)	December 2014	December 2015 (one year)	December 2015	• A drilling OA would be required before a funding commitment in Q1 2016.
								• The application must include a description of the drilling program including:
								  • management
								  • evidence of financial responsibility
								  • an approved benefits plan
								• A certificate of fitness for each drilling and accommodation installation, which is a condition before authorization.

5	Canada Benefits Plan	Aboriginal Affairs and Northern Development Canada (AANDC)	• Section 5.2 of the COGOA	AANDC – Michel Chenier, Director, Policy and Research	Q1 2015	Q3 2015 (six months)	Q4 2015	• The Canada Benefits Plan must be approved before the NEB provides a drilling OA. • The plan describes the operator's policies and activities for involving Canadian and local business, and for employment and training of Canadians and northerners.

6	Section 35 – authorization to alter fish habitat	Fisheries and Oceans Canada (DFO)	• *Fisheries Act*	DFO – Julie Dahl, Manager, Central and Arctic Region	Q1 2017 (if dredging is required)	Q1 2019 (two years, if required)	Q1 2019 (if three months of dredging during the open-water season is required)	• Specific program components to evaluate are:
								  • potential dredging activities in Tuktoyaktuk Harbour
								  • installation of docks, harbours or moorings
								  • set down of anchors
								  • disposal of dredged material
								  • noise and vessel traffic
								• Authorization under the *Fisheries Act* will likely still be needed.

7	Disposal at sea permit (for dredged material)	Environment Canada (EC)	• *Canadian Environmental Protection Act* (CEPA)	EC – Mark Dahl, Senior Ocean Disposal Officer	Q1 2018 (if dredging is required)	Q1 2019 (one year, if required)	Q1 2019 (if three months of dredging during the open-water season is required)	• A permit is required for disposing dredged material at sea.

Table 4-1: Program Required Regulatory Approvals (cont'd)

No.	Approval	Jurisdiction	Legislation	Contact	Planned Submittal Date	Expected Approval Date	Date Approval Required	Description and Notes
8	Approval for potential dredging activities in Tuktoyaktuk Harbour	Transport Canada (TC)	• *Navigable Waters Protection Act*	TC – Matt Klaverkamp, Acting Manager Navigable Waters Protection	Q3 2018 (if dredging is required)	Q4 2018 (three months, if dredging is required)	Q1 2019 (if three months of dredging during the open-water season is required)	• Approval is required if dredging work is undertaken. • The application will include a description of the proposed site, its design, construction and management and operation of the work. • Approval will be required for disposing of dredged material.

9	Certificates of fitness	TC and NEB	• *Canada Oil and Gas Certificate of Fitness Regulations*
			• COGOA
				NEB – Chief Safety Officer
				TC – Craig Miller, Manager Marine Safety
					Q2 2019	Q4 2019 (six months)	December 2019	• Required for vessels and equipment.
								• The NEB will determine if the drilling installation and accommodation:
								  • is designed, constructed, transported and installed in accordance with regulations
								  • is fit for purpose
								  • will continue to satisfy the requirements for the period of validity

10	Drilling unit, icebreaker and supply vessel approvals	TC	• *Arctic Waters Pollution Prevention Act*
			• *Canada Shipping Act*
			• *Navigable Waters Protection Act*
			• *Coasting Trade Act*
			• *Marine Transportation Security Act* and regulations, Part 2
				TC – Craig Miller, Manager Marine Safety
				
				TC – Lavina Harding, Manager Marine Security
					Q3 2017
					
					To be determined
						Q1 2019 (18 months)
						
						To be determined
							Q4 2019
							
							To be determined
								• An early application with significant schedule float is recommended. Approvals will be obtained by prime contractors.
								• Required approvals for each vessel include:
								  • an arctic pollution prevention certificate (not mandatory, but strongly encouraged)
								  • Canadian maritime documents addressing personnel competency, maritime safety and maritime pollution prevention
								  • a coasting trade licence for foreign vessels or non-duty paid vessels
								  • inspection of a vessel operator's international ship safety certificate or for a Canadian vessel, a Canadian vessel security certificate and shipping approval once the flag state is known for all Safety of Life at Sea (SOLAS) or non-SOLAS vessels interfacing with the marine drill site

Table 4-1: Program Required Regulatory Approvals (cont'd)

No.	Approval	Jurisdiction	Legislation	Contact	Planned Submittal Date	Expected Approval Date	Date Approval Required	Description and Notes
11	Water licence	Northwest Territories Water Board (NWTWB)	• *Northwest Territories Water Act* and regulations Sec. 4-8	NWTWB – Executive Director (to be determined) AANDC – Conrad Baetz, Manager, North Mackenzie District	Q4 2018	Q2 2019 (six months)	Q1 2020	• Required for withdrawing water for potable water use and for disposal at the shore-based facility. • Devolution in the NWT will transfer governance of land and water from the federal government to the GNWT. Transfer of responsibility is expected to happen in the spring of 2014. Confirmation of whether the water licence would be issued by the GNWT or NWTWB and AANDC will be obtained.
12	Other approvals required for onshore staging activities, such as land use permits	Land use permits - Inuvialuit Land Administration (ILA) GNWT - Department of Environment and Natural Resources (GNWT-ENR) Waste – ENR has jurisdiction over waste management in the NWT	• IFA • *North West Territories Environmental Protection Act*	Land – ILA, Mike Harlow, Chief Land Administrator (if on Inuvialuit private lands) or AANDC – Conrad Baetz, Manager, North Mackenzie District if on Crown land in the ISR – Catherine Conrad, Director, Northern Affairs Organization Waste: GNWT-ENR, Todd Paget	To be determined with contractor	To be determined with contractor	To be determined before start of onshore activities	• Onshore activities will occur through contracted parties. Imperial will work with contractors to ensure that proper regulatory approvals are in place. If sites and services are not in full compliance, compliant alternatives will be used. • Devolution in the NWT will transfer governance of land and water from the federal government to the GNWT. Transfer of responsibility is expected to happen in the spring of 2014, which might impact Crown land administration. • For waste, joint engagement in conjunction with the Canadian Wildlife Services and TC will occur.
13	Well approval (WA)	NEB	• *Canada Oil and Gas Drilling and Production Regulations* • COGOA	NEB – Patrick Smyth, Chief Conservation Officer	Feb. 1, 2020 (120 days before the latest drilling start date, May 1, 2020)	March 1, 2020 (one month)	Start drilling in 2020 season	• A WA is required before drilling starts. • A WA will be submitted no less than 21 days before the date the operator plans to spud the well. • The operator must start drilling within 120 days after the WA is granted. Imperial might apply for the WA well before the 120 day deadline.

Table 4-1: Program Required Regulatory Approvals (cont'd)

No.	Approval	Jurisdiction	Legislation	Contact	Planned Submittal Date	Expected Approval Date	Date Approval Required	Description and Notes
13	Well Approval (WA) (cont'd)							This would be done to give Imperial time to address any concerns the NEB might have before the program drilling starts. This would help Imperial avoid having program equipment or resources sit idle if there is a delay in the permit being granted.
14	Significant Discovery Licence (SDL)	AANDC	• *Canadian Petroleum Resources Act*	AANDC – Mimi Fortier, Director General	To be determined	To be determined	To be determined	• If a discovery of hydrocarbons is made, Imperial could apply to the NEB and AANDC for an SDL.

Note:
AANDC = Aboriginal Affairs and Northern Development Canada
CEAA, 2012 = *Canadian Environmental Assessment Act, 2012*
CEPA = *Canadian Environmental Protection Act*
COGOA = *Canada Oil and Gas Operations Act*
DFO = Fisheries and Oceans Canada
EC = Environment Canada
EIRB = Environmental Impact Review Board
EIS = Environmental Impact Statement
EISC = Environmental Impact Screening Committee
GNWT-ENR = Government of the Northwest Territories - Department of Environment and Natural Resources
IFA = Inuvialuit Final Agreement
ILA = Inuvialuit Land Administration
ISR = Inuvialuit Settlement Region
NEB = National Energy Board
NWTWB = Northwest Territories Water Board
OA = operations authorization
SDL = significant discovery licence
TC = Transport Canada
WA = well approval

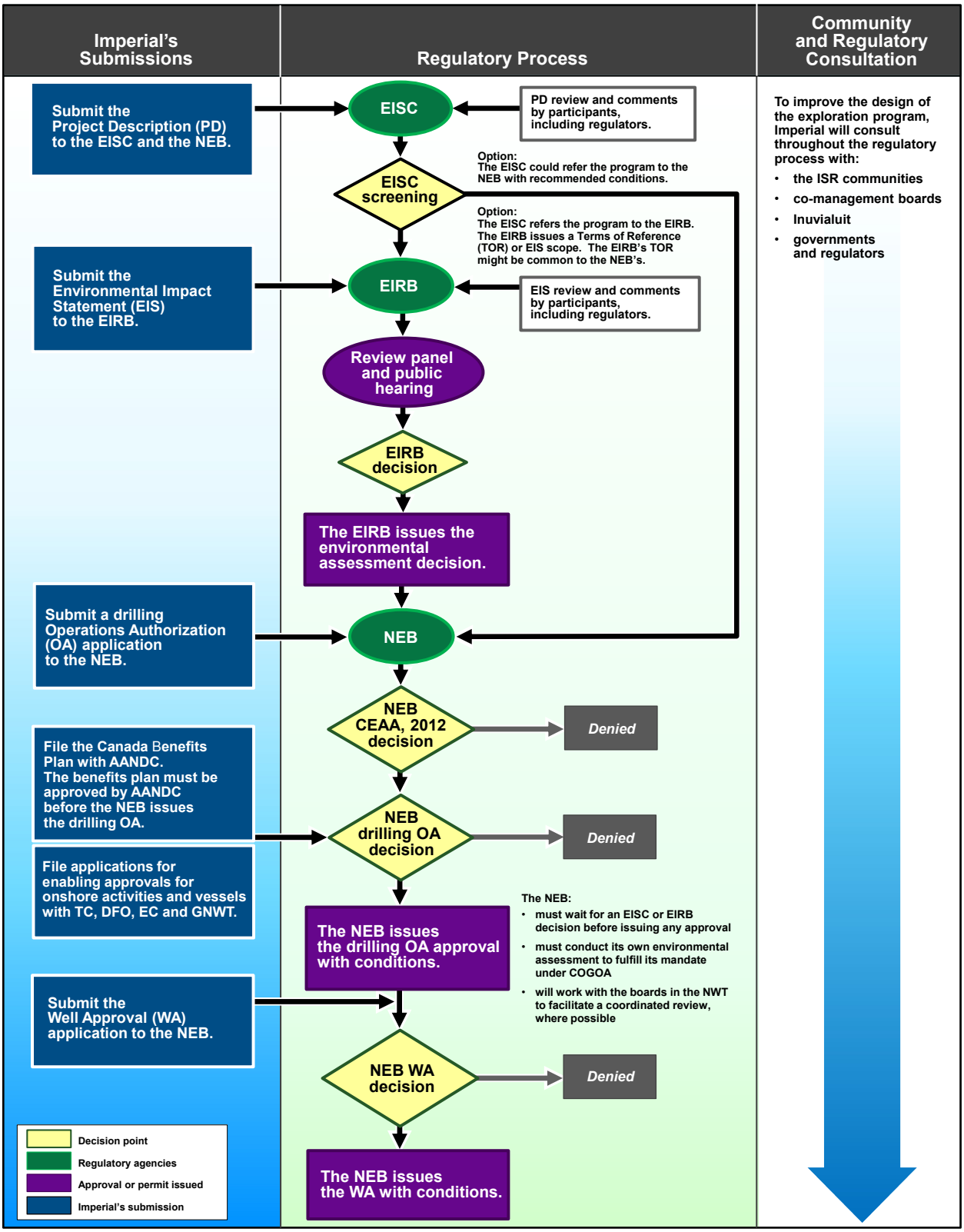

Figure 4-1: Overview of the Regulatory Approval Process

4.1.2 REGULATORY AUTHORITIES

The primary agency providing enabling approvals for the program is the NEB. There are also a number of other regulatory agencies with interest in the approval process, including:

- Fisheries and Oceans Canada (DFO)
- Environment Canada (EC)
- Transport Canada (TC)
- the Canadian Coast Guard (CCG) concerning vessel specifications

Imperial has met with representatives from most of the interested agencies to discuss their interests. This section provides a brief description of the relevant agencies and their interest in the program. For an outline of the comments and questions received from agencies to date, see Section 13, Co-Management, Inuvialuit Organizations and Government Engagement Consultation.

4.1.2.1 National Energy Board

The NEB is an independent federal agency established by the Parliament of Canada to regulate international and interprovincial aspects of the oil, gas and electric utility industries. The NEB is accountable to Parliament through the Minister of Natural Resources Canada (NRCan).

Legislation governing offshore oil and gas drilling in the Beaufort Sea has been developed by federal regulators, including the NEB, and is continuously updated and improved in response to industry activities that have been conducted for more than 40 years. The key piece of legislation administered by the NEB is the COGOA.

In response to the *Deepwater Horizon* (Macondo) accident in 2010, the NEB conducted an Arctic Offshore Drilling Review (AODR) in 2011. The purpose of the AODR was to gather information from stakeholders concerning drilling in the Arctic. That data was used to assist the NEB in evaluating and formulating its policies and requirements, particularly regarding same season relief well (SSRW) capability. Imperial participated in the AODR, which included responding to two rounds of information requests and participating in public hearings held in Inuvik. In December 2011, the NEB concluded its review and issued two documents:

- Review of Offshore Drilling in the Canadian Arctic, which summarized the AODR
- *Filing Requirements for Offshore Drilling in the Canadian Arctic*, an updated set of filing requirements that incorporated lessons learned from the AODR

Imperial will submit an application for a drilling OA to the NEB under the *Canada Oil and Gas Drilling and Production Regulations* and in accordance with the NEB's *Filing Requirements for Offshore Drilling in the Canadian Arctic*.

The amended *Canadian Environmental Assessment Act, 2012* (CEAA, 2012) includes the *Regulations Designating Physical Activities*, commonly called the projects list. This document lists physical activities that require an environmental assessment under the new CEAA, 2012. Currently, it is proposed that offshore exploration wells be added to the projects list. If this change is sanctioned, this program would require an environmental assessment under the CEAA, 2012. The NEB would be responsible for the environmental assessment and would make a CEAA determination after considering the EISC and EIRB recommendations. The NEB would also be required to consider environmental impacts under its jurisdiction and to consider the program under the COGOA and its applicable regulations. If, after considering all the relevant recommendations, and making the CEAA determination, and if the NEB approved of the program, the NEB would issue an OA with a list of conditions that the program must adhere to.

After an OA has been submitted and approved by the NEB, the program proponents would submit an application for a WA to the NEB. Well approvals fall under the *Canada Oil and Gas Drilling and Production Regulations* and must meet the NEB's filing requirements.

4.1.2.2 The EISC and EIRB

The EISC is an advisory committee that conducts environmental screening of development activities proposed for onshore or offshore areas of the ISR. The EISC and EIRB's responsibilities are mandated by the IFA. Although the EISC and EIRB are not federal regulatory agencies, the IFA requires the NEB to wait for an EISC or EIRB decision before issuing any regulatory authorization.

If the EISC determines that a detailed environmental impact assessment and public review of a proposed development project or program is required, then the EISC would refer the project or program to the EIRB (under the IFA) and to the NEB (under the COGOA). Imperial would then file an EIS, which would be completed using methods developed to meet the requirements of:

- the EIRB (under the IFA)
- the NEB (under the COGOA and CEAA, 2012)

The EIRB decides whether a project or program should proceed and, if so, under which specific terms and conditions. In making its decision the EIRB considers the need for:

- wildlife compensation
- mitigation
- remedial measures

4.1.2.3 Environment Canada

It is the responsibility of EC to preserve and enhance the quality of the natural environment of the nation, conserve Canada's renewable resources including wildlife, preserve and protect Canada's water resources, forecast weather and environmental change, enforce rules relating to boundary waters, and coordinate environmental policies and programs for the Government of Canada. Under the

4.1.2.3 Environment Canada (cont'd)

Canadian Environmental Protection Act, EC is the lead agency responsible for ensuring that the cleanup of hazardous waste and oil spills is adequate.

Specific to this exploration program, EC is interested in understanding potential effects on:

- birds
- polar bears, for the Canadian Wildlife Service (CWS)
- pollution prevention

Environment Canada would also be responsible for issuing a Disposal at Sea Permit for dredged material, if dredging is required by the program.

In addition to EC, two agencies that also report to the Minister of Environment and which will have an interest in the program are:

- the Canadian Environmental Assessment Agency
- Parks Canada, which manages the Canadian National Parks system

4.1.2.4 Fisheries and Oceans Canada

Fisheries and Oceans Canada is responsible for developing and implementing policies and programs in support of Canada's social, economic, ecological and scientific interests in Canada's oceans and fresh waters. A key piece of legislation for which the DFO is responsible for is the *Fisheries Act*. In June 2012, amendments to the *Fisheries Act* received royal assent. The changes to the act focused on protecting the productivity of recreational, commercial and Aboriginal fisheries. Within this context, the DFO would evaluate the program's potential effects on:

- marine mammals
- fish
- fish habitat
- marine invertebrates

The DFO would also be responsible for issuing an approval specific to dredging work, if necessary.

The CCG, an operating agency within the DFO, helps the DFO meet its responsibility of ensuring that Canada's waterways are safe and accessible.

4.1.2.5 Transport Canada

Transport Canada is responsible for Canada's federal transportation policies and programs. It ensures that air, marine, road and rail transportation are safe, secure, efficient and managed in an environmentally responsible manner. Transport Canada is also responsible for enforcing several Canadian acts and regulations, including the:

- *Navigable Waters Protection Act*

- *Transportation of Dangerous Goods Act*
- *Canada Transportation Act*
- *Canada Shipping Act, 2001*
- *Marine Transportation Security Act*

Imperial will seek a number of permits and approvals from TC for the drilling unit, vessels and equipment operation, including:

- an arctic pollution prevention certificate
- Canadian maritime documents addressing personnel competency, maritime safety and maritime pollution prevention
- a coasting trade licence for foreign vessels or non-duty paid vessels

Transport Canada will also have a role in approving dredging activities in Tuktoyaktuk Harbour, if required.

