



## Shell Exploration & Production

May 4, 2011

U.S Fish and Wildlife Services  
Marine Mammals Management  
Attn: Craig Perham  
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Re: Request for Letter of Authorization (LOA) for the  
Incidental Take of Polar Bears and Pacific Walrus, and the  
Intentional Take of Polar Bears by Harassment;  
Revised Outer Continental Shelf Lease Exploration Plan, Camden Bay, Alaska

Dear Mr. Perham:

Shell Offshore, Inc. (Shell) hereby requests a Letter of Authorization (LOA) from the U.S. Fish and Wildlife Service (USFWS) for the non-lethal incidental, unintentional “take” of small numbers of Polar Bears and Pacific Walrus, and the intentional take of Polar Bears by harassment, which may occur during Shell’s revised Outer Continental Shelf Lease Exploration Plan, Camden Bay, Alaska. This letter is submitted to fulfill the requirements regarding incidental, unintentional take of protected marine mammals pursuant to 50 Code of Federal Regulations (CFR) Part 18. The governing regulations are entitled, *Nonlethal Taking of Marine Mammals Incidental to Oil and Gas Exploration, Development, and Production Activities in the Beaufort Sea*.

As described in the attached supporting documentation, Shell’s exploration drilling program is planned for various U.S. Department of the Interior, Bureau of Ocean Energy Management, Regulation and Enforcement (BOEMRE) OCS lease blocks in the Beaufort Sea. To minimize any cultural or resource impacts to subsistence whaling activities from its proposed exploration operations, exploration drilling activities in Camden Bay are planned to begin on or about July 10<sup>th</sup> and run through October 31<sup>st</sup>, with suspension of all operations beginning August 25<sup>th</sup> for the Nuiqsut (Cross Island) and Kaktovik subsistence bowhead whale hunts. The drilling vessel and support vessels will leave the Camden Bay project area and will resume activities after the Nuiqsut (Cross Island) and Kaktovik subsistence whale hunts conclude. Activities will extend through October 31<sup>st</sup>, depending on ice and weather.

As part of the application for obtaining an LOA for a similar exploration drilling program in Camden Bay in 2010, Shell developed a Plan of Cooperation (POC) in accordance with 50 CFR§18.124(c)(4) that was submitted to USFWS in May 2009. This POC was described in our initial Camden Bay EP submitted to BOEMRE also in May 2009. This POC has been updated for a revised Camden Bay EP as a POC Addendum that includes information regarding the proposed changes in the revised Camden Bay EP, and documents meetings undertaken to specifically inform North Slope stakeholders and obtain their input. The initial POC and POC Addendum mitigate the effects of Shell’s planned exploration drilling program where exploration activities would take place in or near a traditional Arctic subsistence hunting area and/or may affect the availability of a species or stock of marine mammal for Arctic subsistence uses. The POC and POC Addendum were prepared in consultation with affected Beaufort and Chukchi Sea communities, marine mammal commissions, and subsistence groups. During these consultations, Shell focused on lessons learned from prior year’s activities and presented mitigation measures for avoiding potential conflicts, which are outlined in the POC Addendum included with Shell’s current LOA application.

U.S. Fish and Wildlife Services

May 4, 2011

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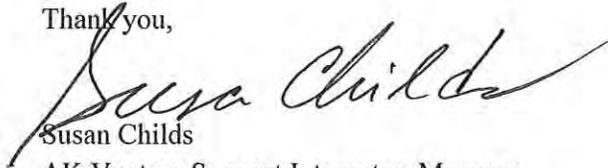
Any potential impacts from the revised Camden Bay exploration drilling program on the polar bear and Pacific walrus populations of the Beaufort Sea will be short-term and transitory (i.e., the temporary displacement of individuals or small groups of marine mammals that may be exposed to the planned activities). The planned activities will not result in any permanent impact on habitats used by marine mammals or their prey. As outlined in the attached documents, Shell will take appropriate measures to prevent unreasonable impacts on the availability of marine mammals for subsistence users.

Items required pursuant to 50 CFR 18 are attached. Items include:

- 1) Polar Bear, Pacific Walrus, and Grizzly Bear Avoidance and Human Encounter/Interaction Plan, Revised Outer Continental Shelf Lease Exploration Plan, Camden Bay, Beaufort Sea, Alaska (which includes a complete description of proposed activities),
- 2) Marine Mammal Monitoring and Mitigation Plan (Attachment B to the Polar Bear, Pacific Walrus, and Grizzly Bear Avoidance and Human Encounter/Interaction Plan); and,
- 3) POC Addendum (Attachment H to the Polar Bear, Pacific Walrus, and Grizzly Bear Avoidance and Human Encounter/Interaction Plan).

If you have any questions regarding this submission, please contact me at (907) 646-7112 or at [Susan.Childs@Shell.com](mailto:Susan.Childs@Shell.com), or Pauline Ruddy at (907) 771-7243 or at [Pauline.Ruddy@Shell.com](mailto:Pauline.Ruddy@Shell.com).

Thank you,



Susan Childs

AK Venture Support Integrator, Manager

Attachment:

Polar Bear, Pacific Walrus, and Grizzly Avoidance and Human Encounters/Interaction Plan

Cc:

Jeff Walker, U.S Department of the Interior, Bureau of Ocean Energy Management, Regulation and Enforcement, Alaska Region, Anchorage

Joel Garlich-Miller, USFWS, Marine Mammals Management, Anchorage

Don Perrin, Alaska Department of Natural Resources, Anchorage

Project File

Administrative Record



**Polar Bear, Pacific Walrus, and Grizzly Bear Avoidance and  
Human Encounter/Interaction Plan  
Revised Outer Continental Shelf Lease Exploration Plan  
Camden Bay, Alaska**

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May 2011

Prepared by:

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**Attachments**

Attachment A Ice Management Plan – Beaufort Sea  
Attachment B Marine Mammal Monitoring and Mitigation Program (4MP)  
Attachment C Bear Avoidance and Encounter Procedures  
Attachment D Wildlife Notification Flow Chart  
Attachment E Polar Bear Sighting Report  
Attachment F Grizzly Bear Observation Form  
Attachment G Walrus Sighting Report  
Attachment H Plan of Cooperation Addendum

## ACRONYMS

°	degree(s)
°C	degrees Celsius
4MP	Marine Mammal Monitoring and Mitigation Plan
ACS	Alaska Clean Seas
ADEC	Alaska Department of Environmental Conservation
ADF&G	Alaska Department of Fish and Game
AW	Augusta Westlund
bbl	barrel(s)
BOEMRE	Bureau of Ocean Energy Management, Regulation and Enforcement
CFR	Code of Federal Regulations
cm <sup>3</sup>	cubic centimeters
<i>Discoverer</i>	Motor Vessel <i>Noble Discoverer</i>
DP	Dynamic Positioning
EA	Environmental Assessment
EP	Exploration Plan
EPA	United States Environmental Protection Agency
ESA	Endangered Species Act
FONSI	Finding of No Significant Impact
FR	Federal Register
ft	foot/feet
GP	General Permit
hr/day	hours per day
IMP	Ice Management Plan
in.	inch(es)
in <sup>3</sup>	cubic inch(es)
kg	kilogram(s)
km	kilometer(s)
km/hr	kilometers per hour
<i>Kulluk</i>	conical drilling unit <i>Kulluk</i>
LOA	Letter of Authorization
m	meter(s)
M/V	Motor Vessel
m <sup>3</sup>	cubic meters
max	maximum
mi	mile(s)
MMO	Marine Mammal Observer
MMPA	Marine Mammal Protection Act
MMS	Minerals Management Service
NMFS	National Marine Fisheries Service
<i>Nordica</i>	Motor Vessel <i>Nordica</i>
NPDES	National Pollutant Discharge Elimination System
OCS	Outer Continental Shelf
ODPCP	Oil Discharge Prevention and Contingency Plan
OSR	oil spill response
OST	oil storage tanker
OSV	offshore supply vessel
Plan	Polar Bear, Grizzly Bear and Pacific Walrus Avoidance and Human Encounter/ Interaction Plan
POC	Plan of Cooperation

RA	Regulatory Affairs
RS/FO	Regional Supervisor/Field Operations
SAR	Search and Rescue
Shell	Shell Offshore Inc.
SIWAC	Shell Ice and Weather Advisory Center
U.S.	United States
USFWS	U. S. Fish and Wildlife Service
VOSS	Vessel of Opportunity Skimming System
VSI	Vertical Seismic Imager
VSP	vertical seismic profile
WCD	worst case discharge
ZVSP	Zero-offset vertical seismic profiling

## 1.0 INTRODUCTION

This Polar Bear, Pacific Walrus, and Grizzly Bear Avoidance and Human Encounter/Interaction Plan (Plan) has been developed by Shell Offshore Inc. (Shell) in support of its exploration drilling program in Camden Bay in the Beaufort Sea, Alaska planned to begin in the summer of 2012.

### 1.1 Background

This Plan details the policies and procedures adopted by Shell, which will be implemented at its operations in Camden Bay as well as its project support activities throughout Alaska's North Slope in 2012. The Plan is intended to support activities that may encounter polar bears (*Ursus maritimus*) and Pacific walrus (*Odobenus rosmarus divergens*), both trust species of the U.S. Fish and Wildlife Service (USFWS), as well as grizzly bears (*Ursus arctos horribilis*), which are under the jurisdiction of the Alaska Department of Fish and Game (ADF&G).

This Plan addresses polar bears, grizzly bears and Pacific walrus, although interactions with Pacific walrus and grizzly bears are considered to be unlikely. It is expected that polar bears will be found within the Shell project areas during the drilling season when pack ice is nearby. In addition, polar bears are likely to be found on land, such as barrier islands. Shell anticipates that chances for encounters of Pacific walrus and grizzly bear are low and interactions and encounters are considered unlikely for this project. Pacific walrus are considered an extralimital species with infrequent use of the Beaufort Sea and, while grizzly bears may be present on the shoreline of the North Slope during the summer, typically they are not seen offshore where the project activities in support of exploration drilling will be located.

The Plan ensures that workers are familiar with the issues and safety precautions associated with working in bear country. The goal of this document is to standardize bear interaction and avoidance protocol and wildlife reporting efforts for the project. With proper knowledge and training, workers will detect the presence of bears and walrus quickly and respond appropriately through monitoring, avoidance, and/or, if necessary, active deterrence by USFWS certified bear hazers. The awareness and prevention of human/bear and human/walrus interactions will ensure the safety of workers as well as wildlife.

This Plan is intended to fulfill the requirement for a "site specific polar bear awareness and interaction plan," as required by 50 Code of Federal Regulations (CFR) 18.124(c)(3), which is part of the requirements for a Letter of Authorization (LOA) for the incidental, non-lethal, unintentional take of polar bear and Pacific walrus as specified under 50 CFR 18, Subpart J. This Plan also applies to the intentional take of polar bears by hazing pursuant to section 101(a)(4)(A), 109(h), and 12(e) of the Marine Mammal Protection Act (MMPA). The MMPA prohibits, with certain exceptions, the "taking" of marine mammals. "Take" is defined to mean, "to harass, hunt, capture, or kill, or attempt to harass, hunt, capture or kill any marine mammal." The "taking" of polar bears is allowed for Alaska Native subsistence or to protect human life. The MMPA and supporting regulations make provision to "take" marine mammals in the course of scientific research and other legitimate work in polar bear habitat.

On May 15, 2008, the polar bear was listed as a threatened species under the Endangered Species Act (ESA). In June 2008, a special rule under authority of section 4(d) of the ESA was adopted which states that the regulatory requirements under the ESA are met by following the requirements of the MMPA, including obtaining a LOA. The grizzly bear is not protected in Alaska under the MMPA or ESA, but is protected by State game laws.

On October 29, 2009, a federal register notice (74 Federal Register [FR] 56058) was published outlining proposed critical habitat for the polar bear. The USFWS published a final critical habitat designation December 7, 2010, which became effective January 6, 2011.

Like polar bears, Pacific walrus are also protected under the MMPA. Also, as of February 10, 2011 the USFWS published its 12-month finding that listing the Pacific walrus as endangered or threatened under the ESA is warranted. Though, with publishing of the 12-month petition finding for the Pacific walrus, it has been added to the candidate species list. Consistent with section 4(b)(3)(C)(iii) of the ESA, USFWS will review the status of the Pacific walrus through an annual Candidate Notice of Review.

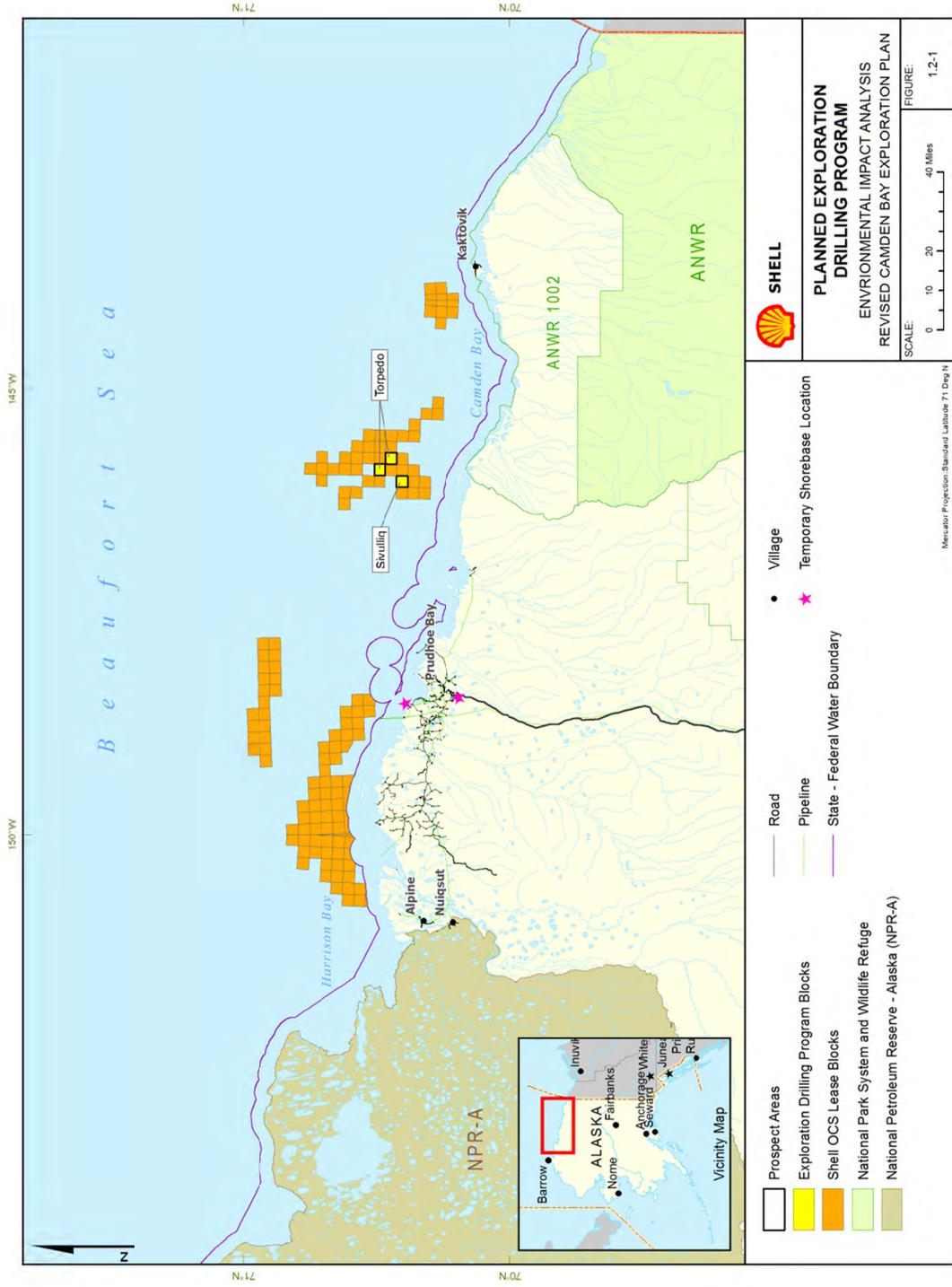
## ***1.2 Proposed Exploration Plan***

### **Exploration Drilling**

Shell submitted its initial Outer Continental Shelf (OCS) Camden Bay Exploration Plan (EP) to the Minerals Management Service (MMS) (now the Bureau of Ocean Energy Management, Regulation and Enforcement and hereinafter collectively referred to as “BOEMRE”) in May 2009. BOEMRE conditionally approved the Camden Bay EP on October 16, 2009 following a BOEMRE Environmental Assessment (EA) and Finding of No Significant Impact (FONSI). The initial Camden Bay EP contemplated a single season of operations using the Motor Vessel (M/V) *Noble Discoverer* (*Discoverer*) (formerly *Frontier Discoverer*) to drill, evaluate and plug and abandon exploration wells at two drill sites: one at the Sivulliq prospect (Sivulliq N – Flaxman Island Lease Block 6558) and one at the Torpedo prospect (Torpedo H – Flaxman Island Lease Block 6610). Shell planned to initiate exploration drilling activities under the Camden Bay EP in the summer of 2010, but the exploration activities were postponed when BOEMRE suspended all exploration drilling activities in the Arctic following the Deepwater Horizon incident in the Gulf of Mexico.

Pursuant to a revised Camden Bay EP submitted to BOEMRE in May 2011, Shell plans to drill four wells on three OCS lease blocks in the Camden Bay area of the Beaufort Sea (Figure 1.2-1) beginning in the summer of 2012. Two of the four wells in Shell’s revised exploration plan (Sivulliq N and Torpedo H) were included in Shell’s initial Camden Bay EP, and were specifically reviewed in BOEMRE’s October 2009 EA and FONSI. This plan revision includes two additional wells, one each at the same prospects; addresses Shell’s agreement with the local communities to collect selected waste streams that, under the initial Camden Bay EP, otherwise would have been discharged pursuant to the current United States (U.S.) Environmental Protection Agency (EPA) National Pollutant Discharge Elimination System (NPDES) General Permit (GP); and notes the possibility that Shell might ultimately decide to substitute the *Discoverer* for the conical drilling unit *Kulluk* (*Kulluk*) to complete the wells contemplated by the revised Camden Bay EP. The four drill sites identified in Shell’s revised Camden Bay EP are listed below in Table 1.2-1.

**Figure 1.2-1 Planned Exploration Drilling Program Area**



Shell plans to drill four wells (Table 1.2-1) to objective depth pursuant to its revised Camden Bay exploration plan. As with any Arctic exploration drilling program, weather and ice conditions, among others, will dictate the actual sequence of wells. All wells are planned to be vertical. Bottomhole locations will have the same latitude and longitude as surface locations.

**Table 1.2-1 Camden Bay Drill Sites**

Drill Site	Lease File Number	NR06-04 Flaxman Island Lease Block No.	Surface Location (NAD 83)*		Distance to Mainland Shore mi (km)
			Latitude (N)	Longitude (W)	
Sivulliq G	OCS-Y 1805	6658	70° 23' 46.82"	146° 01' 03.46"	16.6 (26.7)
Sivulliq N**	OCS-Y 1805	6658	70° 23' 29.58"	145° 58' 52.53"	16.2 (26.1)
Torpedo H**	OCS-Y 1941	6610	70° 27' 01.62"	145° 49' 32.07"	20.8 (33.5)
Torpedo J	OCS-Y 1936	6559	70° 28' 56.94"	145° 53' 47.15"	23.1 (37.2)

\*North American Datum 1983

\*\*Drill sites from initial Camden Bay EP

This plan also contemplates a situation where a well that is started must be temporarily suspended due to ice, weather, or other conditions, and finished at a later date. Any well on which drilling is suspended will be secured in compliance with BOEMRE regulations and with the approval of the Regional Supervisor/Field Operations (RS/FO), whether it is permanently abandoned (30 CFR 250.1710 through 1717) or temporarily abandoned (30 CFR 250.1721-1723).

Shell may conduct a geophysical survey referred to as zero-offset vertical seismic profiling (ZVSP) at each drill site where a well is drilled. Once the objective intervals are fully evaluated, each exploration well will be plugged and abandoned in compliance with BOEMRE regulation.

By agreement with the local communities, during the performance of exploration activities contemplated by the revised Camden Bay EP, Shell will not discharge selected waste streams during routine exploration drilling operations, even though the waste streams are allowable discharges under the current EPA administered Arctic NPDES GP AKG-28-0000. Shell will not discharge treated sanitary waste (black water), domestic waste (gray water), bilge water and ballast water at any time and drilling mud and cuttings with adhered drilling mud below the depth of the 20-inch (in.) conductor shoe. These wastes will be collected and stored on a deck barge and transported and disposed of at an approved and licensed facility. The following licensed facilities have been identified as potential sites for disposal of those waste streams collected during exploration operations:

- Waste Management Inc. (Arlington, Oregon) – water based mud, cuttings with adhered mud, non hazardous trash and debris, treated sanitary waste, treated domestic waste, uncontaminated ballast water, treated bilge water, hazardous waste, used oil
- Emerald Services Inc. (Palmer, Alaska and Seattle, Washington) – hazardous waste, used oil

Cuttings generated while drilling the mudline cellar, the 36- and 26-in. hole sections (all drilled with seawater and viscous sweeps only) plus cement discharged while cementing the 30- and 20-

in. casing strings will be discharged on the surface of the seafloor under provisions of the previously mentioned NPDES GP.

## **Drilling Vessels**

### **Kulluk**

The *Kulluk* has an Arctic Class IV hull design, offers full accommodations for a crew of up to 108 persons. The *Kulluk* is capable of drilling in up to 600 feet (ft) [182.9 meters (m)] of water and is moored using a 12-point anchor system. The *Kulluk's* mooring system consists of 12 Hepburn winches located on the outboard side of the main deck. anchor wires lead inboard off the bottom of each winch drum. The wire is then redirected by a sheave, down through a hawse pipe to an underwater, ice protected, swivel fairlead. The wire travels from the fairlead directly under the hull to the anchor system on the seafloor. The *Kulluk* would have an anchor radius maximum of 3,117 ft (950 m) for the Sivulliq drill sites and 2,995 ft (913 m) for the Torpedo drill sites. While on location at the drill sites, the *Kulluk* will be affixed to the seafloor using 12, 15 metric ton Stevpris anchors arranged in a radial array.

The *Kulluk* is designed to maintain its location in drilling mode in moving ice with thickness up to 4 ft (1.2 m) without the aid of any active ice management. With the aid of the ice management vessels, the *Kulluk* would be able to withstand more severe ice conditions. In more open water conditions, the *Kulluk* can maintain its drilling location during storm events with wave heights up to 18 ft (5.5 m) while drilling, and can withstand wave heights of up to 40 ft (12.2 m) when not drilling and disconnected (assuming a storm duration of 24 hours).

### **Discoverer**

The *Discoverer* is a true drillship, and is a largely self-contained drillship that offers full accommodations for a crew of up to 140 persons. The *Discoverer* is an anchored drillship with an 8-point anchored mooring system and would likely have a maximum anchor radius of 2,903 ft (885 m) at either the Sivulliq or Torpedo drill sites. While on location at the drill sites, the *Discoverer* will be affixed to the seafloor using eight 7,000 kilogram (kg) Stevpris anchors arranged in a radial array. The hull has been reinforced for ice resistance.

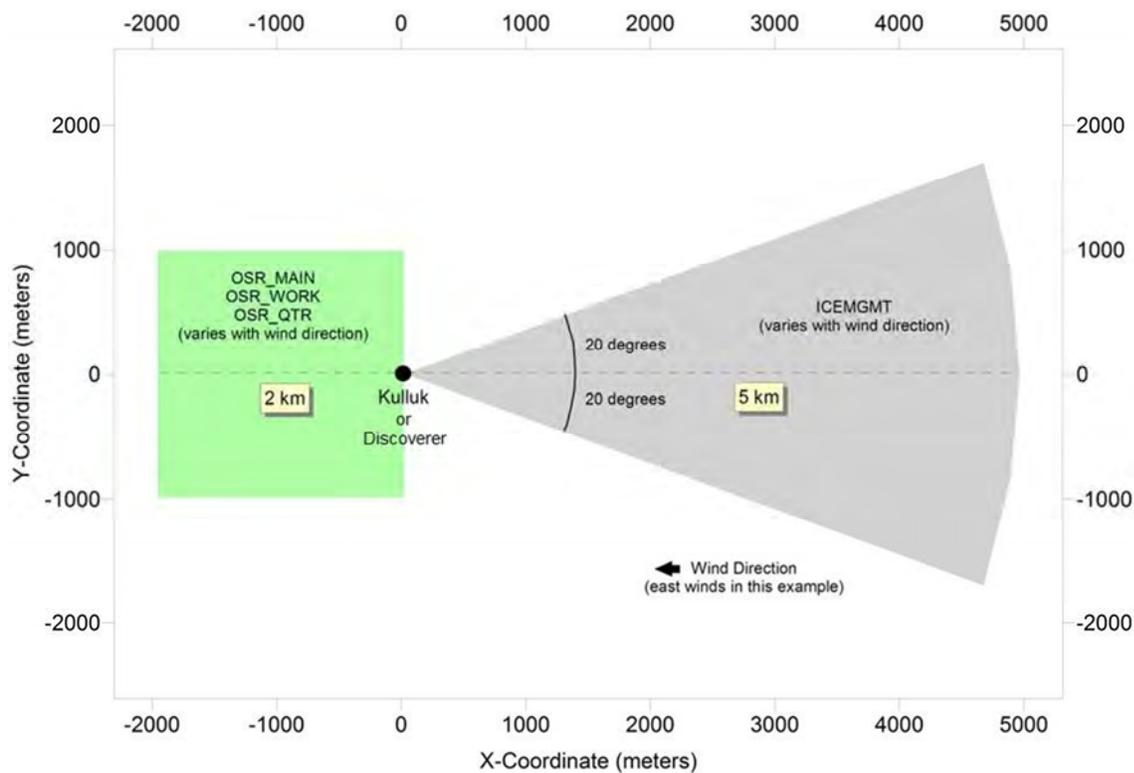
## **Support Vessels**

During exploration operations, the *Kulluk* or *Discoverer* will be attended by a minimum of 11 vessels that will be used for ice management, anchor handling/ice management, oil spill response (OSR), refueling, resupply, waste removal, and servicing of the drilling operations (see Table 1.2-2). A small number of workboats associated with OSR training, and stored on an OSR barge are included in Table 1.2-3, but are not counted among the attending vessels. All vessels will either be in transit or staged (i.e., on anchor) in the Beaufort Sea during the exploration drilling activities.

The M/V *Nordica* (*Nordica*) or a similar vessel, will serve as the primary ice management vessel in support of the *Kulluk* or *Discoverer*. The *Hull 247*, or a similar vessel, will provide anchor handling duties, and will also serve as a secondary ice management vessel. When managing ice, the *Nordica* and *Hull 247* will generally be confined to a 40 degree (°) arc up to 3.1 miles (mi)

(5 kilometers [km]) upwind originating at the drilling vessel (Figure 1.2-2). It is anticipated that the ice management vessels will be managing ice for 38 percent of the time when within 25 mi (40 km) of the *Kulluk* or *Discoverer*. Active ice management involves using the ice management vessel to steer larger floes so that their path does not intersect with the drill site. Around-the-clock ice forecasting using realtime satellite coverage (available through the Shell Ice and Weather Advisory Center [SIWAC]) will support the ice management duties. When the *Nordica* is not needed for ice management, it will reside outside the 25 mi (40 km) radius from the *Kulluk* or *Discoverer* if it is safe to do so. The *Nordica* and *Hull 247* will enter and exit the Beaufort Sea with the *Kulluk* or *Discoverer*.

**Figure 1.2-2 Ice Management Vessels Configuration for the *Kulluk* or *Discoverer***



As anchor handler, *Hull 247's* duties include setting and removing anchors, berthing (accommodations) vessel, providing supplemental oil recovery capability (Vessel of Opportunity Skimming System [VOSS]) and managing smaller ice floes that may pose a potential safety issue to the *Kulluk* or *Discoverer* and the support vessels that will service the *Kulluk* or *Discoverer*.

The exploration drilling operations will require the transfer of supplies between the Deadhorse/West Dock shorebase or Dutch Harbor and the *Kulluk* or *Discoverer*. While the *Kulluk* or *Discoverer* is anchored at a drill site, Shell has allowed for 24 visits/tie-ups (if the *Kulluk* is the drilling vessel being used) or 8 visits/tie-ups (if the *Discoverer* is being used) throughout the drilling season from support vessels. The *Harvey Spirit* (or similar vessel), a 280 ft (85.4 m) offshore supply vessel (OSV) with Dynamic Positioning (DP), will shuttle supplies

from the *Arctic Seal* (or similar vessel) and/or the *Southeast Provider* to the *Kulluk* or *Discoverer*. During visits/tie-ups, the *Harvey Spirit* will be used to remove the mud/cuttings. The mud/cuttings will be transported to the *Southeast Provider* (or similar barge) or the waste barge for storage. Other waste streams (sanitary waste, domestic waste, bilge water, ballast water) will also be transferred to the *Southeast Provider* (or similar vessel) or the waste barge, for temporary storage. These waste streams will be barged south for disposal at the end of the drilling season. While the *Kulluk* or *Discoverer* leaves Camden Bay temporarily during the Kaktovik and Nuiqsut (Cross Island) subsistence whale hunts, Shell will resupply the *Kulluk* or *Discoverer* with drilling supplies and equipment brought in from Dutch Harbor and stored on the *Carol Chouest*, also an OSV, or the *Harvey Spirit*. An estimated 10 resupply trips between Dutch Harbor and the drilling program assets in the Beaufort Sea will occur during each drilling season. The *Carol Chouest* will be used as a backup supply vessel and shuttle between Camden Bay and Dutch Harbor. When drilling starts up again after the bowhead whaling hunt has concluded, additional resupply may be required from West Dock via the *Arctic Seal* via transfer to the *Harvey Spirit* to the drilling vessel.

Removal of waste and resupply to the drilling vessels will be conducted the same way regardless of drilling vessel.

**Table 1.2-2 Camden Bay Exploration Drilling Program – Proposed Support Vessel List**

Specification	Ice Management Vessel <sup>1</sup>	Anchor Handler <sup>2,7</sup>	OSV <sup>3</sup>	West Dock Supply Vessel <sup>4</sup>	OSV <sup>5</sup>	Deck Barge <sup>6</sup>	Waste Storage Barge
<b>Length</b>	380.5 ft (116 m)	360.6 ft (110 m)	280 ft (85.4 m)	134 ft (50.3 m)	280 ft (85.4 m)	360 ft (110 m)	500 ft (152.4 m)
<b>Width</b>	85 ft (26 m)	80 ft (24.4 m)	60 ft (18.29 m)	32 ft (11.6 m)	60 ft (18.29 m)	100 ft (30.5 m)	74 ft (22.6 m)
<b>Draft</b>	27.5 ft (8.4 m)	24 ft (7.3 m)	19.24 ft (5.87 m)	7 ft (2.1 m)	16.5 ft (5.0 m)	14 ft (4.3 m)	27.5 ft (8.4 m)
<b>Accommodations (persons) (berths)</b>	82	64	29	17	26	10	-
<b>Maximum Speed</b>	16 knots (30 km/hr)	15 knots (27.8 km/hr)	15 knots (25 km/hr)	10 knots (18.5 km/hr)	13.5 knots (25 km/hr)	10 knots (18.5 km/hr)	-
<b>Fuel Capacity</b>	11,070 bbl	12,575 bbl	8,411 bbl (normal) 11,905 bbl (max)	667 bbl	6,235 bbl (normal)	2,381 bbl	155,000 bbl

<sup>1</sup> Based on *Nordica*, or similar vessel

<sup>2</sup> Based on *Hull 247*, or similar vessel

<sup>3</sup> Based on the *Carol Chouest*, or similar vessel

<sup>4</sup> Based on *Arctic Seal*, or similar vessel

<sup>5</sup> Based on *Harvey Spirit*, or similar vessel

<sup>6</sup> Based on *Southeast Provider* & *Ocean Ranger*

<sup>7</sup> Hull 247 is under construction by Chouest Offshore. By 2012, she will be christened under a name to be determined.

## **Oil Spill Response Vessels**

The OSR vessels will include a primary OSR barge (the *Arctic Endeavor* and Point Class Tug, or similar vessel), an oil storage tanker (OST - M/V *Mikhail Ulyanov* or a similar vessel), and a containment barge (Table 1.2-3). The *Harvey Spirit* will act as a VOSS, while *Hull 247* will act as a VOSS and provide berthing for the oil spill response crew.

The OSR barge will have associated smaller workboats called Kvichaks. There are three 34-ft (10.4 m) Kvichaks that will support the OSR barge by laying out booms. One 47-ft (14.3 m) *Rozema* will provide skimming and boom towing services. *Hull 247* will be dedicated to the Camden Bay exploration drilling program and remain in the vicinity of the *Kulluk* or *Discoverer*, with the OSR barge and the OST being staged to respond as needed to a discharge. In the unlikely event of a spill, the *Hull 247* can also be used to lighter recovered oil, emulsions and free water to the *Mikhail Ulyanov*. Specifications for these vessels are provided in Table 1.2-3.

The containment barge will be tended by a tug and possibly an anchor handler (Table 1.2-3). The tug tending the containment barge will either drift or motor under “slow-steam” movement with the barge. An anchor handler is included in this plan only as an additional tending option for the containment barge, if Shell deems it necessary in advance of the season to anchor the containment barge. Shell does not assume the containment barge will be anchored or that the anchor handler is necessary, but includes the option of anchoring the barge and it being also tended by an anchor handler in case that option is chosen.

The *Mikhail Ulyanov* or similar vessel with similar liquid storage capacity would be staged such that it would arrive at a recovery site, if needed, within 24 hours of departure from their staging location. The purpose of the OST would be to provide a place to store large volumes of recovered crude oil, emulsion and free water in the unlikely event of a spill and OSR operations. The ship will have an ice-enhanced hull structure designed in compliance with LU6 (1A Super) ice-class standards, under the classification of the Russian Register of Shipping, and will be able to operate in temperatures of -40 degrees Celsius (°C) in ice up to 5 ft (1.5 m) thick without additional ice management.

Surplus storage capacity aboard the OST beyond what is required for response at a recovery site may be allocated to store other liquid commodities consumed by the drilling vessel and support vessels, including diesel fuel.

**Table 1.2-3 Camden Bay Exploration Drilling Program – Proposed Oil Spill Response Vessel List**

Specification	OSR Barge <sup>1,2</sup>		OST <sup>1,3</sup>	Containment Barge <sup>1,4</sup>		
	Barge	Tug		Barge	Tug	Anchor Handler <sup>5</sup>
<b>Length</b>	205 ft 62.5 m	90 ft 27.4 m	853 ft 260 m	400 ft 122 m	136 ft 36.5 m	275 ft 83.7 m
<b>Width</b>	90 ft 27.4 m	32 ft 9.8 m	112 ft 34 m	100 ft 30.5 m	36 ft 11.1 m	59 ft 18.0 m
<b>Draft</b>	--	8.5 ft 2.6 m	44.6 ft 13.6 m	12 ft 3.7 m	20 ft 6.4 m	20 ft 6.1 m
<b>Accommodations</b>	--	8	TBD	--	10	23
<b>Maximum Speed</b>	--	7 knots (13 km/hr)	16 knots	--	10 knots	16 knots
<b>Fuel Storage</b>	--	1,428 bbl	440,000 bbl	--	3,690 bbl	7,484 bbl
<b>Liquid Storage</b>	18,636 bbl	--	543,000 bbl 86,700 m <sup>3</sup> ; additional 221,408 bbl (35,200 m <sup>3</sup> ) in separate ballast tanks	--	--	--
<b>Workboats</b>	(1) 47 ft (14 m) skim boat (3) 34 ft (10 m) work boats (4) mini-barges		--	--	--	

<sup>1</sup> Or similar vessel

<sup>2</sup> Based on the *Arctic Endeavor* & *Point Class* tug.

<sup>3</sup> Based on the *Mikhail Ulyanov*

<sup>4</sup> Based on a standard deck barge, Crowley Invader class ocean going tug, and a *Tor Viking*-style anchor handler

<sup>5</sup> Vessel included for planning purposes only, not assumed necessary but as an additional tending option if deemed necessary by Shell.

## Aircraft

Offshore operations will be serviced by helicopters operated out of an onshore support base location in Deadhorse. The helicopters are not yet contracted. A Sikorsky S92 or Augusta Westlund (AW) 139 capable of transporting 10 to 12 persons will be used to transport crews between the onshore support base and drilling vessel. It is expected that on average, a minimum of 12 flights per week will be necessary to transport supplies and rotate crews. A Sikorsky 92 or AW139 based in Barrow or Deadhorse will be used for search and rescue (SAR) operations and this aircraft will execute one training flight per month to the drilling vessel. A fixed wing aircraft, deHavilland Twin Otter (DHC-6) will be used for marine mammal observer (MMO) flights expected to fly daily for approximately 6 hours per day (hr/day).

Table 1.2-4 presents the aircraft planned to support the exploration drilling program. This includes crew changes via helicopter and search-and-rescue via helicopter, and a fixed wing aircraft for aerial monitoring of marine mammals.

**Table 1.2-4 Camden Bay Exploration Drilling Program – Proposed Aircraft List**

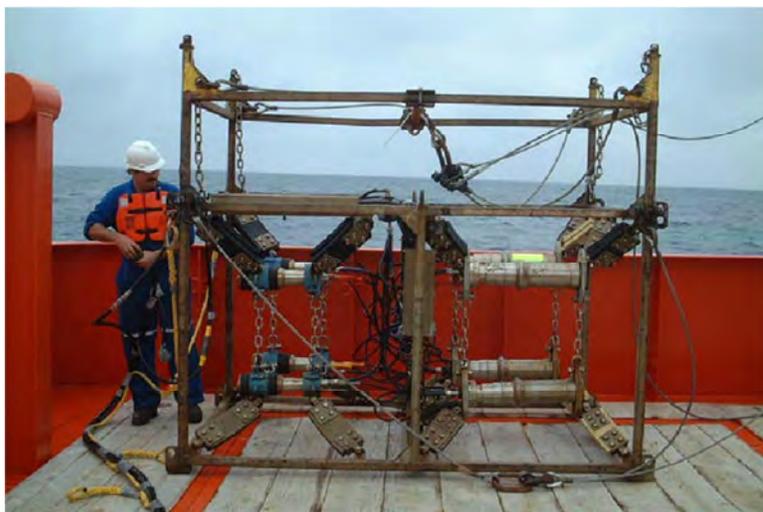
Aircraft	Flight Frequency
(2) Sikorsky S-92, AW139 or similar – crew rotation	Minimum of 12 trips/week between the shorebase and offshore vessels throughout the 2012 drilling season
(1) Sikorsky S-92 or AW139 Helicopter – SAR	Trips made only in emergency; one training flight/month
(1) deHavilland Twin Otter (DHC-6) – 4MP	Daily, beginning 5-7 days before drilling and ending 5-7 days after drilling ends

When transiting to location, the *Kulluk* (under tow) or *Discoverer* (under its own propulsion) and associated support vessels will transit through the Bering Strait into the Chukchi Sea on or after July 1, arriving at location near Camden Bay approximately July 10. Exploration drilling activities at the drill sites are planned to begin on or about July 10 and run through October 31, with a suspension of all operations beginning August 25 for the Nuiqsut (Cross Island) and Kaktovik subsistence bowhead whale harvests. During the suspension for the whale hunts the *Kulluk* or *Discoverer* and support vessels will leave the Camden Bay project area and move to an area mutually agreed upon between Shell and the Alaska Eskimo Whaling Commission. Should the drilling vessel or support vessels anchor during the suspension, none will anchor in known environmentally, or archaeologically sensitive areas. Shell will return to resume activities after the subsistence bowhead whale hunts conclude. Exploration drilling activities may extend through October 31, depending on ice and weather conditions. At the end of the drilling season, the *Kulluk* or *Discoverer*, ice management vessels, and all remaining support vessels will transit west into and through the Chukchi Sea.

**Vertical Seismic Profile**

Shell may conduct a geophysical survey referred to as Vertical Seismic Profiling or VSP at each drill site where a well is drilled in 2012. During VSP surveys, an airgun array is deployed at a location near or adjacent to the drilling vessel, while receivers are placed (temporarily anchored) in the wellbore. The sound source (airgun array) is fired repeatedly, and the reflected sonic waves are recorded by receivers (geophones) located in the wellbore. The geophones, typically in a string, are then raised up to the next interval in the wellbore and the process is repeated until the entire wellbore has been surveyed. The purpose of the VSP is to gather geophysical information at various depths, which can then be used to tie-in or ground-truth geophysical information from the previous seismic surveys with geological data collected within the wellbore.

Shell will be conducting a particular form of VSP referred to as a Zero Offset VSP (ZVSP), in which the sound source is maintained at a constant location near the wellbore (Figure 1.2-3). A typical sound source that likely



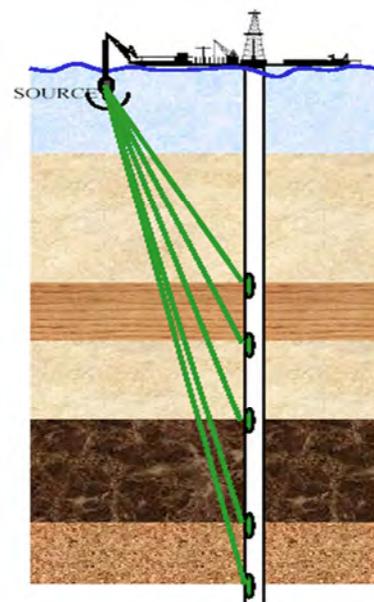
**Photograph of the ITAGA 8-airgun Array in Sled**

would be used by Shell in 2012 is the ITAGA eight-airgun array, which consists of four 150 cubic inches (in<sup>3</sup>) (2,458 cubic centimeters [cm<sup>3</sup>]) airguns and four 40 in<sup>3</sup> (655 cm<sup>3</sup>) airguns. These airguns can be activated in any combination and Shell would utilize the minimum total airgun array volume required to obtain an acceptable signal. Current specifications of the array are provided in Table 1.2-5. The airgun array is depicted within its frame or sled, which is approximately 6 ft x 5 ft x 10 ft (see photograph below). Typical receivers would consist of a Schlumberger wireline four level Vertical Seismic Imager (VSI) tool, which has four receivers 50-ft (15.2-m) apart.

**Table 1.2-5 Sound Source (Airgun Array) Specifications for ZVSP Surveys in the Beaufort Sea in 2012**

Source Type	No. Sources	Maximum Total Chamber Size	Pressure	Source Depth	Calibrated Peak-Peak Vertical Amplitude	Zero-Peak Sound Pressure Level
SLB, ITAGA Sleeve Array	8 airguns 4 X 150 in <sup>3</sup> 4 X 40 in <sup>3</sup>	760 in <sup>3</sup> 12,454 cm <sup>3</sup>	2,000 psi 140 bar	3.0 m / 9.8 ft 5.0 m / 16.4 ft	16 bar @1m 23 bar @1m	238 dB re1μPa @1m 241 dB re1μPa @1m

A ZVSP survey is normally conducted at each well after total depth is reached but may be conducted at a shallower depth. For each survey, Shell would deploy the sound source (airgun array) over the side of the *Kulluk* or *Discoverer* with a crane (sound source will be 50-200 ft (15-60 m) from the wellhead depending on crane location), to a depth of approximately 10-23 ft (3-7 m) below the water surface. The VSI with its four receivers will be temporarily anchored in the wellbore at depth. The sound source will be pressured up to 2,000 psi, and activated 5-7 times at approximately 20-second intervals. The VSI will then be moved to the next interval of the wellbore and reanchored, after which the airgun array will again be activated 5-7 times. This process will be repeated until the entire well bore is surveyed in this manner. The interval between anchor points for the VSI usually is between 200-300 ft (60-91 m). A normal ZVSP survey is conducted over a period of about 10-14 hours depending on the depth of the well and the number of anchoring points.



**Figure 1.2-3 Schematic of ZVSP**

Further information on Shell’s exploration plan is detailed in the “Revised Outer Continental Shelf Lease Exploration Plan, Camden Bay, Alaska.”

### 1.3 Ice Management

Polar bears and walrus are strongly associated with sea ice so that ice management has the potential to affect individuals of these species. Some ice management may be required for Shell’s exploration drilling program. Shell has included two ice management vessels in the fleet supporting the drillship and has prepared and will implement an Ice Management Plan (IMP) (see Attachment A) for this contingency. The IMP includes ice detection and monitoring,

identifies ice alert levels and actions, defines and assigns personnel and responsibilities, and describes well suspension and re-entry procedures.

Shell's IMP relies heavily on the observations and experience of its Ice Specialists and Ice Advisors, a group of arctic-seasoned mariners whose sole duty is to provide critical information and advise drilling vessel supervisors and the drilling vessel master about any and all ice-related threats. These observers and advisors will be stationed on the drilling vessel, the ice management vessel and the anchor handler. Marine mammal monitoring by MMOs is also ongoing while ice management vessel movements and actions are underway with regard to ice-related threats. MMOs, operating under the guidance of the marine mammal monitoring and mitigation plan (4MP) (see Attachment B) for this exploration drilling program will advise ice management specialists and advisors on the necessary mitigation measures designed by the agencies to assist avoidance of incidental take of marine mammals, notably polar bears and Pacific walrus, while ice is being managed by vessels. Ice and weather forecasting is provided by SIWAC. This center is continuously manned by experienced personnel who rely on number of data sources for ice forecasting and tracking including:

- Radarsat and Envisat data – satellites with Synthetic Aperture Radar providing all-weather imagery of ice conditions with very high resolution;
- Moderate Resolution Imaging Spectroradiometer – a satellite providing lower resolution visual and near infrared imagery;
- Aerial reconnaissance – provided by specially deployed fixed wing or rotary wing aircraft for confirmation of ice conditions and position;
- Reports from Ice Specialists on the ice management vessel and anchor handler and from the Ice Observer on the drillship Incidental ice data provided by commercial ships transiting the area; and
- Information from the National Oceanographic and Atmospheric Administration ice centers and the University of Colorado.

General ice management practices are summarized below. Salient aspects include:

- Ice management around the *Kulluk* or *Discoverer* will involve redirecting, rather than breaking, ice floes while the floes are well away from the drill sites; and
- To minimize impacts on marine mammals, vessels that can safely travel outside of the polynya zone will do so, unless it is necessary to break ice (as opposed to managing ice by pushing it out of the way), or if sea state conditions require an alternative route.

Drift ice will be actively managed by ice management vessels, consisting of an ice management vessel and an anchor handling vessel. Ice management for safe operation of Shell's planned exploration drilling program will occur far out in the OCS, remote from the vicinities of any routine marine vessel traffic in Camden Bay thereby resulting in no threat to public safety or services that occurs near to shore. Shell vessels will also communicate movements and activities through the 2012 North Slope Communications Centers. Management of ice by ice management vessels will occur during a drilling season predominated by open water and thus will not contribute to ice hazards, such as ridging, override, or pileup in an offshore or nearshore environment.

The ice-management/anchor handling vessels would manage any ice floes upwind of the *Kulluk* or *Discoverer* by deflecting those that could affect the *Kulluk* or *Discoverer* when it is on location conducting exploration drilling operations. The ice-management/anchor handling vessels would also manage the *Kulluk* or *Discoverer's* anchors during connection to and separation from the seafloor. The ice floe frequency and intensity are unpredictable and could range from no ice to ice densities that exceed ice-management capabilities, in which case exploration drilling operations would be stopped and the *Kulluk* or *Discoverer* disconnected from its anchors and moved off site. If ice is present, ice management activities may be necessary in early July and towards the end of operations in late October, but data regarding historic ice patterns in the area of operations indicate that it will not be required throughout the planned drilling season. When ice is present at the drill site, ice disturbance will be limited to the minimum needed to allow drilling to continue. First-year ice will be the type most likely to be encountered. The ice-management vessels will be tasked with managing the ice so that it will flow easily around and past the *Kulluk* or *Discoverer* without building up in front of it, or around it. This type of ice is managed by the ice-management vessel continually moving back and forth across the drift line, directly updrift of the *Kulluk* or *Discoverer* and making turns at both ends. During ice-management, the vessel's propeller is rotating at approximately 15–20 percent of the vessel's propeller rotation capacity. Ice management occurs with slow movements of the vessel using lower power and therefore slower propeller rotation speed (*i.e.*, lower cavitation), allowing for fewer repositions of the vessel, thereby reducing cavitation effects in the water. Occasionally, there may be multi-year ice ridges that would be managed at a much slower speed than that used to manage first-year ice. Shell does not intend to break ice with the ice-management vessels (if breaking can be avoided) but, rather push it out of the area as described here. Shell has indicated that ice breaking could be conducted if the ice poses an immediate safety hazard at the drill sites, but is far from preferred as indicated in the IMP (see Attachment A).

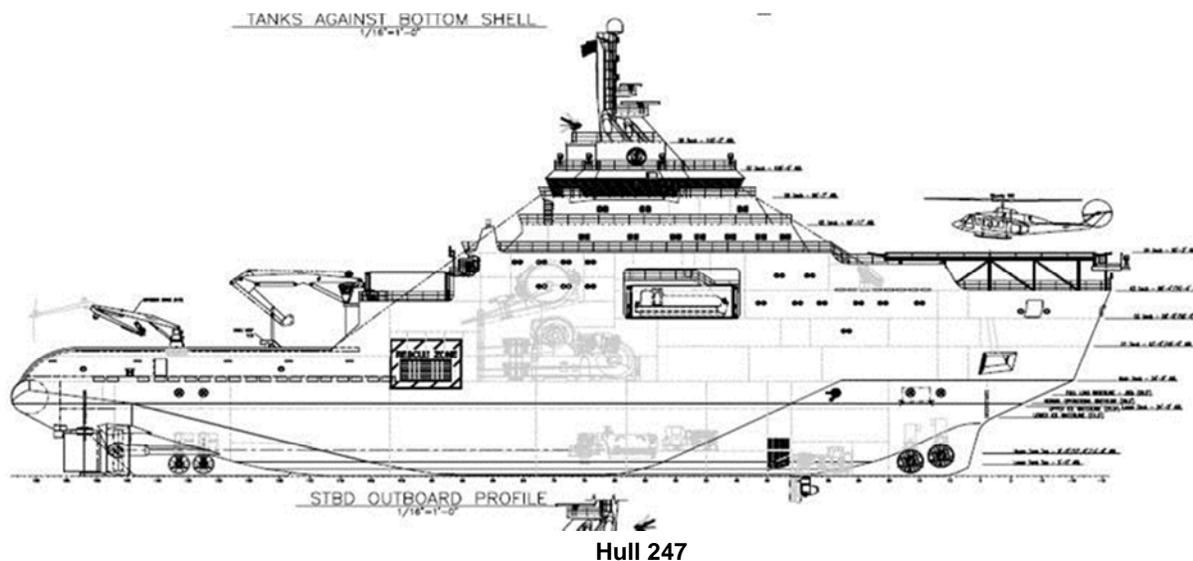


**M/V Nordica**

As described in Section 1.2, Shell's ice management fleet consists of the M/V *Nordica*, or a similar vessel, as an ice management vessel in support of the *Kulluk* or *Discoverer*, and the vessel *Hull 247* or a similar vessel, serving primarily as an anchor handling vessel and secondarily as ice management vessel. The ice management vessels will generally remain outside the immediate drill site area, the *Nordica* and *Hull 247* will generally occupy a 40° arc up to 3.1 mi (5 km) upwind originating at the *Kulluk* or *Discoverer* (Figure 1-2-2). It is anticipated that the ice management vessels will be managing ice for 38 percent of the

time when within 25 mi (40 km) of the *Kulluk* or *Discoverer*. Ice management vessels typically remain upcurrent to anticipate ice movement well before it may become a safety issue for the *Discoverer* or *Kulluk* (see Figure 1-2-2). Active ice management involves using the vessel to steer larger floes so that their path does not intersect with the drilling vessel. In some instances, the ice management vessel may have to break ice that is an immediate safety hazard for the

drilling vessel. Around-the-clock ice forecasting using realtime satellite coverage will support the ice management duties. This vessel will enter and exit the Beaufort Sea with the *Kulluk* or *Discoverer*.



*Hull 247*, or a similar vessel, will serve as the primary anchor handling vessel, and as an auxiliary ice management vessel in support of the *Kulluk* or *Discoverer*. The anchor handler's duties include setting and removing anchors and managing smaller ice floes that may pose a potential safety issue to the *Kulluk* or *Discoverer* or the support vessels that will service either drilling vessel. *Hull 247*, or similar vessel, will enter and exit the Beaufort Sea with the *Kulluk* or *Discoverer*.

During transit, impacts on polar bears, Pacific walrus (and all other marine mammals) and subsistence hunting activities will be minimized. The *Kulluk* or *Discoverer* and support vessels will traverse north through the Bering Strait into the Chukchi Sea along a route that allows for the highest degree of safety regarding ice conditions and sea states. Those vessels that can safely travel outside of the polynya zone will do so unless it is necessary to break ice (as opposed to managing ice by pushing it out of the way). In this case, those vessels will move into the polynya zone far enough so that ice breaking is not necessary. If it is necessary for any vessel to move into the polynya zone, Shell will notify the local communities of the change in the transit route through the Com Centers. Once the vessels are beyond the Chukchi Sea polynya zones, they will transit the Beaufort Sea along a coastal route until they arrive in the exploration drilling area in Camden Bay.

#### **1.4 Oil Spill Prevention and Contingency Planning**

Shell is committed to conducting safe and environmentally responsible operations in the Beaufort Sea. To achieve this goal, oil spill prevention is a primary priority in all aspects of operations. Shell's Beaufort Sea Regional Exploration Program Oil Discharge Prevention and Contingency Plan (ODPCP) emphasizes the prevention of oil pollution by employing the best

control mechanisms for blowout prevention and fuel transfer operations, as well as implementing mandatory programs for ensuring personnel practice prevention in all aspects of operations. Prevention training will include strict procedures and management practices to eliminate spills in all aspects of operations. In addition, all project personnel, including employees and contractors, involved in oil spill contingency response would receive prevention and response training as described in the ODPCP. Training drills also will be conducted periodically to familiarize personnel with onsite equipment, proper deployment techniques, and maintenance procedures.

Despite the very low likelihood of a large oil spill event, Shell has designed a response program based upon a regional capability of responding to a range of spill volumes, from small operational spills up to and including the Worst Case Discharge (WCD) from an exploration well blowout. Shell's program is developed to fully satisfy the response planning requirements of the State of Alaska and federal oil spill planning regulations. The ODPCP presents specific information on the response program that includes a description of personnel and equipment mobilization, the incident management team organization, and the strategies and tactics used to implement effective and sustained spill containment and recovery operations.

During the proposed exploration drilling program, the drilling vessel will be accompanied by an ice management vessel, an arctic-class ice management/anchor handler, and other support vessels that include an OSR barge with associated ice-class tug. The OSR barge and tug will provide the primary oil spill response platform, additional recovered liquid storage, and storage of an oil containment system along with assistance from the anchor handler to supplement the response as needed. Vessels of similar type and class will be used if these specific vessels are not available.

The dedicated OSR barge (*Arctic Endeavor* and *Pt. Oliktok*) would be staged in the vicinity of the *Kulluk* or *Discoverer* and possess sufficient onboard storage capacity 18,636 bbl (2,963 cubic meters [ $m^3$ ]) to provide containment, recovery, and storage for the initial 24-hour operational period. An Arctic OST would be staged within 240 mi (384 km) of the Beaufort Sea drill site and would arrive at the recovery site within 24 hours of departure from its staging location. The anchor handler, *Hull 247* and a similar vessel (*Harvey Spirit*, *Carol Chouest*, or similar) with a minimum storage capacity 8,000 bbl (1,272  $m^3$ ), would be available to relieve the OSR barge to lighten its recovered fluids to the OST. The OSR barge, *Hull 247* and *Harvey Spirit*, *Carol Chouest*, or similar, will work in conjunction to maintain containment and skimming operations and to lighten recovered fluids to the OST for the duration of the response. The OST will possess a minimum liquid storage capacity of 513,000 bbl, sufficient capacity to store all recovered liquids for 20 days of recovery operations. Additional personnel may also be transported via helicopter or vessel from a land- or vessel-based staging area.

Shell's primary response action contractor for Beaufort Sea offshore, nearshore, and onshore spill response is Alaska Clean Seas (ACS). Nearshore recovery efforts implemented by ACS are staged out of Prudhoe Bay with assistance from Auxiliary Contract Response Teams and Village Response Teams personnel. Additionally, Arctic Slope Regional Corporation Energy Services – Response Operations, LLC acts as Shell's support response action contractor to provide dedicated response vessels, skimmers and equipment for the nearshore and offshore operations. Response activities will be conducted using ACS or Shell tactics, as defined in ACS's Technical

Manual and Shell's Beaufort and Chukchi Seas Regional Tactics Manual, or otherwise defined in the ODPCP.

Wildlife protection strategies are discussed in the ACS Technical Manual, Volume 1, Tactics W-1 through W-6 (manual is associated with the ODPCP). The primary objective is to protect wildlife by preventing birds and mammals from entering spill or containment areas. Containment areas will be monitored until USFWS and/or ADF&G determine that monitoring is no longer required. In general, wildlife protection strategies include, but are not limited to:

- Containment and controls to limit the spread of oil, and the area influenced by the spill and response options
- The drilling vessel has a MMO on board at all times
- Hazing of birds and mammals
- Capture and relocation of wildlife in direct threat
- Aircraft monitoring

Refer to the following documents (not attached) for additional information:

- Beaufort Sea Regional ODPCP - Wildlife Capture, Treatment and Release Programs, Beaufort Sea Oil Spill Response Planning
- ACS Tactics Manual – Sections W1 through W6
- DRAFT “Oil Spill Response Plan for Polar Bears in Alaska”, USFWS Marine Mammals Management, June 2010

In the event of an accidental release that may impact shoreline resources, including Cross Island and Kaktovik, additional certified bear guards and security staff would be deployed to protect workers and Polar Bears. Hazing equipment will be stored at the Deadhorse warehouse and office building. USFWS staff may also be deployed to provide additional oversight and consultation in the event of a major response. Section 3.5 of this plan outlines an adaptive management approach between Shell and the USFWS to protect polar bears and walrus in the unlikely event of an oil spill.

## **2.0 POLAR BEAR, PACIFIC WALRUS, AND GRIZZLY BEAR PRESENCE DURING PLANNED DRILLING ACTIVITIES OFFSHORE BEAUFORT SEA**

### **2.1 *Polar Bears***

Polar bears are widely distributed at low densities across the North Slope. Polar bears are most abundant near coastlines and the southern edge of the ice, but they can occur throughout the polar basin. They make extensive movements related to the seasonal position of the ice edge (ADF&G 2008a). About 2,000 polar bears can be found in the Alaskan Beaufort Sea region (USFWS 2003a; USFWS 2003b; USFWS 2011). They use an area extending more than 800 mi (1,280 km) along the north coast of Alaska and Canada.

During the summer, bears spend most of their time on the drifting pack ice. Encounters are most frequent along the coast (particularly at Endicott, West Dock, Milne Point, and Badami) and greater numbers can sometimes be found around whale carcasses, and across the barrier islands. However, bears have been known to venture inland. When polar bears emerge from dens with their cubs in the spring they start traveling on drifting sea ice and forage for food. Extra care is necessary at these times to properly store and dispose of food waste to prevent polar bear attraction and their entry into work areas. Polar bears will generally avoid human activities if they are not attracted by food and wastes. ADF&G data document polar bear sightings and den locations throughout the region; however, if proper mitigation is followed, polar bear presence in the lease area during operations is expected to be rare. Polar bears typically exit their dens by March or April; therefore there would be no active dens during the exploration drilling program.

## **2.2 *Pacific Walrus***

Pacific walrus occur seasonally from Bristol Bay to Point Barrow (Bering and Chukchi Seas), and may be present in the coastal waters of the Beaufort Sea, where they are considered an extralimital species, periodically transiting through the region during the open water season. It is unlikely that Pacific walrus will be in the vicinity of the exploration drilling operations during the 2012 drilling season.

Most Pacific walrus migrate northward during spring and return south during the fall. Migrations are directly related to the seasonal advance and retreat of the sea ice (ADF&G 2008b). Pacific walrus can also be expected in shallow waters near the coast or on ice closer to land. USFWS surveys have estimated up to 101,213 walrus on the Chukchi Sea pack ice in September.

## **2.3 *Grizzly Bears***

Grizzly bears may be present on the North Slope and may be present along the shoreline during the summer months while foraging for food, taking advantage of whale or seal carcasses that are present, or eating human refuse. Given that the vast majority of the exploration drilling program activities are offshore, and the habitat of grizzly bear is onshore, it is extremely unlikely that interactions with grizzly bears will happen during exploration drilling activities with the possible exception of shore base operations at Deadhorse.