4.1.2.6 Aboriginal Affairs and Northern Development Canada

The AANDC is one of the federal government departments responsible for meeting the Government of Canada's legal obligations and commitments to Aboriginal people (First Nations, Inuit and Métis) and for fulfilling the federal government's constitutional responsibilities in the North. The AANDC works in partnership with northern and Aboriginal agencies and people to:

- govern the allocation of Crown lands to the private sector for oil and gas exploration
- set and collect royalties
- issue ELs
- issue significant discovery licences (SDLs)
- approve benefit plans, which define oil and gas operators' policies and activities to maximize employment, business and training prospects for residents of the North

The NEB cannot make its regulatory decision regarding oil and gas exploration and production activities pursuant to the COGOA (e.g., issue a drilling OA) until the Minister of AANDC has approved or waived the requirement of approval of a benefits plan.

4.1.2.7 Government of the Northwest Territories

The Government of the Northwest Territories (GNWT) currently administers the following acts:

- the *Environmental Protection Act*
- the *Spill Contingency Planning and Reporting Regulations*
- the *NWT Wildlife Act*

4.1.2.7 Government of the Northwest Territories (cont'd)

A key interface with the GNWT is through the Department of Environment and Natural Resources (GWNT-ENR). The GNWT is currently in the final stage of devolution negotiations with the federal government. Devolution will transfer the responsibility for public land, water and resource management from the federal government to the GNWT. The devolution process is expected to be finalized in the spring of 2014. As part of the devolution process, the GNWT and participating Aboriginal agencies have agreed to work together on land management and natural resource stewardship.

4.1.2.8 Northwest Territories Water Board

The Northwest Territories Water Board's jurisdiction is the ISR within the NWT and is limited to use of inland water (fresh water) and disposal of waste that might come into contact with water. The need for water licences required for the proposed program will be further defined as government responsibilities are finalized along with the program's plans for onshore staging activities.

5.1.1 PURPOSE OF THE PROPOSED DEVELOPMENT

The purpose of the proposed development is to drill one or more exploration wells within EL 476 (Ajurak) or EL 477 (Pokak) in the Beaufort Sea to:

- determine if hydrocarbons are present in one or more geological structures
- determine the composition of any hydrocarbons found
- identify the boundaries of the prospects to apply for an SDL
- identify the potential for future exploration or development drilling
- determine if there is a potential for commercial production

5.1.2 PROPONENT

Imperial Oil Resources Ventures Limited (Imperial), on behalf of the Beaufort Sea Joint Venture, is the proponent of the Beaufort Sea Exploration Joint Venture Drilling Program.

In 2010, a Joint Operating Agreement was reached between Imperial, ExxonMobil Canada Ltd. (ExxonMobil) and BP Exploration Operating Company Limited (BP). The Joint Operating Agreement provides for a cross-conveyance of Ajurak and Pokak, with ownership as follows:

- Imperial – 25%
- ExxonMobil – 25%
- BP – 50%

Imperial is the designated operator of the joint venture.

5.1.3 EXPLORATION LICENCES

In 2007, AANDC issued EL 446 (Ajurak) to:

- Imperial – 50%
- ExxonMobil – 50%

In 2008, AANDC issued EL 449 (Pokak) to BP.

In July 2012, the Minister of AANDC issued replacement EL numbers to Imperial and BP. The new EL numbers are:

5.1.3 EXPLORATION LICENCES (cont'd)

- EL 476 for Imperial's Ajurak, with an expiry date of July 31, 2019
- EL 477 for BP's Pokak, with an expiry date of September 30, 2020

5.1.4 OPERATING CONDITIONS AT AJURAK AND POKAK

The Ajurak and Pokak ELs are located in the Canadian sector of the Beaufort Sea about 175 km north-northwest of Tuktoyaktuk, Northwest Territories, within the ISR (see Figure 5-1). These ELs are located in water depths ranging from 60 to 1,500 m.

In 2008 and 2009, 3-D seismic programs were conducted by Imperial and BP. From 2009 to 2011, Imperial, ExxonMobil and BP undertook three years of field data collection studies in collaboration with ArcticNet in the Ajurak and Pokak areas.

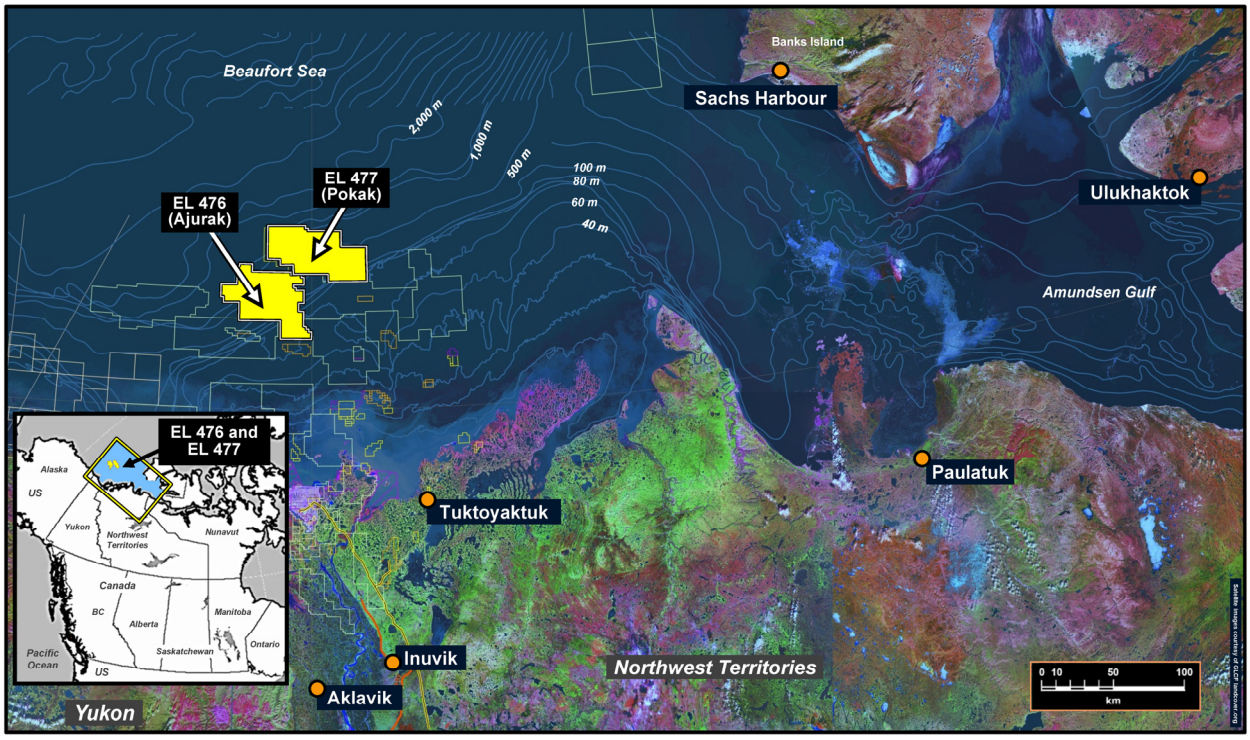

Figure 5-1: Regional Map of the Beaufort Sea with ELs and Six ISR Communities

Historical data indicates that the period of manageable ice conditions in the proposed development area is on average about 120 days, from May to November.

Imperial will use Inuvialuit expertise and traditional knowledge of the region, particularly their understanding of sea state, ice conditions and wildlife. Imperial will incorporate the scientific and traditional information of the region into their

design and operating specifications to ensure that the drilling program is safe and environmentally responsible.

5.1.5 BEAUFORT SEA DRILLING PROGRAM

The drilling program for the Beaufort Sea might involve a series of activities over a given time period, including:

- obtaining initial and final regulatory approvals
- satisfying pre-operating regulatory conditions
- procuring materials and equipment to drill one or more wells, including the drilling unit and support vessels
- preparing a shore-based facility
- mobilizing to the work area
- drilling for multiple seasons, with drilling suspension at the end of each season
- conducting formation evaluations based on drilling data collected
- conducting abandonment and decommissioning activities

The major equipment components of an offshore drilling operation will include:

- a drilling unit and related equipment
- marine support vessels

5.1.6 POTENTIAL DRILLING SCHEDULE

For planning purposes, a potential drilling program schedule has been developed. This potential schedule allows for one or more wells to be spudded in EL 477 during the 2020 open-water season before the expiry of EL 477 (see Figure 5-2). This schedule is based on the following events occurring in a timely and effective manner:

- timely regulatory reviews and approvals, including:
  - EISC and NEB screening decisions
  - environmental assessment public review, if required
  - the NEB reviewing the drilling OA application and providing acceptable conditions
- the joint venture's decision to commit in the 2016 to 2018 time period to a drilling system, including support vessels
- the final NEB WA

5.1.6 POTENTIAL DRILLING SCHEDULE (cont'd)

- mobilization to the Beaufort Sea and the start of drilling by 2020 (i.e., spudding the well)

It is assumed that any well drilled in Ajurak or Pokak would require at least two years to complete. Depending on weather and ice conditions at the time, the drilling window for a single well could require up to four seasons to complete. The seasonal drilling operations would be conducted using a single drilling unit.

Notwithstanding the potential program schedule, there is a possibility of an earlier spud date and more than one drilling location.

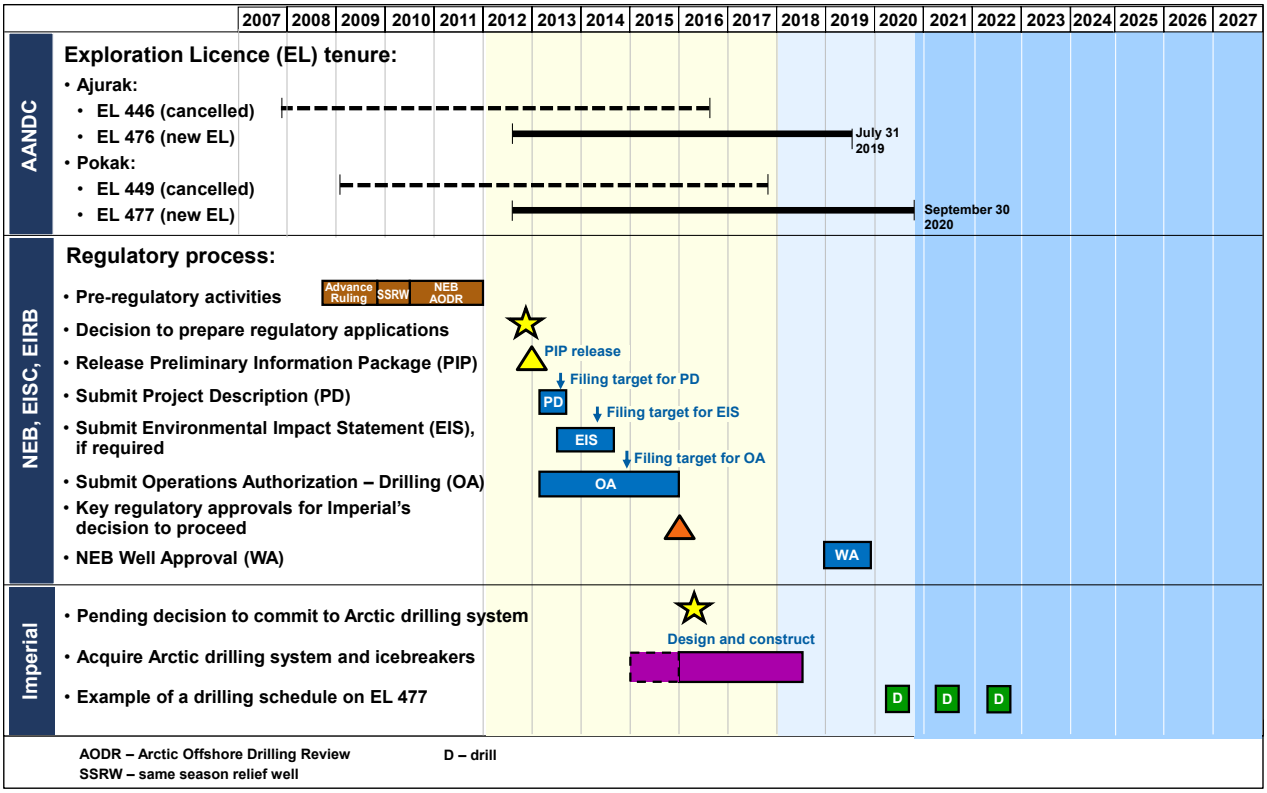

Figure 5-2: Example of a Potential Drilling Program Schedule

5.1.7 PHASES OF ACTIVITY

The scope and duration of the drilling activities would vary in any given year depending on:

- ice conditions in the Beaufort Sea at the start and end of the season
- day-to-day ice incursions at the drill site
- the annual drilling progress to well depths that are appropriate for well suspension

5.1.7.1 Years 2013 to 2015

The focus between 2013 and 2015 will be on:

- conducting community consultation and engagement with Inuvialuit, regulators and the public
- completing an environmental screening and assessment, and a public review, if required
- developing an early design and performing relevant technical studies
- performing additional field studies, including seeking opportunities for collaboration with other oil and gas explorers in the Arctic
- preparing and submitting a benefits plan to the AANDC
- preparing and submitting a drilling OA application to the NEB

5.1.7.2 Year 2016

The lead time required to spud a well or wells in 2020 requires that a decision to drill be made in 2016. Factors that would affect this decision include:

- the joint venture's confidence that a well or wells can be drilled in a safe and environmentally responsible manner
- the level of support by Inuvialuit for an exploration program
- acceptable conditions from the NEB regarding the program's drilling OA
- resolution of the SSRW equivalency requirement
- availability of an Arctic drilling system within the required time frame
- availability of proven technology and resources to meet the expected operating conditions
- the necessary financial commitment from the joint venture

5.1.7.3 Pre-Spud Activities in 2016 to 2019

If a decision is made to drill one or more wells in EL 476 or EL 477, many activities would need to be completed before spudding a well in 2020, including:

- finalizing well locations
- applying for and receiving a WA from the NEB
- establishing contracts for the drilling unit, icebreakers and support vessels
- developing infrastructure, such as a shore-based facility, aviation and communications, as required
- ordering drilling supplies and equipment

5.1.7.3 Pre-Spud Activities in 2016 to 2019 (cont'd)

- providing information on potential employment and business opportunities, including opportunities for Inuvialuit communities
- training the program workforce
- testing equipment and conducting drills, including appropriate emergency response drills
- executing other program plans and commitments, such as:
  - a Waste Management Plan (WMP)
  - a Wildlife Protection Plan
  - an Ice Management Plan (IMP)
  - regulatory requirements
  - company commitments
- potentially pre-installing a mooring system on the seafloor to secure the drilling unit in subsequent seasons
- potentially mobilizing equipment, fuel and supplies into the Beaufort Sea

5.1.7.4 Post-Drilling Activities (2022+)

If no further drilling is planned after the exploration well or wells have been drilled, the shore-based facility will be returned to its pre-program condition. All remaining supplies, equipment and fuel would be shipped out of the ISR, unless other arrangements are made.

If it was decided that further geological prospects warranted new exploration, the process would begin again to:

- conduct a possible seismic program
- obtain the necessary regulatory approvals
- begin drilling a new exploration well

5.1.8 MANAGEMENT AND EXPERIENCE

The drilling program design would draw on Imperial's and ExxonMobil's experience from 90 years of working safely and responsibly during drilling and production activities in the Arctic and global experience in operating in harsh offshore environments.

Other wells drilled worldwide have experienced the conditions that a Beaufort Sea drilling program might encounter, including:

- ice conditions
- oceanographic conditions (e.g., wave heights and currents)
- weather
- temperature
- water depth

- surficial geology
- reservoir pressure

The drilling program will be designed and implemented using all relevant Imperial and ExxonMobil standards and in compliance with regulatory requirements.

To reduce the risk of incidents and mitigate potential effects on the environment, certain aspects of the planning process will undergo a detailed risk assessment. The program will be prepared using Imperial's Operations Integrity Management System (OIMS) and ExxonMobil Development Company (EMDC) drilling's OIMS for drilling-related activities, which both use a systematic approach to managing risks and preventing incidents.

5.1.9 WELL CONTROL

Imperial's primary approach to well control is prevention.

Procedures will be developed to prevent a single point of failure leading to a catastrophic event. These procedures will ensure that:

- wells are designed for the range of risk expected
- equipment is inspected and maintained
- operators are trained
- tests and drills are conducted to verify personnel competency
- adequate barriers and redundancy are in place and tested to safely execute the work

Overbalanced fluids will be used to provide the primary barrier against well flow. Specialized pressure hunt teams and tools will be used on the drilling rig to:

- analyze well data for signs of abnormal pressure
- make the necessary adjustments to mud weight to ensure overbalance
- select casing setting depths to ensure that wellbore integrity can be maintained

The well will be monitored at all times to detect signs of well flow. If well flow is detected, personnel will have been trained and certified to quickly activate the secondary barrier (i.e., the blowout preventer) to stop the well flow and properly manage the well control event to restore the primary barrier (i.e., overbalanced fluid).

5.1.10 CONTINGENCY PLANS

Contingency planning describes how Imperial would respond to a non-routine event that could compromise safety or the environment. Contingency plans are formulated to provide the necessary plans for immediate and long-term response

5.1.10 CONTINGENCY PLANS (cont'd)

to incidents. For a Beaufort Sea drilling program, contingency plans will be developed for emergency response and oil spill response.

The optimal response to restore well control is well specific. Surface intervention would be the primary means of regaining well control and the fastest method to put in place. Other effective same-well intervention methods include activating the subsea BOP stack, which is typically the first option for regaining well control.

5.1.11 DRILLING UNIT

There are many types of drilling systems used around the world today, including:

- jack-up rigs
- moored semi-submersible drilling units
- drillships

For the water depths and conditions likely to be experienced in the Beaufort Sea, a floating drilling unit is the system of choice.

A key requirement of any drilling system is its ability to maintain its position (referred to as stationkeeping) at the well site location. The two most common stationkeeping methods used today are:

- moored drilling systems that use anchors attached to the seafloor
- dynamic positioning (DP) using a computer-controlled system to automatically maintain the drilling unit's position and heading by using its own propellers and thrusters

Dynamic positioning allows for operations in deep water where mooring is not feasible because of water depth.

Whatever drilling unit is selected for use in the Beaufort Sea, the most important factor is that it be fit for purpose and use proven technologies appropriate for the most severe conditions that could be experienced.

5.1.12 MARINE SUPPORT VESSELS

Multiple vessels will be required to support the drilling program, including:

- icebreaking support vessels
- ice-strengthened supply vessels
- ice-strengthened fuel tankers
- an ice-strengthened wareship

All of these vessels will be powered by diesel engines burning low sulphur diesel. No nuclear-powered vessels will be used. Each vessel might also have one

or more boilers that will also burn low sulphur diesel to generate heat for the vessel's living compartments and other spaces. Each vessel would have multiple roles.

5.1.12.1 Icebreaking Support Vessels

Most drilling unit options in the Arctic would require icebreaking support. Several icebreaking support vessels will be used. Each vessel will be capable of performing one or more of the following functions:

- breaking ice to clear a path for a drilling unit into and out of the Beaufort Sea at the beginning and end of each drilling season
- breaking ice a considerable distance from the drilling unit (ice management)
- breaking ice to clear a path into and out of the Beaufort Sea for fuel tankers or a wareship, if these vessels are used
- breaking ice and providing ice management for fuel tankers or a wareship while they are in the licence areas, if these vessels are used
- carrying fuel, drilling materials and other supplies for the drilling unit
- carrying, installing and retrieving the pre-set anchors used to moor the drilling unit at the drilling site, if required
- deploying and retrieving a remotely operated vehicle to support well work operations
- carrying and refuelling helicopters for personnel transfer and ice reconnaissance
- supporting source control operations in the unlikely event of loss of well control
- supporting oil spill response operations, including applying dispersants and skimming oil from the water surface
- providing emergency response for the drilling unit, including firefighting and evacuating the drilling unit's crew

Icebreaking support vessels will be of various sizes, but will likely be too big to enter Tuktoyaktuk Harbour. These vessels would normally remain in or near the EL areas, except when escorting the drilling unit, fuel tankers or wareship (if used) into and out of the Beaufort Sea.

These vessels will be designed:

- for breaking and ramming ice
- in accordance with Canadian regulations and international standards, including the International Association of Classification Societies Ltd. (IACS) Unified Requirements for Polar Ships
- to operate independently for an extended duration

5.1.12.2 Ice-Strengthened Supply Vessels

Depending on the final strategies for logistics, waste management, oil spill response and well control, several ice-strengthened supply vessels might be used to perform one or more of the following functions:

- carry fuel, drilling materials and other supplies from Tuktoyaktuk to the drilling unit and icebreaking support vessels
- carry waste products from the drilling unit and icebreaking support vessels to Tuktoyaktuk for shipment out of the ISR
- carry drilling unit and icebreaking support vessel crew members to and from Tuktoyaktuk
- support source control operations in the unlikely event of loss of well control
- support oil spill response operations, including deploying containment booms

These vessels would be designed to enter and operate out of Tuktoyaktuk Harbour and would be smaller in size than the icebreaking support vessels described previously. Ice-strengthened supply vessels would be:

- capable of operating independently throughout the drilling season in the ice conditions expected between Tuktoyaktuk and the licence areas
- designed in accordance with Canadian regulations and international standards, including the IACS Unified Requirements for Polar Ships

5.1.12.3 Ice-Strengthened Fuel Tankers

Depending on the exploration drilling program's final logistics strategy, ice-strengthened fuel tankers might be used over the course of each drilling season to supply some or all of the diesel fuel and other supplies required by:

- the drilling unit
- icebreaking support vessels
- ice-strengthened supply vessels

The number and size of fuel tankers could vary from a single large tanker to multiple small tankers, or a combination of both.

Fuel tankers would be too large to enter Tuktoyaktuk Harbour and would remain in or near the licence areas, except when transiting into and out of the Beaufort Sea.

The fuel tankers used would likely:

- have double hulls
- be designed in accordance with Canadian regulations and international standards including the IACS Unified Requirements for Polar Ships

- be capable of independent operations in the ice conditions expected between the port of departure and the licence area throughout the drilling season, except at the beginning and ends of the season when it is expected that escort by one of more of the icebreaking support vessels would be required
- be specially configured for ship-to-ship transfer of fuel to smaller vessels, such as the icebreaking support vessels and ice-strengthened supply vessels

5.1.12.4 Ice-Strengthened Wareship

Depending on the final strategies for logistics, waste management, spill response, and well control, an ice-strengthened wareship might be used to perform one or more of the following functions:

- carry fuel, drilling materials and other supplies for the drilling unit and support vessels
- receive waste products from the drilling unit and support vessels for storage and shipment out of the licence areas
- support helicopter operations
- provide a location to conduct or support maintenance work needed for the drilling unit and support vessels
- support for source control operations in the unlikely event of loss of well control
- support for oil spill response operations, including carrying containment booms and dispersant

The wareship, if used, would be too large to enter Tuktoyaktuk Harbour and would normally remain in or near the licence area, except when transiting into and out of the Beaufort Sea at the beginning and end of each season. After arriving at the beginning of the season, the wareship would remain in an ice-free section of the licence area and move only as necessary to avoid ice. The icebreaking support vessels and ice-strengthened supply vessels (if used) would offload fuel and other supplies from the wareship both for their own needs and to transfer fuel to the drilling unit.

5.1.13 SUPPORT FACILITIES

Deepwater drilling operations typically require a deep-draft port for operations support. Because there is no deep-draft port in the Beaufort Sea, an offshore wareship might be used.

Various land-based facilities and services might be needed to support offshore drilling operations, including:

- a shore-based facility, which might include:
  - accommodations

5.1.13 SUPPORT FACILITIES (cont'd)

  - staging sites and storage areas
  - a dock area
- transportation services (i.e., air and land) for moving supplies and personnel
- emergency equipment storage
- a potable water supply
- waste management services

5.1.14 SHORE-BASED FACILITY

The offshore drilling program could require the support of a shore-based facility, most likely located in Tuktoyaktuk, which is about 125 km from the potential drilling location in EL 476 or EL 477. The shore-based facility would be leased from one or more of the existing commercial locations.

5.1.14.1 Onshore Accommodations

Onshore accommodation could be required for:

- shore-based facility personnel, if such a facility were established for the program
- personnel transiting to and from the offshore drill site
- personnel evacuated from the offshore drill site in an emergency

The accommodation requirements will be determined at a later date.

5.1.14.2 Staging Sites and Storage Areas

It is not expected that a lot of equipment would be stored at the shore-based facility.

Infrastructure at the shore-based facility to support the drilling operations might include:

- a staging site and storage area for equipment and materials
- a heated warehouse
- offices and communication services

5.1.14.3 Dock Area

Some dock construction and upgrading might be required to handle the loading and unloading of supplies and personnel. To allow shallow-draft vessels to enter and exit Tuktoyaktuk Harbour, dredging might be required near the dock area and at some locations inside the harbour. The dock area would require equipment to handle small tools and lightweight containers.

5.1.15 OPPORTUNITIES

Imperial and ExxonMobil personnel would typically occupy and/or provide oversight to the senior positions on the drilling unit, support vessels and at the shore-based facility. Most of the workforce for a Beaufort Sea drilling program would consist of individuals hired by contractors working under service agreements with Imperial and ExxonMobil.

Work would be awarded based on an assessment of whether a proposal provides the best total value, including:

- safety and environmental performance
- technical and operational capabilities
- Inuvialuit and Canadian content
- cost competitiveness
- the ability to deliver work within Imperial's schedule requirements

Imperial's intent is to provide opportunities for Inuvialuit companies by:

- notifying Inuvialuit suppliers of potential opportunities as early as possible
- preparing work packages that encourage Inuvialuit companies to bid on the work or align with other companies in joint ventures to manage larger work packages

If an Inuvialuit company secures a contract, Imperial will assist the successful bidder to:

- achieve first-class safety and environmental performance
- provide training and development opportunities
- verify that the company has all the required procedures and policies in place to do the work safely and successfully
- deliver timely and high-quality results, which would put the company in good standing for future work opportunities in the Beaufort Sea region or at the national and international level

Identifying specific jobs and contracting services at this time in the planning cycle would be premature. If the joint venture partners decide in 2016 to proceed with drilling, the job identification effort will be further defined. The first areas of employment opportunities will be for positions to provide long lead time services, such as new-build vessels, if required, and upgrading the shore-based facility at Tuktoyaktuk, if required.

5.1.16 ACCOUNTABILITY

Imperial and ExxonMobil will fill key management and technical positions with qualified personnel for the proposed Arctic and offshore operations. These personnel would have the authority and responsibility to make decisions that ensure operations are performed in a safe and environmentally responsible

5.1.16 ACCOUNTABILITY (cont'd)

manner. Imperial will take responsibility and oversight of their contractors' actions and activities.

In the unlikely event of an incident that could affect the livelihood of local residents, damage to the environment or Inuvialuit culture and lifestyle, Imperial's solid financial status and the compensation procedures it has in place, including fair and timely wildlife compensation, would ensure:

- appropriate compensation for individuals or local businesses
- restoration of the environment, as quickly as possible

5.2.1 VALUED ECOSYSTEM COMPONENTS

While all components of the environment are important, it is neither practical nor necessary to assess the potential effects of the program on every component. This PD focuses on the valued ecosystem components (VECs) that have the greatest value and sensitivity and, therefore, have the greatest degree of sensitivity to program-related activities.

The value of a component not only relates to its role in the ecosystem, but also to the value placed on it by humans. The VECs identified are surrogates to focus or structure the environmental effects assessment, with an understanding that effects on other related components of the environment would be similar.

The VECs were identified through a relevant literature review, local knowledge of the potentially affected area, the results of baseline studies, previous environmental assessment experience and from lists of generally accepted VECs among discipline experts (i.e., VECs known to be strong indicators of change). The VECs selected for this assessment and the rationale for their inclusion are listed in Table 5-1.

Table 5-1: Selected VECs

VEC	Description	Rational for Selection
Atmospheric environment	• Includes ambient air quality and ambient noise levels (expressed in A-weighted decibels or dBA).	• Requirement to comply with the *Guideline for Ambient Air Quality Standards in the Northwest Territories*. • The potential for health implications. • Noise levels are likely to increase as a result of program activities.
Benthos	• Includes benthic invertebrates living on the seafloor (epifauna) or within the sediment of the seafloor (infauna) in the local study area (LSA), benthic macrophytes (seaweeds) occurring in Tuktoyaktuk Harbour and benthic habitat in the LSA.	• Ecological importance in the regional study area (RSA). • Potentially affected by proposed program activities.
Coastal landscapes	• Shoreline and seafloor erosion or alteration because of dredging or vessel transit. • Fouling of shoreline habitats.	• Shoreline morphologic changes are possible because of program activities. • Erosion of the shoreline might increase risk to existing coastal populations (i.e., Tuktoyaktuk). • Oil spills during storm surges could result in fouling large areas of coastal plain and vegetation.

Table 5-1: Selected VECs (cont'd)

VEC	Description	Rational for Selection
Community wellness	• Community health and wellness includes determinants that can have an effect on economic, physical, mental and social well-being.	• Importance of community wellness in the ISR.
Human health	• Health of individuals in the ISR harvesting country foods.	• Public concern that program activities could influence the health of the populations in and around Tuktoyaktuk and other local communities.
Marine and anadromous fish	• Includes marine and anadromous fish and fish habitat occurring in the RSA, including broad whitefish, lake whitefish, round whitefish, inconnu, Dolly Varden, Arctic cisco, least cisco, Bering cisco, Arctic char, Pacific herring, Arctic cod, rainbow smelt, fourhorn sculpin, Arctic flounder, starry flounder, blackline prickleback and northern wolffish.	• Identified as important during traditional knowledge studies and during consultation activities. • Ecological, social, cultural and commercial importance in the RSA. • Biological indicators for marine and terrestrial ecosystem health. • Mackenzie River and estuary supports spawning, rearing and feeding areas. • Potentially affected by proposed program activities. • Includes several species listed in the federal *Species at Risk Act* (SARA).

Marine avifauna	• Includes:
	  • seabirds
	  • waterfowl
	  • shorebirds
	  • raptors
	  • passerines occurring in the RSA
	  • protected migratory bird areas, important bird areas and other critical habitat areas for marine avifauna
		• Identified as important during traditional knowledge studies and during consultation activities.
		• Ecological, social, cultural and commercial importance in the RSA.
		• Biological indicators for marine and terrestrial ecosystem health.
		• Potentially affected by proposed program activities.
		• Includes several federal SARA-listed species. Migratory and non-migratory species protected by federal and territorial legislation.
		• Identified as important by regulators and in the Beaufort Sea Petroleum and Environmental Management Tool (PEMT).

Marine mammals	• Includes:
	  • beluga whales
	  • bowhead whales
	  • ringed seals
	  • polar bears
	  • protected marine mammal zones and critical habitat areas (e.g., foraging ground and migratory corridors)
		• Identified as important during traditional knowledge studies and during consultation activities.
		• Ecological, social, cultural and commercial importance in the RSA.
		• Biological indicators for marine and terrestrial ecosystem health.
		• Potentially affected by proposed program activities.
		• Includes federally SARA-listed species.
		• Program activities would take place in, or adjacent to, recognized beluga management zones.
		• Identified as important by regulators and in the PEMT (AECOM 2010).

Table 5-1: Selected VECs (cont'd)

VEC	Description	Rational for Selection

Terrestrial wildlife	• Includes:
	  • barren-ground caribou
	  • Peary caribou
	  • grizzly bear
	  • wolf
	  • Arctic fox
		• Importance as Inuvialuit resources (nutrition, clothing, cultural).
		• Territorial and federally protected species listings (i.e., SARA listing).
		• Ecological, social, cultural and commercial importance in RSA.
		• Biological indicators for terrestrial ecosystem health (keystone species).
		• Potentially effected by program activities.
		• Identified as important by regulators (i.e., Peary Caribou identified in the PEMT).
		• Identified as important during traditional knowledge studies.

Traditional land and resource use	• Considers harvesting of marine mammals, marine birds, fish and terrestrial wildlife.	• Program activities might affect traditional harvesting activities. • An EISC requirement.

Note:
LSA = local study area
PEMT = Petroleum and Environmental Management Tool
RSA = regional study area
SARA = *Species at Risk Act*

5.2.2 IDENTIFICATION OF POTENTIAL PROGRAM ACTIVITY INTERACTIONS

Before predicting and assessing effects that are likely to occur, the potential for program activities to interact with VECs were determined and likely interactions identified (see Table 5-2). These interactions and associated effects have been identified based on a general understanding of the existing environment, and the experience of technical specialists, supported by existing information and data collected from past studies. Both direct and indirect interactions have been identified. A direct interaction occurs when the VEC is affected by a program component or activity. An indirect interaction occurs when one VEC is affected by a change in another VEC (e.g., beluga whales and resource harvesting).

Table 5-2: VEC and Program Activity Interaction

Program Activity	Description	Atmospheric environment	Benthos	Coastal Landscapes	Community Wellness *	Human Health	Marine and Anadromous Fish	Marine Avifauna	Marine Mammals	Terrestrial Wildlife	Traditional Land and Resource Use
Routine											
Mobilization/Demobilization/Support or Resupply											
Vessel transit and presence	• Vessel movements to and from the drill site • Vessel movement to the Beaufort Sea • Drilling unit presence	X			X	X		X	X		
Aircraft support	• Aircraft flights to and from the shore-based facility	X			X	X	X		X		
Transfer of supplies and consumables	• Land-to-ship transfers • Ship-to-ship transfers	X			●						
Routine discharges	• Ballast water • Wastewater and greywater • Cooling water		●	●	●	●		●	●		
Drilling Program											
Site preparation and construction	• Drill site preparation	X	X						●		
Icebreaking and management	• Ice management for the drilling program • Ice management for supply transits	X				X	X		X		
Drilling	• Well spud • Well drilling • Cuttings disposal • Well completion • Suspension and abandonment	X	X	X	●	X			X		
Well testing	• Flaring, vertical seismic profiling and surveys	X		X	X	X			X		
Onshore Support											
Shore-based facility preparation and operation	• Shore-based facility upgrades • Ongoing operations • Storage of supplies and materials	●				X	X			●	
Dock construction	• Upgrade of dock infrastructure	X	X	X	X	●			X	●	
Harbour dredging (might not be undertaken)	• Removal and disposal of material	X	X	X	●	●		X	X	●	
Waste disposal	• Disposal of ship-generated waste and shore-based facility waste				●	●	●			●	

Table 5-2: VEC and Program Activity Interaction (cont'd)

Program Activity	Description	Atmospheric environment	Benthos	Coastal Landscapes	Community Wellness *	Human Health	Marine and Anadromous Fish	Marine Avifauna	Marine Mammals	Terrestrial Wildlife	Traditional Land and Resource Use
Non-Routine											
Tier 3 spills	• Subsea blowouts • Blowout during open water • Blowout during fall	X	X	X	X	X	X	X	X	X	
Tier 1 spills	• Spills during open-water fuelling • Spills from vessel collisions • Onshore spills	X	X	X	X	X			X	X	

Note:
* The program as a whole has the potential to affect community wellness (both positively and negatively). This will be addressed separately in the assessment.
● = interaction is negligible and is not assessed further
X = likely effect to be assessed

5.3.1 ROUTINE ACTIVITIES

An assessment of the significance of the effects of routine program activities is provided in:

- Table 14-4, for vessel transit and presence
- Table 14-6, for aircraft support
- Table 14-7, for transfer of supplies and consumables (resupply)
- Table 14-8, for drill site preparation
- Table 14-9, for icebreaking and ice management
- Table 14-10, for drilling
- Table 14-11, for well testing
- Table 14-12, for shore-based facility preparation and operation
- Table 14-13, for dock construction
- Table 14-14, for dredging

Once mitigation is applied, the effects of the program activities are assessed as not significant.

5.3.2 NON-ROUTINE EVENTS

An assessment of the significance of effects of non-routine events is provided in:

- Table 14-19, for a minor spill
- Table 14-20, for a major spill

Once mitigation is applied, the effects of a minor spill are assessed as not significant.

Once mitigation is applied, the effects of a major spill are assessed as not significant, except for:

- effects on marine avifauna
- traditional land and resource use

5.4.1 PREVENTION AND MITIGATION OF ROUTINE ACTIVITIES

Some prevention measures apply at all stages of the program's life cycle. In general, these measures are tied to best practice and use of best available technology, including:

- maintaining a continual on-site environmental compliance presence during all program phases and activities, in accordance with Imperial's OIMS and with EMDC drilling's OIMS for all drilling-related activities
- establishing an environmental compliance and cultural awareness training program for program personnel
- conducting permit compliance training with all employees
- conducting periodic safety, security, health and environment (SSHE) compliance assessments

Table 5-3 lists the mitigation measures developed for the program's routine activities. These measures include best practices for oil and gas development projects that account for the unique Arctic environment. In addition to the VEC-specific mitigation measures, Imperial will develop and implement an Environmental Protection Plan (EPP) that provides specific procedures and protocols to address all program-related activities, such as site preparation, drilling, other offshore operations and transits to, or from, Tuktoyaktuk Harbour.