## **3.0 THE PLAN – SPECIFIC OBJECTIVES AND ACTIONS**

Because exploration drilling activities and/or support activities will be occurring in polar bear habitat and in areas where Pacific walrus and grizzly bear may occasionally be found, complete avoidance of these animals cannot be ensured. However, precautions detailed in this document can reduce the chances of human encounters and problems with bears and walrus.

Objectives of the Plan are to:

- prevent (avoid) bear/human and walrus/human encounters and interactions;
- educate workers about the controls used to prevent encounters and interactions;

- protect workers, bears and walrus during drilling activities, ice management and in the unlikely event of an oil spill; and
- implement reporting and observation procedures.

During the duration of the drilling activities, Shell will be aware of, or have established, a 24 hour direct connection (duty line) to personnel from the USFWS.

### ***3.1 Prevent Polar and Grizzly Bear/Human Interactions***

There is always the potential for bear encounters during field activities even when all precautions are taken to avoid and eliminate attractants. Early detection of bears in the vicinity of operations is an essential element to prevent bear/human encounters. Bear avoidance and encounter procedures are presented in Attachment C. Workers will regularly and frequently observe their surroundings to detect bears in project areas. MMOs are the most likely personnel to notice bears or walrus because their job description requires them to look for and identify marine mammals (Attachment B) near project activities. They will be the primary support for project activities with the potential to encounter bears.

In contact situations, the main concern is to maintain the safety of personnel. The goal is to avoid and minimize potential conflict and bear/human interactions.

Actions that will be taken if bears are in the area include:

- If a bear is observed, alert all on-site personnel so work activities can be altered or stopped to avoid interactions. Bear sightings will be reported to the designated representative.
- Depending on the distance between the bear and the activities, retreating to the safety of vessels, emergency shelter, or buildings or vehicles if an encounter occurs in developed onshore areas may be necessary.
- Personnel should give bears plenty of room and should not approach or crowd bears. Every bear has “personal space” – the distance in which they feel threatened. The greater the distance between the worker and the bear, the better for conflict avoidance.
- Personnel are forbidden from feeding bears or any other wildlife.

### ***3.2 Protecting Workers and Bears***

Worker safety is a priority. The following procedures will be implemented to ensure worker awareness and knowledge about their own safety concerning bears. A copy of the Bear Avoidance and Encounter Procedures are provided as Attachment C.

- To avoid surprise encounters, personnel exiting a vessel or other facility will check behind doors, blind spots, and access areas prior to exiting to avoid a surprise encounter.
- Polar bears traverse along the barrier island corridor throughout the year. During summer months, increased numbers are anticipated in this area, particularly during the months of August and September.

- Personnel will be made aware that bears will hide behind structures, and to be conscience of this.
- Areas will be illuminated during hours of darkness, when workers are present.
- Periodic safety sessions will be conducted to address and elevate awareness of bear avoidance techniques and activities.
- Outdoor work crews will survey the surrounding area, to ensure bears cannot enter without being detected.
- Workers will become familiar with the local environment.
- A “buddy system” will be employed, to ensure fellow workers are informed about the whereabouts and activities that may bring workers in contact with bears.
- Workers and facility occupants will be alerted if a bear is observed.
- A Bear Guard will be designated, if necessary, to monitor for the presence of bears. The Bear Guard may also hold another work position that would allow him or her to monitor for the presence of bears, such as equipment operator.
- Bear hazing will be approved by the designated representative (e.g., site manager). Only a designated properly trained and authorized bear Hazer will be permitted to haze bears. Personnel other than the designated bear Hazer will not attempt to haze a bear.
- An 0.5 mi (800 m) exclusion zone will be enforced around bears observed on land or ice during travel status. Concentrations of polar bears and walrus will be avoided by a minimum of the 0.5 mi (800 m) exclusion zone cited above.
- Aircraft will maintain a 1,500 ft [457 m] minimum altitude within 0.5 mi (800 m) of bears hauled out onto land or ice, unless weather does not permit this altitude.
- When within 1,000 ft (305 m) of polar bears in water, vessels will reduce speed, and avoid multiple changes of direction.
- Vessel speed to be reduced during inclement weather conditions in order to avoid collisions with bears.
- A bear culvert trap has been constructed for oil spill response needs and is stored at the shore base facility in Deadhorse.

Polar bear monitoring, reporting, and survey activities will be conducted in accordance with the regulations that implement the MMPA as outlined in 71 FR 26770. The basic monitoring and reporting requirements are:

- Following a chain-of-reporting, and responding to polar bear sightings. Attachment D depicts the Wildlife Notification Flow Chart.
- Designating a qualified individual or individuals to observe, record, and report the effects of the activity on polar bears. A USFWS-approved monitoring plan requires trained onboard MMOs. MMOs will monitor the exclusion zone for bears. If a bear is sighted, mitigation measures as specified in the 4MP (Attachment B) will be implemented.

### ***3.3 Protecting Workers and Walrus***

Worker safety is priority. The following procedures are to ensure worker awareness and knowledge about their own safety concerning walrus.

- Drilling support vessels will observe an 0.5 mi (800 m) exclusion zone around walrus observed on land or ice during travel status except during active ice management (see Section 3.4 for procedures during ice management).
- Aircraft will maintain a 1,500 ft (457 m) minimum altitude within 0.5 mi (800 m) of Pacific walrus hauled-out onto land or ice, unless weather does not permit this altitude.
- When within 1,000 ft (305 m) of walrus in water, vessels will reduce speed, and avoid multiple changes of direction.
- Vessel speed to be reduced during inclement weather conditions in order to avoid collisions with walrus.

Walrus monitoring, reporting, and survey activities will be conducted in accordance with those outlined in 71 FR 26770 of the MMPA. The basic monitoring and reporting requirements are:

- Following a chain-of-reporting, and responding to walrus sightings. Attachment D depicts the Wildlife Notification Flow Chart.
- Designating a qualified individual or individuals to observe, record, and report the effects of the activity on walrus. A USFWS-approved monitoring plan requires trained onboard MMOs. MMOs will monitor the exclusion zone for walrus. If a walrus is sighted, mitigation measures as specified in the 4MP (Attachment B) will be implemented.

### ***3.4 Protecting Polar Bears and Walrus during Ice Management***

Ice management is conducted to ensure the integrity and safety of the drill vessel and its crew. Because the vessels must come into contact with the ice floes during ice management activities, special protocols (as outlined below) will be in place during these activities to minimize the potential for effects on walrus or polar bears. These are in addition to those identified above in Section 3.3. Shell will implement these protocols in a phased approach, based partially on the number of observed walrus in the vicinity of the ice management operations and the perceived ice threat to drilling operations and safety. The approach will also necessarily be one of adaptive management because all situations cannot be foreseen, because both the ice conditions (trajectory, size, density) and animal behavior (hauled out, swimming, etc.) are subject to change as they approach the drill site without interference by Shell.

#### **Reconnaissance**

- Shell will conduct real-time monitoring of sea ice as described in the IMP (see Attachment A) and summarized above in Section 1.3.
- Shell will have MMOs on the ice management vessels as required by the IHA and 4MP.

## Consultation with USFWS

- A 24 hour duty phone will be established with the USFWS
- All polar bear and walrus sightings will be reported to USFWS as described in Sections 8.1 and 8.3, respectively
- Indication that large areas of pack ice are approaching the area of the drilling vessel and may require management, and/or sightings of large numbers of walrus on ice (note: given that walrus are extralimital in the Beaufort Sea – this situation is much less likely than the prospect of this occurring in the Chukchi Sea), will be reported to the USFWS contact identified in Section 8.3, immediately by telecommunications (duty phone); this will commence consultation and involve the USFWS in the adaptive management process

## Adaptive Management Approach

- If the polar bears are deemed to be a threat to personnel safety, or to themselves, hazing techniques as permitted under an intentional take authorization will be used to keep the bears out of harms way. Shell will follow the appropriate reporting protocol in this event (Section 8.1).
- If hauled-out walrus are present, Shell will monitor to ascertain whether the walrus appear as if they are going to stay on the ice or might abandon the ice on their own. Shell will avoid, to the maximum extent possible, the management of ice on which walrus have hauled out. Shell will attempt to communicate with the USFWS and consult with the agency before management of ice with hauled out walrus.
- If an ice floe with hauled out walrus must be managed, the vessel will approach the ice floe at as slow a speed as is possible to allow the walrus to exit the floe before contact; the walrus will not be intentionally harassed
- If the walrus stay on the ice in the vicinity of ice management activities, Shell will notify the USFWS (via the USFWS 24 hour duty line) and begin discussions regarding appropriate action. With the USFWS input, we would consider the following ice management options:
  - Low Threat Level: If the ice does not represent a significant threat to the drill vessel, allow the ice to pass through the drilling area with walrus onboard
  - Moderate Threat Level: If ice poses a significant threat and hauled out walrus presence is moderate on the ice, carefully conduct ice management
  - High Threat Level: If ice poses a significant threat to the drill vessel and hauled out walrus presence is high on the ice, or the consequences of ice management are high, Shell will engage in further consultation with USFWS to come to a resolution regarding intentional harassment of walrus
- All walrus sightings will be reported to USFWS as described in Section 8.3

All mitigation measures listed in Section 3.2 and 3.3 will be adhered to unless the mitigation measures need to be adjusted/alterd/or avoided based on guidance from USFWS because they are in conflict with the adaptive management approach described in this section.

### ***3.5 Protecting Polar Bears and Walrus during Oil Spill Response***

The probability of a very large oil spill from a well blowout occurring is low. Worker safety is a priority during the unlikely event that there will be an oil spill response situation. Shell has prepared an ODPCP in the event of an oil spill and the plan includes procedures to be implemented in order to protect wildlife. The ODPCP has been approved by BOEMRE and the State of Alaska, Alaska Department of Environmental Conservation (ADEC), and is currently being revised for the 2012 exploration drilling program. ACS is Shell's primary response action contractor and their wildlife protection strategies can be found in sections W1 through W6 of Volume 1 of ACS' Tactics Manual. The tactics manual is part of the ODPCP approved without conditions on March 11, 2010, has undergone revision for exploration drilling, planned to begin in 2012, and is currently under review by BOEMRE.

The following procedures are to ensure worker awareness and knowledge about their own safety concerning polar bears and walrus. The approach will also necessarily be one of adaptive management because all situations cannot be foreseen. Defined levels of response for both offshore and onshore in the event of an oil spill are adapted from the ACS Tactics Manual Section W-1, which in turn is based on the Wildlife Protection Guidelines for Alaska, Annex G of the Alaska Regional Response Team Unified Plan:

1. Primary Response – Containment and Recovery of Oil: this level of response deals with controlling the spread of oil and keeping it from important habitat; oil is recovered as quickly as possible:
  - Primary response for protecting polar bears and walrus from oil spills shall be to prevent oil from reaching areas where the animals are concentrated
  - Areas of concentration for polar bears include areas of pack ice and barrier islands
2. Secondary Response – wildlife hazing by trained personnel: haze wildlife away from and prevent them from entering the spill area; hazing techniques include passive excluders (e.g., balloons, reflector tape), propane fueled cannons, shotguns, pistols, cracker shells, banger, rubber bullets (for bear deterrence) and shotgun slugs (for protection from bears); electric fencing may be used on land:
  - Secondary response for protecting polar bears and walrus from oil spills shall be to deter the animals from an oil slick or contaminated habitat
  - Any deterrence or hazing of polar bears or walrus would require an intentional take authorization from the on-scene coordinator and a permit from USFWS or National Marine Fisheries Service (NMFS), and would be conducted according to protocol identified in Tactic W-1 of the ACS Technical Manual

- Dead oiled wildlife shall be collected and disposed of as indicated in Tactic W-14 of the ACS Technical Manual to prevent any secondary poisoning through ingestion of petroleum
3. Tertiary Response – Capture, stabilization and treatment of oiled wildlife by trained and authorized personnel.
- Tertiary response includes the capture, stabilization, and treatment of oiled wildlife
  - Any capture or treatment of polar bears or walrus would require authorization from the on-scene coordinator and a permit from USFWS or NMFS
  - Any tertiary response would be conducted according to protocol identified in Tactic W-1 and W-2 of the ACS Technical Manual

Oiled walrus or polar bears may be captured by authorized USFWS personnel (or personnel authorized by the USFWS; not Shell) using tranquilizers or baited culvert traps (polar bears only). Upon capture, it will be transported by truck or helicopter to an ACS stabilization facility. Those animals that are determined to be able to survive in the wild are released. Other animals that are deemed incapable of surviving release to the wild will be held for potential transport to a zoo. In some cases, animals may be euthanized depending on the extent of their injuries. Details surrounding the capture, stabilization and treatment of oiled polar bears can be found in the DRAFT version of the *Oil Spill Response Plan for Polar Bears in Alaska*, USFWS Marine Mammal Management June 2010.

ACS maintains a facility and equipment in Prudhoe Bay that is capable of being transported in an emergency situation. Equipment includes a cleaning, treatment and necropsy kit; three temporary holding cages and a large water tank. Potential short term holding facilities occur in Barrow at the Barrow Arctic Science Consortium/Naval Arctic Research Laboratory facility, the Anchorage Zoo and the Seward Sealife Center. All mitigation measures listed in Section 3.2 and 3.3 will be adhered to by Shell personnel involved in implementing response tactics, unless after consultation with USFWS personnel they are in direct conflict with the adaptive management procedures.

## **4.0 FOOD WASTE MANAGEMENT PLAN**

The most important factor in the avoidance of attracting bears to active operations is to correctly handle food and associated waste. Proper handling of food and food-associated waste is important in reducing the potential for bears to associate humans and facilities with food. The following practices will be implemented.

- Food wastes will not be discharged overboard from the drilling vessel.
- Personnel will separate food waste from other solid wastes. Food and food-associated waste will be placed only into containers secured from wildlife access onboard vessels or in vehicles. Personnel will use only designated receptacles for food and associated waste inside facilities or those that are secure from wildlife access.
- No food-associated wastes may be placed into solid-waste containers.

- Containers will be located where there is good visibility and away from high-traffic areas.
- Personnel will back-haul food-associated waste to approved bear-proof containers.
- Dedicated receptacles will be secured – there should be no food-associated attractants in the containers.
- Back-hauled food-associated waste will not be left in unmanned facilities, vessels, or unsecured vehicles.

## **5.0 SAFETY AND COMMUNICATION**

The following safety and communication practices will be implemented.

- Contact the designated Bear Guard or designated representative for the most recent bear sighting information.
- If you sight a bear, look around for other bears while moving to a safe location. Alert other workers in the area. Do not attempt to scare the bear away. Do not approach a bear for any reason. Once in a secure location, immediately report the bear sighting to the on-site Shell representative. Only trained personnel are authorized to deal with animal problems. Do not try to photograph a bear unless you are in a secure location. Early bear detection is essential to limit human/bear encounters.
- Use the “buddy system” during outside jobs.
- Make sure personnel are trained to operate radios or other communication equipment.
- Make noise before walking into an area with poor visibility.
- Do NOT take food with you. If it is necessary to eat away from the designated camp mess unit, make sure that all food is safely stored inside secure containers.
- Coordinate with other field operations to ensure the activities are compatible with bear avoidance and protection.

## **6.0 TRAINING**

### ***6.1 Marine Mammal Observer Training***

Prior to any vessel departure, MMOs will have completed a training course to recognize marine mammals, including polar bear and Pacific walrus, in water or on land or ice, to properly record sightings, and to advise what mitigation measures should be followed. The MMO training curricula will be preapproved by USFWS and NMFS. Trained MMOs will receive a document to verify course completion. Course information will include:

- Overview of MMPA and relevance to drilling activity and mammals
- Overview of drilling activities
- Overview of mitigation measures

- MMO roles and responsibilities
- MMO regulatory requirements
- Identification of arctic marine mammals by species, sex, and age
- Search methods for marine mammals
- Overview of data collection and reporting requirements

## **6.2 *Bear Guard Training***

Bear guards will undergo an intensive training program performed by USFWS. Training will include:

- bear habits, range, and habitat
- how to minimize the number of human/bear interactions
- the proper use of deterrents and projectiles to haze bears
- how to report a bear sighting, hazing, and/or fatal taking
- weapons handling/safety qualification

## **6.3 *Other Training Materials and Meetings***

Employees will be provided training that describes bear behavior and safety concerns, including hazing (e.g., new employee orientation, safety discussions). All hazing will be performed by a designated person who is trained in appropriate hazing tactics and firearms safety. The employee safety training program will include:

- Bear Avoidance Action Plan;
- USFWS or ADF&G (or comparable) Bear Encounter/Hazing Training;
- Firearms training for designated Bear Guards;
- Bear awareness reinforced at daily safety meetings; and
- Video training material:
  - “Human/Polar Bear Interaction” (Alaska Oil and Gas Association)
  - Working in Polar Bear Country, for Industrial Managers, Supervisors and Workers
  - Staying Safe in Polar Bear Country, A Behavioral-based Approach to Reducing Risk.

## **7.0 AT-RISK LOCATIONS AND SITUATIONS**

With the exception of limited marine vessel traffic in and out of West Dock in Prudhoe Bay, work areas during the exploration drilling program will be exclusively offshore and distant from most prospective at-risk locations. Also, given that all personnel will be vessel-based, the

prospect of at risk situations are remote. However, in the event that exceptional circumstances occur, the following lists locations/situations where risk of bear or walrus encounters may be higher and where attention to mitigating these risks is essential:

- sea ice floes, during ice management by vessels
- coastal bluffs
- barrier islands
- small watercraft (i.e., oil spill response drills or onshore equipment inspections)
- marine vessels, particularly those with low freeboard
- waste generation and collection facilities
- “blind” areas that are obscured by onshore facilities, equipment or other obstacles

At-risk situations and activities include:

- transit in sea ice, and ice management by vessels
- activities on or around barrier islands
- any portable, temporary shelter (i.e., oil spill response drills or equipment caching)
- emerging from vessels or shorebase facilities
- dark/unlighted and visually obscured areas

## 8.0 REPORTING

Sightings of bears or walrus by MMOs or other workers during the exploration drilling program will be recorded and reported to USFWS and ADF&G by a Shell Regulatory Affairs staff designee. Given that MMOs will be drilling vessel- and vessel-based, the majority of sightings/observations are expected to be marine mammals. Polar bear sightings will be reported according to the procedures and process described in Section 8.1 of this Plan, grizzly bear sightings will be reported in accordance with Section 8.2, and walrus sightings will be reported in accordance with Section 8.3.

Shell developed a 4MP (Attachment B) for its exploration drilling program activities in the Beaufort Sea. The 4MP supports protection of the marine mammal resources in the area by adhering to mitigation measures, fulfilling wildlife sighting/observation and reporting obligations to the USFWS (and NMFS), and providing data useful for understanding the impacts of exploration drilling activities on Pacific walrus and polar bear. The 4MP dedicates multiple personnel 24-hours per day to the task of watching for, recording observations of, and instituting mitigation measures for wildlife observed, most notably those protected by the MMPA, ESA, or both. The outcome of conducting the 4MP will be resolute reporting of polar bear and Pacific walrus observed in the vicinities of the exploration drilling program activities. The 4MP for exploration drilling program activities is provided as an attachment to the LOA application (see Attachment B).

After the appropriate bear or walrus encounter procedures have been followed, workers will be required to report the presence of a bear or walrus using the procedure outlined below. A copy of the Wildlife Notification Flow Chart is included as Attachment D.

- 1) Workers are required to notify immediately the on-site Shell representative of a bear or walrus sighting and complete the appropriate sighting/observation form (Attachments E through G).
- 2) Workers are to document any interactions (such as the use of cracker shells, vehicle horns, or other auditory devices; using vehicles or equipment to deter bears from an area; taking direct action to harass a bear out of an area; etc.) in the sighting/observation form.
- 3) If the bear or walrus was sighted within an exclusion zone or human/bear interaction took place (i.e., actions listed under bullet 2 above), the on-site Shell representative must promptly contact Shell Regulatory Affairs at 907-830-7435 (24 hrs) or 907-646-7152 (business hrs). The on-site Shell representative must also fax or e-mail the completed sighting/observation form to the Shell Regulatory Affairs designee in Anchorage at 907-646-7145 (fax). The Shell Regulatory Affairs designee will send (fax or e-mail) the completed sighting/observation form within 24 hours of the bear observation to the USFWS or ADF&G agency contact.
- 4) If the bear or walrus was sighted outside an exclusion zone and no human/bear interaction took place, the MMO will provide the sighting/observation information to the Shell Regulatory Affairs designee in Anchorage by e-mail in the daily MMO report.

### ***8.1 Polar Bear Reporting***

Actions will be taken to the maximum extent practicable to avoid and minimize potential interactions with polar bears. MMOs will be assigned to project vessels to identify potential encounters and record polar bear behavior. Using the procedure provided in Section 8.0 and in the Wildlife Notification Flow Chart (Attachment D), the Shell Regulatory Affairs designee will be informed of polar bear sightings/observations. All relevant information must be recorded. The Polar Bear Sighting Report (Attachment E) must be completed to the greatest extent possible prior to submission. Regular reports of polar bear sightings in accordance with the LOA stipulations will be made to the USFWS.

The primary polar bear contact:

Craig Perham  
USFWS – Marine Mammals Section  
1011 East Tudor Road  
Anchorage, Alaska 99503  
Telephone: 907-786-3810 (direct); 907-786-3800 (main office)  
Fax: 907-786-3816  
E-mail: craig\_perham@fws.gov

Alternate Polar Bear Contact:

Terry DeBruyn  
USFWS – Marine Mammals Section  
1011 East Tudor Road  
Anchorage, Alaska 99503  
Telephone: 907-786-3800 (main office)  
Fax: 907-786-3816  
E-Mail: terry\_debruyn@fws.gov

## **8.2 Grizzly Bear Reporting**

Actions will be taken to the maximum extent practicable to avoid and minimize potential interactions with grizzly bears. Using the procedure provided in Section 8.0 and in the Wildlife Notification Flow Chart (Attachment D), the Shell Regulatory Affairs designee will be informed of grizzly bear sightings/observations. All relevant information must be recorded. The Grizzly Bear Observation Form (Attachment F) is a typical report form must be completed to the greatest extent possible prior to submission. Regular reports of grizzly bear sightings will be made to the ADF&G.

The ADF&G grizzly bear contact is:

Dick Shideler, ADF&G  
1300 College Road  
Fairbanks, AK 99709-4173  
Phone: 907-459-7283  
Fax: 907-459-3091  
E-mail: dick.shideler@alaska.gov

Local Contact:

Geoff Carroll, ADF&G  
Area Wildlife Biologist  
P.O. Box 1284  
Barrow, Alaska 99723-1284  
Phone: 907-852-3464  
Fax: 907-852-3465  
E-mail: geoff.carroll@alaska.gov

## **8.3 Walrus Reporting**

Vessel traffic will avoid any walrus to the maximum extent practicable to avoid and minimize potential interactions. MMOs will be assigned to project vessels to identify potential encounters and record walrus behavior. Weekly reports of walrus sightings would be made to the USFWS using the Walrus Sighting Report Form (Attachment G).

Actions will be taken to the maximum extent practicable to avoid and minimize potential interactions with walrus. MMOs will be assigned to project vessels to identify potential encounters and record walrus behavior. Using the procedure provided in Section 8.0 and in the Wildlife Notification Flow Chart (Attachment D), the Shell Regulatory Affairs designee will be informed of walrus sightings/observations. All relevant information must be recorded. The Walrus Sighting Report (Attachment G) is a typical report that must be completed to the greatest extent possible prior to submission. Regular reports of walrus sightings in accordance with the LOA stipulations will be made to the USFWS.

Primary Pacific walrus contact:

Joel Garlich-Miller  
USFWS – Marine Mammals Section  
1011 East Tudor Road  
Anchorage, Alaska 99503  
Telephone: 907-786-3820 (direct); 907-786-3800 (main office)  
Fax: 907-786-3816  
E-mail: [joel\\_garlichmiller@fws.gov](mailto:joel_garlichmiller@fws.gov)

Secondary Pacific walrus contact:

Craig Perham  
USFWS – Marine Mammals Section  
1011 East Tudor Road  
Anchorage, Alaska 99503  
Telephone: 907-786-3810 (direct); 907-786-3800 (main office)  
Fax: 907-786-3816  
E-mail: [craig\\_perham@fws.gov](mailto:craig_perham@fws.gov)

## 9.0 INTENTIONAL “TAKE” ACTIONS FOR BEARS

Early detection and worker awareness will reduce chance encounters with a bear. If a bear remains on site for an extended period, the on-site Shell representative/Shell Regulatory Affairs designee will contact USFWS or ADF&G (as appropriate) for advice. Firearms with bean bags or rubber bullets, noisemakers, or other appropriate materials will be available on site to provide deliberate and intentional harassment of bears to ensure worker safety. These actions constitute a “take”. If, despite preventive actions, a lethal or non-lethal “take” occurs to protect human life, the following information must be recorded and actions performed:

- Record all details of the event including time, exact location, bear’s behavior, preventive measures followed, etc.
- Record all witness statements
- Polar Bears – Immediately notify Craig Perham with USFWS at (907) 786-3810 (direct line) or (907) 786-3800 (main office). An alternate contact is Terry DeBruyn with USFWS at 907-786-3812 (direct line) or 907-786-3800 (main office)

- Grizzly Bears – Immediately notify Dick Shideler (Fairbanks ADF&G) at (907) 459-7283 and Geoff Carroll (Barrow ADF&G) at (907) 852-3464
- If there is a lethal “take”, the entire animal carcass will be transported to Deadhorse for sealing and processing under the direction of either a responsible USFWS agent designee (polar bear) or ADF&G agent designee (grizzly bear). The agent designee will determine disposition of useable meat (e.g., donation to a Native village).

The trained Bear Guard or designated representative is responsible for:

- recording all the event details including time, exact location, bear’s behavior, preventive measures followed, etc.
- recording all witness statements

## 10.0 PLAN OF COOPERATION

A Plan of Cooperation (POC) has been developed as a required component of a LOA application under 50 CFR 18.128(d). A POC is also required as part of an application for an IHA from NMFS under 50 CFR § 216.104(a) (12), and under the BOEMRE lease stipulation 5 for lease sales 195 and 202. A POC was prepared and was submitted with the initial Camden Bay EP. An addendum to the POC was prepared for this revised exploration program and it updates the initial POC with information regarding proposed changes in proposed exploration drilling program, and documentation of meetings undertaken to inform the stakeholders of the revised exploration drilling program. The POC Addendum builds upon the previous POC. The POC Addendum is provided to USFWS as Attachment H to this LOA.

The POC Addendum identifies the measures that Shell has developed in consultation with North Slope communities and will implement during its planned Camden Bay exploration drilling program to minimize any adverse effects on the availability of marine mammals for subsistence uses. In addition, the POC Addendum details Shell’s communications and consultations with local communities concerning its proposed revised Camden Bay EP exploration drilling program beginning in the summer of 2012, potential conflicts with subsistence activities, and means of resolving any such conflicts (50 CFR § 18.128(d) and 50 CFR § 216.104(a) (12) (i), (ii), (iv)). Shell has documented its contacts with the North Slope communities, as well as the substance of its communications with subsistence stakeholder groups. Tables summarizing the substance of Shell’s communications, and responses thereto, are included in Attachment H. This POC Addendum may be further supplemented, as appropriate, to reflect additional engagements with local subsistence users and any additional or revised mitigation measures that are adopted as a result of those engagements.

## 11.0 REFERENCES

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**Attachment A**  
**Ice Management Plan – Beaufort Sea**

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SHELL OFFSHORE INC.  
3601 C Street, Suite 1000  
Anchorage, AK 99503

**ICE MANAGEMENT PLAN**  
**Beaufort Sea**

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Submitted to:

U. S. Department of the Interior  
Bureau of Ocean Energy Management,  
Regulation and Enforcement  
Alaska OCS Region

Submitted by:  
Shell Offshore Inc.



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## I. INTRODUCTION

### SCOPE

A Critical Operations and Curtailment Plan (COCP) will be in place for the Shell Offshore, Inc. (Shell) Camden Bay Exploration Program. As part of the COCP, this Ice Management Plan (IMP) has been developed. The description of notification of curtailment (an excerpt from the COCP) is presented in Attachment 1.

The IMP addresses the following activities:

- Vessels
- Shell Ice and Weather Advisory Center (SIWAC)
- Ice Alerts and Procedures
- Ice Management Philosophy
- Well Suspension Procedures
- Mooring System Recovery and Release
- Moving onto the Drill Site
- Training

The IMP:

- Defines Roles and Responsibilities
- Establishes Alert Levels; and
- Establishes Responses to Alert Levels.

The IMP facilitates appropriate decision-making and responses to the threat of hazardous ice and procedures set forth in the IMP prevent damage or harm to personnel, assets, or the environment.

Nothing in this document takes away the authority and accountability of the Master(s) of the vessels for the safety of their personnel and vessels and protection to the environment.

This plan is not a substitute for good judgment.

**Guidance Note:** This document is not intended to contain detailed procedures. Detailed procedures are contained within the vessel-specific operating manuals.

## II. DEFINITIONS

### A. Roles and Responsibilities

**Responsibilities have been defined for key personnel in section V. In addition to the defined personnel, the following positions have a role in IMP,**

Chief Officer /Second Officer/Third Officer	In addition to regular duties will assist the Ice Advisor (IA)
Shell Drilling Superintendent	Shell's Drilling Superintendent is the senior Shell shore-based manager responsible for all Shell well operations offshore Alaska.
Rig Manager	The senior shore-based manager (Alaska). Liaising with the Shell Drilling Superintendent.

### B. Definitions and Abbreviations

AHTS	Anchor Handling Tug Supply
API	American Petroleum Institute
BOEMRE	Bureau of Ocean Energy Management, Regulation and Enforcement
BOP	blowout preventer
CFR	Code of Federal Regulations
COCP	Critical Operations Curtailment Plan
cm	centimeter(s)
<i>Discoverer</i>	Turret-moored Drillship Motor Vessel (M/V) <i>Noble Discoverer</i>
DNV	Det Norske Veritas
ft	foot/feet
FTP	file transfer protocol
FY	First-year ice. Sea ice of not more than one winter's growth, developing from young ice; 12 inches (in.) (30 centimeters [cm]) or greater. It may be subdivided into thin FY – sometimes referred to as white ice, medium FY and thick FY.
GFS	Global Forecast System
GIS	Geographic Information System
Hazardous Ice	Ice, which due to its size, stage of development, concentration, set and drift is considered to be a threat to the safety of personnel, the drilling vessel and well operations. Close proximity of an ice feature regardless of its set and drift may be determined to be hazardous ice. Guidance Note: Sea state as well as visibility may influence what is categorized as hazardous ice.
HOS	hang-off sub
HT	Hazard Time. The estimated time it will take for hazardous ice to reach the drill site.
IA	Ice Advisor
IMO	International Maritime Organization
IMP	Ice Management Plan

IMV	Ice management vessel. Any ice class vessel tasked with ice management duties in support of the drilling vessel. This includes the primary ice management vessel (IMV) and the ice class Anchor Handling Tug Supply (AHTS)
in.	inch(es)
<i>Kulluk</i>	conical drilling unit <i>Kulluk</i>
LMRP	Lower Marine Riser Package
m	meter(s)
MODU	Mobile Offshore Drilling Unit
MT	Move-off Time. The time required to clear decks on the anchor handler recover all anchors conventionally and move off the drill site in an orderly fashion.
M/V	Motor Vessel
MY	Multi-year ice. OI which has survived at least two summers' melt. Hummocks are smoother than on SY and the ice is almost salt-free. Where bare, this ice is usually blue in color. The melt pattern consists of large interconnecting, irregular puddles and a well developed drainage system.
NOAA	National Oceanic and Atmospheric Administration
<i>Nordica</i>	M/V <i>Nordica</i>
OI	Old ice. Sea ice which has survived at least one summer's melt. Topographic features generally are smoother than FY. It may be subdivided into SY and multiyear ice.
OSR	Oil Spill Response
OSV	Offshore Supply Vessel
PIC	Person in Charge
RP	Recommended Practice
SAR	Synthetic Aperture Radar
Shell	Shell Offshore Inc.
SIWAC	Shell Ice and Weather Advisory Center located in Anchorage. The center develops forecasts from various sources, and disseminates same.
Support Vessels	Includes all vessels defined in this plan (IMV/OSR/AHTS/OSV).
SY	Second-year ice. OI which has survived only one summer's melt. Thicker than FY, it stands higher out of the water. In contrast to MY, summer melting produces a regular pattern of numerous small puddles. Bare patches and puddles are usually greenish-blue.
ST	Secure Time. The time required to secure the well, disconnect the Lower Marine Riser Package (LMRP) from the blowout preventer (BOP), recover and secure the riser.
TD	total depth
T-Time	Total Time. The sum of ST + MT.
U.S.	United States
USCG	United States Coast Guard
VMT	Vessel Management Team. This team is headed by the Drilling Vessel Master and includes the Shell Drilling Foreman, Rig Superintendent, Drilling Vessel IA and the Chief Engineer.

### III. VESSELS COVERED BY IMP

- Motor Vessel (M/V) Noble *Discoverer* (*Discoverer*) or conical drilling unit *Kulluk* – Drilling Vessel
- *M/V Nordica* (or similar) – Primary Ice Management Vessel (IMV)
- *Hull 247* (or similar) – Ice Management and Anchor Handling

Drilling is to be executed by the *Kulluk* or *Discoverer*, but not both.

#### *Kulluk*

The *Kulluk* has an Arctic Class IV hull design, is capable of drilling in up to 600 feet (ft) [182.9 meters (m)] of water and is moored using a 12-point anchor system. The *Kulluk* mooring system consists of 12 Hepburn winches located on the outboard side of the main deck, Anchor wires lead off the bottom of each winch drum inboard for approximately 55 ft (16.8 m). The wire is then redirected by a sheave, down through a hawse pipe to an underwater, ice protected, swivel fairlead. The wire travels from the fairlead directly under the hull to the anchor system on the seafloor.

The *Kulluk* is designed to maintain its location in drilling mode in moving ice with thickness up to 4 ft (1.2 m) without the aid of any active ice management. With the aid of IMVs, the *Kulluk* would be able to withstand more severe ice conditions. In more open water conditions, the *Kulluk* can maintain its drilling location during storm events with wave heights up to 18 ft (5.5 m) while drilling, and can withstand wave heights of up to 40 ft (12.2 m) when not drilling and disconnected (assuming a storm duration of 24 hours).

The *Kulluk* will comply with the requirements of 30 Code of Federal Regulations (CFR) Part 250.417, the International Maritime Organization (IMO), the U.S. (United States) Coast Guard (USCG) and Det Norske Veritas (DNV). All drilling operations will be conducted under the provisions of 30 CFR 250, American Petroleum Institute (API) Recommended Practices (RP) 53, 65 Part 2 and 75, and other applicable regulations and notices, including those regarding the avoidance of potential drilling hazards and safety and pollution prevention control. Primary safety measures include: inflow detection and well control; monitoring for loss of circulation and seepage loss; and casing and cementing program designs. Primary pollution prevention measures consist of contaminated and non-contaminated drain systems, a mud drain system, and oily water processing.

*Discoverer*

The *Discoverer* is a true, self-contained drillship. The *Discoverer* is an anchored drillship with an 8-point anchored mooring system. Station keeping is accomplished using the turret-moored, 8-point anchor system. The underwater fairleads prevent ice fouling of the anchor lines. Turret mooring allows orientation of vessel's bow into the prevailing ice drift direction to present minimum hull exposure to drifting ice. The vessel is rotated around the turret by hydraulic jacks. Rotation can be augmented by the use of the fitted bow and stern thrusters.

The hull has been reinforced for ice resistance. Ice-strengthened sponsons have been retrofitted to the ship's hull.

The *Discoverer* is classed by DNV as a Mobile Offshore Drilling Unit (MODU) for worldwide service. It is a "1A1 Ship-Shaped Drilling Unit I" and is capable of performing drilling operations offshore Alaska. The *Discoverer* has been issued with a DNV Appendix to Class stating:

"the structural strength and material quality of the 'Ice Belt' formed by the sponsons below the 8950mm A/B level, have been reviewed against the requirements for the DNV ICE-05 Additional Class Notation and found to meet those requirements (as contained in DNV Rules for Classification of Ships, Pt 5 Ch 1, July 2006) for a design temperature of -15 degrees C."

The *Discoverer* will comply with the requirements of 30 CFR Part 250.417, the IMO, the USCG and DNV. All drilling operations will be conducted under the provisions of 30 CFR Part 250 Subpart D, API RP 53, 65 Part 2 and 75 and other applicable regulations and notices including those regarding the avoidance of potential drilling hazards and safety and pollution control. Such measures as inflow detection and well control, monitoring for loss of circulation and seepage loss, and casing design will be the primary safety measures. Primary pollution prevention measures are the contaminated and non-contaminated drain systems, the mud drain system, and the oily water processing system.

Structurally, this is comparable to Canmar drillships used safely and successfully in exploration campaigns in the Beaufort and Chukchi Seas into the 1990s.

Details on the drilling vessels are included as Attachment 2.

## Drilling Vessel Principal Dimensions

Dimension	<i>Discoverer</i>	<i>Kulluk</i>
Length Overall	514 ft (156.7 m)	266 ft (81.0 m) diameter
Draft	27 ft (8.2 m)	41 ft (12.5 m)
Width	85 ft (26 m)	266 ft (81.0 m) diameter

## **Ice Management Vessels**

Ice management support to the drilling vessel will be provided by the *Nordica* (or similar) and *Hull 247* (or similar). The drilling vessel will be supported by these IMVs from the beginning of the campaign until the vessel departs the area. A description of these vessels is provided in Attachment 2.

### ***Nordica* (or similar vessel)**

The *Nordica* (or similar vessel) is designated as the primary IMV. The *Nordica* is classed by the DNV as +1A1.

Designed for the management, maintenance and service of offshore oil wells, the 380.5-ft (116-m) *Nordica* is a multipurpose vessel specialized in marine construction and icebreaking. *Nordica* is equipped with diesel-electric propulsion systems and their innovative combination of capabilities, based on extensive design and engineering work, facilitates use of these systems in arctic conditions.

### ***Hull 247* (or similar vessel)**

*Hull 247* is designated as the secondary IMV and anchor handler. *Hull 247* is currently in the construction phase and will be completed in March 2012. Engineered drawing and specifications are included in Attachment 2.

#### Ice Management Vessel Principal Dimensions

Dimension	<i>Nordica</i>	<i>Hull 247</i>
Length Overall	380.5 ft (116 m)	360.6 ft (110 m)
Draft	27.5 ft (8.4 m)	24 ft (7.3 m)
Width	85 ft (26 m)	80 ft (24.4 m)

**Guidance Note:** IMVs supporting the drilling vessel may be deployed to assist other vessels, as operations and ice conditions dictate. Diverting ice management resources away from the drilling vessel may require a curtailment of activities. This decision shall be made jointly by the Shell Drilling Foremen and the Master on the drilling vessel. The onshore Shell Drilling Superintendent (in consultation with the Rig Manager) will endorse the plan or set priorities if agreement cannot be reached at the field level.

#### **IV. SHELL ICE AND WEATHER ADVISORY CENTER**

SIWAC is an integrated forecasting service staffed 24/7 by industry-leading specialists under Shell contract in Anchorage, Alaska. SIWAC's primary function is to provide current and forecast ice and weather conditions directly to field operations and planning managers during the operational season. SIWAC provides information to decision makers and field principals to help them minimize risks when operating in the presence of ice. To provide quality and accurate information, SIWAC depends on skilled forecasters, subscription and public satellite imagery, numerical models, field observations, Geographic Information System (GIS) software tools, and a robust communication network.

#### **SIWAC ICE DATA INPUTS**

Ice forecasts are developed and issued daily. The Lead Ice Analyst compiles available data from subscription, specialized, and public services in ArcMAP (GIS Software) such as:

- MDA RadarSat 2 imagery
- MODIS satellite
- Canadian Ice Services
- National Ice Center
- Contract weather services
- Field observations
- IceNav images

#### **Data Transmission**

Effective communication of SIWAC ice and weather guidance and reciprocal feedback and field observations requires a robust and capable data network. The drilling vessel and IMVs are equipped with high-speed data and voice satellite service that has been proven to perform well in the U.S. Chukchi and Beaufort Seas.

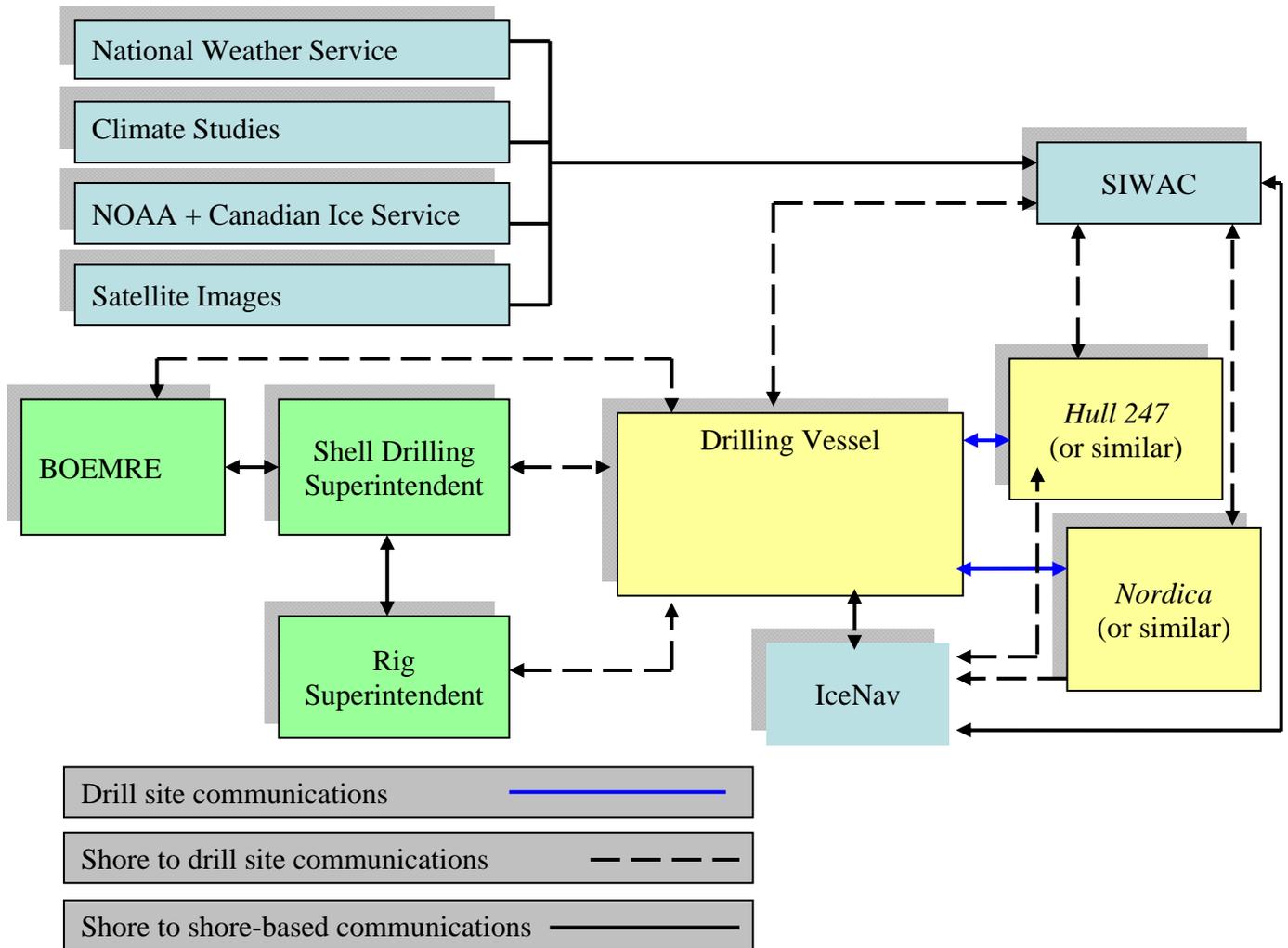
Data, including satellite imagery and observations, are relayed through a file transfer protocol (FTP) site between SIWAC and the field vessels using automated processes. This keeps both the field and forecasters continuously refreshed with the latest information. In addition, SIWAC maintains a secure website that allows direct, on demand access to all forecast reports and data products.

Additional information about SIWAC is in Attachment 3.

#### **Ice Information Flow Chart**

NOTE: The following graphic, Ice Management Communications Flow Chart, depicts the constant two-way communication that would occur between the various components of the system.

Ice Management Communications Flow Chart



NOAA = National Oceanic and Atmospheric Administration  
 BOEMRE = Bureau of Ocean Energy Management, Regulation and Enforcement

**Guidance Note:** Additional information regarding ice may be requested by the Master of the drilling vessel. Any means appropriate to the circumstances shall be used to provide this information. Where this information is to be obtained by aerial reconnaissance, the Shell Drilling Foreman will liaise with Shell Logistics to provide the appropriate resources.

## V. ICE ALERT LEVELS AND PROCEDURES

These procedures define five Alert Levels that are linked to the time that hazardous ice is forecast to be at the drilling vessel location, and the time required to secure the well and move the drilling vessel off location if it becomes necessary. Roles, responsibilities and actions required are specified according to the Alert Level.

### Ice Alert Levels

ALERT LEVEL	TIME CALCULATION	STATUS
Green	(HT – T-Time) is greater than 24 hours	Normal operations
Blue	(HT – T-Time) is greater than 12 hours and less than 24 hours	Initiate risk assessment. Validate secure times and move times.
Yellow	(HT – T-Time) is greater than 6 hours and less than 12 hours	Limited well operations in line with COCP. Commence securing well.
Red	(HT – MT) is less than 6 hours	Well-Securing Operations Completed. Commence anchor recovery operations.
Black	Drill site evacuated	Move drilling vessel to a safe location.

HT = Hazard Time

MT = Move-off Time

T-Time = Total Time

**Guidance Note:** If T-Time becomes greater than HT at any time, well securement and drill site evacuation contingency plans will be implemented.

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## Ice Alert Roles and Responsibilities

The following table summarizes roles, responsibilities and actions required for each Ice Alert Level.

Alert	Drilling Vessel Master	Drilling Vessel IA	IMV IA (Shell)	IMV Master	Rig Superintendent	Shell Drilling Foreman
<b>ROLES AND RESPONSIBILITIES FOR ALL ALERT LEVELS</b>	<p>The Drilling Vessel Master is the person in charge (PIC) of the drilling vessel. He is the final authority in regards to safety of the vessel, crew and complement. All changes of Alert level are issued by the Master. The responsibility to evacuate the drill site in response to a hazard rests with the Master</p> <p>Evaluates information from SIWAC, IAs and Vessel Management Team (VMT)</p> <p>Establishes Ice Alert Level and directs ice management operations.</p> <p>Establishes MTs in conjunction with the IMV Masters.</p> <p>Ensure Alert Level status is broadcast to fleet and internally throughout drilling vessel at intervals dependent on Alert Level or at change of alert Level</p>	<p>Collates and evaluates information from the SIWAC, IMV IAs and VMT</p> <p>Advises Master in establishing Ice Alert Level.</p> <p>Correlates Secure Time (ST) with information from rig operations.</p> <p>Establishes HT and MT in conjunction with IMVs and drilling vessel and advises Master and VMT.</p> <p>Works in conjunction with IAs on IMVs to develop and establish effective ice management strategies and advises Drilling Vessel Master.</p> <p>Ensures current ice drift is broadcast to fleet and liaises with SIWAC</p>	<p>The IA is Shell's representative onboard the IMVs and is the primary contact for all communications with the Drilling Vessel Master. He advises the IMV Master in executing the ice management strategies.</p> <p>Works in conjunction with Master of IMVs to determine the local ice conditions and hazardous ice.</p> <p>Works in conjunction with Drilling Vessel IA and Master of IMVs to develop and implement effective ice management strategies.</p> <p>Provides feedback on effectiveness of strategy and reports any anomalies pertaining to ice.</p>	<p>The Master is the PIC of the IMVs. He is the final authority in regards to safety of the vessel, crew and complement.</p> <p>Evaluates advice from the SIWAC and IA (drilling vessel &amp; IMVs).</p> <p>Works in conjunction with IA on drilling vessel and IA of IMVs to develop and execute effective ice management strategies within the capability of the vessel.</p> <p>Provides feedback on effectiveness of the strategy to the IA on the IMVs.</p> <p>Reports to IMVs IA any condition which inhibits vessel performance</p>	<p>The Rig Superintendent is the on-site supervisor responsible for all rig functions and drilling-related operations aboard the drilling vessel.</p> <p>Establishes ST &amp; informs VMT of ST and well conditions.</p> <p>Validates drilling team is aware of their duties under present Ice Alert Level.</p> <p>Validates well secure contingency plans</p>	<p>The Drilling Foreman is the senior on-site Shell supervisor with responsibility for overseeing drilling and well operations and for initiating spill response as the On-site Incident Commander for spills originating from the well site.</p> <p>Validates well ST in conjunction with the Rig Superintendent. Informs Drilling Vessel Master and Rig Superintendent regarding ongoing &amp; upcoming critical operations and curtailment plans.</p> <p>Communicates status of well and Ice Alert level to Shell shore-based management</p> <p>Under the authority of the Shell Drilling Superintendent the Shell Drilling Foreman may raise the Ice Alert Level at any time, He may order the suspension of drilling operations, securing of the well.</p>

Alert	Condition	VMT Comms Frequency	Drilling Vessel Master	Drilling Vessel IA	IMV IA (Shell)	IMV Master	Rig Superintendent	Shell Drilling Foreman
<b>Green</b>	(HT – T-Time) is greater than 24 hours	Every 24 hours, or more frequently as needed	Discharges duties as per accountabilities	Discharges duties as per accountabilities	Discharges duties as per accountabilities	Discharges duties as per accountabilities	Discharges duties as per accountabilities	Discharges duties as per accountabilities
<b>Blue</b>	(HT – T-Time) is greater than 12 hours and less than 24 hours	Every 12 hours, or more frequently as needed	Ensures readiness to execute contingency plans.  Ensures primary IMV is available to execute Ice Management strategies for the given ice regime.  Ensures anchor handling tug supply (AHTS) IMV readiness to manage ice and anchor handling operations.	Establish Ice Management Strategies in conjunction with IMVs and IA onboard IMVs.	Establishes Ice Management Strategies in conjunction with IMV Master and Drilling Vessel IA  Validate readiness of IMV to execute ice management strategy	Executes Ice Management Strategies in conjunction with IA on IMVs  Establishes and states readiness of IMV to execute ice management strategy	Establishes ST and assesses upcoming well operations for changes to ST  Informs VMT of ST and well conditions  Validates securing contingency plans  Evaluates ongoing & upcoming stage of drilling program with regard to ST and COCP	Validates ST in conjunction with the Rig Superintendent  Informs Drilling Vessel Master and Rig Superintendent regarding ongoing & upcoming COCP  Reports Alert changes to Shell shore-based management
<b>Yellow</b>	(HT – T-Time) is greater than 6 hours and less than 12 hours	Every 6 hours, or more frequently as needed	Directs ice management operations  Establishes and Validates MT  Establishes departure strategy  Ensures Alert status is broadcast to fleet and internally at 1-hour intervals or at change of Alert Level	Establishes HT & advises Master & VMT  Works in conjunction with IA on IMVs to initiate ice management strategies  Ensures current ice drift is broadcast to fleet	Implements ice management strategies as directed by Drilling Vessel Master in conjunction with IMV Master  Provides feedback on effectiveness of strategy	Executes ice management strategies as directed by Drilling Vessel Master and IA on IMV  Provides feedback on effectiveness of the strategy	Commences securing well in accordance with agreed upon plan, informs VMT of progress	Monitors Well Securing Operations and effectiveness of ice management operations  Communicates overall drilling vessel status to Shell shore management
<b>Red</b>	(HT – MT) is less than 6 hours	Every hour	Initiates departure plans following confirmation from Rig Superintendent that lower marine riser package (LMRP) has been retrieved and secured and guide wires are released  Ensures Alert Level status is broadcast to fleet and internally  Directs IMV and AHTS activities	Assess effectiveness of Ice Management Strategy in line with ongoing operations,  Assist Drilling Vessel Master as needed  Ensures current ice drift is broadcast to fleet during anchor recovery operations	Continues to implement ice management strategies in support of drilling vessel and anchor recovery operations	Executes ice management strategies and or activities associated with releasing the drilling vessel from moorings as directed by Drilling Vessel Master and IMV IA	Confirms well is secured and that LMRP is disconnected, retrieved & secured  Commences securing drill floor for departure from site	Monitors rig securing operations and departure plan  Communicates status to Shell shore management  Organizes additional support as needed for site departure operations (for example logistics)
<b>Black</b>	Drill site evacuated	As needed	Directs IMV support operations leading to safe departure from drill site to pre-agreed safe area  Complies with all regulatory reporting requirements (internal and external)  Works with VMT and IA and IMVs to establish further course of action	Continues to monitor ice conditions. Works in conjunction with IA on IMVs during transit  Provides Master of Drilling Vessel and VMT with information to aid further decision making	Advises IMV Master on operations leading to safe transit from drill site to pre-agreed safe area  Provides information to Drilling Vessel Master to aid further decision making	Works under direction of the Drilling Vessel Master and IMV IA during transit	Confirms drill floor and associated areas are secured and ready to depart drill site  Provides information to Master and VMT to aid further decision making	Informs Shell shore management of evacuation  Complies with all regulatory reporting requirements (internal and external)  Provides information to Master and VMT to aid further decision making

## VI. ICE MANAGEMENT PHILOSOPHY

An effective IMP is designed to enable execution of the exploration program, with the appropriate barriers in place to manage and mitigate against risks that are specific to exploration drilling operation in offshore Alaska (in this case, threat of ice). Additionally, the IMP identifies the “top” event caused by the failure of barriers and addresses the procedures to deal with consequences of escalation.

The “top” event, for the purpose of the IMP, is a yellow alert level that triggers the commencement of well suspension operations. This section addresses the activities associated with ice management as a barrier to the top event.

The strategy to prevent the top event is to have the following elements as effective barriers:

- proper equipment,
- skilled people,
- appropriate information, and
- work processes.

The key elements identified above are discussed herein.

### Proper Equipment

- The IMVs will be capable IMVs, with the appropriate ice strengthening, and have been contracted to support the exploration campaign.
- IceNav: The drilling vessel and IMVs will be outfitted with IceNav Equipment (Enhanced radar imaging of ice)
- *Hull 247* (or similar vessel) is a high specification anchor handling vessel and will be the primary anchor handling vessel.
- *Nordica* (or similar vessel) designated as the primary IMV has anchor handling capability and could be used to supplement *Hull 247* if needed.

### Skilled People

- The drilling vessel and IMVs will carry specialist IA, in addition to the regular crew complement.
- The drilling vessel and the *Nordica* (or similar vessel) will have two IAs onboard providing 24/7 coverage.
- The IAs supporting the exploration campaign will have documented experience of having performed ice management activities associated with supporting exploration activities.
- SIWAC will be staffed with world-class industry-acknowledged experts in weather, satellite and Ice Synoptic analysis.
- IMVs will have crews with ice management experience.

## Appropriate Information

A multi-layered, systematic approach is taken to provide relevant information from SIWAC with a feedback loop from the vessels using:

- Wide Area Satellite Imagery
- High Resolution Satellite Imagery
- Meteorological Buoys
- Field Observation
- Numerical Models
- Local Radar
- Vessels are outfitted with Fit-for-Purpose Data and Communications link.

## Work Processes

A systematic approach for risk mitigation is adopted by developing effective work processes.

- Development of effective ice management strategies based on available information (global and local)
- Deployment of assets to deliver strategy
  - Threat sectors identified
  - Assess manageability of ice feature
  - Appropriate management of ice feature ( breaking/deflecting)
  - Primary IMV deployed at an effective perimeter to reduce floes to manageable size in advance of HT
- Scheduled VMT meetings (frequency dictated by Alert levels)
- Planning/Coordination meetings with specific focus on Ice Alert Levels

## **VII. WELL SUSPENSION PROCEDURES.**

Effectiveness of the IMP depends on accurately establishing HT, ST and MT. Secure Time is time taken to secure the well, disconnect and retrieve the LMRP.

As part of securing the well, well suspension procedures will be established. These procedures will supplement the detailed well securing procedures that will be contained within the Rig Operations Procedures and will be specific to securing the well in response to the threat of hazardous ice.

Return to the drill site following exit due to the threat of hazardous ice is covered in Section IX.

Examples of well suspension options and procedures are presented in Attachment 4.

### **A. Well Suspension Options**

Securing and suspending the well can be accomplished by several means. The base case is to suspend the well by plugging, (mechanical or cement). The chosen option or combination thereof will be dependent upon well conditions, environmental conditions, and (or) equipment limitations. Shell will employ the most effective suspension procedure under the specific circumstances at the time.

Relevant information associated with well suspension will be documented in the daily drilling reports. The BOEMRE field representative will be apprised, and relevant records will be submitted to BOEMRE.

Potential well suspension options are listed in the following table.

	Mechanical Plugging	Drillpipe Hang-off	Pull Out of Hole	Shearing Drill Pipe	Dropping String
Time Required / Preference	Requires most time. Is the base case procedure for securement.	Less time than plugging	Potentially less time depending upon position in hole.	Least amount of time ;Stuck pipe contingency	Comparable to shearing drillpipe. Contingency to cope with mechanical hoisting failure
Provides Wellbore Isolation	Yes	Yes (blind/shears closed)	Yes (blind/shears closed)	Yes (blind/shears closed)	Yes (blind/shears closed)
Hang-off Sub (HOS) Required	No	Yes (Emergency Drill Pipe Hang-off Tool)	No	No	No
Packers / Bridge Plug Required	Yes	No	No	No	No
Potential to Leave String in Hole	Yes, if suspended below packer.	Yes	No	Yes, but access to pump through sheared string is questionable.	String in hole but requires fishing trip and overshot to circulate
Remarks	Mechanical plugs are preferred method in cased hole.	In this case no downhole plugging has been assumed.	This method is acceptable in situations where casing has been run and cemented, but not drilled out yet. Pipe can be pulled and blind/shears closed without further containment.	Contingency for stuck pipe situation	Contingency to cope with mechanical hoisting failure
Advantages	Provides complete wellbore isolation. Equipment readily available.	Provides wellbore isolation via blind/shear rams. Equipment readily available. Can be done in a timely manner. Leaves kill string in place for potential well control requirements.	Requires less time in situations where casing has been run but not drilled out, or if already out of the hole as noted above, for logging or changing BHA.	Quickest way to secure the well and prepare for move-off	Next to shearing, quickest way to prepare rig for move-off. Also leaves the top of the string in the hole undamaged and ready for recovery or circulating via overshot and packoff
Disadvantages	Takes longer. Packers require additional tripping. Cementing requires mixing / pumping time and introduces potential for contamination.	No downhole wellbore isolation.	Not a preferred method with open hole conditions because no pipe is left in the hole for potential well control methods. No downhole wellbore isolation.	Potential to leave a deformed pipe profile complicating fishing and circulating operations	No downhole isolation is accomplished. Requires fishing trip to reestablish downhole circulation

## VIII. MOORING SYSTEM RELEASE/ RECOVERY

### A. Conditions Present to Initiate Mooring System Release and Recovery

This section addresses mooring system release and recovery if ice conditions have triggered an Ice Alert Level of yellow and escalated to a red. The following discussion assumes the well has been secured and all recoverable well-related equipment has been retrieved.

### B. Release Options

Mooring system release /recovery can be accomplished by several means. The base case is to recover moorings in the conventional manner. The selection of a specific release option and the execution of the procedures rest with the Drilling Vessel Master who informs the VMT. Potential options are listed in the table below.

#### Mooring System Release/ Recovery

	Conventional Anchor Retrieval	Rig Anchor Release (RAR)	Running off Wires
Time Required / Preference	Requires most time. Is the base case procedure for retrieval	Less time than conventional recovery	Contingency plan if RARs fail to activate.
Advantages	System is intact. Ready for redeployment	Reduced MT	None
Disadvantages	None	Increased redeployment time. Requires back up equipment. Potential loss of buoys. Relies on activation by acoustic release.	Complicates redeployment. High potential for seabed fouling. Potential to compromise system.

## IX. MOVING ONTO OR RETURNING TO THE DRILL SITE

The authority to move on to or return to the drill site will be issued by the Shell Drilling Superintendent with the concurrence of the Rig Manager. Relevant regulatory authorities will be notified in accordance with the requirements.

Upon authorization, the final decision to move on to or return to the drill site is dependent upon the Drilling Vessel Master and the VMT who are able to assess the various parameters properly with input from the IMV Masters and IA to determine the practicality of the decision.