5.4.2 PREVENTION AND MITIGATION OF NON-ROUTINE ACTIVITIES

To prevent and respond to fuel spills Imperial will:

- maintain adequate oil spill response equipment and personnel to respond to terrestrial and marine spills
- train personnel in acceptable refuelling procedures and establish specified refuelling locations
- use secondary containment at temporary fuel storage and transfer locations, including using drip pans and liners, which will be mandatory, in accordance with Imperial's policies and procedures
- implement an Oil Spill Response Plan (OSRP) that covers incidents at sea and onshore, including information on:
    - spill kits (i.e., number, type, contents and location)
    - crew spill response training and vessel spill response certification

5.4.2 PREVENTION AND MITIGATION OF NON-ROUTINE ACTIVITIES (cont'd)

- spill response communication plans and contact information
- the Oil Record Book, as required under the MARPOL 73/78 International Convention for the Prevention of Pollution from Ships

- implement management plans:
  - a Safety Plan
  - an IMP
  - an Emergency Response Plan (ERP)

For information on oil spill response, including a subsea release or oil that is drifting or moving on the surface, see section 16.3, Management Plans.

Table 5-3: Mitigation Measures for Routine Program Activities

VEC	Mitigation Measures

Coastal landscapes, including water quality and sediment quality related to dredging	• Develop and implement a comprehensive Dredging Management Plan for dredging activities that might be required alongside the dock or pier in Tuktoyaktuk Harbour at the shore-based facility, at the entrance to the harbour or along the fairway (marine resupply corridor) to deeper water offshore. This plan will include mitigation identified during a separate and comprehensive environmental assessment of dredging that Imperial will conduct, if another party does not perform the dredging and Imperial decides to perform the dredging itself. The Dredging Management Plan will include performance criteria, and incorporate suggestions and recommendations from northern residents and other stakeholders, including regulators, as appropriate. This plan will also cover selection of equipment appropriate for areas or locations that need to be dredged with minimal disturbance.
	• Mitigation measures include:
	  • Accurately marking the areas to be dredged on large-scale charts before starting dredging so all dredging will take place inside the perimeter of these marked areas. This will allow for accurate vessel positioning during dredging.
	  • Installing a silt curtain to contain or control resuspended sediments, and contribute to meeting the performance criteria developed for dredging.
	  • Taking additional steps to prevent or limit resuspension of contaminated material if it is determined that sediment near the dock or pier at the shore-based facility is contaminated with hydrocarbons or metals from non-program operations.
	  • Disposing of all sediment (spoil) removed during dredging at an approved offshore location in accordance with applicable regulations and permits. Spoil placement will be monitored with a measurement program that is based on the volume of material to be dredged. Samples for analysis will be collected before, during and after the spoil is placed in the disposal area.
	• Have a qualified environmental monitor on site during program activities.
	• Operate program vessels in a manner that will avoid spills to the marine environment.
	• Perform dredging (if required) during the marine/estuarine fisheries winter work window for the area, where practicable (i.e., July 1 to October 1 and December 1 to February 15). Subject to agreement by applicable regulatory agencies and the implementation of appropriate controls, some work might need to occur outside of these windows to accommodate the construction schedule and sequencing.
	• Follow best management practices for dredging operations, as applicable, as identified by the International Association of Dredging Companies and the International Finance Corporation. Additional related guideline information is also provided by the International Maritime Organization (IMO) London Convention on Prevention of Marine Pollution by Dumping of Wastes and Other Matter (and the 1996 protocol) and the guidelines developed for the disposal of dredged materials at sea.

Table 5-3: Mitigation Measures for Routine Program Activities (cont'd)

VEC	Mitigation Measures
Marine avifauna	• Identify the areas where birds congregate (i.e., for feeding, breeding and rearing, and moulting), including protected areas or key subsistence harvesting locations or other sensitive bird habitat locations and avoid these areas where possible. • Ensure that vessels maintain operational protocols for maximum speeds and standard courses, where possible, to reduce potential bird strikes or other negative effects. Icebreaking activities at the drill site and along supply routes might require rapid changes in speed and course to respond to changing ice conditions, as necessary for safe operations. • Shield or reduce external lights at night to limit the effect of program-related light sources, where possible. • Ensure that birds that might land on vessels are left undisturbed, where practical, and provide training to program personnel on how to handle injured or resting birds. Only personnel who have a CWS handling permit would perform this task. • Establish and implement an Air Operations Plan to provide minimum operational altitudes and speeds, and other safe operating procedures and protocols (including mapping sensitive bird habitat locations along potential program flight paths) to minimize potential interactions with birds. • Conduct flaring only when necessary for well testing, in accordance with regulatory requirements and industry guidelines. • Operate all program vessels operating in Tuktoyaktuk Harbour at reduced speeds.
Marine mammals	• Implement a Marine Mammal Management Plan that includes marine mammal monitoring (to be undertaken by qualified observers) for all vessel-related activities. Establish safe vessel operations protocols (including safety perimeters, speed and course restrictions, and suspension of work requirements) to avoid marine mammals and sensitive marine mammal habitats along the marine resupply corridor route and at the drill site, whenever possible. These actions will reduce the likelihood of a vessel strike that leads to injury or mortality. • Establish and implement an Air Operations Plan to provide minimum operational altitudes and speeds and other operating procedures and protocols (including mapping locations of sensitive marine mammal habitats and locations along potential flight paths) to minimize potential interactions with marine mammals. This plan will cover inbound and outbound fixed-wing aircraft and helicopter operations carrying passengers or cargo to or from the fleet offshore. • Establish and implement an ERP that provides procedures and protocols for addressing all accidents, spills or items of a similar nature to ensure that appropriate measures are in place to mitigate the potential effects of an accidental release or malfunction affecting marine mammals, including follow-up protocols to investigate and determine root causes and identify lessons learned. • Develop and implement a program-specific Polar Bear Interaction and Management Plan that includes procedures and protocols for polar bear interactions.
Offshore water quality and sediment quality during drilling	• If ballast water discharge is necessary, it would be governed by a Ballast Water Management Plan that will be developed and implemented for program vessels. The plan would be developed and implemented in accordance with the IMO convention on exchange of ballast water and associated sediment. • Separate drilling fluid from cuttings during drilling operations. The cleaned or washed cuttings will be placed in a designated area on the seafloor by pumping them down a delivery system below the sea surface. Residual fluid on the separated cuttings will be measured as part of the disposal process. As part of the Environmental Effects Monitoring Plan, a seafloor sampling program will be developed to monitor the dispersal and distribution of cuttings on the seafloor and the effects of burial on the benthic community in the affected area. • Develop and implement a program-specific WMP in accordance with the NEB's *Offshore Waste Treatment Guidelines* and other federal regulations or guidelines that

Table 5-3: Mitigation Measures for Routine Program Activities (cont'd)

VEC	Mitigation Measures
Offshore water quality and sediment quality during drilling (cont'd)	apply in Canadian waters, and federal or territorial regulations or guidelines that apply onshore. • Maintain records of all program-related discharges. • Provide program personnel with opportunities for continuous improvement and training in the handling and disposal of waste in compliance with the requirements of Imperial's OIMS and EMDC drilling's OIMS for drilling-related activities.
Traditional land and resource use	• Ensure that the information collected during the traditional knowledge process is incorporated into the program design and operations. Continue the public consultation process to identify any new areas of significance or historic importance, ensuring that community confidentiality is maintained during the reporting process. • Implement a wildlife compensation program that would cover damages or loss of equipment, loss or reduction of income, loss or reduction of wildlife harvest and any adverse changes to the quality of the harvest. Compensation could include relocation or replacement costs for equipment, provision of wildlife products or a cash settlement. • Prohibit hunting by program personnel. Provide cultural resource sensitivity training and traditional harvesting sensitivity training to program personnel, as required. Imperial will consult with communities about who should be trained, when the training should happen, and how hunters and trappers committee (HTC) members or other residents will be part of this process. • Minimize potential program effects on traditional land use and harvesting activities by avoiding sensitive locations and ensuring that operations are timed to limit any potential overlap with traditional harvesting activities or land use. • Avoid all areas identified as being of archaeological or cultural significance along the shoreline at, or near, the entrance to Tuktoyaktuk Harbour. It is unlikely that new traditional resources will be discovered by program personnel, but if this occurs, the appropriate authorities will be notified immediately. • Establish and implement a Northern Communications Plan for the program to communicate and inform local communities of program-related developments, ensuring a flow of information to the communities in a timely and efficient manner. This plan will include a process for liaising with the HTC in Tuktoyaktuk, and HTCs in other communities, as required. Avoid scheduling public meetings and information sharing sessions at times when community members are hunting, fishing or engaged in other harvesting activities.
Wildlife and habitat	• Establish vessel and aircraft operations routes and schedules designed to minimize wildlife disturbance. • Establish and enforce vehicle and vessel speed limits within the program area. • Institute a no hunting policy for program personnel. • Prepare and implement a Wildlife Interaction Plan and a program-specific Polar Bear Interaction and Management Plan. The Wildlife Interaction Plan will provide measures to address potential interactions with terrestrial wildlife at the shore-based facility and encounters with marine mammals and birds within the proposed marine resupply corridor and the EL areas. • Design and operate the shore-based facility to reduce effects on wildlife, marine seabirds and mammals, including effects related to nesting or denning sites. • Ensure that all program-related waste is disposed of properly and in accordance with regulatory requirements and industry best practice, including using wildlife-proof waste collection containers. Waste will be stored at the shore-based facility pending disposal at an approved facility. • Prohibit feeding wildlife.

BEAUFORT SEA EXPLORATION
JOINT VENTURE DRILLING PROGRAM
PROJECT DESCRIPTION

OVERVIEW

6.1.1 PURPOSE OF THE PROPOSED DEVELOPMENT

The purpose of the proposed development is to drill one or more exploration wells within EL 476 (Ajurak) or EL 477 (Pokak) in the Beaufort Sea to:

- determine if hydrocarbons are present in one or more geological structures
- determine the composition of any hydrocarbons found
- identify the boundaries of the prospects to apply for an SDL
- identify the potential for future exploration or development drilling
- determine if there is a potential for commercial production

6.1.2 EXPLORATION LICENCES

In 2007, AANDC issued EL 446 (Ajurak), now EL 476, to:

- Imperial – 50%
- ExxonMobil – 50%

In 2008, Imperial conducted a 3-D marine seismic program over the Ajurak licence area to identify potential geological prospects and possible drilling locations.

In 2008, AANDC issued EL 449 (Pokak), now EL 477, to BP. In 2009, BP conducted a 3-D seismic program over the Pokak area.

In 2010, a Joint Operating Agreement was reached between Imperial, ExxonMobil and BP. The Joint Operating Agreement provides for a cross-conveyance of Ajurak and Pokak, with ownership as follows:

- Imperial – 25%
- ExxonMobil – 25%
- BP – 50%

Imperial is the designated operator of the joint venture.

The geographic coordinates of the EL areas are shown in:

- Table 6-1, for EL 476
- Table 6-2, for EL 477

Table 6-1: Geographic Coordinates for EL 476

Latitude *	Longitude *	Section
71° 00' N	136° 30' W	1-7
	136° 00' W	1-5, 11-15, 21-25, 31-35, 41-45, 51-58, 61-68, 71-78, 81-88, 91-98
	135° 30' W	1-5, 11-15, 21-25, 31-35, 41-45, 51-55, 61-65, 71-75, 81-85, 91-95
	135° 00' W	51-53, 61-64, 71-74, 81-84, 91-94
70° 50' N	136° 30' W	4-10, 14-20, 24-30, 34-40, 44-50, 54-60, 66-70
	136° 00' W	1-100
	135° 30' W	1-100
	135° 00' W	54-58, 64-68, 71-78, 81-89, 91-100
70° 40' N	136° 00' W	7-10, 17-20, 27-30, 37-40, 47-50, 57-60, 67-70, 77-80, 87-90, 97-100
	135° 30' W	1-40, 47-50, 57-60, 67-70, 77-80, 87-90, 97-100
	135° 00' W	21, 22, 31-33, 41-44, 51-100
70° 30' N	135° 30' W	10, 20, 30, 40
	135° 00' W	30, 40, 50, 60, 70, 80, 90, 100
Note: 205,321 hectares, more or less. * = North American Datum 1927		

Table 6-2: Geographic Coordinates for EL 477

Latitude *	Longitude *	Section
71° 00' N	134° 00' W	12-20, 22-30, 32-40, 42-50, 52-60, 62-70, 72-80, 82-90, 92-100
	134° 30' W	2-10, 12-20, 22-30, 32-40, 42-50, 52-60, 65-70, 75-80, 85-90, 95-100
	135° 00' W	5-10, 15-20, 25-30, 35-40, 45-50, 55-60, 65-70, 75-80, 85-90, 95-100
	135° 30' W	8-10, 18-20, 28-30, 38-40, 48-50, 60, 70, 80, 90, 100
71° 10' N	134° 00' W	11-14, 21-24, 31-34, 41-44, 51-54, 61-64, 71-74, 81-84, 91-94
	134° 30' W	1-4, 11-100
	135° 00' W	1-100
	135° 30' W	1-100
71° 20' N	135° 00' W	41, 51-52, 61-62, 71-72, 81-82, 91-92
	135° 30' W	1-2, 11-12, 21-22, 31-32, 41-42, 51-52, 61-62, 71-72, 81-82, 91-92
Note: 202,380 hectares, more or less. * = North American Datum 1927		

6.1.3 NEB ARCTIC OFFSHORE DRILLING REVIEW

As a result of the *Deepwater Horizon* accident in 2010 in the Gulf of Mexico, the NEB convened the AODR. Imperial actively participated in the review, including responding to questions from the NEB, and in the Inuvik roundtable meeting in September 2011.

In December 2011, the NEB published the findings of the AODR, including filing requirements for offshore drilling in the Canadian Arctic. In its report the NEB reaffirmed its commitment to goal-based regulation. The report also included a provision for the flexibility to propose equivalent alternatives to SSRW capability.

Imperial will develop a plan for SSRW equivalency for submission to the NEB as part of the:

- drilling OA
- well-specific drilling WA

At this early stage in the development of the drilling program, Imperial is undertaking the necessary technical and engineering studies to fully address the subject. Consequently, only a high-level discussion is provided in this document.

6.1.4 EXTENSION OF EXPLORATION LICENCE TERMS

Because of the time required conducting the AODR, all holders of active ELs in the Beaufort Sea lost some of the time available for conducting exploration activities before the licences would expire. To compensate for the lost time, in July 2012, the Minister of AANDC issued replacement EL numbers to all affected Beaufort Sea EL holders.

For the joint venture the changes in EL numbers are:

- EL 446 (Ajurak) was replaced by EL 476, with an expiry date of July 31, 2019
- EL 449 (Pokak) was replaced by EL 477, with an expiry date of September 30, 2020

6.1.5 OPERATING CONDITIONS AT AJURAK AND POKAK

The Ajurak and Pokak ELs are located in the Canadian sector of the Beaufort Sea about 125 km north-northwest of Tuktoyaktuk, NWT, within the ISR (see Figure 6-1 and Figure 6-2). These ELs are located in water depths ranging from 60 to 1,500 m (see Figure 6-3).

From 2009 to 2011, Imperial, ExxonMobil and BP undertook three years of field studies in collaboration with ArcticNet in the Ajurak and Pokak licence areas. The results of those studies, in addition to other past academic and government scientific research and ongoing field work under the federal Beaufort Regional Environmental Assessment (BREA) program, are discussed in Section 10, Description of the Biophysical Environment.