**X. TRAINING**

All personnel will be made aware of their roles and responsibilities within this IMP through a training session on each vessel. This training will include a table-top exercise, which will be executed prior to beginning operations to provide exposure to and test communications and procedures of the COCP and the IMP. Participants at the table-top exercise will include:

- Shell and Drilling leadership
- Rig Crews (both Drilling and Marine Operations staff)
- Oil Spill Response (OSR) representative
- SIWAC representatives
- BOEMRE operations representatives
- IMVs
- IAs
- Alaska Logistics (Marine and Aviation) Representatives

Observations from the table-top exercise will be documented.

**XI. ATTACHMENTS**

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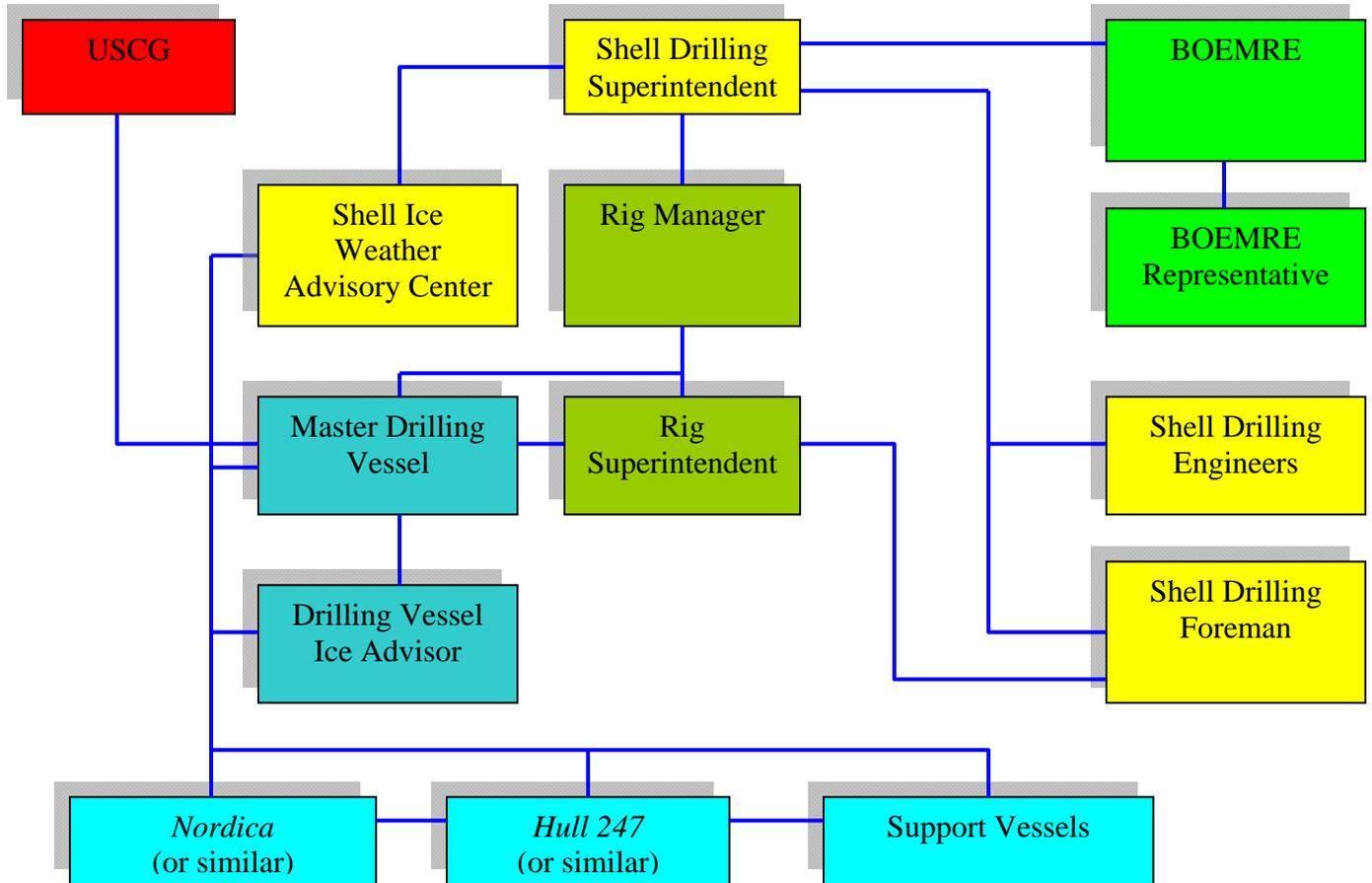
**Attachment 1 – Extract from Critical Operations Curtailment Plan****Per Section 10 of the COCP:**

Notification of the decision for curtailments requiring the rig to disconnect from the well and depart location will be made as soon as practical, but not to interfere with the safety of the crew, environment, or vessel. This notification will be made either verbally to a representative on site or by telephone to a BOEMRE representative on duty; the notification may also be made in written form through the use of fax or email.

All operations curtailment decisions will be documented on the Shell Daily Operations Report. This information will be conveyed to BOEMRE on a weekly basis via the Well Activity Report and at the end of the well operations as part of the End of Operations Report.

The following flow chart depicts notifications in the event of curtailment.

**Curtailment Notification Flow Chart (Attachment 1 continued)**



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Kulluk Specifications

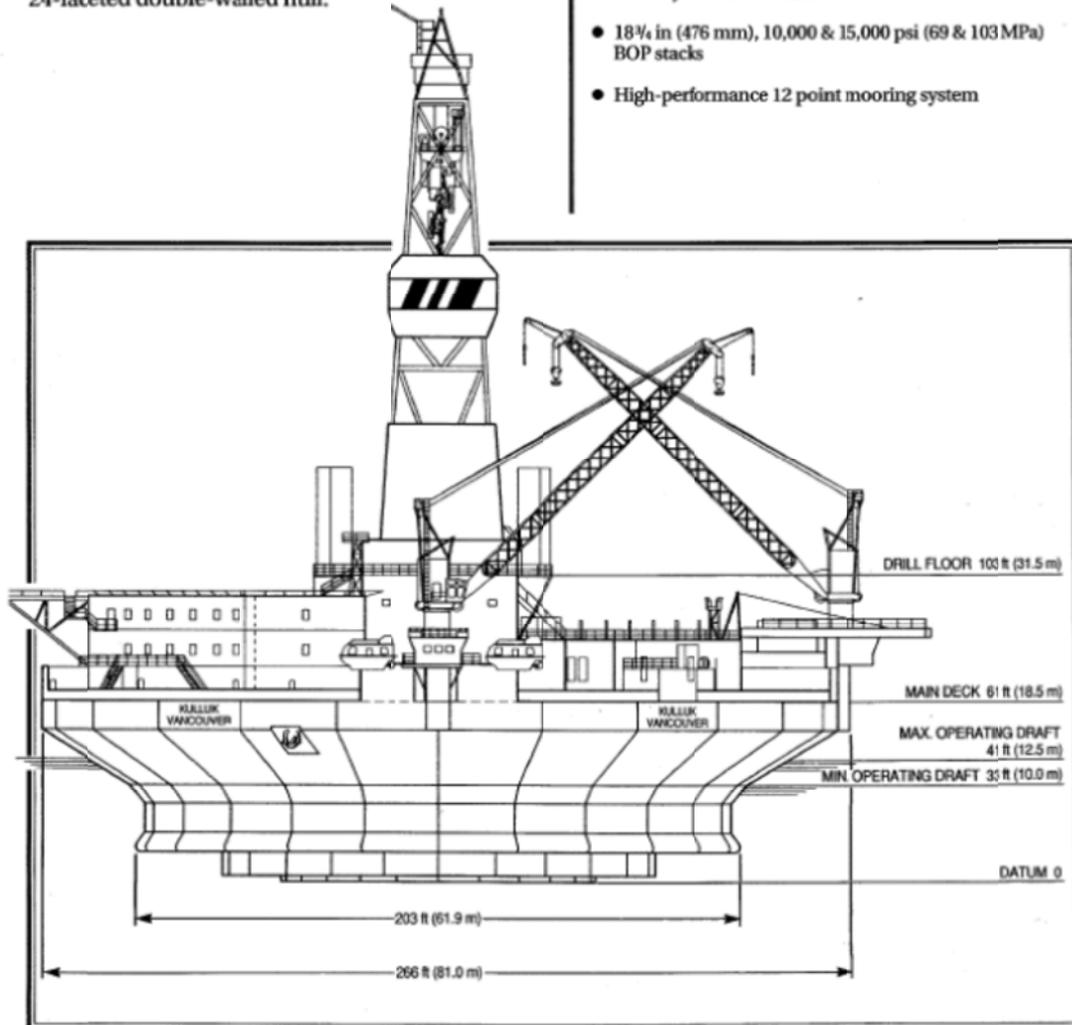


Kulluk is the first floating drilling vessel designed and constructed for extended season drilling operations in deep Arctic waters.

An improvement on the floating drillship concept, Kulluk is a conically shaped, ice strengthened floating drilling unit with a 24-faceted double-walled hull.

**Key Features**

- Unique, purpose-built conical Arctic Class IV hull design
- Operating water depth 60 to 600 ft (18.3 to 183 m), drilling depth up to 20,000 ft (6 096 m)
- Electrically driven Varco top drive drilling system
- 24 ft (7.3 m) diameter glory hole bit capable of drilling and setting a steel caisson 40 ft (12.2 m) into the seabed for ice scour protection
- Partially enclosed derrick
- 18 1/4 in (476 mm), 10,000 & 15,000 psi (69 & 103 MPa) BOP stacks
- High-performance 12 point mooring system



### Classification

The unit has been designated as Arctic Class IV (by the Canadian Coast Guard) under Canadian Arctic Shipping Pollution Prevention Regulations, and as Ice Class 1AA by the American Bureau of Shipping.

### Specifications

Owner:	BeuDril Limited
Flag:	Canadian
Rig Type:	Conical Drilling Unit (CDU)
Delivered:	1983
Rig Design:	Earl & Wright - Lavalin
Built By:	Mitsui Engineering and Shipbuilding, Japan

### Dimensions

Diameter at main deck:	266 ft (81.0 m)
Diameter at pump deck:	196 ft (59.7 m)
Hull Depth:	61 ft (18.5 m)

### Operations

Draft (max. operating):	41 ft (12.5 m)
Draft (min. operating):	33 ft (10.0 m)
Draft (light ship):	26 ft (8.0 m)
Light Ship Displacement:	19,300 tons (17 510 tonnes)
Maximum Drilling Depth:	20,000 ft (6 096 m)
Operating Water Depth:	60 to 600 ft (18.3 to 183 m)

### Variable Load

7,717 tons (7 000 tonnes)

### Storage Capacities

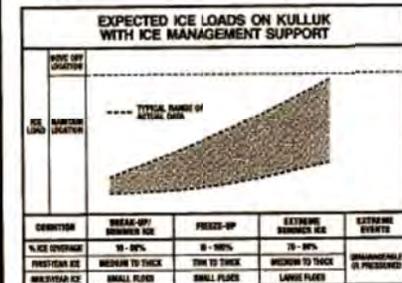
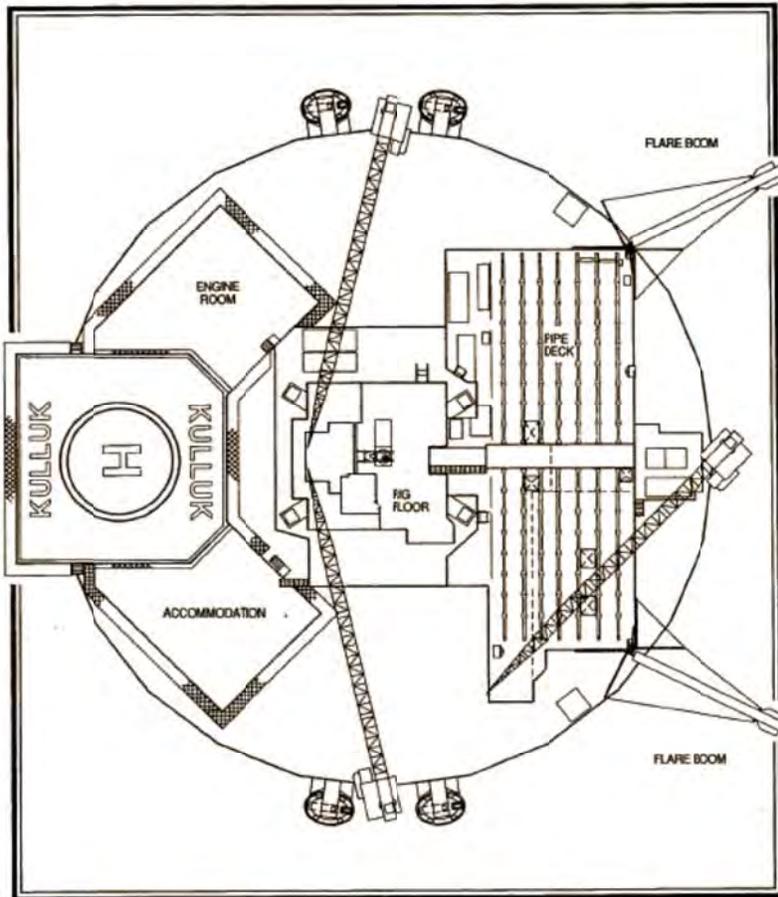
Barite & cement bulk:	21,471 cf (608 m <sup>3</sup> )
Liquid mud:	2,605 bbl (414 m <sup>3</sup> )
Drill water:	4,227 bbl (672 m <sup>3</sup> )
Fuel:	10,085 bbl (1 603 m <sup>3</sup> )
Potable water:	1,961 bbl (312 m <sup>3</sup> )
Ballast:	35,928 bbl (5 712 m <sup>3</sup> )
Pipe & casing (pipe deck):	1,543 tons (1 400 tonnes)
Brine:	2,010 bbl (320 m <sup>3</sup> )

### Operational Limits

#### Stationkeeping Conditions

Kulluk was built to operate in the ice infested waters of the Arctic offshore. The unit was developed to extend the drilling season available to more conventional floating vessels by enabling operations to be carried out through spring breakup conditions, the summer months, and well into the early winter period.

Kulluk was designed to maintain location in a drilling mode in moving first-year ice of 4 ft (1.2 m) thickness. With ice management support provided by BeauDril's Arctic Class IV icebreakers, the unit can maintain location in more severe conditions as shown below.



In terms of Kulluk's open water performance, the drilling unit was designed to maintain location in storm conditions associated with maximum wave heights of 18 ft (5.5 m) while drilling and 40 ft (12.2 m) while disconnected (assumed storm duration of 24 hrs). If ice or open water storm conditions become more severe than those indicated, the unit's mooring system, which incorporates acoustic release devices, is disconnected from the anchors and the unit moves off location.

## Equipment

### Drilling Equipment

#### Derrick

160 ft (44.8 m) Dresco dynamic with a 40 ft x 40 ft (12.2 m x 12.2 m) base, rated at 1,400,000 lb (623 000 daN) with 14 lines

Racking platform has capacity to hold 23,340 ft (7 115 m) of 5 in (127 mm) drill pipe plus bottom hole assembly

#### Drawworks

Ideco E-3000 electric drawworks complete with sandreel, Elmago model 7838 Baylor auxiliary brake, spinning and breakout catheads and three GE model 752 motors each rated at 1,000 hp (746 kW) continuous

#### Travelling Block

McKissick model 686, 650 ton (590 tonne) capacity with 7 sheaves grooved for 1 7/8 in (41.3 mm) drilling line

#### Swivel

Ideco TL-500, 500 ton (454 tonne) capacity

#### Drill Pipe

20,000 ft (6 096 m) x 5 in (127 mm), 19.5 lb/ft (29 kg/m) with 4 1/2 IF connections

#### Top Drive

Varco TDS-3 with one GE model 752 motor rated at 1,000 hp (746 kW) continuous and a 500 ton (454 tonne) hoisting capacity

#### Rotary Table

Ideco LR-495, 49.5 in (1 257 mm) driven by one GE model 752 motor, rated at 1,000 hp (746 kW) continuous, coupled to a two speed transmission

#### Drill String Compensator

NL Shaffer 18 ft (5.5 m) stroke 400,000 lb (178 000 daN) compensating capacity or a 1,000,000 lb (444 800 daN) locked capacity

#### Tensioner System

4 x 80,000 lb (35 600 daN) Western Gear riser tensioners, 48 ft (14.6 m) wireline travel with 1 1/4 in (44.5 mm) wire rope

6 x 16,000 lb (7 100 daN) Western Gear guideline/pod tensioners, 40 ft (12.2 m) wireline travel with 3/4 in (19.1 mm) wire rope

#### Mud Pumps

2 x Ideco T1600 triplex, each driven by two GE model 752 motors rated at 1,000 hp (746 kW) continuous

#### Cementing Unit

Dowell owned R717 twin triplex powered by two GE model 752 motors each rated at 1,000 hp (746 kW) continuous, with 7,500 psi (52 MPa) and 10,500 psi (72 MPa) fluid ends

#### Rig Floor Pipe Handling System

Varco Iron Roughneck model IR-2000 Range: 2 7/8 to 8 in (73 to 203 mm)

#### Mud Logging Room

Designed to accommodate equipment from any of the major mud logging companies. This room is an integral part of the rig and contains complete lab facilities

#### Testing Equipment

Complete testing system with a 10,000 BOPD (1 590 m<sup>3</sup>/day) capacity consisting of: data header, choke manifold, steam heater, 3-phase separator, surge tank, water degasser, transfer pumps, and flare booms

#### Mud Conditioning Equipment

4 x Thule United VSM-120 shale shakers  
1 x Brandt SR-3 desander  
1 x Brandt SE-24 desilter  
1 x Thule VSM-200 mud cleaner  
1 x Wagner Sigma-100 centrifuge  
1 x Sharples DM 40 000 centrifuge  
2 x Burgess Magna-Vac vacuum degassers  
2 x Alfa-Laval AX30 mud coolers

#### Subsea Equipment

**BOP System**  
1 x NL Shaffer 18 3/4 in (476 mm), 10,000 psi (69 MPa) BOP stack with annular, 4 ram type preventors, and Vetco H-4 E connector  
1 x NL Shaffer 18 3/4 in (476 mm), 15,000 psi (103 MPa) BOP stack with annular rated at 10,000 psi (69 MPa), 4 ram type preventors, and Vetco H-4 E x F connector

#### Lower Marine Riser Packages

2 x 18 3/4 in (476 mm) with 10,000 psi (69 MPa) Shaffer annular, Regan 24 in (610 mm) CR-1 pressure compensated lower ball joint and Vetco H-4E connector

#### BOP Cranes

2 x Hepburn main bridge cranes, 85 ton (77 tonne) capacity each with 10 ton (9.1 tonne) auxiliary hoists

**30 in (762 mm) Marine Riser System**  
3 x hydraulic pin connectors; 2 x 36 in (914 mm) Cameron and 1 x 30 in (762 mm) Drill-Quip

1 x Regan 28 in (711 mm) CR-1 pressure compensated lower ball joint  
30 in (762 mm) riser consisting of 1 in (25.4 mm) wall casing with Hunting Lynx 52S connectors

1 x Regan 28 in (711 mm) telescoping riser joint with 45 ft (13.7 m) stroke

1 x Regan 28 in (711 mm) DR-1 upper ball joint

1 x Regan KFDS 28 in (711 mm) diverter

**21 1/4 in (540 mm) Marine Riser System**

21 1/4 in (540 mm) Cameron RCK riser with 10,000 psi (69 MPa) choke and kill lines

2 x Cameron telescoping riser joints, 1 x 40 ft (12.2 m), and 1 x 50 ft (15.2 m) stroke

1 x Regan 24 in (610 mm) DR-1 upper ball joint

1 x Regan KFDS 24 in (610 mm) diverter

#### Glory Hole Bit

1 x Brown Tornado, 24 ft (7.3 m) diameter hydraulically operated with airlift discharge. Capable of drilling a glory hole 40 ft (12.2 m) into the seabed for ice scour protection

#### Power Generation

##### Prime Movers:

3 x Electro-Motive Diesel rated at 2,817 hp (2 100 kW) each

##### Emergency Power:

1 x GM Detroit diesel rated 873 hp (651 kW)

#### Cranes

3 x Liebherr, BOS 65/850, rated at 72 ton (65 tonne) at 30 ft (9.1 m)

#### Safety Equipment

4 x Whittaker 54-person survival craft; two on port, two on starboard

1 x Hurricane Model 700-D emergency rescue boat

2 x RFD inflatable escape slides

#### Helideck

Capacity for Sikorsky 61 or similar with fueling station

#### Accommodation

Bunks for 108 people, recreation room, sauna, galley with seating for 36, offices, and hospital

## ***Kulluk Mooring System***

The Kulluk's mooring system consists of twelve Hepburn winches located on the outboard side of the main deck. Anchor wires lead off the bottom of each winch drum inboard for approximately 55 ft (17 m). The wire is then redirected by a sheave, down through a hawse pipe to an underwater, ice protected, swivel fairlead. The wire travels from the fairlead directly under the hull to the anchor system on the seafloor.

### ***Specifications***

#### **Anchor Winch**

12 x Hepburn single-drum winches with a 287 ton (260 tonne) operating tension

#### **Mooring Wires and Anchors**

##### *Anchors:*

Various sizes & quantities of anchors are available for use. Exact anchor configuration to be provided once location and seafloor conditions are specified

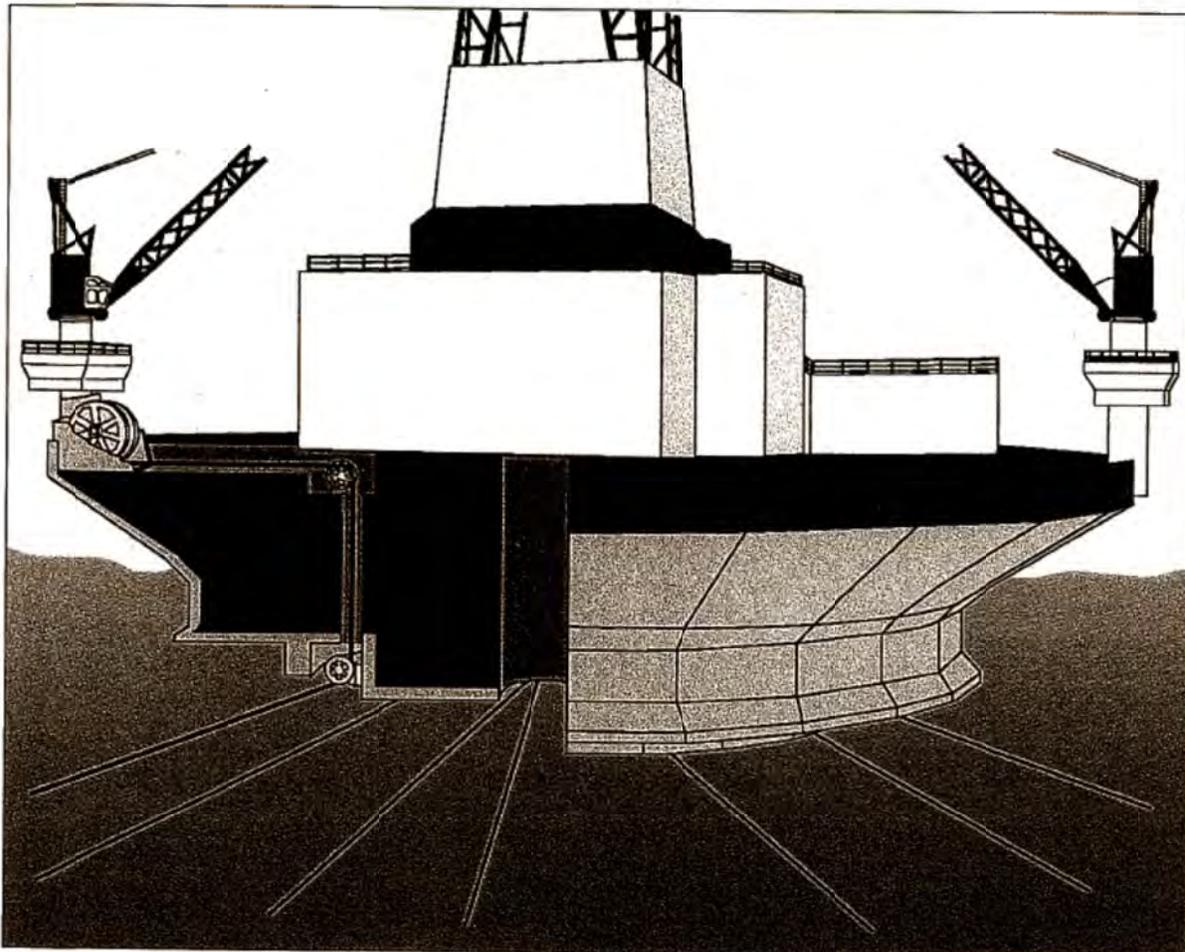
##### *Wire ropes:*

Each winch drum has capacity for 3,763 ft (1 147 m) of 3 1/2 in (88.9 mm), 573 ton (520 tonne) breaking strength wireline

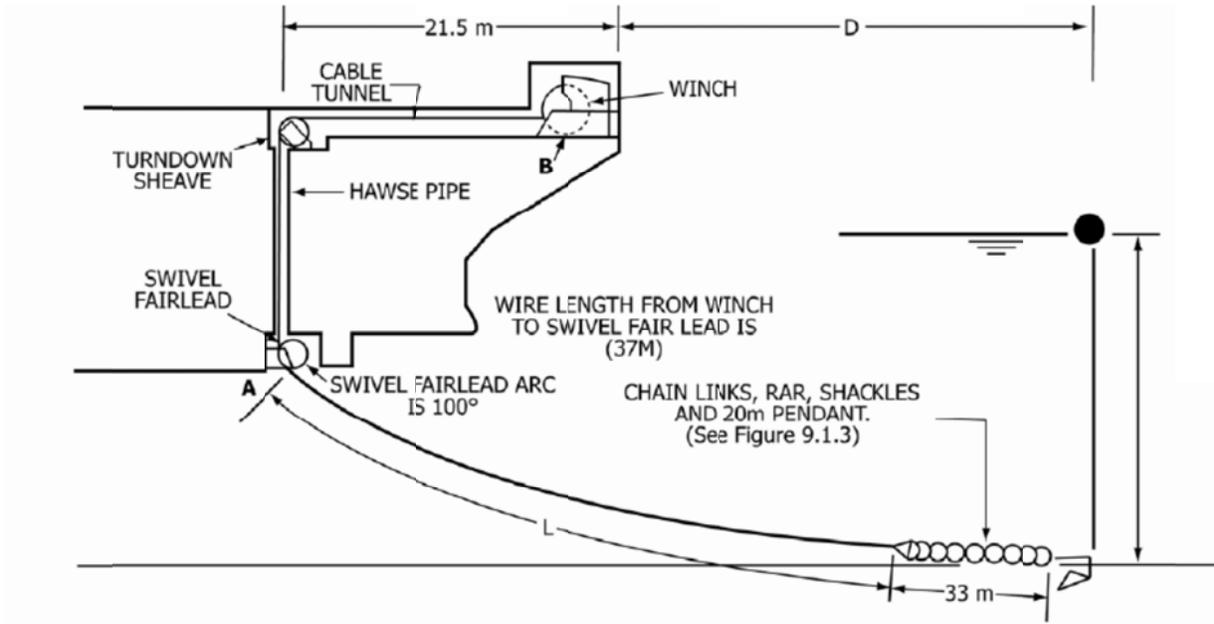
##### *Anchor Release:*

Each anchor wire contains a remote acoustic release (RAR) unit

FOR MORE INFORMATION ABOUT KULLUK, CONTACT MANAGER, BEAUFORT SEA (03) 233-3030



Kulluk Anchoring Detail



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*Discoverer* Specifications

<b>DISCOVERER SPECIFICATIONS</b>	
TYPE-DESIGN	Drillship - Sonat Offshore Drilling <i>Discoverer</i> Class
SHAPE	Monohull with sponsons added for ice-resistance <sup>1</sup>
SHIP BUILDERS & YEAR	Namura Zonshno Shipyard, Osaka, Japan - hull number 355
YEAR OF HULL CONSTRUCTION	1965
YEAR OF CONVERSION	1976
DATE OF LAST DRY-DOCKING	2010

<b>DISCOVERER DIMENSIONS</b>		
LENGTH	514 ft	156.7 m
LENGTH BETWEEN PERPENDICULARS (LBP)	486 ft	148.2 m
WIDTH	85 ft	26 m
MAXIMUM (MAX) HEIGHT (ABOVE KEEL)	274 ft	83.7 m
HEIGHT OF DERRICK ABOVE RIG FLOOR	175 ft	53.3 m

<b>DISCOVERER MOORING EQUIPMENT</b>	
Anchor pattern symmetric 8 points system. The unit is fitted with Sonat Offshore Drilling patented roller turret mooring system giving the unit the ability to maintain favorable heading without an interruption of the drilling operations	
ANCHORS	Stevpris New Generation 7,000 kilograms (kg) each (ea) 15,400 pounds (lb) ea
ANCHOR LINES	Chain Wire Combination
SIZE/GRADE	2.75-in. wire 3-in. ORQ Chain
LENGTH	2,750 ft (838 m) wire + 1,150 ft (351 m) chain (useable) per anchor

<b>DISCOVERER OPERATING WATER DEPTH</b>		
MAX WATER DEPTH	1,000 ft (305 m) with present equipment (can be outfitted to 2,500 ft [762 m])	
MAX DRILLING DEPTH	20,000 ft	6,098 m

Table 1.c-2 <i>Discoverer</i> Specifications (continued)		
DRAW WORKS	EMSCO E-2,100 - 1,600 horsepower (hp)	
ROTARY	National C-495 with 49 ½ -in. opening	
MUD PUMPS	2 ea. Continental Emsco Model FB-1600 Triplex Mud Pumps	
DERRICK	Pyramid 170 ft. with 1,300,000 lb nominal capacity	
PIPE RACKING	BJ 3-arm system	
DRILL STING COMPENSATOR	Shaffer 400,000 lb with 18-ft (5.5 m) stroke	
RISER TENSIONS	8 ea. 80,000 lb Shaffer 50-ft (15.2 m) stroke tensioners	
CROWN BLOCK	Pyramid with 9 ea. 60-in. (1.5 m) diameter sheaves rated at 1,330,000 lb	
TRAVELING BLOCK	Continental - Emsco RA60-6	
BLOWOUT PREVENTOR (BOP)	Cameron Type U 18 ¾ -in. (48 cm) x 10,000 pounds per square in. (psi)	
RISER	Cameron RCK type, 21-in. (53 cm)	
TOP DRIVE	Varco TDS-3S, with GE-752 motor, 500 ton	
BOP HANDLING	Hydraulic skid based system, drill floor	
<b>DISCOVERER DISPLACEMENT</b>		
FULL LOAD	20,253 metric tons (mt)	
DRILLING	18,780 mt (Drilling, max load, deep hole, deep water)	
<b>DISCOVERER DRAUGHT</b>		
DRAFT AT LOAD LINE	27 ft	8.20 m
TRANSIT	27 ft (fully loaded, operating , departure)	8.20 m
DRILLING	25.16 ft	7.67 m
<b>DISCOVERER HELIDECK</b>		
MAXIMUM HELICOPTER SIZE	Sikorsky 92N	
FUEL STORAGE	2 ea. 720-gallon tanks	
<b>DISCOVERER ACCOMODATIONS</b>		
NUMBER OF BEDS	140	
SEWAGE TREATMENT UNIT	Hamworthy ST-10	
<b>DISCOVERER PROPULSION EQUIPMENT</b>		
PROPELLER	1 ea 15 ft 7-in. (4.8 m) diameter, fixed blade	
PROPULSION DRIVE UNIT	Marine Diesel, 6 cylinder, 2 cycle, Crosshead type	
HORSEPOWER	7,200 hp @ 135 revolutions per minute (RPM)	
TRANSIT SPEED	8 knots	
<b>GENERAL STORAGE CAPACITIES</b>		
SACK STORAGE AREA	934 cubic meters (m <sup>3</sup> )	
<b>BULK STORAGE</b>		
Bentonite / Barite	180 m <sup>3</sup> - 4 tanks	
Bulk Cement	180 m <sup>3</sup> - 4 tanks	
<b>LIQUID MUD</b>		
Active	1,200 barrels (bbl)	
Reserve	1,200 bbl	
Total	2,400 bbl	
POTABLE WATER	1,670 bbl / 265.5 m <sup>3</sup> (aft peak can be used as add. pot water tank)	
DRILL WATER	5,798 bbl / 921.7 m <sup>3</sup>	
FUEL OIL	6,497 bbl / 1,033 m <sup>3</sup>	

<sup>1</sup> Sponsons designed and constructed to meet requirements of Det Norske Veritas (DNV) Additional Class Notation ICE-05.

## Nordica Specifications



OFFSHORE



## Powerful, high-tech, multipurpose vessels for global underwater oil field construction

Designed for the management, maintenance and service of offshore oil wells, the 97-metre Botnica is a multipurpose vessel specialised in marine construction and icebreaking, as are the 116-metre vessels Fennica and Nordica. They are equipped with diesel-electric propulsion systems and their innovative combination of capabilities, based on extensive design and engineering work, facilitates their use in both arctic and tropical conditions. All three of these multipurpose vessels are highly advanced, powerful and extremely well designed and built.

### Unique technology for demanding conditions

These vessels are ideal for offshore operations. The working deck is about 1,000 m<sup>2</sup>, making it exceptionally large and level for ships of this length. The deck was designed for fast equipment changes. Depending on the ship, such equipment may range from simple deck cranes to a 160-tonne pedestal active heave compensated crane, or from deepwater installation equipment to pipe-laying systems, underwater machinery control or the towing and installation of large pipelines.

With their 15,000 kW power output and 230-tonne bollard pull, the Nordica and the Fennica are ideal for seabed ploughing and towing, and they are also fully equipped for anchor-handling operations. The ships' main engine and generator solution makes it possible to perform heavy-duty maintenance tasks without affecting their operating ability.

Both the Fennica and the Nordica are also equipped with a stern roller.

### Accurate, safe and highly suitable

The Botnica's moon pool and the large size of its working deck make this ship highly suitable for a variety of offshore operations. Different types of special tools and structures can be installed on the working deck. The attributes of the Botnica, a class 3 DP ship, are in keeping with the strict rules and stipulations demanded in oil well management, as well as the requirements on oil fields set by the Norwegian Maritime Directorate.

The multipurpose icebreakers are equipped with Kongsberg Simrad's Dynamic Positioning [DP] system, which has five independent control units operating their main propellers and three bow thrusters. Even in a sector in which ocean vessels equipped with DP systems are a normal sight, these vessels have performed their tasks exceptionally well in terms of manoeuvrability and accuracy. Their unusual asymmetrical and spacious navigation bridge was designed with an eye to the requirements placed on the ship's multiple applications, both on the open sea and in icebreaking and towing operations.

The vessels have a separate deck for the clients' use, with cabins and offices and a separate data network. The high quality facilities accommodate a total of 45-47 guests, depending on the ship.

**Fennica****Dimensions**

Length 116.00 m  
 Beam 26.00 m  
 Draught 8.40 m max.  
 Built 1993  
 Max. speed 16 knots

**Class**

DnV + 1A1 – Tug Supply Vessel – SF – EO –  
 Icebreaker polar – 10, Dynpos, AUTR,  
 Helideck

**Dynpos**

Simrad ADP 702

**Accommodation**

82 persons  
 24 cabins for client use (47 persons)  
 Client's offices: 1 operation centre on 4th  
 bridge deck, 1 x 20 m<sup>2</sup> office

**Helideck**

Superpuma or similar

**Deck**

Working deck area 1090 m<sup>2</sup>  
 Anchor handling/towing winch  
 Aquamaster TAW 3000/3000 E

**Machinery**

Main engines  
 2 x Wärtsilä Diesel, Vasa 16V 32,  
 each 6000 kW  
 2 x Wärtsilä Diesel, Vasa 12V 32,  
 each 4500 kW  
 Generators  
 ABB Strömberg Drives  
 2 x HSG 1120 MP8, power 8.314 kVA,  
 Volt 6.3 KV, speed 750 rpm  
 2 x HSG 900 LR8, power 6.235 kVA,  
 Volt 6.3 KV, speed 750 rpm  
 Propellers  
 2 x HSSOL 18/1654, output 7.500 kW each,  
 ABB Strömberg Drives  
 2x Aquamater-Rauma US ARC 1,  
 7500 kW each,  
 FP propellers, variable RPM  
 Bow thrusters  
 3 x Brunvoll FV-80 LTC-2250, VP propellers  
 1.050 kW each

**Bollard pull** 234 tons

**Cranes (optional)**

Stb 30 tons/38 metre jib  
 Port 15 tons  
 A-frame 120 tons

**Navigation Equipment**

Robertson ECDIS Navigation System  
 Doppler speed log  
 Lorán C  
 GPS  
 Fiber optic gyros  
 Differential GPS Gyro.  
 Navintra Ecdis  
 Direction finder  
 Echo sounder  
 Facsimile recorder

**Communication Equipment**

1 x Skanti TRP 8400D MF/HF SSB, including  
 all GMDSS requirements  
 1 x Watch receiver  
 1 x Aero VHF. Helicopter communication  
 6 x VHF  
 1 x Navtex receiver  
 1 x Inmarsat B satellite comm. system  
 VSAT online satellite comm. system  
 3 x UHF walkie-talkie  
 3 x VHF walkie-talkie  
 2 x Freefloat EPRIB, 121,5 and 406 MHz  
 2 x Distress transponders, 96 Hz  
 Call signal OJAC

**Nordica****Dimensions**

Length 116.00 m  
 Beam 26.00 m  
 Draught 8.40 m max.  
 Built 1994  
 Max. speed 16 knots

**Class**

DnV + 1A1 – Tug Supply Vessel – SF – EO –  
 Icebreaker polar – 10, Dynpos, AUTR,  
 Helideck

**Dynpos**

Simrad ADP 702

**Accommodation**

82 persons  
 24 cabins for client use (47 persons)  
 Client's offices: 1 operation centre on 4th  
 bridge deck, 1 x 20 m<sup>2</sup> office

**Helideck**

Superpuma or similar

**Deck**

Working deck area 1090 m<sup>2</sup>  
 Anchor handling/towing winch  
 Aquamaster TAW 3000/3000 E

**Machinery**

Main engines  
 2 x Wärtsilä Diesel, Vasa 16V 32,  
 each 6000 kW  
 2 x Wärtsilä Diesel, Vasa 12V 32,  
 each 4500 kW  
 Generators  
 ABB Strömberg Drives  
 2 x HSG 1120 MP8, power 8.314 kVA,  
 Volt 6.3 KV, speed 750 rpm  
 2 x HSG 900 LR8, power 6.235 kVA,  
 Volt 6.3 KV, speed 750 rpm  
 Propellers  
 2 x HSSOL 18/1654, output 7.500 kW each,  
 ABB Strömberg Drives  
 2x Aquamater-Rauma US ARC 1,  
 7500 kW each,  
 FP propellers variable RPM  
 Bow thrusters  
 3 x Brunvoll FV-80 LTC-2250, VP propellers  
 1.050 kW each

**Bollard pull** 234 tons

**Main crane (optional)**

Lifting capacity 160 T/9 m  
 30 T/32 m

**Main winch**

Active Heave  
 Compensated  
 Constant Tension  
 Heave amplitude + 3,5 m double part  
 + 7 m single part

Operating depth 500 m–160 T (double part)

1000 m–80 T (single part)

Aux winch 10 T, 33 m,  
 Constant Tension

Tugger winches 2 x 4 T Constant Tension  
 Port 15 tons

**A-frame (optional)** 120 tons

**Navigation Equipment**

Navintra ECDIS Navigation System  
 Doppler speed log  
 Lorán C  
 GPS  
 Fiber Optic Gyros  
 Differential GPS Gyro.  
 Direction finder  
 Echo sounder  
 Facsimile recorder

**Communication Equipment**

1 x Skanti TRP 8400D MF/HF SSB, including  
 all GMDSS requirements  
 1 x Watch receiver

1 x Aero VHF. Helicopter communication  
 6 x VHF  
 1 x Navtex receiver  
 1 x Inmarsat B satellite comm. system  
 VSAT online satellite comm. system  
 3 x UHF walkie-talkie  
 3 x VHF walkie-talkie  
 2 x Freefloat EPRIB, 121,5 and 406 MHz  
 2 x Distress transponders, 96 Hz  
 Call signal OJAE

**Botnica****Dimensions**

Length 96.70 m  
 Beam 24.00 m  
 Draught 7.2 to 8.5 m  
 Built 1998  
 Max. speed 15 knots

**Class**

DnV + 1A1 – Supply Vessel – SF – EO –  
 Icebreaker Ice – 10,  
 Dynpos AUTRO, RPS  
 NMD Mobile offshore Units, DP UNIT, with  
 equipment class 3

**Dynpos**

Simrad SDP22 + SDP12 backup  
 2 x HIPAP combined SSBL/MJL BL  
 hydroacoustic system  
 2 x Sealex DPS DGPS combined  
 GPS/Glonass

**Accommodation**

72 persons  
 24 cabins for client use (45 pers.)  
 2 x client's office

**Helideck**

Superpuma or similar

**Deck**

Working deck area 1000 m<sup>2</sup>

**Machinery**

Main engines  
 12 x Caterpillar 3512B, 1257 kW, 1500 rpm  
 Main generators  
 6 x ABB-AMG 560, 2850 kVA, 3.3 kV 3 N,  
 50 Hz  
 Emergency generators  
 1 x Caterpillar 3406, 200 kW, 400 V, 3 N,  
 50 Hz  
 Main propulsion  
 Stern 2 x 5000 kW Azipod, FF  
 Bow thrusters  
 3 x Brunvoll tunnel, variable pitch á 1150 kW

**Bollard pull** 117 tons

**Cranes (optional)**

1 x Hydralift, 160 tons

1 x 15 tons

**Main cranes**

Lifting capacity 160 T/9 m  
 30 T/32 m

**Main winch**

Active Heave  
 Compensated  
 Constant Tension  
 Heave amplitude + 4 m double part  
 + 8 m single part

Operating Depth 550 m–160 T (double part)

1100 m–80 (single part)

Aux winch 10 T, 33 m,  
 Constant Tension

**Moonpool** 6.5 x 6.5 metres

**Navigation and communication equipment**

GMDSS  
 Inmarsat B  
 VSAT online satellite comm. system  
 Call signal OJAK

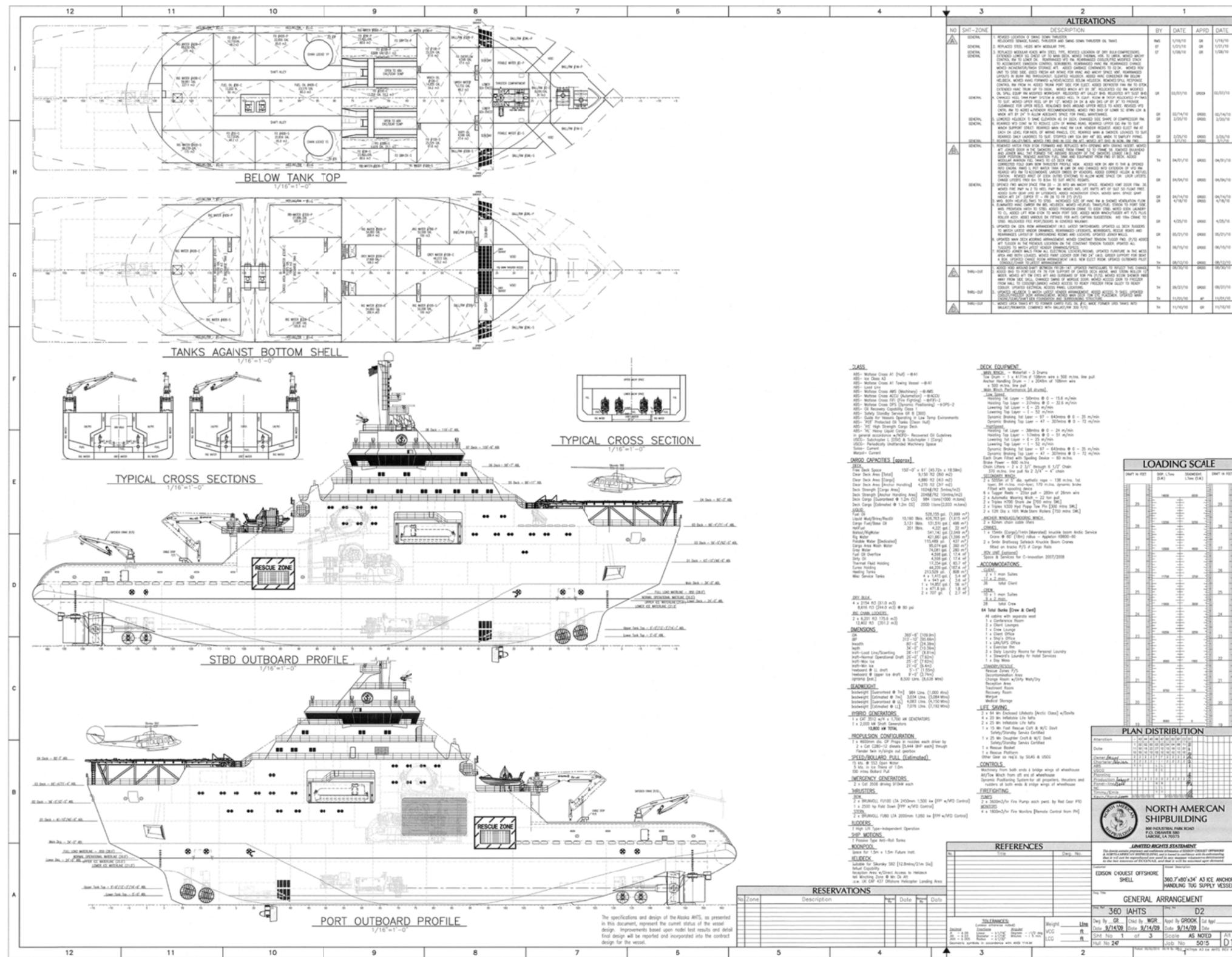
**Shipping Enterprise**

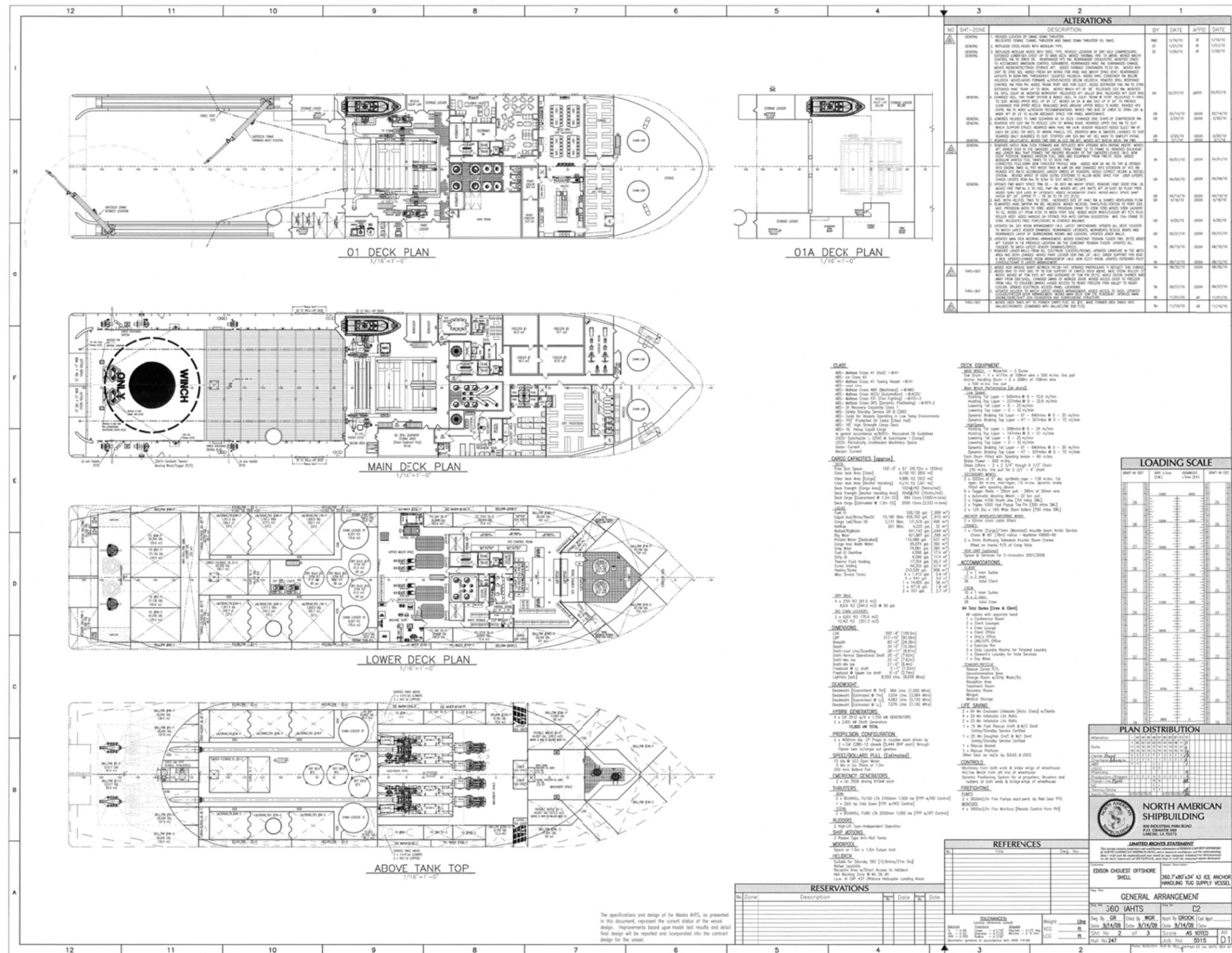
Valimotie 16  
 FI-00380 Helsinki, Finland  
 Phone +358 30 620 7000, fax +358 30 620 7030  
 e-mail: shipping@finstaship.fi  
 www.finstaship.fi

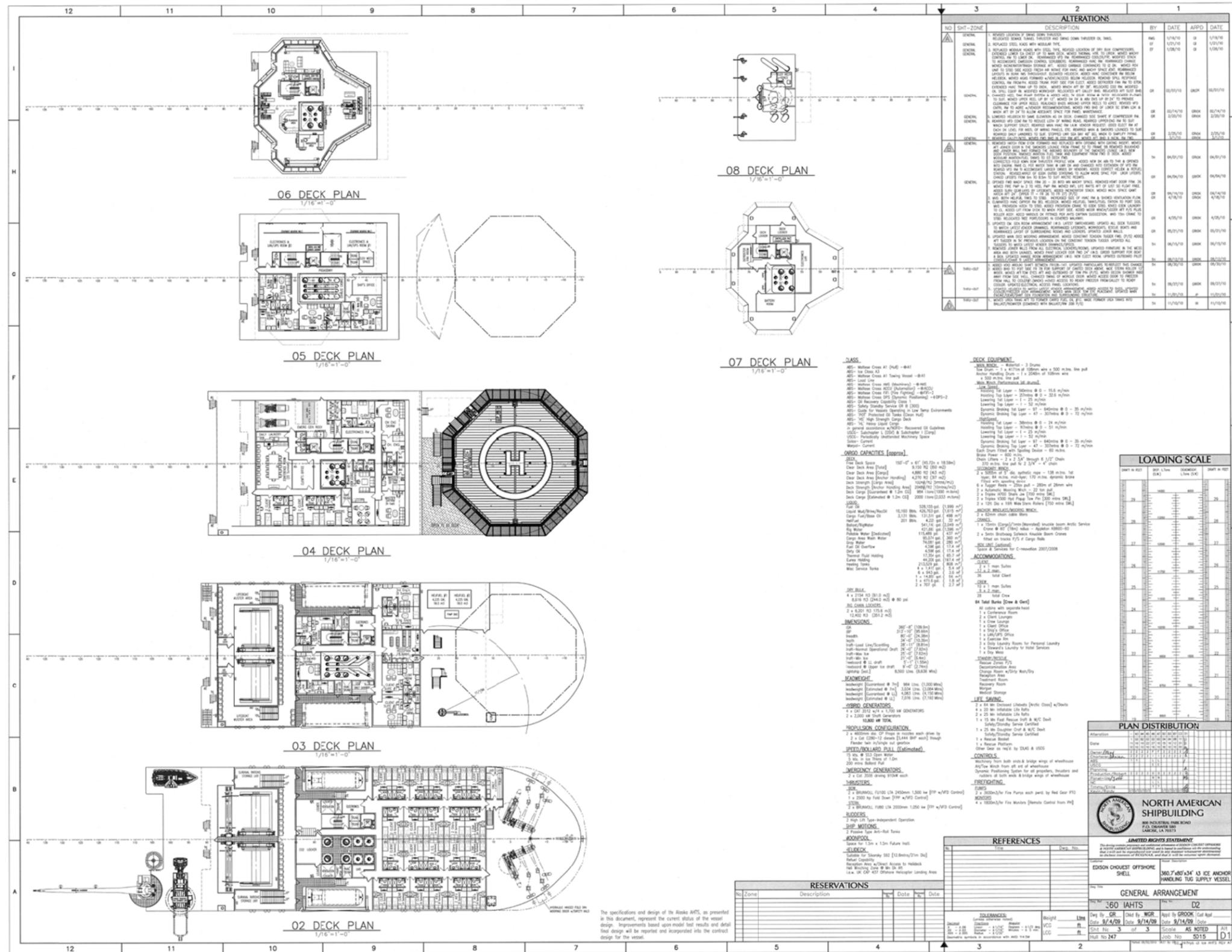
**GDV Maritime AS**

Brygga Næringssenter  
 Vikavæien 31, N-4817 His, Norway  
 Phone +47 3701 2260, fax +47 3701 2862  
 e-mail: maritime@gdv.no  
 www.gdv.no

HULL 247 Specifications







The specifications and design of the vessel are, as presented in this document, represent the current status of the vessel design. Improvements based upon model test results and detail design will be reported and incorporated into the contract design for the vessel.

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## **Attachment 3 – Shell Ice and Weather Advisory Center**

### **Operational Support Overview**

Safe and efficient offshore operations in the Arctic are contingent upon quality and timely ice and weather forecasts. Using state-of-the-art satellite technology, large areas of the Beaufort and Chukchi Seas are monitored remotely by the SIWAC to track and forecast movement of ice and make estimates of ice type and concentration.

Synthetic Aperture Radar (SAR) instruments on board the RADARSAT 2 satellite are contracted to acquire necessary images of sea ice over areas of interest several times per week. These images are transmitted to ground stations, processed, and made available for analysis within hours of acquisition. Interpretation of the ice edge and features are performed by experienced specialists using powerful mapping software to produce ice charts that are considerably more detailed than those available from national ice centers. These charts are then distributed to operational personnel and planning managers.

Knowing the location and composition of the ice at any given moment is a valuable tool. However, it is important to forecast how the ice may change over time. A complementary component of ice forecasting is quality weather information. Weather conditions in the Arctic are among the most severe on the planet and can change dramatically over a short time. The National Weather Service does not provide measurements and forecasts that sufficiently resolve the conditions over small areas or short time spans in the Arctic offshore. Therefore, dedicated meteorologists with Arctic forecasting experience are employed full time to produce accurate snapshots of the current conditions and reliable forecasts of weather conditions into the future.

Using the Global Forecast System (GFS) numerical weather model as a starting point, the meteorologists produce a high resolution grid in proprietary modeling software of weather parameters, such as atmospheric pressure, wind speed, and wave height that have been corrected based on local observations and weather instrumentation from Shell's vessels at sea, meteorological buoys, and coastal weather stations. The result is a model that accurately reflects current and forecast weather conditions over short distances in the Beaufort and Chukchi Seas, making marine operations and vessel transits safer and more responsible. Without this innovative forecast effort, weather products from other sources tend to describe the average or general conditions that one could expect over large areas, such as the entire U.S. Beaufort Sea, which results in reports of local conditions rarely matching what is forecast for the specific areas of operations.

The wind vectors, a set of points indicating the speed and direction of the wind distributed over the Beaufort and Chukchi Seas, and other output from the weather model are applied to the ice charts in the mapping software. This allows the ice analyst to assess the effect of wind and weather systems on the future movement and development of the ice.

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## Attachment 4 – Well suspension Options and Contingencies

In all the following well suspension scenarios, the assumption is that a determination has been made by the Shell Drilling Superintendent, the Shell Drilling Foreman, the Drilling Superintendent, the Drilling Vessel Master and the VMT that a hazard exists and the well should be suspended. The Shell Drilling Foreman and the Drilling Superintendent in conjunction with the Shell Drilling Engineer and the Shell Drilling Superintendent will have analyzed the trip time, borehole stability, well control issues, operational parameters, depth of hole, and time available to decide upon the contingency steps most appropriate for well securement, and a detailed procedure will have been worked up. The Shell Drilling Foreman then presents the procedure to the BOEMRE Field Representative aboard the drilling vessel for comment and concurrence.

### **Well Suspension Scenario 1 – Mechanical Plugging**

1. After determining that the well should be suspended under the assumptions described above, the Shell Drilling Foreman orders the Drilling Superintendent to stop all normal drilling operations and to commence circulating the hole.
2. The driller completes circulating at minimum a full “bottoms up.”
3. The drilling assembly is pulled out of the hole and a mechanical packer suitable to the last casing or liner size is made up on the bottom of the drill string.
4. The packer is tripped in the hole, set approximately 200 ft above the last casing or liner shoe depth and pressure tested.
5. Depending on actual water depth, sufficient pipe is pulled to enable having the end of the string 200 ft above the top of the packer when hung off in the wellhead via the hang-off sub (HOS).
6. A full-opening safety valve and an inside blowout preventer (BOP) are made up in the top of the drill pipe, and one additional joint is added above these valves. The HOS is installed in the top of this joint. (The full opening safety valve is left in the *open* position.)
7. The HOS assembly is run in the hole on drill pipe to land the HOS in the wellhead bowl.
8. The proper hydraulic fluid volume to actuate the BOP stack is confirmed by the Subsea Engineer and the system operating pressure is checked. Pipe rams in the BOP are closed on the HOS profile. The drill pipe is backed out from the HOS and the landing string is pulled from the riser. The blind/shear rams are closed and locked above the HOS. BOP failsafe valves are all left in the closed position.
9. The master bushings are removed and the riser spider is installed.
10. The diverter handling tool is made up and the diverter assembly is laid down.
11. The riser landing joint is made up into the slip joint inner barrel. The slip joint inner barrel is collapsed and the inner barrel is locked.
12. BOP stack functions are blocked, and the LMRP connector is unlocked.

13. The LMRP is pulled off the top of the BOP with the block motion compensator and riser tensioners.
14. Once the Shell Drilling Foreman has ascertained that the LMRP is released from the BOP, he advises the Drilling Vessel Master that he is free to initiate (or continue) mooring recovery and departure procedures.
15. The drill crew and Subsea Engineer pull the landing joint to surface. The landing joint, slip joint and riser are then layed down and the LMRP is secured on deck.
16. The Drilling Vessel Master confirms with the IA that the Ice Alert Level has reached “red” status (ice hazard is due to arrive within 6 hours of completing anticipated mooring recovery time). The Drilling Vessel Master advises the Drilling Superintendent to have the Subsea Engineer shear guidelines loose from the top of the BOP guideposts and to retrieve the lines to surface.
17. The drill floor and moonpool area are cleared and inspected in preparation for mobilizing the drilling vessel.
18. All decisions and supporting facts are recorded on the Daily Report and issued to the BOEMRE, SIWAC, and the normal distribution list.

### **Well Suspension Scenario 2 – Drillpipe Hang-off**

1. After determining that the well should be suspended, the Shell Drilling Foreman orders the Drilling Superintendent to stop all normal drilling operations and to commence circulating the hole.
2. The driller completes circulating at minimum a full “bottoms up.”
3. A pill of heavy, kill-weight drilling mud is mixed and spotted at total depth (TD), then the rig pulls the bottomhole assembly back into the casing such that the bit will be at least 200 ft above the shoe when the pipe has been hung off on the BOP rams.
4. After pulling the proper distance into the casing, a full-opening safety valve and an inside BOP are made up in the top of the drillpipe. (The full opening safety valve is left in the *open* position.) One additional joint of drillpipe is added above these valves and all connections made up properly.
5. Drill pipe is added to the top of the single, but the connection at the hang-off point is not fully tightened.
6. The drill string is lowered back into the well with the loose connection positioned just above a pipe ram.
7. The proper hydraulic fluid volume to actuate the BOP stack is confirmed by the Drilling Superintendent and the system operating pressure is checked. Pipe rams in the BOP just below the loose drill pipe connection are closed. The drill string is lowered until all string weight is resting on the closed pipe ram. The loose connection is backed off and the remaining drill pipe is pulled from the riser. The blind/shear rams are closed and locked above the backed off drill pipe. BOP failsafe valves are all left in the closed position.
8. Proceed with steps 9 through 18 as indicated in Scenario 1 above.