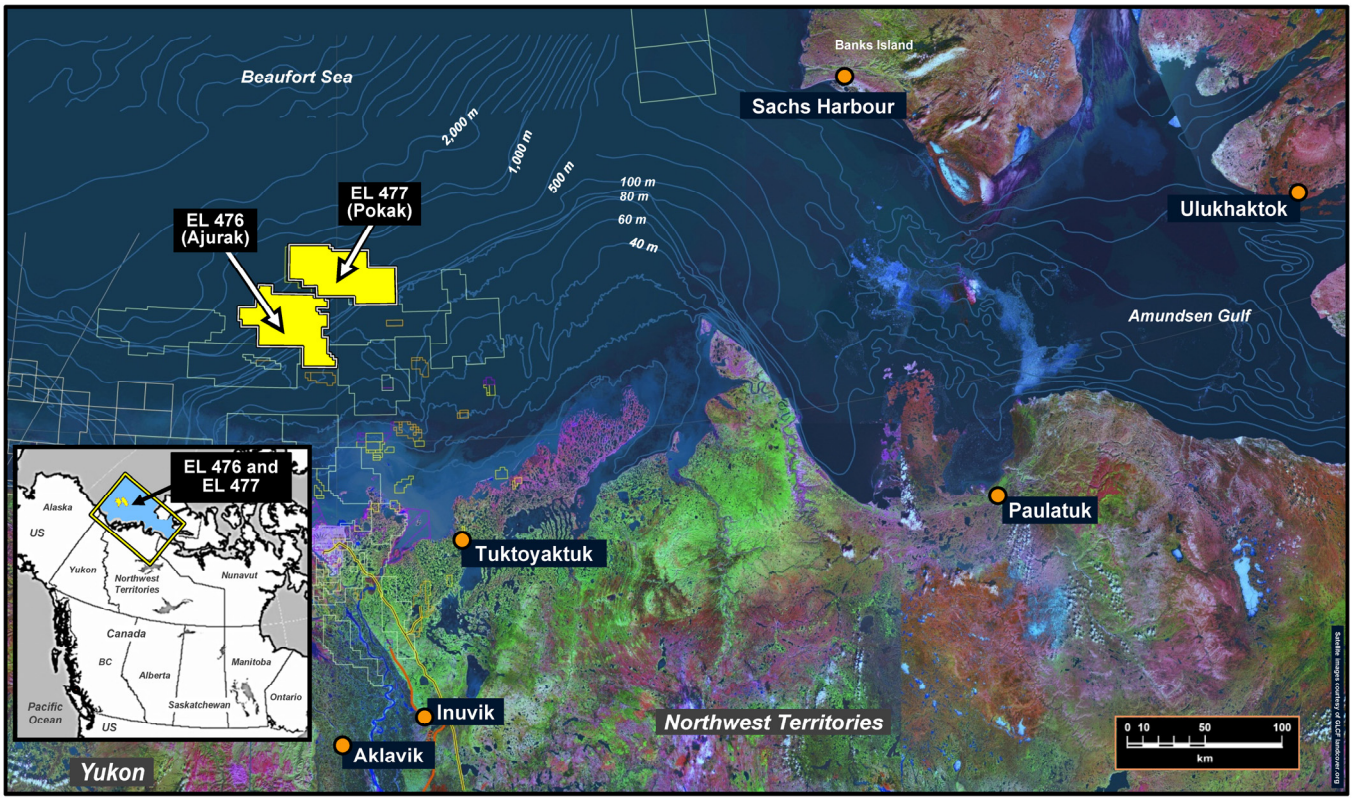

Figure 6-1: Regional Map of the Beaufort Sea with ELs and Six ISR Communities

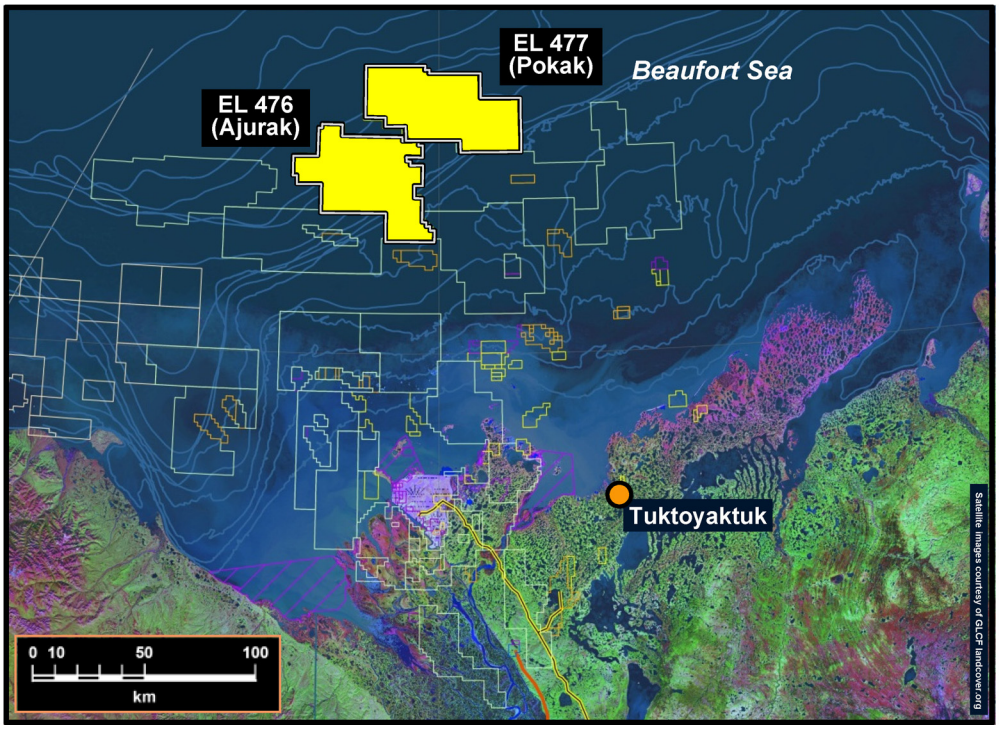

Figure 6-2: Program Area with EL 476 and EL 477

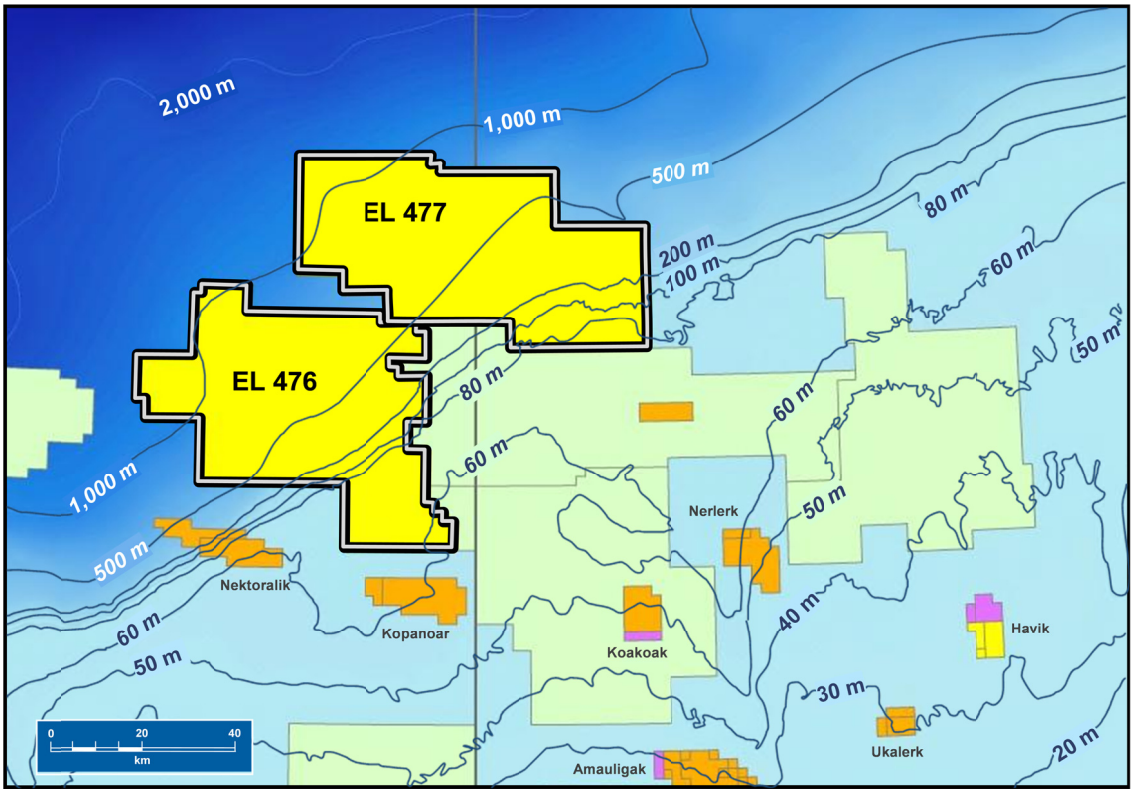

Figure 6-3: Bathymetry Near EL 476 and EL 477

Historical data indicates that the period of manageable ice conditions in the proposed development area is on average about 120 days, from May to November. The period for working conditions in the Beaufort Sea is shown in Figure 6-4.

To acquire more detailed information about the operating conditions in the area, Imperial expects to continue field studies in the coming years, and where appropriate or valuable, would work in conjunction with other scientific expeditions conducted by:

- academic institutions
- government research scientists, such as the Geological Survey of Canada, which would conduct studies of seafloor slope stability

In addition, Imperial will use Inuvialuit expertise and traditional knowledge of the region, particularly their understanding of sea state, ice conditions and wildlife.

Imperial will incorporate scientific data and traditional knowledge for the region into its design and operating specifications for the program to ensure that the drilling program is safe and environmentally responsible.

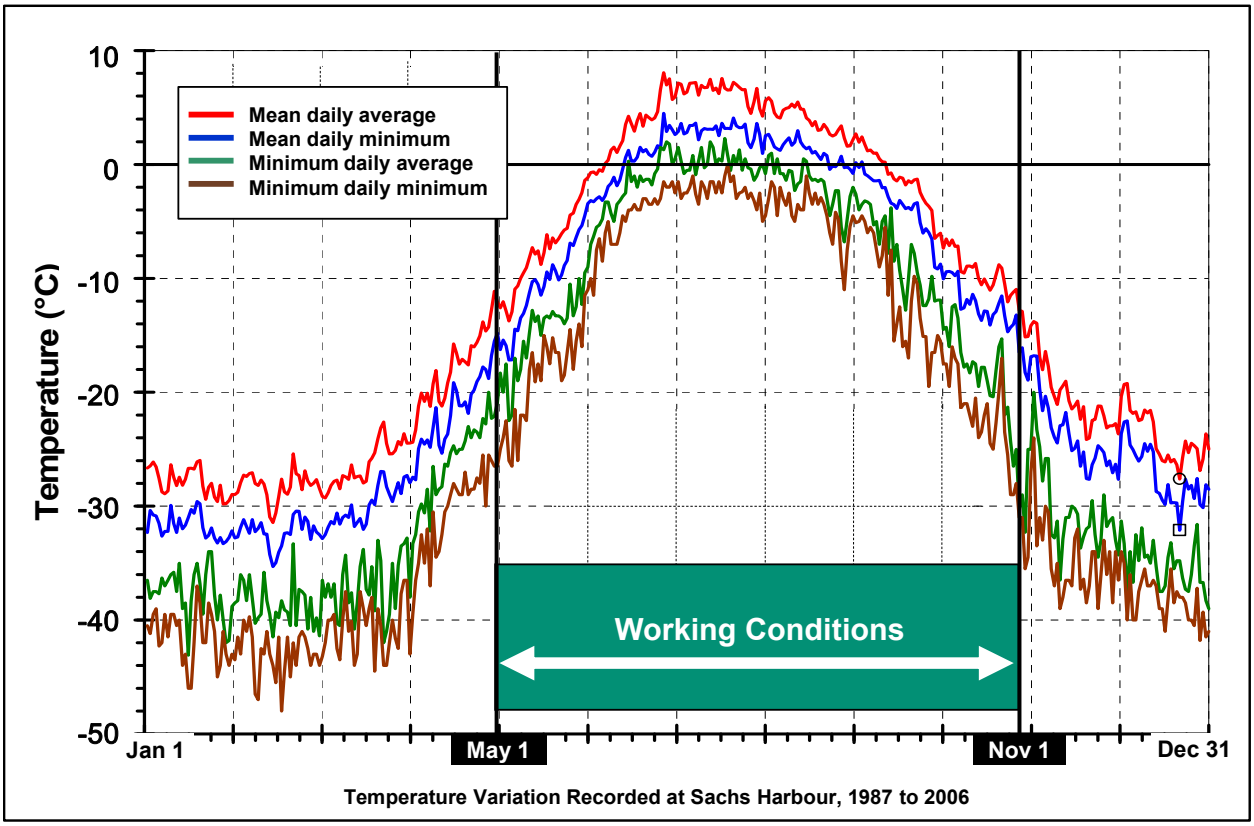

Figure 6-4: Arctic Working Conditions Based on Temperature

6.2.1 BEAUFORT SEA DRILLING PROGRAM

The drilling program for the Beaufort Sea might involve a series of activities over a given time period, including:

- obtaining initial and final regulatory approvals
- satisfying pre-operating regulatory conditions
- procuring materials and equipment to drill one or more wells, including the drilling unit and support vessels
- preparing a shore-based facility
- mobilizing to the work area
- drilling for multiple seasons, with drilling suspension at the end of each season
- conducting formation evaluations based on drilling data collected
- conducting abandonment and decommissioning activities

6.2.2 POTENTIAL DRILLING SCHEDULE

For planning purposes, a potential drilling program schedule has been developed. This potential schedule allows for one or more wells to be spudded in EL 477 during the 2020 open-water season before the expiry of EL 477 (see Figure 6-5). This schedule is based on the following events occurring in a timely and effective manner:

- regulatory reviews and approvals, including:
  - EISC and NEB screening decisions
  - environmental assessment public review, if required
  - the NEB reviewing the drilling OA application and providing acceptable conditions
- the joint venture's decision to commit in the 2016 to 2018 time period to a drilling system, including support vessels
- the issuance of the NEB WA
- mobilization to the Beaufort Sea and the start of drilling by 2020 (i.e., spudding the well)

6.2.2 POTENTIAL DRILLING SCHEDULE (cont'd)

It is assumed that any well drilled in the Ajurak or Pokak licence areas would require at least two years to complete. Depending on weather and ice conditions at the time, the drilling window for a single well could require up to four drilling seasons to complete. The seasonal drilling operations would be conducted using a single drilling unit.

Notwithstanding the potential program schedule, there is a possibility of an earlier spud date and more than one drilling location.

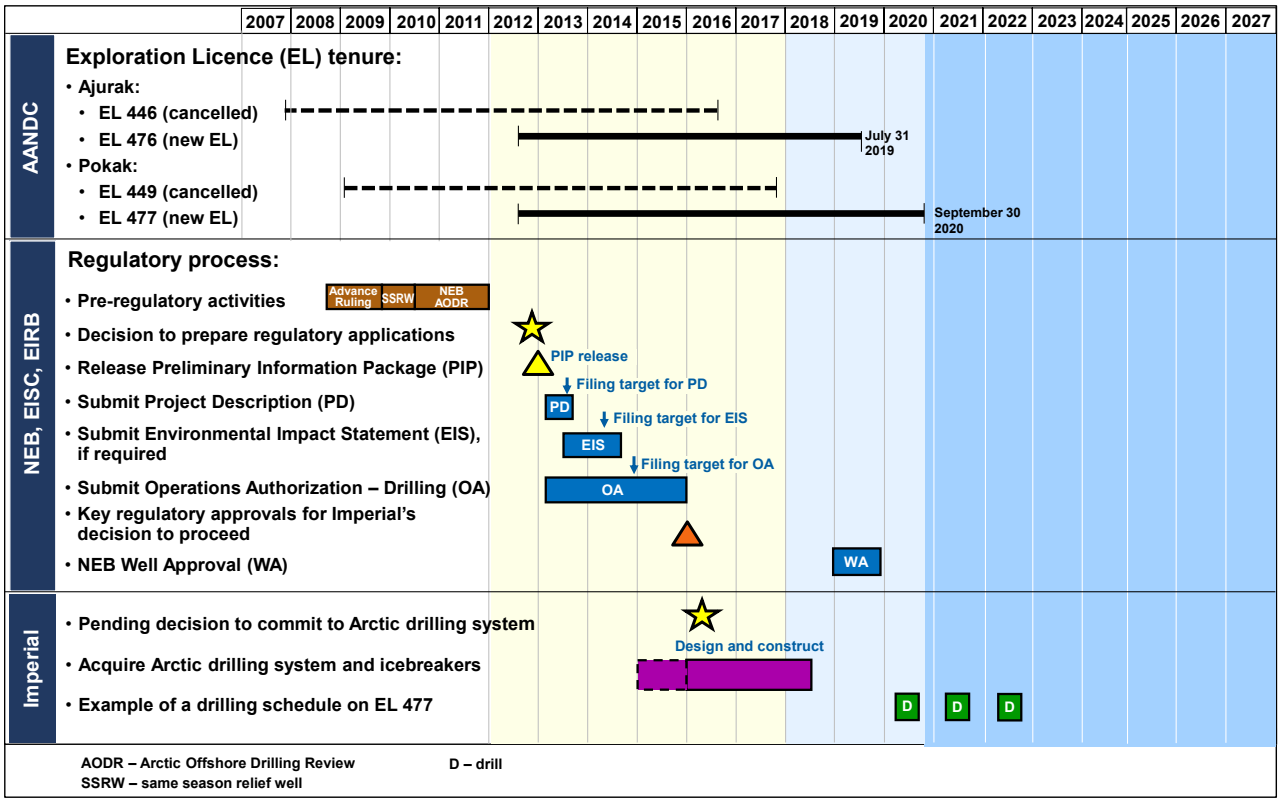

Figure 6-5: Example of a Potential Drilling Program Schedule

6.2.3 PHASES OF ACTIVITY

The scope and duration of the drilling activities would vary in any given year depending on:

- ice conditions in the Beaufort Sea at the start and end of the season
- day-to-day ice incursions at the drill site
- the annual drilling progress to well depths that are appropriate for well suspension

6.2.3.1 Years 2013 to 2015

The focus between 2013 and 2015 will be on:

- conducting community consultation and engagement with Inuvialuit, regulators and the public
- completing an environmental screening and assessment and a public review, if required
- developing an early design and performing relevant technical studies
- performing additional field studies, including seeking opportunities for collaboration with other oil and gas explorers in the Arctic
- preparing and submitting a benefits plan to the AANDC
- preparing and submitting a drilling OA application to the NEB

6.2.3.2 Year 2016

The lead time required to spud a well or wells in 2020 requires that a decision to drill be made in 2016. Factors that would affect this decision include:

- the joint venture's confidence that a well or wells can be drilled in a safe and environmentally responsible manner
- the level of support by Inuvialuit for an exploration program
- acceptable conditions from the NEB regarding the program's drilling OA
- resolution of the SSRW equivalency requirement
- availability of an Arctic drilling system within the required time frame
- availability of proven technology and resources to meet the expected operating conditions
- the necessary financial commitment from the joint venture

6.2.3.3 Pre-Spud Activities in 2016 to 2019

If a decision is made to drill one or more wells in EL 476 or EL 477, many activities would need to be completed before spudding a well in 2020, including:

- finalizing well locations
- applying for and receiving a WA from the NEB
- establishing contracts for the drilling unit, icebreakers and support vessels
- developing infrastructure, such as a shore-based facility, aviation and communications, as required
- ordering drilling supplies and equipment

6.2.3.3 Pre-Spud Activities in 2016 to 2019 (cont'd)

- providing information on potential employment and business opportunities, including opportunities for Inuvialuit communities
- training the program workforce
- testing equipment and conducting drills, including appropriate emergency response drills
- operating in accordance with program plans and commitments, such as:
  - a WMP
  - a Wildlife Protection Plan
  - an IMP
  - regulatory requirements
  - company commitments
- potentially pre-installing a mooring system on the seafloor to secure the drilling unit in subsequent seasons
- potentially mobilizing equipment, fuel and supplies into the Beaufort Sea

6.2.3.4 Post-Drilling Activities (2022+)

If no further drilling is planned after the exploration well or wells have been drilled, the shore-based facility would be returned to its pre-program condition. All remaining supplies, equipment and fuel would be shipped out of the ISR, unless other arrangements are made.

If it was decided that further geological prospects warranted new exploration, the process would begin again to:

- conduct a possible seismic program
- obtain the necessary regulatory approvals
- begin drilling a new exploration well

6.3.1 MANAGEMENT AND EXPERIENCE

The drilling program design would draw on Imperial's and ExxonMobil's experience from 90 years of working safely and responsibly during drilling and production activities in the Arctic and global experience in operating in harsh offshore environments.

Other wells drilled worldwide have experienced the conditions that a Beaufort Sea drilling program might encounter, including:

- ice conditions
- oceanographic conditions (e.g., wave heights and currents)
- weather
- temperature
- water depth
- surficial geology
- reservoir pressure

The drilling program will be designed and implemented using all relevant Imperial and ExxonMobil standards and in compliance with regulatory requirements.

To reduce the risk of incidents and mitigate potential effects on the environment, certain aspects of the planning process will undergo a detailed risk assessment. The program will be prepared using Imperial's OIMS and EMDC drilling's OIMS for drilling-related activities, which both use a systematic approach to managing risks and preventing incidents.

The OIMS provides the framework to ensure that:

- standards are met, designs and procedures are properly assessed and risks managed
- the quality of equipment is verified and maintained
- competent personnel perform the work
- significant changes are properly managed
- emergency response plans are in place for specific work areas

The expected bottomhole conditions of the licence area are well within the temperature and pressure ranges of wells previously designed by the joint venture

6.3.1 MANAGEMENT AND EXPERIENCE (cont'd)

members. Proven equipment and procedures were used on these wells to safely execute the drilling operations (see Figure 6-6).