**Well Suspension Scenario 3 – Pull Out of Hole:**

It is assumed the wellbore is isolated from the formation (i.e., a casing string has been run and cemented, but not yet drilled out). A drilling assembly has been run in the hole to the top of cement.

1. After determining that the well should be suspended, the Shell Drilling Foreman orders the Drilling Superintendent to pull out of the hole.
2. After pulling out of the hole, the proper hydraulic fluid volume to actuate the BOP stack is confirmed by the Drilling Superintendent and the system operating pressure is checked.
3. The blind/shear rams are closed and locked. BOP fail-safe valves are left in the *closed* position.
4. Proceed with steps 9 through 18 as indicated in scenarios 1 and 2 above.

**Well Suspension Scenario 4 – Shearing Drill Pipe**

It is assumed the drill string is stuck and unable to be pulled from the hole.

1. After determining that the well should be suspended, the Shell Drilling Foreman orders the Drilling Superintendent to circulate at minimum a full “bottoms up” (assuming circulation is possible).
2. While circulating, the Drilling Superintendent and the Toolpusher calculate the location of the drill string tool joints below the rotary.
3. Once circulation is completed the proper hydraulic fluid volume to actuate the BOP stack is confirmed by the Drilling Superintendent and the system operating pressure is checked.
4. Pipe rams are closed under the nearest connection.
5. The drill string is slacked down until all string weight is resting on the closed ram or the string weight has been transferred to the point at which pipe is stuck.
6. The blind/shear rams are closed, shearing the drill string above the hang-off point. The blind/shear rams are locked closed. BOP fail-safe valves are left in the *closed* position.
7. The cut section of drill string is pulled to surface.
8. Proceed with steps 9 through 18 as indicated in scenarios 1 and 2 above.

**Well Suspension Scenario 5 – Dropping String**

It is assumed that there has been a failure to the rig’s hoisting capability; for example, failure of the drawworks to be able to pick up or position the string by lifting, and an approaching hazard has been identified. (Dropping the string is normally associated with being unable to shear the pipe across the shear rams, whether it is in the form of drill collars or heavywall casing, etc., and comes into play more often with a dynamically positioned vessel in a “drive off” situation.) Under most all circumstances with encroaching ice (barring mechanical failure), there is

adequate time to trip drill collars out of the hole if across the stack or to install a crossover and run casing past the stack on drill pipe and then utilize a conventional hang-off tool.)

1. After determining that the well should be suspended and the string dropped because of a mechanical failure, the Shell Drilling Foreman orders the Drilling Superintendent to circulate at minimum a full bottoms up (if circulation is possible).
2. Once circulation is completed the proper hydraulic fluid volume to actuate the BOP annulars is confirmed by the Drilling Superintendent and the system operating pressure is checked.
3. Operating pressure for both annulars is increased to maximum, and both annulars are closed.
4. The string is slacked down until all string weight is supported by the closed annular elements.
5. Elevators are unlatched.
6. Opening pressure is applied to the annulars, releasing their hold upon the string and allowing it to fall downhole.
7. The blind/shear rams are closed and locked. BOP failsafe valves are left in the closed position.
8. At this point, the BOP stack functions are blocked, and the LMRP connector is unlocked. The LMRP is pulled off the top of the BOP with the riser tensioners alone, allowing it to clear the BOP sufficiently to enable moving off location.
9. Note that in this circumstance the LMRP is left hanging until the hoisting capabilities of the rig have been restored. Movement off location will thus have to take water depth into consideration and clearance between the bottom of the LMRP and the seabed.
10. Once hoisting capabilities have been restored, proceed beginning with step 9 in the scenarios above to get the diverter and slip joint layed down and the LMRP secured on deck.

**Attachment B**  
**Marine Mammal Monitoring and Mitigation Program (4MP)**

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**MARINE MAMMAL MONITORING  
AND MITIGATION PLAN**

for

**Exploration Drilling of Selected Lease Areas  
in Camden Bay in the Alaskan Beaufort Sea in 2012**



**Shell Offshore Inc.**

May 2011



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**Tables**

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## ACRONYMS

~	approximately
°	degree
°C	degrees Celsius
°T	degrees True North
4MP	Marine Mammal Monitoring and Mitigation Plan
μPa	micropascal
ADF&G	Alaska Department of Fish and Game
AEWC	Alaska Eskimo Whaling Commission
BOEMRE	Bureau of Ocean Energy Management, Regulation and Enforcement
CDs	compact discs
cm <sup>3</sup>	cubic centimeters
Com Center	Communications and Call Centers
COPAC	Coastal and Offshore Pacific Corporation
DASAR	Directional Autonomous Seafloor Acoustic Recorder
dB	decibel(s)
<i>Discoverer</i>	Motor Vessel <i>Noble Discoverer</i>
GPS	Global Positioning System
ft	feet
ft <sup>2</sup>	square feet
hr	hour
Hz	Hertz
IHA	Incidental Harassment Authorization
in <sup>3</sup>	cubic inches
kHz	kilohertz
km	kilometer(s)
km <sup>2</sup>	kilometers squared
km/hr	kilometers per hour
lb	pounds
Leq	noise equivalent level
LGL	LGL Alaska Research Associates, Inc.
LOA	Letter of Authorization
m	meter(s)
m <sup>2</sup>	square meters
mi	mile(s)
MMPA	Marine Mammal Protection Act
MMO	Marine Mammal Observer
MMS	Minerals Management Service
NMFS	National Marine Fisheries Service
NMML	National Marine Mammal Laboratory
NSB	North Slope Borough
NVD	night-vision device
psi	pounds per square inch
rms	root mean square
Shell	Shell Offshore Inc.
Twin Otter	DeHavilland Twin Otter
USFWS	U.S. Fish and Wildlife Service
VSI	Vertical Seismic Imager
VSP	vertical seismic profile
ZVSP	zero-offset vertical seismic profile

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## INTRODUCTION

Shell Offshore Inc. (Shell) submits the following Marine Mammal Monitoring and Mitigation Program (4MP) for exploration drilling activities in Camden Bay in the Beaufort Sea during the 2012 open-water season. The 4MP developed for Shell's exploration drilling program is designed to protect the marine mammal resources in the area, fulfill reporting obligations to the Bureau of Ocean Energy Management, Regulation and Enforcement (BOEMRE), the National Marine Fisheries Service (NMFS), and the U.S. Fish and Wildlife Service (USFWS), and establish a means for gathering additional data on marine mammals for future operations planning.

Shell plans to conduct exploration drilling within existing lease holdings in Camden Bay of the Beaufort Sea. One drilling vessel, either the conical drilling unit *Kulluk* (*Kulluk*) owned by Shell, or the drillship Motor Vessel (*M/V*) *Noble Discoverer* (*Discoverer*) owned and operated by Noble Drilling will be used in the Beaufort Sea during the 2012 exploration drilling activities, but not both. The *Kulluk* is an ice-class drilling platform designed, engineered and constructed to safely operate in the Arctic. The *Discoverer* is an ice-class drillship also designed, engineered and constructed to safely operate in the Arctic. In addition to the drilling equipment, several support vessels will be used. The support vessels will include tugs and barges, a primary ice management vessel, an anchor handler/ice management vessel, resupply vessels, and oil spill response vessels.

At the completion of each well a zero-offset vertical seismic profile (ZVSP) likely will be conducted. During ZVSP surveys, an airgun array is deployed adjacent to the drillship, while receivers are placed (temporarily anchored) in the wellbore. The sound source (airgun array) is fired repeatedly, and the reflected sonic waves are recorded by receivers (geophones) located in the wellbore. The survey will last 10-14 hours as the receivers are moved through the length of the wellbore and the airguns are fired 5-7 times after each movement. The purpose of the ZVSP is to gather geophysical information at various depths, which can then be used to tie-in or ground-truth geophysical information from the previous seismic surveys with geological data collected within the wellbore.

Shell's 4MP is a combination of active monitoring of the area of operations and the implementation of mitigation measures designed to minimize project impacts to marine resources. Monitoring will provide information on the numbers of marine mammals potentially affected by the exploration operations and facilitate real time mitigation to prevent injury of marine mammals by industrial sounds or activities. These goals will be accomplished by conducting vessel-based, aerial, and acoustic monitoring programs to document the potential reactions of marine mammals in the area to the various sounds and activities and to characterize the sounds produced by the exploration drilling activities, support vessels, and ZVSP.

Monitoring during exploration drilling activity and periods when exploration drilling activity is not occurring will provide information on the numbers of marine mammals potentially affected by the exploration operations and facilitate real time mitigation to prevent impacts to marine mammals by industrial sounds or activities. Vessel-based marine mammal observers (MMOs) onboard the *Kulluk* or *Discoverer* and all support vessels will record the numbers and species of marine mammals observed in the exploration area and any observable reaction of marine mammals to the exploratory activities. Aerial monitoring, designed primarily for detecting

cetaceans, will be used to identify any large scale distributional changes of cetaceans relative to the activities and add to the existing database on the abundance and distribution of observed species. The acoustic program will characterize the sounds produced by the exploration drilling activities and support vessels, and document the potential reactions of marine mammals in the area, particularly bowhead whales, to those sounds and activities.

## **VESSEL-BASED MARINE MAMMAL MONITORING PROGRAM**

### **Introduction**

The vessel-based operations of Shell's 4MP are designed to meet the requirements of the Incidental Harassment Authorization (IHA) and Letter of Authorization (LOA) requested from NMFS and USFWS, respectively, for this project, and to meet any other stipulated agreements between Shell and other agencies or groups. The objectives of the program will be:

- to ensure that disturbance to marine mammals and subsistence hunts is minimized and all permit stipulations are followed;
- to document the effects of the proposed exploratory activities on marine mammals; and
- to collect data on the occurrence and distribution of marine mammals in the study area.

The 4MP will be implemented by a team of experienced MMOs, including both biologists and Inupiat personnel. MMOs will be stationed aboard the *Kulluk* or *Discoverer* and associated support vessels throughout the exploration drilling period. Reporting of the results of the vessel-based monitoring program will include the estimation of the number of "takes" as stipulated in the IHA and LOA.

The vessel-based portion of Shell's 4MP will be required to support the exploration drilling activities in the eastern Alaskan Beaufort Sea. The dates and operating areas will depend upon ice and weather conditions, along with Shell's arrangements with agencies and stakeholders. Exploration drilling activities are expected to begin July 10 through October 31, 2012. Vessel-based monitoring for marine mammals will begin 5–7 days before exploration drilling begins (i.e. anchors are deployed); will continue throughout the period of exploration drilling operations, and will cease 5-7 days after exploration drilling stops (i.e. anchors are pulled) to comply with anticipated provisions in the IHA and LOA that Shell expects to receive from NMFS and USFWS.

The vessel-based work will provide:

- the basis for real-time mitigation, if necessary, as required by the various permits that Shell receives;
- information needed to estimate the number of "takes" of marine mammals by harassment, which must be reported to NMFS and USFWS;
- data on the occurrence, distribution, and activities of marine mammals in the areas where the exploration drilling program is conducted;
- information to compare the distances, distributions, behavior, and movements of marine mammals relative to the *Kulluk* or *Discoverer* at times with and without exploration drilling activity;

- a communication channel to coastal communities including Inupiat whalers; and
- employment and capacity building for local residents, with one objective being to develop a larger pool of experienced Inupiat MMOs.

The 4MP will be operated and administered consistent with monitoring programs conducted during seismic and shallow hazards surveys in 2006–2010 or such alternative requirements as may be specified in the IHA and LOA received from NMFS and USFWS, respectively for this project. Any other stipulated agreements between Shell and agencies or groups such as BOEMRE, the North Slope Borough (NSB), and the Alaska Eskimo Whaling Commission (AEWC) will also be fully incorporated. All MMOs will be provided training through a program approved by NMFS, USFWS (if so stipulated) and Shell, as described later. At least one observer on each vessel will be an Inupiat who will have the additional responsibility of communicating with coastal communities and directly with Inupiat whalers during the whaling season. Details of the vessel-based marine mammal monitoring program are described below.

### **Mitigation Measures During Exploration Drilling Activities and Zero-Offset Vertical Seismic Profile Surveys**

Shell's planned offshore exploration drilling program incorporates both design features and operational procedures for minimizing potential impacts on marine mammals and on subsistence hunts. The design features and operational procedures of the mitigation measures have been described in the IHA (Section 12 of the IHA application to which this 4MP is appended) and LOA applications submitted to NMFS and USFWS respectively, and are not repeated in entirety here. Survey design features include:

- timing and locating some exploration drilling and support activities to avoid interference with the annual fall bowhead whale hunts from Kaktovik, Nuiqsut (Cross Island), and Barrow;
- identifying transit routes and timing to avoid other subsistence use areas and communicate with coastal communities before operating in or passing through these areas;
- conducting pre-season sound propagation modeling to establish the appropriate safety and behavioral radii;
- vessel-based monitoring to implement appropriate mitigation if necessary, and to determine the effects of project activities on marine mammals;
- acoustic monitoring of the Kulluk and vessel sounds and marine mammal vocalizations; and
- seismic activity mitigation measures during performance of ZVSP surveys.

The potential disturbance of marine mammals during operations will be minimized further through the implementation of several vessel-based mitigation measures (see Section 12 of the IHA application to which this 4MP is appended) if mitigation becomes necessary.

### ***Safety and Disturbance Zones***

Under current NMFS guidelines (e.g., NMFS 2000), “safety radii” for marine mammals around industrial sound sources are customarily defined as the distances within which received sound levels are  $\geq 180$  decibels (dB) re 1 micropascal ( $\mu\text{Pa}$ ) root mean square (rms) for cetaceans and  $\geq 190$  dB re 1  $\mu\text{Pa}$  rms for pinnipeds. These safety criteria are based on an assumption that sound energy received at lower received levels will not injure these animals or impair their hearing abilities, but that higher received levels might have some such effects. Disturbance or behavioral effects to marine mammals from underwater sound may occur after exposure to sound at distances greater than the safety radii (Richardson et al. 1995). NMFS assumes that marine mammals exposed to underwater impulsive sounds at received levels  $\geq 160$  dB rms have the potential to exhibit behavioral reactions great enough to meet the definition of “harassment” in the Marine Mammal Protection Act (MMPA). For continuous sounds NMFS has established a similar disturbance threshold at  $\geq 120$  dB rms.

### ***Exploration Drilling Activities***

Initial safety and behavioral radii for the sound levels produced by the exploration drilling activities have been modeled. These radii will be used for mitigation purposes should they be necessary until direct measurements are available early during the exploration activities.

Sounds from the *Kulluk* have previously been measured in the Beaufort Sea (Greene 1987, Miles et al. 1987). The back-propagated source level estimated by Greene (1987) from these measurements was 185 dB re 1  $\mu\text{Pa}$  at 1 meter (m). These measurements were used as a proxy for modeling the sounds likely to be produced by exploration drilling activities from the *Kulluk*. Based on the models, source levels from exploration drilling are expected to fall below 180 dB rms approximately ( $\sim$ )43 ft (13 m) from the *Kulluk*. The 160 dB rms radius would extend  $\sim$ 180 ft (55 m) from the *Kulluk* and the 120 dB rms radius would be expected to be  $\sim$ 8 mi ( $\sim$ 13 kilometer [km]) from the *Kulluk*.

Sounds from the *Discoverer* have not previously been measured in the Arctic. However, measurements of sounds produced by the *Discoverer* were made in the South China Sea in 2009 (Austin and Warner 2010). The results of those measurements were used to model the sound propagation from the *Discoverer* (including a nearby support vessel) at planned drilling locations in the Chukchi and Beaufort seas (Warner and Hannay 2011). Broadband source levels of sounds produced by the *Discoverer* varied by activity and direction from the ship, but were generally between 177 and 185 dB re 1  $\mu\text{Pa}$  at 1 m rms (Austin and Warner 2010). Propagation modeling at the Sivulliq and Torpedo prospects yielded somewhat different results, with sounds expected to propagate shorter distances at the Sivulliq site (Warner and Hannay 2011). As a precautionary approach, the larger distance to which sounds  $\geq 120$  dB (2.06 mi [3.32 km]) are expected to propagate at the Torpedo site have been used to estimate the area of water potentially exposed at both locations. The estimated 2.06 mi (3.32 km) distance was multiplied by 1.5 (= 3.09 mi [4.98 km]) as a further precautionary measure before calculating the total area that may be exposed to continuous sounds  $\geq 120$  dB re 1  $\mu\text{Pa}$  rms by the *Discoverer* at each drill site. Assuming one well will be drilled in each season (summer and fall), the total area of water ensonified to  $\geq 120$  dB rms in each season would be 30  $\text{mi}^2$  (78 square kilometers [ $\text{km}^2$ ]).

The source levels noted above for exploration drilling and support vessel activities are not high enough to cause a temporary reduction in hearing sensitivity or permanent hearing damage to marine mammals. Consequently, mitigation as described for seismic activities including ramp ups, power downs, and shut downs should not be necessary for exploration drilling activities, but will be employed during the ZVSP survey described below. Shell plans to use MMOs onboard the *Kulluk* or *Discoverer* and the various support vessels to monitor marine mammals and their responses to industry activities and to initiate mitigation measures should in-field measurements of the operations indicate conditions represent a threat to the health and well-being of marine mammals.

### **ZVSP Surveys**

The sound source to be used by Shell for the ZVSP survey in 2012 is the ITAGA eight-airgun array, which consists of four 150 cubic inches ( $\text{in}^3$ ) (2,458 cubic meters [ $\text{cm}^3$ ]) airguns and four 40  $\text{in}^3$  (655  $\text{cm}^3$ ) airguns. These airguns can be activated in any combination and Shell would utilize the minimum airgun volume required to obtain an acceptable signal. A similar airgun source was used in the region in 2008 during the BP Liberty seismic survey. Preseason estimates of the propagation of airgun sounds from the ITAGA vertical seismic profiler (VSP) sound source have been estimated based on the measurements of the seismic source reported in BP's 90-day report (Aerts et al. 2008). The BP liberty source was also an eight-airgun array, but had a slightly larger total volume of 880  $\text{in}^3$  (14,421  $\text{cm}^3$ ). Because the number of airguns is the same, and the difference in total volume only results in an estimated 0.4 dB decrease in the source level of the ZVSP source, the 100<sup>th</sup> percentile propagation model from the measurements of the BP Liberty source is almost directly applicable. However, the BP Liberty source was towed at a depth of 5.9 ft (1.8 m), while the ZVSP source will be lowered to a target depth of 13 ft (4 m) (from 10-23 ft [3-7 m]). The lower depth of the ZVSP source has the potential to increase the source strength by as much as 6 dB. Thus, the constant term in the propagation equation from the BP Liberty source has been increased from 235.4 to 241.4 while the remainder of the equation ( $-18 \cdot \text{LogR} - 0.0047 \cdot R$ ) has been left unchanged. This equation results in the following estimated distances to maximum received levels: 190 dB = 1,719 ft (524 m); 180 dB = 4,068 ft (1,240 m); 160 dB = 12,041 ft (3,670 m); 120 dB = 34,449 ft (10,500 m).

MMOs on the *Kulluk* or *Discoverer* will initially use these estimated safety radii for monitoring and mitigation purposes. An acoustics contractor will perform direct measurements of the received levels of underwater sound versus distance and direction from the ZVSP array using calibrated hydrophones. The acoustic data will be analyzed as quickly as reasonably practicable (within 5 days) in the field and used to verify (and if necessary adjust) the safety distances. The mitigation measures to be implemented will include pre-ramp up watches, ramp ups, power downs and shut downs as described below.

### **Ramp Ups**

A ramp up of an airgun array provides a gradual increase in sound levels, and involves a step-wise increase in the number and total volume of airguns firing until the full volume is achieved. The purpose of a ramp up (or "soft start") is to "warn" cetaceans and pinnipeds in the vicinity of the airguns and to provide the time for them to leave the area and thus avoid any potential injury or impairment of their hearing abilities.

During the proposed ZVSP surveys, the operator will ramp up the airgun arrays slowly. Full ramp ups (i.e., from a cold start when no airguns have been firing) will begin by firing a single airgun in the array. A full ramp up will not begin until there has been a minimum of 30 minutes of observation of the safety zone by MMOs to assure that no marine mammals are present. The entire safety zone must be visible during the 30-minute lead-in to a full ramp up. If the entire safety zone is not visible, then ramp up from a cold start cannot begin. If a marine mammal(s) is sighted within the safety zone during the 30-minute watch prior to ramp up, ramp up will be delayed until the marine mammal(s) is sighted outside of the safety zone or the animal(s) is not sighted for at least 15-30 minutes: 15 minutes for small odontocetes and pinnipeds, or 30 minutes for baleen whales and large odontocetes.

### Power Downs and Shut Downs

A power down is the immediate reduction in the number of operating energy sources from all firing to some smaller number. A shut down is the immediate cessation of firing of all energy sources. The arrays will be immediately powered down whenever a marine mammal is sighted approaching close to or within the applicable safety zone of the full arrays, but is outside the applicable safety zone of the single source. If a marine mammal is sighted within the applicable safety zone of the single energy source, the entire array will be shut down (i.e., no sources firing).

### **Marine Mammal Observers**

Vessel-based monitoring for marine mammals will be done by trained MMOs throughout the period of exploration drilling operations to comply with expected provisions in the IHA and LOA that Shell receives. The observers will monitor the occurrence and behavior of marine mammals near the *Kulluk* or *Discoverer* during all daylight periods during operation, and during most daylight periods when exploration drilling operations are not occurring. MMO duties will include watching for and identifying marine mammals; recording their numbers, distances, and reactions to the exploration drilling operations; and documenting “take by harassment” as defined by NMFS.

### ***Number of Observers***

A sufficient number of MMOs will be required onboard each vessel to meet the following criteria:

- 100% monitoring coverage during all periods of exploration drilling operations in daylight;
- maximum of 4 consecutive hours on watch per MMO; and
- maximum of ~12 hours of watch time per day per MMO.

MMO teams will consist of Inupiat observers and experienced field biologists. An experienced field crew leader and an Inupiat observer will be members of every MMO team onboard the *Kulluk* or *Discoverer* and each support vessel during the exploration drilling program. The total number of MMOs may decrease later in the season as the duration of daylight decreases assuming NMFS does not require continuous nighttime monitoring. Inupiat MMOs will also function as Native language communicators with hunters and whaling crews and with the Communications and Call Centers (Com Centers) in Native villages along the Beaufort Sea coast.

***Crew Rotation***

Shell anticipates that there will be provision for crew rotation at least every three to six weeks to avoid observer fatigue. During crew rotations detailed hand-over notes will be provided to incoming crew leader by the outgoing leader. Other communications such as email, fax, and/or phone communication between the current and oncoming crew leaders during each rotation will also occur when possible. In the event of an unexpected crew change Shell will facilitate such communications to insure monitoring consistency among shifts.

***Observer Qualifications and Training***

Crew leaders and most other biologists serving as observers in 2012 will be individuals with experience as observers during one or more of the 1996-2010 seismic or shallow hazards monitoring projects in Alaska, the Canadian Beaufort, or other offshore areas in recent years.

Biologist-observers will have previous marine mammal observation experience, and field crew leaders will be highly experienced with previous vessel-based marine mammal monitoring projects. Resumés for those individuals will be provided to NMFS so that NMFS (and USFWS if so stipulated) can review and accept their qualifications. Inupiat observers will be experienced in the region, familiar with the marine mammals of the area, and complete a NMFS approved (and USFWS if so stipulated) observer training course designed to familiarize individuals with monitoring and data collection procedures. A MMO handbook, adapted for the specifics of the planned Shell exploration drilling program, will be prepared and distributed beforehand to all MMOs (see below).

Most observers, including Inupiat observers, will also complete a two-day training and refresher session on marine mammal monitoring, to be conducted shortly before the anticipated start of the 2012 drilling season. Any exceptions will have or receive equivalent experience or training. The training session(s) will be conducted by qualified marine mammalogists with extensive crew-leader experience during previous vessel-based seismic monitoring programs.

Primary objectives of the training include:

- review of the 4MP for this project, including any amendments specified by NMFS or USFWS in the IHA or LOA, by BOEMRE, or by other agreements in which Shell may elect to participate;
- review of marine mammal sighting, identification (photographs and videos), and distance estimation methods including any amendments specified by NMFS or USFWS in the 2012 IHA or LOA;
- review of operation of specialized equipment (reticle binoculars, night vision devices, and GPS system);
- review of, and classroom practice with, data recording and data entry systems, including procedures for recording data on mammal sightings, monitoring operations, environmental conditions, and entry error control. These procedures will be implemented through use of a customized computer database and laptop computers; and
- review of the specific tasks of the Inupiat Communicator.

### **MMO Handbook**

A MMO Handbook will be prepared for Shell's monitoring program. The handbook will contain maps, illustrations, and photographs, as well as copies of important documents, and descriptive text intended to provide guidance and reference information to trained MMOs. The following topics will be covered in the MMO Handbook for the Shell project:

- summary overview description of the project, marine mammals and underwater noise, the 4MP (vessel-based, aerial, acoustic measurements, special studies), the NMFS IHA and USFWS LOA and other regulations/permits/agencies, the MMPA;
- monitoring and mitigation objectives and procedures, initial safety radii;
- responsibilities of staff and crew regarding the 4MP;
- instructions for ship crew regarding the 4MP;
- data recording procedures: codes and coding instructions, common coding mistakes, electronic database; navigational, marine physical, field data sheet;
- use of specialized field equipment (reticle binoculars, night-vision devices (NVDs), laser rangefinders);
- reticle binocular distance scale;
- table of wind speed, Beaufort wind force, and sea state codes;
- data storage and backup procedures;
- list of species that might be encountered: identification, natural history;
- safety precautions while onboard;
- crew and/or personnel discord; conflict resolution among MMOs and crew;
- drug and alcohol policy and testing;
- scheduling of cruises and watches;
- communications;
- list of field gear that will be provided;
- suggested list of personal items to pack;
- suggested literature, or literature cited; and
- copies of the NMFS IHA and USFWS LOA when available.

### **Monitoring Methodology**

The observer(s) will watch for marine mammals from the best available vantage point on the *Kulluk* or *Discoverer* and support vessels. Ideally this vantage point is an elevated stable platform from which the MMO has an unobstructed 360 degree (°) view of the water. The observer(s) will scan systematically with the unaided eye and 7 × 50 reticle binoculars, supplemented with 20 x 60 image-stabilized Zeiss Binoculars or Fujinon 25 x 150 "Big-eye" binoculars and night-vision equipment when needed (see below). Personnel on the bridge will assist the MMOs in watching for marine mammals. New or inexperienced MMOs will be paired

with an experienced MMO or experienced field biologist so that the quality of marine mammal observations and data recording is kept consistent.

Information to be recorded by MMOs will include the same types of information that were recorded during recent monitoring programs associated with Industry activity in the Arctic (e.g. Ireland et al. 2009). When a mammal sighting is made, the following information about the sighting will be carefully and accurately recorded:

- Species, group size, age/size/sex categories (if determinable);
- Physical description of features that were observed or determined not to be present in the case of unknown or unidentified animals;
- Behavior when first sighted and after initial sighting, heading (if consistent);
- Bearing and distance from observer, apparent reaction to activities (e.g., none, avoidance, approach, paralleling, etc.), closest point of approach, and behavioral pace;
- Time, location, speed, and activity of the vessel, sea state, ice cover, visibility, and sun glare; and
- The positions of other vessel(s) in the vicinity of the observer location.

The drilling vessel, or vessel's position, speed of support vessels, and water temperature, water depth, sea state, ice cover, visibility, and sun glare will also be recorded at the start and end of each observation watch, every 30 minute during a watch, and whenever there is a change in any of those variables.

Distances to nearby marine mammals will be estimated with binoculars (Fujinon 7 × 50 binoculars) containing a reticle to measure the vertical angle of the line of sight to the animal relative to the horizon.

Observers may use a laser rangefinder to test and improve their abilities for visually estimating distances to objects in the water. However, previous experience showed that a Class 1 eye-safe device was not able to measure distances to seals more than about 230 feet (ft) (70 meters [m]) away. The device was very useful in improving the distance estimation abilities of the observers at distances up to about 1,968 ft (600 m)—the maximum range at which the device could measure distances to highly reflective objects such as other vessels. Humans observing objects of more-or-less known size via a standard observation protocol, in this case from a standard height above water, quickly become able to estimate distances within about ±20% when given immediate feedback about actual distances during training.

### ***Monitoring At Night and In Poor Visibility***

Night-vision equipment ("Generation 3" binocular image intensifiers, or equivalent units) will be available for use when/if needed. Past experience with NVDs in the Beaufort Sea and elsewhere has indicated that NVDs are not nearly as effective as visual observation during daylight hours (e.g., Harris et al. 1997, 1998; Moulton and Lawson 2002).

### ***Specialized Field Equipment***

Shell will provide or arrange for the following specialized field equipment for use by the onboard MMOs: reticle binoculars, Big-eye binoculars, global positioning system (GPS) unit, laptop computers, night vision binoculars, and possibly digital still and digital video cameras.

### ***Field Data-Recording, Verification, Handling, and Security***

The observers on the *Kulluk* or *Discoverer* and support vessels will record their observations onto datasheets or directly into handheld computers. During periods between watches and periods when operations are suspended, those data will be entered into a laptop computer running a custom computer database. The accuracy of the data entry will be verified in the field by computerized validity checks as the data are entered, and by subsequent manual checking of the database printouts. These procedures will allow initial summaries of data to be prepared during and shortly after the field season, and will facilitate transfer of the data to statistical, graphical or other programs for further processing. Quality control of the data will be facilitated by (1) the start-of-season training session, (2) subsequent supervision by the onboard field crew leader, and (3) ongoing data checks during the field season.

The data will be backed up regularly onto compact disks (CDs) and/or USB disks, and stored at separate locations on the vessel. If possible, data sheets will be photocopied daily during the field season. Data will be secured further by having data sheets and backup data CDs carried back to the Anchorage office during crew rotations.

In addition to routine MMO duties, Inupiat observers will be encouraged to record comments about their observations into the “comment” field in the database. Copies of these records will be available to the Inupiat observers for reference if they wish to prepare a statement about their observations. If prepared, this statement would be included in the 90-day and final reports documenting the monitoring work.