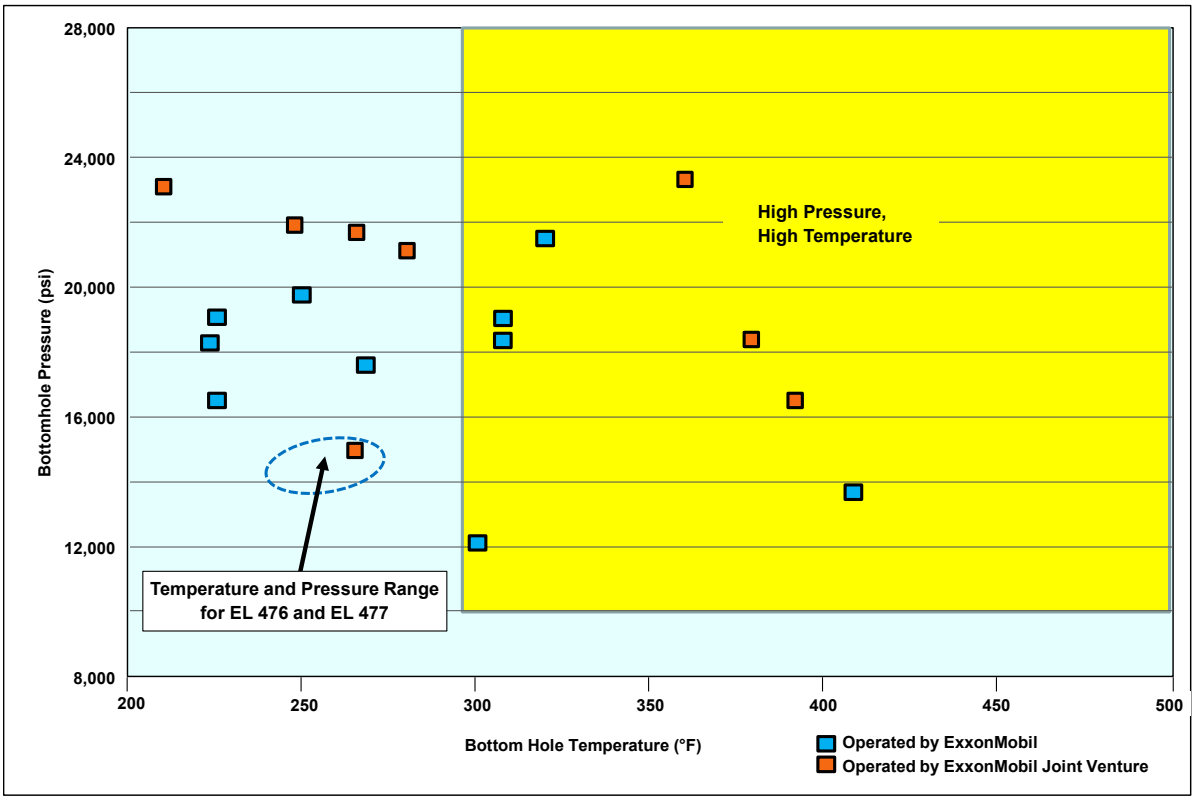

Figure 6-6: Comparison of Previously Drilled Wells with a Beaufort Sea Well

6.3.2 WELL AND EQUIPMENT DESIGN

ExxonMobil standards will be used to guide the well design and to select critical equipment. A well planning process that is used globally will incorporate well design considerations, including:

- tubulars (e.g., drill strings, casing strings and production tubing strings)
- cementing
- blowout prevention equipment
- critical rig equipment
- other critical equipment and services

Proprietary technology and tools will be used to reduce risk and enhance well designs in areas such as:

- casing and tubing design
- pressure prediction
- flow modelling

To ensure that implementation of any proposed well meets Imperial's and ExxonMobil's standards, the well design and equipment will be subjected to:

- extensive analysis and modelling
- multiple reviews
- design verifications
- a rigorous assessment of the execution plan

The assessment process involves carefully identifying and understanding the risks and determining how to prevent an incident from occurring. This process typically involves multiple layers of engineering review and control, with final approvals from senior management.

6.3.3 WELLHEAD EQUIPMENT

The wellhead equipment will be designed to be compatible with the casing design. The wellhead system would be a big-bore design capable of setting multiple casing strings and liners.

6.3.4 CASING DESIGN

The casing and liner strings will be designed to contain the maximum expected pressure in each formation. The selected casing will ensure that any fluids entering into the wellbore can be contained.

6.3.5 DRILLING FLUIDS

A drilling fluid program will be developed for each section of each well drilled. The drilling fluid weight would be sufficient to maintain hydrostatic overbalance, keeping formation fluids under control and preventing any unexpected flow of formation fluids into the wellbore.

Typically, water-based drilling fluids are used for the first and shallow-depth sections of the well. These sections are drilled without the drilling riser in place and the drilling fluid and drill cuttings are discharged to the seafloor. A typical well of this design could generate between 1,300 to 1,500 m^3 of water-based cuttings.

Subsequent and deeper sections of the well would likely be drilled using nonaqueous drilling fluids (NADF). The NADF formulations in use today have fewer environmental effects than traditional oil-based fluids.

Equipment on the drilling unit would be used to handle and treat the drill cuttings for discharge into the sea. Treated cuttings will be tested, and if they meet regulatory criteria, the treated cuttings will be discharged to the seafloor according to approval conditions.

6.3.6 CEMENTING

A detailed cementing program will be developed for each casing and liner string for each well that is planned to be drilled. The cement weight and strength would be sufficient to:

- maintain hydrostatic overbalance
- keep formation fluids under control
- avoid any unexpected intrusion of oil, gas or water into the wellbore

Each casing string would be independently cemented to ensure hydraulic isolation between the individual casing strings and the formations.

6.3.7 LOGGING WHILE DRILLING OPERATIONS

Logging while drilling tools would likely be used while drilling a typical well in the Beaufort Sea. The logging while drilling tools measure formation properties in real time. Additional tools might be used to measure formation pressure to ensure that the hydrostatic pressure in the wellbore is always sufficient to:

- maintain hydrostatic overbalance
- keep formation fluids under control
- avoid any unexpected intrusion of oil, gas or water into the wellbore

6.3.8 WELL CONTROL

Imperial's primary approach to well control is prevention.

Procedures will be developed to prevent a single point of failure leading to a catastrophic event. These procedures will ensure that:

- wells are designed for the range of risk expected
- equipment is inspected and maintained
- operators are trained
- tests and drills are conducted to verify personnel competency
- adequate barriers and redundancy are in place and tested to safely execute the work

Overbalanced fluids will be used to provide the primary barrier against well flow. Specialized pressure hunt teams and tools will be used on the drilling rig to:

- analyze well data for signs of abnormal pressure
- make the necessary adjustments to mud weight to ensure overbalance
- select casing setting depths to ensure that wellbore integrity can be maintained

The well will be monitored at all times to detect signs of well flow. If well flow is detected, personnel will have been trained and certified to quickly activate the secondary barrier (i.e., the blowout preventer) to stop the well flow and properly

manage the well control event to restore the primary barrier (i.e., overbalanced fluid).

6.3.9 BLOWOUT PREVENTER DESIGN

The blowout preventer (BOP) and ancillary well control equipment used on a Beaufort Sea exploration well will comply with industry and ExxonMobil standards. These standards will ensure that the equipment is fit for purpose and operational.

For a given well, the required working pressure of the BOP system will exceed the maximum expected surface pressure of the wellbore fluids, assuming the presence of gas in the wellbore. The temperature rating of the BOP rubber components will be greater than the maximum expected wellbore temperature in the BOP. Only elastomeric materials from the original equipment manufacturer (OEM) will be used in BOP equipment, and they will meet the specifications for the intended service environment.

Only OEM or OEM-licensed parts will be used on all blowout prevention equipment, including:

- BOPs
- valves
- choke manifolds
- risers
- diverter systems
- ring gaskets
- control systems

Subsea blowout prevention equipment is designed and equipped to provide redundant control systems and components to secure the well. The BOP stack would be designed with multiple barriers to well flow, including:

- double valves for each outlet
- multiple ram preventers
- two annular preventers

The control systems will include:

- actuation panels at various locations on the drilling unit
- redundant systems to transmit control signals from the drilling unit to the subsea equipment
- redundant subsea control pods to provide hydraulic power fluid to actuate BOP components
- remotely operated vehicle intervention capability as a backup to the primary BOP control system

6.3.9 BLOWOUT PREVENTER DESIGN (cont'd)

- a deadman and auto shear system (used only on dynamically positioned drilling units)

A typical subsea BOP for offshore drilling is shown in Figure 6-7.

Imperial will follow defined policies and practices, and will apply rigorous management plans to any proposed Beaufort Sea exploration wells to ensure safe operations in the unique Arctic environment.

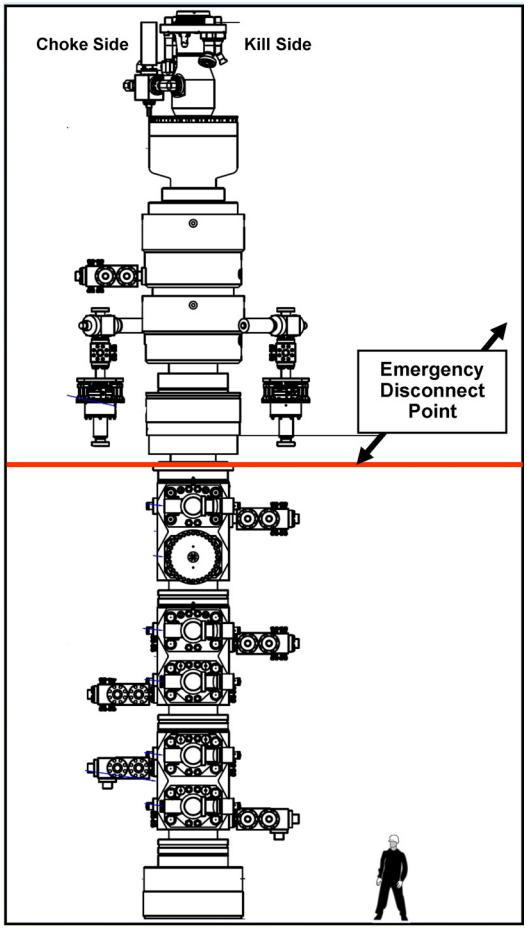

Figure 6-7: Example of a Typical Subsea BOP for Offshore Drilling

6.3.10 FORMATION EVALUATION

6.3.10.1 Well Logging and Sampling

During drilling and after completion of an exploration well, well logging would be conducted to measure the formation properties, including the porosity and permeability of the rock. Fluid and rock sampling might be conducted during logging to determine the reservoir fluid properties if oil or gas is encountered.

6.3.10.2 Vertical Seismic Profile

After drilling completion, a vertical seismic profile (VSP) could be conducted using geophones inside the wellbore to obtain real depth information for comparison to the original seismic data. This would result in a series of detailed seismic images.

6.3.10.3 Well Testing

If appropriate, well testing could be carried out on any zone of interest. Under carefully controlled conditions for the well test, reservoir fluids would be produced from the well and allowed to flow to the surface for a period of time. Depending on the requirements and goals of the test, the duration of the test might range from several hours to several days. The produced oil or gas could be flared at the surface from the drilling rig, if required by the regulator.

6.3.11 WELL ABANDONMENT

Once drilling of a well is completed and all testing has been finished, the well would be plugged and permanently abandoned in accordance with NEB regulations and Imperial's procedures.

6.4.1 CONTINGENCY PLANS

Contingency planning describes how Imperial would respond to a non-routine event that could compromise safety or the environment. Contingency plans are formulated to provide the necessary plans for immediate and long-term response to incidents. For a Beaufort Sea drilling program, contingency plans will be developed for emergency response and oil spill response.

The optimal response to restore well control is well specific. Surface intervention would be the primary means of regaining well control and the fastest method to put in place. Other effective same-well intervention methods include:

- activating the subsea BOP stack, which is typically the first option for regaining well control
- implementing pump and kill methods (techniques such as dynamic, bullhead or conventional circulating kills performed in the original wellbore have been proven to be effective)
- mechanical intervention (mechanical, hydraulic, and inflatable packers or stingers have proven to be effective same-well intervention techniques to stop or reduce flow from a well)
- securing the well with a capping stack

6.4.2 SOURCE CONTROL

The wellhead and intermediate casing strings will be designed to contain hydrocarbons to surface. In the unlikely event that the intermediate casing integrity is compromised and pressure from deeper horizons is exerted on the surface casing, the surface casing will be designed to divert the flow below the surface casing shoe and prevent hydrocarbon discharge at the seafloor.

Source control plans using the incident command structure will be in place to address the unlikely scenario where a loss of well control results in hydrocarbon discharge to the environment.

The optimal response to controlling the source will be specific to each well.

6.4.3 SURFACE INTERVENTION

If a well control event occurs and control is not immediately regained by conventional mechanical means or natural occurrences, surface intervention could include:

- re-establishing the primary barrier by:
  - circulating or bullheading fluids
  - performing a dynamic kill to restore a sufficient column of mud to overcome formation pressure
- installing or repairing the secondary barrier blowout prevention equipment by:
  - capping the well
  - restoring the integrity of the existing blowout prevention equipment

The nature and severity of the well control event will dictate the surface intervention response. In the event of a small flow of oil, the control methods could be as simple as sealing a leak or repairing an equipment component. If a substantial flow of oil and gas occurred, appropriate surface intervention methods would be used, ranging from re-establishing kill weight mud in the hole, restoring the blowout prevention equipment integrity or well capping, depending on the nature of the well control event.

6.4.4 RELIEF WELL

As required by the NEB, Imperial will prepare a Relief Well Plan as part of its drilling OA application, but the plan will not be for an SSRW.

If a relief well is required, it would take longer than drilling the original well because:

- the relief well would have a longer wellbore – it would need to be drilled from a location other than the original wellbore
- the relief well would be a directional well
- the additional surveys and directional accuracy required to drill a relief well result in slower drilling progress

A relief well might be started in the same season, but it could not be finished in the same season.

6.5.1 MAJOR COMPONENTS

The major equipment components of an offshore drilling operation will include:

- a drilling unit and related equipment
- marine support vessels

6.5.2 DRILLING UNIT

There are many types of drilling systems used around the world today, including:

- jack-up rigs
- moored semi-submersible drilling units
- drillships

For the water depths and conditions likely to be experienced in the Beaufort Sea, a floating drilling unit is the system of choice. The early drilling units used in the Beaufort Sea, such as the Canmar Explorer III, have been much improved over the past decades with newer designs and built-in technologies. The drilling units have a hole, or moon pool, which extends through the ship and hull allowing the drill string to extend into the water below.

A key requirement of any drilling system is its ability to maintain its position (referred to as stationkeeping) at the well site location. The two most common stationkeeping methods used today are:

- moored drilling systems that use anchors attached to the seafloor
- DP using a computer-controlled system to automatically maintain the drilling unit's position and heading by using its own propellers and thrusters

Dynamic positioning allows for operations in deep water where mooring is not feasible because of water depth.

Whatever drilling unit is selected for use in the Beaufort Sea, the most important factor is that it be fit for purpose and use proven technologies appropriate for the most severe conditions that could be experienced.

6.5.2.1 Drilling Unit Specifications

Water depths over EL 476 and EL 477 range from 60 to 1,500 m, with prospects for a potential exploration well, or wells, in water depths of 80 to 850 m.

6.5.2.1 Drilling Unit Specifications (cont'd)

A drilling unit will be selected that can operate safely in the range of ice conditions that could be experienced in the Beaufort Sea. The design of the drilling unit would use proven technologies and the specifications would likely include:

- greater structural integrity to withstand ice conditions, including thicker bulkheads and additional internal beams
- equipment for drilling operations capable of operating in subfreezing temperatures

For the water depths in the program's ELs, the Arctic drilling unit might be configured with mooring and DP assist capability, which would allow the drilling unit to maintain a constant position with mooring, but be able to move off location under its own power using thrusters.

6.5.2.2 Fixed Heading Moored DP Arctic Drilling Unit

A fixed heading moored DP Arctic drilling unit might have 8 to 12 mooring lines leading from the drilling unit to anchoring systems on the seafloor.

A fixed heading moored DP Arctic drilling unit would be able to:

- maintain station heading by using thrusters and anchors
- withstand large ice loads using the mooring system

If ice conditions make it necessary for the fixed heading moored DP Arctic drilling unit to leave the drill site, the drilling unit would be able to:

- safely suspend the well
- disconnect from the moorings
- move off the drill site under its own power

6.5.2.3 Turret-Moored DP Arctic Drilling Unit

A typical turret-moored DP Arctic drilling unit has 8 to 12 mooring lines leading from a turret on the drilling unit to anchors or pre-set buoys on the seafloor (see Figure 6-8).

A turret-moored DP Arctic drilling unit would be able to:

- maintain station heading by using thrusters and anchors
- respond to changes in the direction of environmental loads, including ice loads, using its capability of rotating 360º around the turret

If ice conditions make it necessary for the turret-moored DP Arctic drilling unit to leave the drill site, the drilling unit would be able to:

- safely suspend the well

- disconnect from the moorings
- move off the drill site under its own power

A turret-moored system has lower environmental loading than a fixed heading moored system.

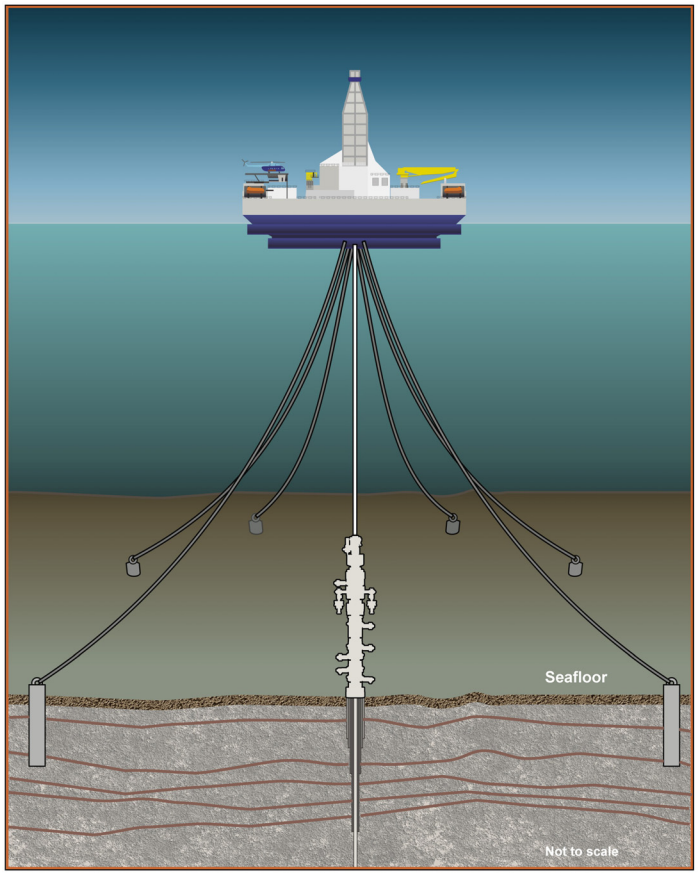

Figure 6-8: Turret-Moored DP Arctic Drilling Unit

6.5.3 MARINE SUPPORT VESSELS

Multiple vessels will be required to support the drilling program. These vessels can generally be categorized by their level of ice strengthening and their mission and could include:

- icebreaking support vessels
- ice-strengthened supply vessels
- ice-strengthened fuel tankers
- an ice-strengthened wareship

All of these vessels will be powered by diesel engines burning low sulphur diesel. No nuclear-powered vessels will be used. Each vessel might also have one or more boilers that will also burn low sulphur diesel to generate heat for the

6.5.3 MARINE SUPPORT VESSELS (cont'd)

vessel's living compartments and other spaces. Each vessel would have multiple roles.

6.5.3.1 Icebreaking Support Vessels

Most drilling unit options in the Arctic would require icebreaking support. Several icebreaking support vessels will be used. Each vessel will be capable of performing one or more of the following functions:

- breaking ice to clear a path for a drilling unit into and out of the Beaufort Sea at the beginning and end of each drilling season (see Figure 6-9 for an example of a medium-powered icebreaker)
- breaking ice a considerable distance from the drilling unit (ice management)
- breaking ice to clear a path into and out of the Beaufort Sea for fuel tankers or a wareship, if these vessels are used
- breaking ice and providing ice management for fuel tankers or a wareship while they are in the licence areas, if these vessels are used
- carrying fuel, drilling materials and other supplies for the drilling unit
- carrying, installing and retrieving the pre-set anchors used to moor the drilling unit at the drilling site, if required
- deploying and retrieving a remotely operated vehicle to support well work operations
- carrying and refuelling helicopters for personnel transfer and ice reconnaissance
- supporting source control operations in the unlikely event of loss of well control
- supporting oil spill response operations, including applying dispersants and skimming oil from the water surface
- providing emergency response for the drilling unit, including firefighting and evacuating the drilling unit's crew

Icebreaking support vessels will be of various sizes, but will likely be too big to enter Tuktoyaktuk Harbour. These vessels would normally remain in or near the EL areas, except when escorting the drilling unit, fuel tankers or wareship (if used) into and out of the Beaufort Sea. These vessels will be designed:

- for breaking and ramming ice
- in accordance with Canadian regulations and international standards, including the IACS Unified Requirements for Polar Ships

Figure 6-9: Example of a Medium-Powered Icebreaker – the Fesco *Krasin*

All of these vessels will have two or more propellers and one or more bow thrusters for propulsion and maneuvering.

Each vessel will have about 20 to 30 crew members and will be fully equipped with all necessary facilities to enable them to operate independently for an extended duration, including cooking and cleaning facilities, fresh water generators, waste collection and waste treatment equipment.

6.5.3.2 Ice-Strengthened Supply Vessels

Depending on the final strategies for logistics, waste management, oil spill response and well control, several ice-strengthened supply vessels might be used to perform one or more of the following functions:

- carry fuel, drilling materials and other supplies from Tuktoyaktuk to the drilling unit and icebreaking support vessels
- carry waste products from the drilling unit and icebreaking support vessels to Tuktoyaktuk for shipment out of the ISR
- carry drilling unit and icebreaking support vessel crew members to and from Tuktoyaktuk
- support source control operations in the unlikely event of loss of well control
- support oil spill response operations, including deploying containment booms

These vessels would be designed to enter and operate out of Tuktoyaktuk Harbour and would be smaller in size than the icebreaking support vessels described previously (see 6.5.3.1). Ice-strengthened supply vessels would be:

- capable of operating independently throughout the drilling season in the ice conditions expected between Tuktoyaktuk and the licence areas
- designed in accordance with Canadian regulations and international standards, including the IACS Unified Requirements for Polar Ships

Each of these ice-strengthened supply vessels would:

6.5.3.2 Ice-Strengthened Supply Vessels (cont'd)

- have two or more propellers and one or more bow thrusters for propulsion and maneuvering
- have about 10 to 15 crew members
- be able to operate independently for weeks at a time because they would be fully equipped with all necessary facilities, including:
  - cooking and cleaning facilities
  - fresh water generators
  - waste collection
  - waste treatment equipment

Figure 6-10 shows examples of ice-strengthened supply vessels.

Figure 6-10: Examples of Ice-Strengthened Supply Vessels – the Fesco *Sakhalin* and the MSV *Fennica*

6.5.3.3 Ice-Strengthened Fuel Tankers

Depending on the exploration drilling program's final logistics strategy, ice-strengthened fuel tankers (see Figure 6-11) might be used over the course of each drilling season to supply some or all of the diesel fuel and other supplies required by:

- the drilling unit
- icebreaking support vessels
- ice-strengthened supply vessels

The number and size of fuel tankers could vary from:

- a single large tanker
- several smaller tankers
- a combination of a large tanker and several small tankers

A single large tanker could be used to carry fuel for the drilling unit and all support vessels for the entire drilling season, including the vessel transit in and out of the Beaufort Sea. After arriving at the beginning of the drilling season, the fuel tanker would remain in an ice-free section of the licence area and move only as necessary to avoid ice. The icebreaking support vessels and ice-strengthened

supply vessels (if used) would offload fuel from the single large tanker for their own needs and also to transfer fuel to the drilling unit. This tanker would have a capacity to carry between 40,000 and 75,000 tons of fuel.

Figure 6-11: Example of an Ice-Strengthened Fuel Tanker – the Stena *Poseidon*

Several smaller tankers could be used and would make multiple excursions between the licence area and a port outside of the Beaufort Sea. In this scenario, the fuel tankers would be scheduled so that one tanker would arrive in the licence area every two to four weeks, offload its cargo to the icebreaking support vessels and ice-strengthened supply vessels (if used) and then depart. Each tanker would have the capacity to carry between 10,000 and 15,000 tons of fuel.

A combination of a single large fuel tanker and several smaller fuel tankers could be used to supply fuel for the program.

Fuel tankers would be too large to enter Tuktoyaktuk Harbour and would remain in or near the licence areas, except when transiting into and out of the Beaufort Sea.

The fuel tankers used would likely:

- have double hulls
- be designed in accordance with Canadian regulations and international standards including the IACS Unified Requirements for Polar Ships
- be capable of independent operations in the ice conditions expected between the port of departure and the licence area throughout the drilling season, except at the beginning and ends of the season when it is expected that escort by one of more of the icebreaking support vessels would be required

6.5.3.3 Ice-Strengthened Fuel Tankers (cont'd)

- be specially configured for ship-to-ship transfer of fuel to smaller vessels, such as the icebreaking support vessels and ice-strengthened supply vessels
- have about 15 to 20 crew members and would be fully equipped with all necessary facilities to enable them to operate independently for weeks at a time, including:
  - cooking and cleaning facilities
  - fresh water generators
  - waste collection
  - waste treatment equipment
  - oil spill response capabilities

6.5.3.4 Ice-Strengthened Wareship

Depending on the final strategies for logistics, waste management, oil spill response, and well control, an ice-strengthened wareship might be used to perform one or more of the following functions:

- carry fuel, drilling materials and other supplies for the drilling unit and support vessels
- receive waste products from the drilling unit and support vessels for storage and shipment out of the licence areas
- support helicopter operations
- provide a location to conduct or support maintenance work needed for the drilling unit and support vessels
- support for source control operations in the unlikely event of loss of well control
- support for oil spill response operations, including carrying containment booms and dispersant

The wareship, if used, would be too large to enter Tuktoyaktuk Harbour and would normally remain in or near the licence area, except when transiting into and out of the Beaufort Sea at the beginning and end of each season. After arriving at the beginning of the season, the wareship would remain in an ice-free section of the licence area and move only as necessary to avoid ice. The icebreaking support vessels and ice-strengthened supply vessels (if used) would offload fuel and other supplies from the wareship both for their own needs and to transfer fuel to the drilling unit.

6.6.1 SUPPORT FACILITIES

Deepwater drilling operations typically require a deep-draft port for operations support. Because there is no deep-draft port in the Beaufort Sea, an offshore wareship might be used.

Various land-based facilities and services might be needed to support offshore drilling operations, including:

- a shore-based facility, which might include:
  - accommodations
  - staging sites and storage areas
  - a dock area
- transportation services (i.e., air and land) for moving supplies and personnel
- emergency equipment storage
- a potable water supply
- waste management services

6.6.2 SHORE-BASED FACILITY

The offshore drilling program could require the support of a shore-based facility, most likely located in Tuktoyaktuk, which is about 125 km from the potential drilling location in EL 476 or EL 477. The shore-based facility would be leased from one or more of the existing commercial locations.

A satellite image showing Tuktoyaktuk Harbour and the general route that could be taken by shallow-draft vessels to the shore-based facility is shown in Figure 6-12.

6.6.2.1 Onshore Accommodations

Onshore accommodation could be required for:

- shore-based facility personnel, if such a facility were established for the program
- personnel transiting to and from the offshore drill site
- personnel evacuated from the offshore drill site in an emergency

The accommodation requirements will be determined at a later date.

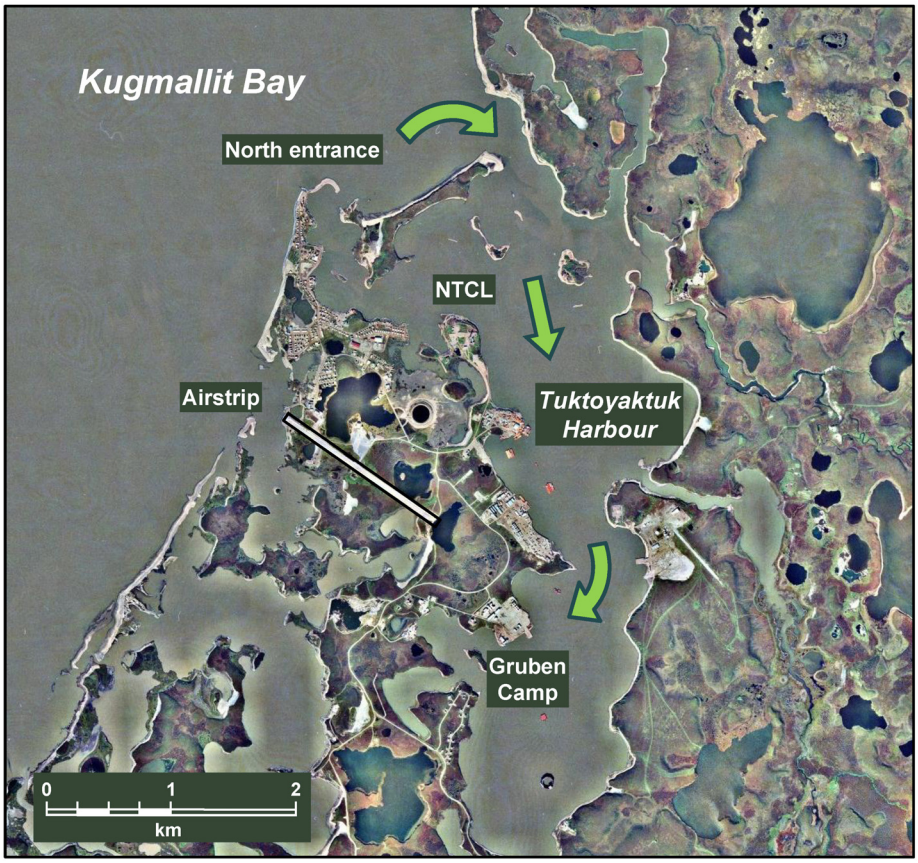

Figure 6-12: Tuktoyaktuk Infrastructure and Shipping Route to the Shore-Based Facility

6.6.2.2 Staging Sites and Storage Areas

It is not expected that a lot of equipment would be stored at the shore-based facility.

Infrastructure at the shore-based facility to support the drilling operations might include:

- a staging site and storage area for equipment and materials
- a heated warehouse
- offices and communication services

6.6.2.3 Dock Area

Some dock construction and upgrading might be required to handle the loading and unloading of supplies and personnel. To allow shallow-draft vessels to enter and exit Tuktoyaktuk Harbour, dredging might be required near the dock area and at some locations inside the harbour. The dock area would require equipment to handle small tools and lightweight containers.

6.6.3 TRANSPORTATION SERVICES

One of the major logistical considerations for an offshore drilling program is the transportation of supplies and personnel to and from the drill site during the drilling season. Once work begins at the drill site, ongoing resupply will be required.

The drilling operations at the drilling unit would require large quantities of supplies such as:

- pipe
- drilling fluids
- cement
- fuel
- equipment
- other materials

These materials would likely be stored on a wareship.

In addition, crews on the drilling unit or on support vessels would require:

- food
- medical supplies
- other consumables

In the spring, ships carrying crew members for the drilling unit or support vessels, and vessels carrying supplies, including fuel tankers, might travel to the Beaufort Sea from ports outside of the area. Options for resupply of consumables could include using a:

- single supply warebarge or wareship to transport all of the supplies expected to be needed for a single season. A warebarge or wareship could be positioned at the drill site and consumables transferred to the drilling unit as required.

- combination of a warebarge or wareship and a shore-based facility

Workers will need to be transported safely when moving between the drilling unit and the shore-based facility, either by helicopter or by supply vessel, particularly if weather conditions restrict flying.

Imperial would consider using the limited municipal infrastructure at Tuktoyaktuk only if such use is supported by the Hamlet Council. Potential issues were identified during community consultations with the hamlet's stakeholders, and in the Environmental Studies Research Funds' June 2010 report *Review of Tuktoyaktuk Harbour as a Base for Offshore Oil and Gas Exploration and Development*. These issues would be managed and resolved by Imperial with the support of the Hamlet Council. Issues identified include:

- increased traffic on the roads
- vessel traffic in the harbour
- breaking ice in the harbour

6.6.3.1 Land Transportation Services

It is expected that some vehicle transportation for personnel and supplies would be required, primarily between the shore-based facility and the airstrip. During the winter, some materials and supplies could be transported by land to Tuktoyaktuk over ice roads and stockpiled for the next drilling season.

6.6.3.2 Air Transportation Services

The existing airstrip would be used for air transportation. For workforce rotations, two or more helicopters would be chartered to make regularly scheduled transits between the drilling unit, support vessels and the Tuktoyaktuk airstrip, averaging about one flight per day to the drill site.

6.6.4 WASTE MANAGEMENT SERVICES

Waste would be removed from the drilling unit and transported by supply vessel to the shore-based facility. A qualified contractor would arrange for onshore disposal or for storage in preparation for shipping waste out of the Beaufort Sea region. Alternatively, waste from the drilling unit and support vessels could be stored on the wareship for shipment out of the licence areas.

6.7.1 TRANSIT ROUTES

The drilling unit and support vessels could mobilize from a west coast Canadian port by early June to take on crew, fuel and drilling consumables. Depending on weather and ice conditions along the route, vessel transit into the Beaufort Sea could take one to two weeks.

Depending on the location of the drilling unit and support vessels, entry into the Beaufort Sea could also be from a port on the east coast of Canada via the Northwest Passage. Figure 6-13 shows the possible east and west transit routes to the Beaufort Sea.

The decision to suspend the well, demobilize and exit would depend on actual and predicted ice conditions at the drill site, and ice and weather conditions along the egress route.

The routes chosen for transit in the Alaskan and Canadian Beaufort Sea would maximize the use of existing open-water leads.

If a decision was made to overwinter vessels in the Canadian sector of the Beaufort Sea in the fall, there would be a contingency plan to use one or more sites in the region that have been used in the past, such as McKinley Bay, Summers Harbour or Wise Bay.

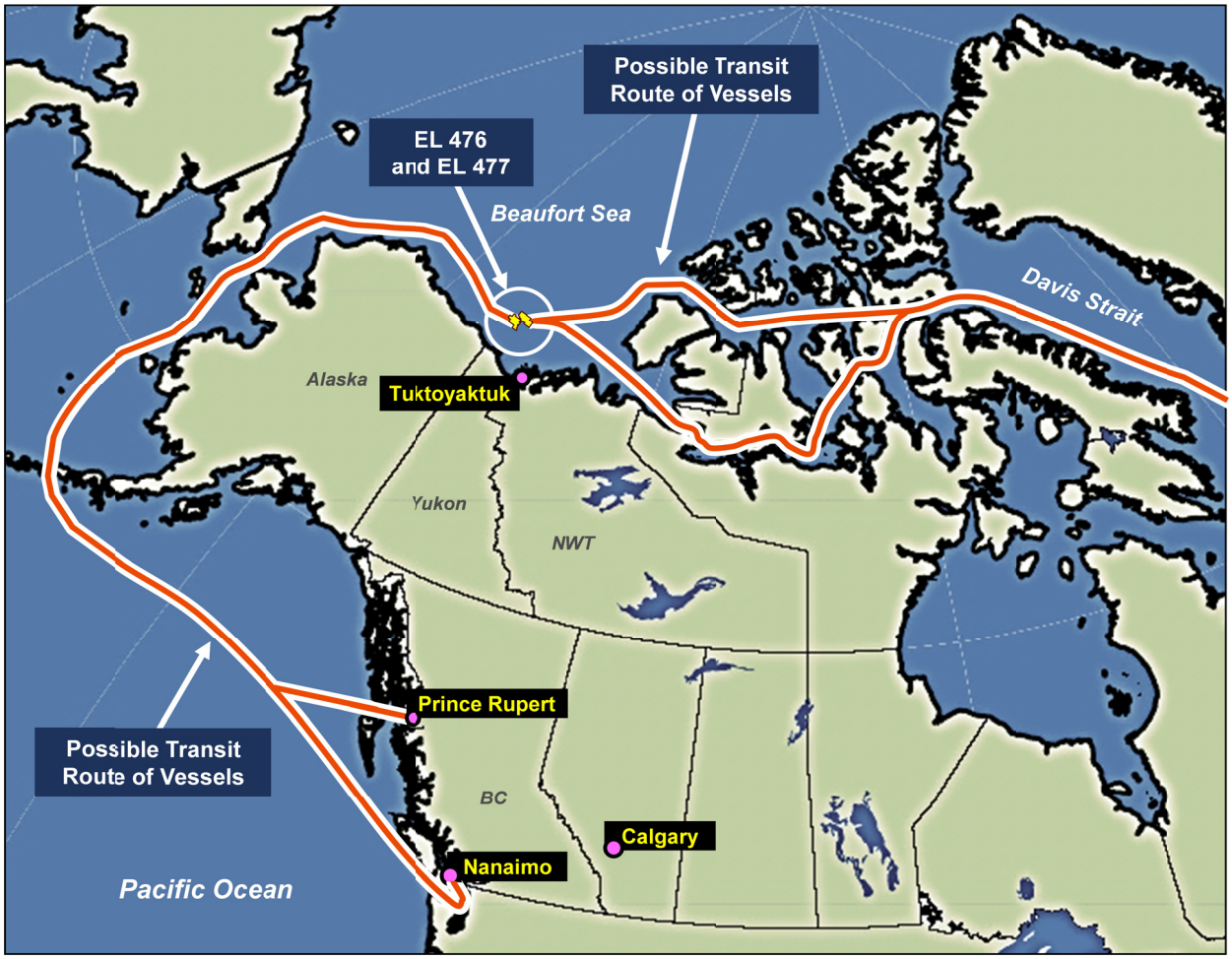

Figure 6-13: Possible Transit Routes for Vessels Entering and Leaving the Beaufort Sea

6.8.1 OPPORTUNITIES

Imperial and ExxonMobil personnel would typically occupy and/or provide oversight to the senior positions on the drilling unit, support vessels and at the shore-based facility. Most of the workforce for a Beaufort Sea drilling program would consist of individuals hired by contractors working under service agreements with Imperial and ExxonMobil.

Work would be awarded based on an assessment of whether a proposal provides the best total value, including:

- safety and environmental performance
- technical and operational capabilities
- Inuvialuit and Canadian content
- cost competitiveness
- the ability to deliver work within Imperial's schedule requirements

Imperial's intent is to provide opportunities for Inuvialuit companies by:

- notifying Inuvialuit suppliers of potential opportunities as early as possible
- preparing work packages that encourage Inuvialuit companies to bid on the work or align with other companies in joint ventures to manage larger work packages

If an Inuvialuit company secures a contract, Imperial will assist the successful bidder to:

- achieve first-class safety and environmental performance
- provide training and development opportunities
- verify that the company has all the required procedures and policies in place to do the work safely and successfully
- deliver timely and high-quality results, which would put the company in good standing for future work opportunities in the Beaufort Sea region or at the national and international level

Identifying specific jobs and contracting services at this time in the planning cycle would be premature. If the joint venture partners decide in 2016 to proceed with drilling, the job identification effort will be further defined. The first areas of employment opportunities will be for positions to provide long lead time

6.8.1 OPPORTUNITIES (cont'd)

services, if required, such as new-build vessels and upgrading the shore-based facility at Tuktoyaktuk.

Table 6-3 shows examples of the types of potential employment opportunities.

Table 6-3: Examples of Potential Employment Opportunities

Opportunities on the Drilling Unit and Support Vessels	Opportunities Onshore
Able-bodied seamen	Accommodation service providers
Cooks	Community liaison advisers
Custodial personnel	Dispatchers
Environmental technicians	Office managers and assistants
Galley hands	Crane operators
Ice-management technicians	Drivers
Marine mammal observers	Electricians
Ordinary seamen	Firefighting personnel
Roughnecks	Forklift operators
Roustabouts	Helicopter and fixed-wing aircraft staff
Ship captains	Mechanics
Waste management technicians	Oil spill response personnel
Wildlife monitors	Radio operators
	Security personnel
	Vessel traffic managers
	Warehousing personnel
	Waste management personnel
	Welders

7.1.1 PREVIOUS ACTIVITY

Since acquiring EL 446 (now EL 476) in July 2007, and subsequently becoming the operator for BP's EL 449 (now EL 477) in 2010, Imperial has undertaken a number of activities related to potential drilling plans. To communicate information about these activities, Imperial has prepared various public presentations, documents, submissions and statements, including:

- five workshops given in the ISR during 2009 and 2010, and attended by Inuvialuit and regulators:
  - Deepwater Drilling Well Control – September 2009
  - Ice Management Workshop – December 2009
  - Waste Management Workshop – January 2010
  - Wildlife Harvesting Workshop – February 2010
  - Spill Prevention Response Workshop – April 2010
- two submissions to the NEB:
  - the Relief Well Policy for Offshore Drilling in Arctic Waters – submitted March 2010
  - response to the AODR Call for Information – submitted April 2011
- opening comments at the NEB AODR roundtable forum from September 12 to 14, 2011
- responses to questions during the NEB AODR roundtable forum, as detailed in the AODR transcripts
- the Preliminary Information Package (PIP) released in December 2012
- presentations to, and consultations with, Inuvialuit organizations, Inuvialuit communities, and territorial and federal regulators from 2011 to 2013

For a detailed description of these consultations and presentations, see Section 12, Community Engagement and Consultation and Section 13, Co-Management, Inuvialuit Organizations and Government Engagement and Consultation. For further information on proposed mitigation measures, see Section 16, Proposed Mitigation Measures to Address Potential Impacts.

7.1.2 COMMITMENTS

While the design for a drilling program in EL 476 and EL 477 continues to be advanced, some previous early planning has been revised. Nonetheless, many statements made by Imperial in the past are still applicable and will likely continue to be applicable throughout the drilling program development and implementation.

Past and present statements that could be considered as commitments to Inuvialuit, northerners and regulators are provided in:

- Table 7-1 Proponent Commitments – Program Management
- Table 7-2 Proponent Commitments – Drilling and Well Control
- Table 7-3 Proponent Commitments – Support Operations
- Table 7-4 Proponent Commitments – Consultation and Regulatory
- Table 7-5 Proponent Commitments – Environmental, Prevention, Emergency and Oil Spill Response
- Table 7-6 Proponent Commitments – Benefits and Financial Capacity

These tables also include the timing for implementing each commitment.

Table 7-1: Proponent Commitments – Program Management

Summary Commitment	Implementation Timing
• Imperial will employ trained personnel, apply world-class experience and use best available proven technologies and equipment.	• Ongoing for the life of the program.
• Imperial will focus on managing risks and safe operations to prevent its operations from causing environmental impacts.	• Ongoing for the life of the program.
• Imperial will conduct a series of program risk assessments to reduce or mitigate specific risks associated with all aspects of the program to an acceptable level, taking into account environmental operating conditions that could affect the drilling program.	• A series of risk assessments will be undertaken and documentation provided to the NEB as part of the OA application submission.
• Imperial will ensure that all contractors meet Imperial's requirements for creating a stringent safety and environmental protection culture.	• Ongoing for the life of the program.
• Imperial's personnel on site will have the authority to stand down an operation if it is unsafe.	• Ongoing for the life of the program.

• Imperial will have a series of management plans to meet internal and regulatory requirements, including:
  • OIMS required plans, including EMDC drilling's OIMS for drilling-related activities
  • a Safety Plan
  • a Well Control Plan
  • an EPP
	• Key components of these plans will be included in the OA submission filed with the NEB. Some aspects of the plans will need to be finalized before spudding the well.

Table 7-1: Proponent Commitments – Program Management (cont'd)

Summary Commitment	Implementation Timing
• a WMP • an IMP • an ERP, including oil spill response • a Regulatory Compliance Plan	
• Imperial will review applicable draft management plans with Inuvialuit before filing with the NEB, to the extent possible.	• Before filing the OA submission with the NEB.
• Imperial will file its management plans with the NEB, except for proprietary and commercial information that would need to remain confidential.	• Included in the OA submission filed with the NEB.

Table 7-2: Proponent Commitments – Drilling and Well Control

Summary Commitment	Implementation Timing
• Imperial will apply a rigorous well control system to all aspects of well design, drilling and completions.	• Ongoing throughout drilling operations.
• Drilling contractors will be trained and capable of carrying out their functions.	• Before the start of drilling.
• Drills and exercises will be performed regularly at the well site to ensure competency of operations personnel.	• Ongoing throughout drilling operations.
• Imperial will develop an Abandonment Plan to ensure that there are sufficient barriers in place, depending on specific well conditions.	• Included in the OA submission filed with the NEB. The Abandonment Plan will be implemented upon well completion.
• Imperial will consider the potential application of well control innovations as they advance from concept to best available proven technologies.	• Ongoing for the life of the program.
• Imperial will apply proven pore pressure prediction and formation evaluation technologies to detect abnormal pressure conditions to prevent or contain kicks.	• A description of the proposed technology will be included in the OA submission filed with the NEB. The technology will be in place for drilling operations.

Table 7-3: Proponent Commitments – Support Operations

Summary Commitment	Implementation Timing
• An IMP will be developed to ensure that all marine vessels, equipment and trained personnel are in place to monitor ice conditions continuously in the field and take necessary actions to prevent ice incursions into the safety zone around the drilling unit.	• An IMP will be included in the OA submission filed with the NEB. The plan will be reviewed with TC and implemented during drilling.
• All support vessel activities will be coordinated to preclude any possible collisions with the drilling unit or with another vessel.	• To be in place throughout drilling operations.
• The frequency of support vessels entering and leaving Tuktoyaktuk Harbour will be reduced or stopped after the harbour starts to freeze.	• To be in place throughout drilling operations.
• No fuel will be stored in barges over the winter.	• To be in place throughout drilling operations.
• Imperial will develop safety and environmental procedures for vessel traffic in Tuktoyaktuk Harbour with local authorities.	• To be in place throughout the drilling operations.

Table 7-4: Proponent Commitments – Consultation and Regulatory

Summary Commitment	Implementation Timing
Consultation	
• Imperial will consult with Inuvialuit throughout the life of the program, from initial design and planning through to completion on all issues of interest or concern.	• Ongoing for the life of the program.
Regulatory	
• Imperial will fulfill the obligations of the ELs.	• In place and will continue through the life of the ELs.
• All applicable regulations and conditions will be identified, tracked and verified through documentation, and complied with at all times.	• A Regulatory Compliance Plan will be developed and included in the OA submission with the NEB.
• Imperial will be responsible for preparing and filing all regulatory applications.	• As required, filings will be made, as required, by with each regulator.

Table 7-5: Proponent Commitments – Environmental, Prevention, Emergency and Oil Spill Response

Summary Commitment	Implementation Timing
Environmental	
• An environmental and socio-economic assessment will address short- and long-term impacts of all program activities.	• The assessment will be filed with the NEB and, if a referral is made by the EISC, to the EIRB.
• The environmental assessment will use best available information from scientific and traditional knowledge sources.	• Included in the environmental assessment process.
• As part of ice management, Imperial will monitor the area for the presence and impacts from icebreaking and vessels transits on marine mammals, such as polar bears and seals.	• This will be included in the Wildlife Protection Plan that will be reviewed with Inuvialuit.

Table 7-5: Proponent Commitments – Environmental, Prevention, Emergency and Oil Spill Response (cont'd)

Summary Commitment	Implementation Timing
Environmental (cont'd)	
• Imperial will meet the EISC *Flight Altitude Guidelines*.	• Ongoing for the life of the program.
• Imperial will avoid vessel routes in the Beluga Management Zone 1A.	• Ongoing for the life of the program.
• Imperial will hire marine mammal observers for support vessels during the beluga harvest period to help direct vessels from beluga whale harvesting areas. The marine mammal observers will also maintain close communications with the HTCs regarding vessel transits and schedules.	• Ongoing for the life of the program.
• Imperial will develop a Polar Bear Interaction and Management Plan in consultation with Inuvialuit.	• The plan will be developed and in place before spudding the well.
Prevention, Emergency and Oil Spill Response	
• Imperial will ensure that preventing incidents that might result in a spill is top priority. This will be done by applying disciplined risk assessments and management processes.	• Ongoing throughout design and implementation of the drilling program.
• In the unlikely event of a spill, Imperial will safeguard the health and safety of oil spill response personnel and the public.	• In the event of a spill.
• Imperial will develop a level of spill response that is fit for purpose, taking into account the risks, probability and consequences.	• An OSRP would be included in the OA submission filed with the NEB.
• Imperial will take immediate responsibility for responding to spills that might occur during operations and will respond as quickly and effectively as possible.	• In the event of a spill.
• Imperial will conduct the necessary studies, using local knowledge and expertise, to understand the fate, behaviour and transport of an oil spill, and identify the most vulnerable and sensitive species, habitats and areas.	• In the event of a spill.
• Imperial will apply a net environmental benefit analysis to help determine the best response options that will lead to the lowest overall impacts on the environment, wildlife harvesting and the most rapid recovery.	• In the event of a spill.
• Credible and effective oil spill response options will be available in the offshore, nearshore, Tuktoyaktuk Harbour and shorelines for open water and ice conditions.	• In the event of a spill.
• Imperial will have the capability in place to apply a combination of the best modelling, tracking and surveillance technologies for oil spill response.	• In place for the drilling program.
• Imperial will continue to enhance oil spill response capabilities through research and development.	• Ongoing for the life of the program.
• Primary oil spill response options will be dispersant use (by aerial application and subsea injection at the wellhead) and in situ burning to reduce or avoid effects on key species and shorelines.	• Testing and implementation in place before the start of drilling.

Table 7-5: Proponent Commitments – Environmental, Prevention, Emergency and Oil Spill Response (cont'd)

Summary Commitment	Implementation Timing
Prevention, Emergency and Oil Spill Response (cont'd)	
• Imperial will ensure that all oil spill response providers have appropriate safety and operations training.	• Training will be conducted before the start of drilling operations.
• All support vessels will comply with the IMO protocols, have a Shipboard Oil Pollution Emergency Plan and have the necessary equipment on board for a Tier 1 spill.	• In place when support vessels are in Canadian Arctic waters.

Table 7-6: Proponent Commitments – Benefits and Financial Capacity

Summary Commitment	Implementation Timing
Benefits	
• Imperial will have a benefits strategy specific to identifying opportunities for Inuvialuit and northern businesses and for employment.	• Ongoing for the life of the program.
• Imperial will look for ways to advance early training, education and on-the-job experiences for northerners seeking job and business opportunities.	• Ongoing for the life of the program.
Financial	
• Imperial will have the financial capacity to fund any cleanup of its activities or remediate any environmental and economic impacts from an oil spill without need for further financial guarantees.	• The IFA already stipulates the unlimited financial liability of the operator.
• Imperial will establish a wildlife compensation process that meets the requirements of the IFA. The compensation process will be efficient, effective, fair and timely for Inuvialuit organizations or individuals to file a claim for existing or future harvest loss.	• A draft process will be submitted to the Inuvialuit Game Council for review and input, and finalized before spudding the well.

8.1.1 RELEVANT DRILLING EXPERIENCE

Imperial has extensive experience and knowledge in drilling and managing activities in the Beaufort Sea, including using ice-class support vessels and icebreakers, starting in 1973 with the Immerk B-48 well located on an artificial island, through to 1989 and the Isserk I-15 well drilled from the Molikpaq platform. During this period, about 90 wells were drilled in the Beaufort Sea, a third of which were drilled by Imperial without any drilling-related incidents.

The experience gained by Imperial in the Canadian sector of the Beaufort Sea, particularly by using established technologies to drill in cold climate waters, was used by ExxonMobil to drill offshore of:

- Alaska in the late 1980s
- Sakhalin Island, Russia in the Sea of Okhotsk in the 1990s

ExxonMobil has also drilled wells in some of the world's most challenging deepwater environments, including:

- Angola
- Australia
- Brazil
- Indonesia
- Libya
- Nigeria
- the North Sea (72° latitude)
- the east coast of Canada
- the Philippines
- the United States (US) Gulf of Mexico

Further experience will be gained by ExxonMobil and its affiliates over the coming years from offshore operations in other Arctic interests under conditions similar to the Beaufort Sea.

8.1.2 TECHNOLOGY REVIEW PROCESS

When designing wells worldwide, including wells for the Canadian sector of the Beaufort Sea, Imperial and ExxonMobil well design standards will be applied. These standards have been developed based on many years of experience and the application of proven technologies. In addition to these standards, EMDC

8.1.2 TECHNOLOGY REVIEW PROCESS (cont'd)

drilling's OIMS will be used to ensure that all wells are drilled and operated consistently in a safe and environmentally responsible manner worldwide. When new technologies are developed, they go through a rigorous review process before being implemented in any drilling operation.

The drilling systems and associated support activities that would be used in the Beaufort Sea operations will be the best available at the time using proven technology. The proposed drilling system will undergo a rigorous technical design and engineering review by the NEB before any drilling program is authorized, and will be closely monitored and inspected by the NEB during operations.

9.1.1 JUSTIFICATION FOR A DRILLING PROGRAM

Seismic programs, conducted over EL 476 in 2008 and EL 477 in 2009, identified a number of traps or seals deep beneath the surface in rock formations with potential for hydrocarbon accumulation. Although predictions about the presence and properties of fluids contained within these reservoir rocks can be made based on seismic interpretation, substantial uncertainty exists concerning the fluid type, amount (saturation), composition, temperature, pressure and physical properties of the fluids and the reservoir rocks.

In the 1980s some wells were drilled and discoveries made near EL 476 and EL 477 (e.g., Kenalooak, Nektoralik, Kopanoar and Koakoak). However, reservoir rocks can undergo dramatic changes in physical properties over a short distance, making extrapolations from existing discoveries difficult. In addition, AANDC and the NEB require formation testing and proof that hydrocarbons have been identified over a defined geological field before they will issue an SDL to an EL holder.

Therefore, drilling an exploration well at a favourable location on the EL is necessary to prove that an exploration discovery exists, along with a possible commercial opportunity. Consequently, there is no alternative to drilling one or more exploration wells at specific well site locations within the EL areas to test for presence of hydrocarbons.

9.2.1 CONSIDERATIONS FOR PROGRAM OPTIONS

As described in Section 6, Summary of the Proposed Development, there are many options available on how the program could be undertaken. Decisions on the best options to take forward through the regulatory phase and into planning, design and execution will be based on a combination of:

- ensuring the safety of the workforce and public
- understanding and preparing for the specific operating conditions, such as:
  - water depth
  - ice
  - oceanography
  - weather
- ensuring well integrity
- protecting the environment
- protecting Inuvialuit harvesting and other cultural activities
- ensuring that the needs and concerns of the Hamlet of Tuktoyaktuk concerning a potential shore-based facility are addressed
- creating opportunities for local and Inuvialuit businesses and employment
- meeting the terms and conditions of the NEB OA
- meeting the requirements of other regulatory agencies
- meeting the licence conditions of EL 476 and EL 477
- meeting Imperial's and EMDC drilling's operating standards and procedures under the OIMS
- ensuring that the program is cost effective
- meeting the drilling schedule