### ***Field Reports***

Throughout the exploration drilling program, the observers will prepare a report each day or at such other interval as the IHA, LOA, or Shell may require summarizing the recent results of the monitoring program. The reports will summarize the species and numbers of marine mammals sighted. These reports will be provided to NMFS, USFWS, BOEMRE and Shell as required.

## **Reporting**

The results of the 2012 vessel-based monitoring, including estimates of “take by harassment”, will be presented in the 90-day and final technical report(s). Reporting will address the requirements established by NMFS in the IHA, and USFWS in the LOA (if so stipulated).

The technical report(s) will include:

- summaries of monitoring effort: total hours, total distances, and distribution of marine mammals through the study period accounting for sea state and other factors affecting visibility and detectability of marine mammals;

- analyses of the effects of various factors influencing detectability of marine mammals including sea state, number of observers, and fog/glare;
- species composition, occurrence, and distribution of marine mammal sightings including date, water depth, numbers, age/size/gender categories, group sizes, and ice cover;
- analyses of the effects of exploration drilling operations:
  - sighting rates of marine mammals during periods with and without exploration drilling activities (and other variables that could affect detectability);
  - initial sighting distances versus drilling state;
  - closest point of approach versus drilling state;
  - observed behaviors and types of movements versus drilling state;
  - numbers of sightings/individuals seen versus drilling state;
  - distribution around the drillship and support vessels versus drilling state;
  - estimates of “take by harassment”.

Shell will consider requests for data collected during the marine mammal monitoring only after the data have been put through a quality control/quality assurance program. Such requests may include incorporating the data with other companies’ data and/or integrating the raw data with data from other marine mammal studies.

## **AERIAL SURVEY PROGRAM**

### **Objectives**

An aerial survey program will be conducted in support of the exploration drilling program in the Beaufort Sea during the summer and fall of 2012. The exploration drilling program may start in the Beaufort Sea as early as 10 July 2012. The objectives of the aerial survey will be:

- to advise operating vessels as to the presence of marine mammals (primarily cetaceans) in the general area of operation;
- to collect and report data on the distribution, numbers, movement and behavior of marine mammals near the exploration drilling operations with special emphasis on migrating bowhead whales;
- to support regulatory reporting related to the estimation of impacts of exploration drilling operations on marine mammals;
- to investigate potential deflection of bowhead whales during migration by documenting how far east of exploration drilling operations a deflection may occur, and where whales return to normal migration patterns west of the operations; and
- to monitor the accessibility of bowhead whales to Inupiat hunters.

### **Safety**

Safety will be of primary importance in all decisions regarding the planning and conduct of the aerial surveys. Safety-related considerations during planning have included choice of aircraft,

aircraft operator, and pilots; outfitting of the aircraft; lengths and locations of survey grids; and safety training. Safety during aerial survey operations will include careful and judicious consideration of weather and avoidance of flight in questionable conditions. Although the pilots will have ultimate authority, the aerial survey crew will also be required to make their own judgments and to avoid flying in questionable circumstances. To this end, the aerial survey teams will have a crew leader with experience conducting this type of survey in arctic conditions, and will have the authority to cancel or (in agreement with the pilots) amend flight operations as necessary for safety.

### **Selection of Aircraft**

Specially-outfitted deHavilland Twin Otter (Twin Otter) aircraft are expected to be the survey aircraft and have an excellent safety record. These aircraft will be specially modified for survey work and have been used extensively by NMFS, Alaska Department of Fish and Game (ADF&G), Coastal and Offshore Pacific Corporation (COPAC), NSB, and LGL during many marine mammal projects in Alaska, including Industry funded projects as recent as the 2006–2008, and 2010 seasons. The aircraft will be provided with a comprehensive set of survival equipment appropriate to offshore surveys in the Arctic. For safety reasons, the aircraft will be operated with two pilots.

### **Survey Procedures**

#### ***Flight and Observation Procedures***

Aerial survey flights will begin 5 to 7 days before operations at the exploration well sites get underway. Surveys will be flown daily throughout exploration drilling operations, weather and flight conditions permitting, and continued for 5 to 7 days after all activities at the site have ended.

The aerial survey procedures will be generally consistent with those used during earlier industry studies (Davis et al. 1985; Johnson et al. 1986; Evans et al. 1987; Miller et al. 1997, 1998, 1999, 2002; Patterson 2007). This will facilitate comparison and pooling of data where appropriate. However, the specific survey grids will be tailored to Shell's operations. During the 2012 drilling season Shell will coordinate and cooperate with the aerial surveys conducted by BOEMRE/NMFS and any other groups conducting surveys in the same region.

It is understood that the timing, duration, and location (between identified well sites) of Shell's exploration drilling operations are subject to change as a result of unpredictable weather and ice conditions, as well as regulatory and stakeholder concerns. The aerial survey design is flexible and able to adapt at short notice to changes in the operations.

For marine mammal monitoring flights, aircraft will be flown at ~120 knots ground speed and usually at an altitude of 1,000 ft (305 m). Flying at a survey speed of 120 knots greatly increases the amount of area that can be surveyed, given aircraft limitations, with minimal effect on the ability to detect bowhead whales. Surveys in the Beaufort Sea are directed at bowhead whales and an altitude of 900-1,000 ft (274-305 m) is the lowest survey altitude that can normally be flown without concern about potential aircraft disturbance; it is also the altitude recommended by NMFS for IHA monitoring efforts for bowhead whales. Aerial surveys at an altitude of 1,000 ft

(305 m) do not provide much information about seals but are suitable for both bowhead and beluga whales. The need for a 900-1000+ ft cloud ceiling will limit the dates and times when surveys can be flown. Selection of a higher minimum altitude for surveys (e.g. 1,500 ft [457 m]) would result in a significant reduction in the number of days where surveys would be possible, impairing the ability of the aerial program to meet its objectives. All other aircraft during the 2012 exploration drilling program shall not operate below 1,500 ft (457 m) unless the aircraft is engaged in marine mammal monitoring, approaching, landing, taking off, under poor weather (low ceilings) conditions, engaged in providing assistance to a whaling vessel in distress, or any other emergency situations.

Two primary observers will be seated at bubble windows on either side of the aircraft and a third observer will observe part-time and record data the rest of the time. All observers need bubble windows to facilitate downward viewing. For each marine mammal sighting, the observer will dictate the species, number, size/age/sex class when determinable, activity, heading, swimming speed category (if traveling), sighting cue, ice conditions (type and percentage), and inclinometer reading to the marine mammal into a digital recorder. The inclinometer reading will be taken when the animal's location is 90° to the side of the aircraft track, allowing calculation of lateral distance from the aircraft trackline.

Transect information, sighting data and environmental data will be entered into a GPS-linked computer by the third observer, and simultaneously recorded on digital voice recorders for backup and validation. At the start of each transect, the observer recording data will record the transect start time and position, ceiling height (ft), cloud cover (in 10ths), wind speed (knots), wind direction degrees True North (°T) and outside air temperature degrees Celsius (°C). In addition, each observer will record the time, visibility (subjectively classified as excellent, good, moderately impaired, seriously impaired or impossible), sea state (Beaufort wind force), ice cover (in 10ths) and sun glare (none, moderate, severe) at the start and end of each transect, and at 2-minute intervals along the transect. This will provide data in units suitable for statistical summaries and analyses of effects of these variables (and position relative to the drillship) on the probability of detecting animals (see Davis et al. 1982; Miller et al. 1999; Thomas et al. 2002). The data logger will automatically record time and aircraft position (latitude and longitude) for sightings and transect waypoints, and at pre-selected intervals along the transects.

### **Supplementary Data**

Ice observations during aerial surveys will be recorded and satellite imagery may be used, where available, during post-season analysis to determine ice conditions adjacent to the survey area. These are standard practices for surveys of this type, and are necessary in order to interpret factors responsible for variations in sighting rates.

Shell will, as a high priority, assemble the information needed to relate marine mammal observations to the locations of the *Kulluk* or *Discoverer*, and to the estimated received levels of industrial sounds at mammal locations. During the aerial surveys, Shell will record relevant information on other industry vessels, whaling vessels, low-flying aircraft, or any other human activities that are seen in the survey area.

### **Coordination with BOEMRE/NMFS Aerial Surveys**

BOEMRE/NMFS are planning to continue its wide-ranging aerial surveys of bowhead whales and other marine mammals in the Beaufort Sea during the autumn of 2012. In 2012, the surveys will be contracted to the National Marine Mammal Laboratory (NMML) in Seattle. These surveys include the area where exploration drilling activities will occur. Shell will co-ordinate with BOEMRE/NMML to share data, both during the drilling season and for use in analyses and reports.

Shell will also consult with BOEMRE/NMML regarding coordination during the drilling season and real-time sharing of data. The aims will be:

- to ensure aircraft separation when both crews conduct surveys in the same general region;
- to coordinate the 2012 aerial survey projects in order to maximize consistency and minimize duplication;
- to use data from BOEMRE's broad-scale surveys to supplement the results of the more site-specific Shell surveys for purposes of assessing the effects of exploration drilling activities on whales and estimating "take by harassment";
- to maximize consistency with previous years' efforts insofar as feasible.

It is expected that raw bowhead sighting and flightline data will be exchanged between BOEMRE and Shell on a daily basis during the drilling season, and that each team will also submit its sighting information to NMFS in Anchorage each day. After the Shell and BOEMRE data files have been reviewed and finalized, they will be exchanged in digital form.

Shell is not aware of any other related aerial survey programs presently scheduled to occur in the Alaskan Beaufort Sea in areas where Shell is anticipated to be conducting exploration drilling operations during July–October 2012. If another aerial survey project were planned, Shell would seek to coordinate with that project to ensure aircraft separation, maximize consistency, minimize duplication, and share data.

### **Survey Design**

During the late summer and fall, the bowhead whale is the primary species of concern, but belugas and gray whales are also present. Bowheads and belugas migrate through the Alaskan Beaufort Sea from summering areas in the central and eastern Beaufort Sea and Amundsen Gulf to their wintering areas in the Bering Sea (Clarke et al. 1993; Moore et al. 1993; Miller et al. 2002). Small numbers of bowheads are sighted in the eastern Alaskan Beaufort Sea starting mid-August and near Barrow starting late August, but the main migration does not start until early September. Recent surveys (COMIDA/BWASP 2009) and GPS tagging (ADF&G 2009) have also recorded some bowheads in the western Alaskan Beaufort Sea in July and August. The bowhead migration tends to be through nearshore and shelf waters, although in some years small numbers of whales are seen near the coast and/or far offshore. Bowheads frequently interrupt their migration to feed (Ljungblad et al. 1986; Lowry 1993; Landino et al. 1994; Würsig et al. 2002; Lowry et al. 2004) and their stop-overs vary in duration from a few hours to a few weeks (Koski et al. 2002). A commonly used feeding area is in and near Smith Bay, east of Barrow. Less consistently used feeding areas are in coastal and shelf waters near and east of Kaktovik. In

2007 and 2008, bowhead whales also used areas near Camden Bay to feed during the migration (Ireland et al. 2008; Funk et al. 2010).

To address concerns regarding deflection of bowheads at greater distances the survey pattern around exploration drilling operations has been designed to document whale distribution from about 25 mi (40 km) east of the exploration drilling operations to about 37 mi (60 km) west of operations (Figure

1). Aerial surveys will be conducted daily starting 5 to 7 days before exploration drilling operations begin.

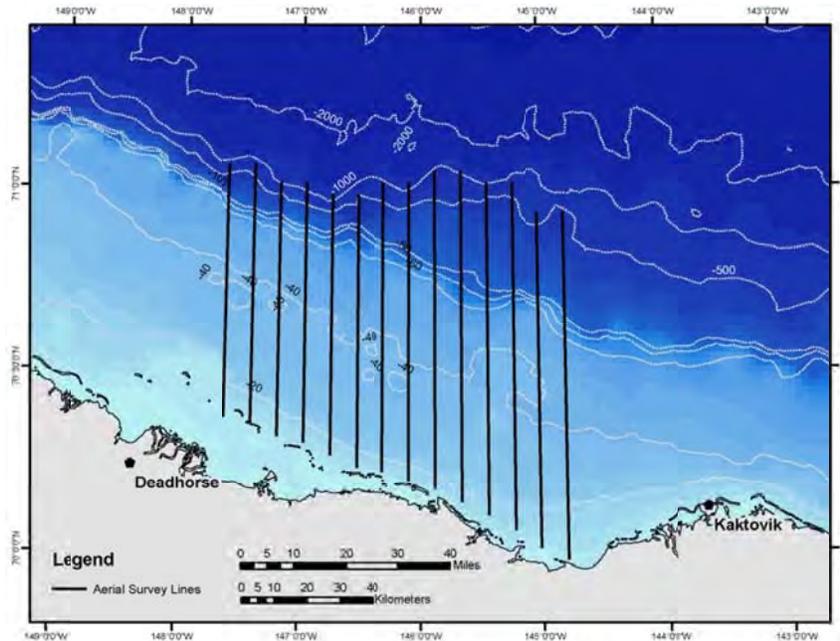


FIGURE 1. Central Alaskan Beaufort Sea showing a representative aerial survey pattern that will be flown daily during late summer and fall. The survey grid will be moved east or west depending on the precise location of the *Kulluk* or *Discoverer* and lines will be shifted slightly within the grid for each survey in order to randomize their location and meet sampling design objectives.

Bowhead whale movements during the late summer/autumn are generally from east to west, and transects should be designed to intercept rather than parallel whale movements. The transect lines in the grid will be oriented north-south, equally spaced at 5 mi (8 km), and randomly shifted in the east-west direction for each survey by no more than the transect spacing. The survey grid will total about 808 mi (1,300 km) in length, requiring ~6 hours (hr) to survey at a speed of 137 mi/hr (220 km/hr) (120 knots), plus ferry time. Exact lengths and durations will vary somewhat depending on the position of the exploration drilling operation and thus of the grid, the sequence in which lines are flown (often affected by weather), and the number of refueling/rest stops.

Weather permitting, transects making up the grid in the Beaufort Sea will be flown in sequence from west to east. This decreases difficulties associated with double counting of whales that are (predominantly) migrating westward. The survey sequence around the exploration drilling

operation is designed to monitor the distribution of whales around the exploration drilling operation.

### **Analysis of Aerial Survey Data**

During the field program, preliminary maps and summaries of the daily surveys will be provided to NMFS as normally required by the terms of the IHA, and USFWS and BOEMRE (if so stipulated). While in the field data, will be checked for entry errors and files will be backed up to CDs or portable memory drives. Two levels of analyses will be conducted at the end of the season. The first level will consist of basic summaries that are required for the 90-day report specified by the IHA. These include summaries of numbers of marine mammals seen, survey effort by date, maps summarizing sightings, and estimates of numbers of marine mammals that are “taken” according to NMFS criteria. The second level of analyses will be presented in a subsequent comprehensive report. The comprehensive report will provide more detailed analyses of the data to quantify the effect of the exploration drilling program on the distribution and movements of marine mammals.

### **Estimation of Numbers “Taken”**

Shell has used this methodology, which was developed using past studies in the Beaufort and Chukchi sea regions (Miller et al. 1999; Haley and Ireland 2006) and other areas of the world (Lawson et al. 1998; Holst et al. 2005; Ireland et al. 2005), for estimating the numbers of marine mammals that are “taken” (as defined by NMFS). These estimates require estimating the numbers of animals present near or passing the exploration drilling program during periods without exploration drilling activity and assuming that similar numbers would have passed during those activities if the activities were not conducted. The planned approach has been accepted by NMFS as satisfying the requirements for “take” estimates for previous monitoring programs.

The criteria to be used in tabulating and estimating numbers of cetaceans potentially exposed to various sound levels will be consistent with those used during previous related projects in 1996-2010, unless otherwise directed by NMFS. Only cetaceans will be addressed using the aerial survey data because the altitude of the surveys is too high to reliably detect and identify pinnipeds. As in previous studies, Shell anticipates that there will be four components:

1. *Numbers of cetaceans observed within the area ensounded strongly by the exploration drilling operations.* For cetaceans, Shell will estimate the numbers of animals exposed to received rms levels of sounds exceeding 120, 160 dB and 180 dB re 1  $\mu$ Pa, as required by NMFS.
2. *Numbers of cetaceans observed showing apparent reactions to exploration drilling operations, e.g., heading in an “atypical” direction.* Animals exhibiting apparent responses to the activities will be counted as affected by the programs if they were exposed to sounds from those activities.
3. *Numbers of cetaceans estimated to have been subjected to sound levels  $\geq 120$ ,  $\geq 160$  and  $\geq 180$  dB re 1  $\mu$  Pa rms when no monitoring observations were possible.* This will involve using the observations from the survey aircraft (Shell and BOEMRE/NMFS), supplemented by relevant vessel-based observations, to estimate how many cetaceans were exposed over the full course of Shell’s 2012 exploration drilling season to

situations where received sound levels were  $\geq 120$ ,  $\geq 160$  and  $\geq 180$  dB rms. In the case of the bowhead whale, Shell will estimate the proportions of the observed whales that were close enough to shore to have passed through the area where exposure might occur, and could have passed while exploration drilling operations were underway. Shell's aerial survey design, together with the complementary aerial surveys to be conducted by BPEMRE/NMFS, will provide the needed data.

4. *The number of bowheads whose migration routes came within 12 mi (20 km) of the drilling activity, or would have done so if they had not been displaced farther offshore, will be estimated.* If the 2012 data indicate that the avoidance distance exceeds 12 mi (20 km), the larger avoidance distance will also be used for estimating the numbers of whales potentially responding to the exploration drilling activity. These estimates will be obtained by determining the displacement distance based on the aerial survey results, and then estimating how many bowheads were likely to approach the avoided area during times while the *Kulluk* or *Discoverer* and support vessels were present.

### ***Effects of Exploration Drilling Program on Bowhead Migration***

The location of the bowhead migration corridor in 2012 will be determined by examining data from periods with exploration drilling activities and data from east of those operations. The BOEMRE/NMFS aerial survey data will be a useful supplement for areas well east of the drilling locations. Shell will contrast the numbers of bowhead sightings and individuals vs. distance from shore:

- during periods with vs. without exploration drilling operations, and
- near vs. east vs. west of the exploration areas.

The distance categories will be linked to receive sound levels based on the results from the acoustic measurement task. Analyses will be done on a sightings-per-unit effort basis to allow meaningful interpretation even though aerial survey effort is inevitably inconsistent at different distances offshore.

To determine how far east, north and west displacement effects (if any) extend, additional analyses will be conducted on bowhead sightings and survey effort in relation to distance and bearing from the exploration drilling operations during times with and without operations. Shell anticipates applying a logistic or Poisson regression approach to assess the effects of distance and direction from the exploration drilling operations on sighting probability of bowhead whales, allowing for the confounding influence of sightability (sea state, ice conditions, etc.) and other covariates. Such an approach has been used extensively in analyses of whale and seal distribution in the Beaufort Sea (Manly et al. 2004; Moulton et al. 2005). Other analyses that may be useful to describe the effects of the exploration drilling operation on the bowhead migration path, including summaries of headings, behavior and swimming speeds, will be included in the technical report.

The data from the current survey may not provide enough sightings to be able to quantify the effects of Shell's 2012 activities on the bowhead whale migration path. That could occur if Shell's operations in the Beaufort Sea during the bowhead whale migration season were limited

due to ice or other factors, or if 2012 is a year when weather conditions are poorer than average, which would limit the periods when surveys could be conducted.

The aerial survey data pertaining to other species of marine mammals will also be mapped and analyzed insofar as this is useful. However, the main migration corridor of belugas is far offshore, and generally north of the survey area proposed here. Few gray whales and walrus are likely to be seen because of their rarity in the Beaufort Sea area (although gray whales were seen in the area in 1998 (Miller et al. 1999) and small numbers have been seen during several recent surveys by BOEMRE, formerly as Minerals Management Service (MMS) (Treacy 1998, 2000, 2002) and LGL (Patterson et al. 2007). Therefore, the proposed aerial surveys are expected to document the infrequent use of continental shelf waters of the Beaufort Sea by beluga whales, gray whales and walrus, but detailed analyses for these species probably will not be warranted. Seals cannot be surveyed quantitatively by aerial surveys at altitudes 900-1,500 ft (274- 457 m) over open water. The aerial surveys will provide only incidental data on the occurrence of bearded and especially ringed seals in the area.

## ACOUSTIC MONITORING PLAN

### Drilling Sound Measurements

#### *Objectives*

Drilling sounds are expected to vary significantly with time due to variations in the level of operations and the different types of equipment used at different times onboard the *Kulluk* or *Discoverer*. The objectives of these measurements are:

- to quantify the absolute sound levels produced by drilling, and to monitor their variations with time, distance and direction from the drilling vessel;
- to measure the sound levels produced by vessels operating in support of exploration drilling operations. These vessels will include crew change vessels, tugs, ice-management vessels and spill response vessels; and
- to measure the sound levels produced by an end-of-hole ZVSP survey using a stationary sound source.

#### *Equipment*

The *Kulluk* or *Discoverer*, support vessels, and ZVSP sound measurements will be performed using one of two methods, both of which involve real-time monitoring. The first method would involve use of bottom-founded hydrophones cabled back to the *Kulluk* or *Discoverer* (Figure 2). These hydrophones weigh approximately 88 pounds (lb) (40 kilograms) with a footprint of approximately 2.7 ft<sup>2</sup> (0.5 m<sup>2</sup>) and would be positioned between 1,640 ft (500 m) and 3,281 ft (1,000 m) from the *Kulluk* or *Discoverer*, depending on the final positions of the anchors used to hold the *Kulluk* or *Discoverer* in place. Hydrophone cables would be fed to real-time digitization systems on board. In addition to the cabled system, a separate set of bottom-founded hydrophones (Figure 3) may be deployed at various distances from the exploration drilling operation for storage of acoustic data to be retrieved and processed at a later date.

As an alternative to the cabled hydrophone system (and possible inclusion of separate bottom-founded hydrophones), the second (or alternative) monitoring method would involve a radio buoy approach deploying four sparbuoys 4-5 mi (6-8 km) from the *Kulluk* or *Discoverer*. Additional hydrophones may be deployed closer to the *Kulluk* or *Discoverer*, if necessary, to better determine sound source levels. Monitoring personnel and recording/receiving equipment would be onboard one of the support vessels with 24-hr monitoring capacity. The system would allow for collection and processing of real-time data similar to that provided by the cabled system but from a wider range of locations. Processing would provide real-time localization of sound sources including seals and whales.

Sound level monitoring with either method will occur on a continuous basis throughout all exploration drilling activities. Both types of systems will be set to record digital acoustic data at sample rate 32 kiloHertz (kHz), providing useful acoustic bandwidth to at least 15 kHz. Both the hydrophone systems use Reson TC4032 hydrophones with sensitivity -170 dB re  $\mu\text{Pa}$ . These systems are capable of measuring absolute broadband sound levels between 90 and 180 dB re  $\mu\text{Pa}$ . The long duration recordings will capture many different operations performed from the *Kulluk* or *Discoverer*. Retrieval of these systems will occur following completion of the exploration drilling activities.

The deployment of drilling sound monitoring equipment will occur as soon as possible once the *Kulluk* or *Discoverer* is on site. Activity logs of exploration drilling operations and nearby vessel activities will be maintained to correlate with these acoustic measurements.

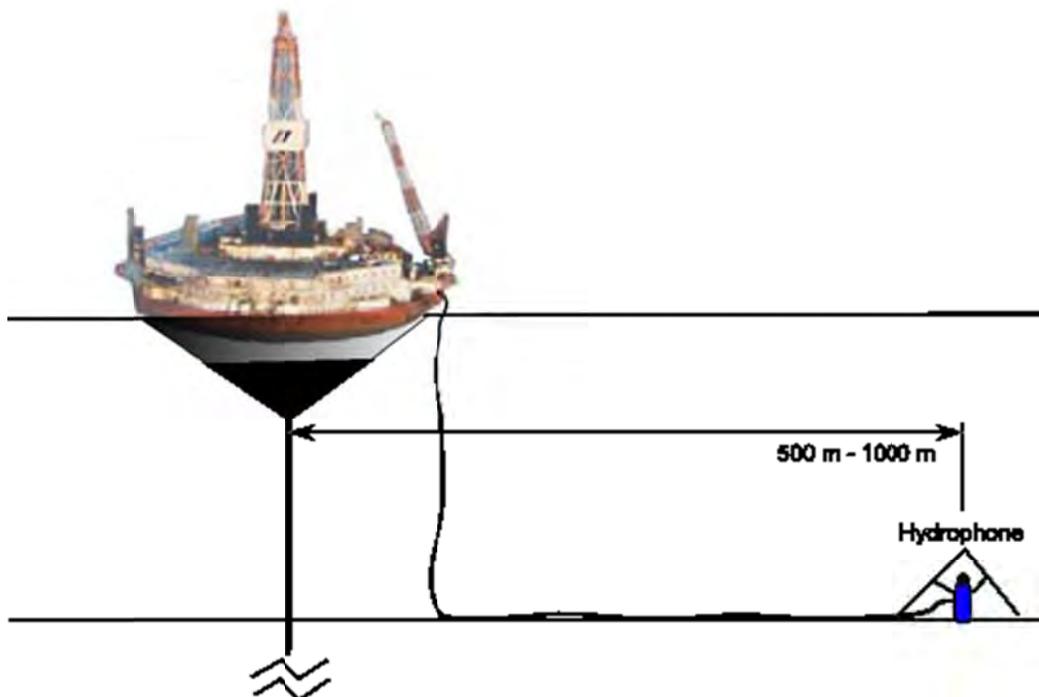


Figure 2: Cabled hydrophone method for real time monitoring of drilling sounds<sup>1</sup>.

Note: <sup>1</sup> Drilling vessel *Kulluk* is pictured; however, either it, or the drillship *Discoverer* will be used.



Figure 3. Hydrophone recording system being deployed at sea. The hydrophone system is an autonomous recorder with very high recording resolution. Acoustic data is stored internally on a hard-drive.

### ***Vessel Sounds Monitoring***

Sound produced by the vessels supporting exploration drilling operations will be recorded by the drilling-sounds monitoring equipment. Logs of vessel position and activity will be used to determine the time varying contribution of each vessel to the overall sound level measurements. Additional dedicated measurements of vessel source levels will be obtained by having the vessels sail past the monitoring locations. These dedicated measurements will provide sound level versus distance from the respective vessels and will also be processed to compute source levels in 1/3-octave bands referenced to 3ft (1 m) range.

### ***Zero Offset Vertical Seismic Profiling Sounds Monitoring***

Sounds produced by the ZVSP survey at the end of each drill hole will be recorded using the drilling sounds monitoring equipment. During ZVSP surveys, an airgun array, which is typically much smaller than those used for routine seismic surveys, is deployed at a location near or adjacent to the *Kulluk* or *Discoverer*, while receivers are placed (temporarily anchored) in the wellbore. The sound source (airgun array) is fired repeatedly, and the reflected sonic waves are recorded by receivers (geophones) located in the wellbore. The geophones, typically in a string, are then raised up to the next interval in the wellbore and the process is repeated until the entire wellbore has been surveyed. The purpose of the ZVSP is to gather geophysical information at various depths, which can then be used to tie-in or ground-truth geophysical information from the previous seismic surveys with geological data collected within the wellbore.

During the ZVSP, the sound source is maintained at a constant location near the wellbore (Figure 4). A typical sound source that would be used by Shell in 2012 is the ITAGA eight-airgun array, which consists of four 150 in<sup>3</sup> (2,458 cm<sup>3</sup>) airguns and four 40 in<sup>3</sup> (655 cm<sup>3</sup>) airguns. These airguns can be activated in any combination and Shell would utilize the minimum airgun volume required to obtain an acceptable signal. Current specifications of the array are provided in Table 1. The airgun array is depicted within its frame or sled, which is approximately 6 ft (2 m) x 5 ft (1.5 m) x 10 ft (3 m), in the photograph below. Typical receivers would consist of a

Schlumberger wireline four level Vertical Seismic Imager (VSI) tool, which has four receivers 50-ft (15.2-m) apart.

Photograph of ITAGA 8-airgun Array in Sled

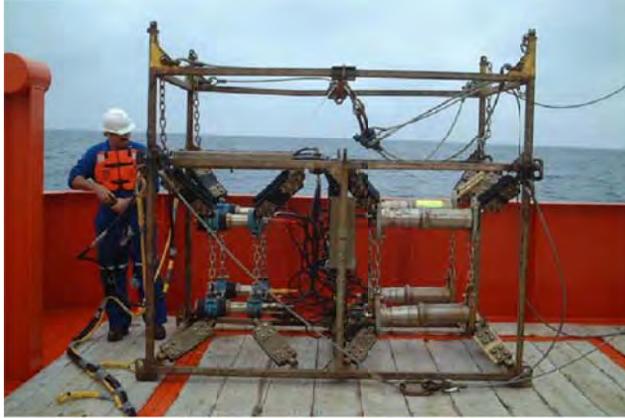


Table 1 Typical Sound Source (Airgun Array) Specifications for ZVSP

Source Type	Number of Sources	Maximum Total Chamber Size	Pressure	Source Depth	Calibrated Peak-Peak Vertical Amplitude	Zero-Peak Sound Pressure Level
SLB, ITAGA Sleeve Array	8 airguns (4) 150 in <sup>3</sup> (2,458 cm <sup>3</sup> ) (4) 40 in <sup>3</sup> (655 cm <sup>3</sup> )	760 in <sup>3</sup> (12,454 cm <sup>3</sup> )	2,000 psi 140 bar	9.8 ft / 3.0 m 16.4 ft / 5.0 m	16 bar @1 m 23 bar @1 m	238 dB re1μPa @1 m 241 dB re1μPa @1 m

A ZVSP survey is normally conducted at each well after total depth is reached. For each survey, Shell would deploy the sound source (airgun array) over the side of the *Kulluk* or *Discoverer* with a crane (sound source will be 50-200 ft (15-60 m) from the wellhead depending on crane location), to a depth of approximately 10-23 ft (3-7 m) below the water surface. The VSI with its four receivers will be temporarily anchored in the wellbore at depth. The sound source will be pressured up to 2,000 pounds per square inch (psi) (138 bar), and activated 5-7 times at approximately 20-second intervals. The VSI will then be moved to the next interval of the wellbore and re-anchored, after which the airgun array will again be activated 5-7 times. This process will be repeated until the entire well bore is surveyed in this manner. The interval between anchor points for the VSI usually is between 200-300 ft (60-91 m). A normal ZVSP survey is conducted over a period of about 10-14 hr depending on the depth of the well and the number of anchoring points.

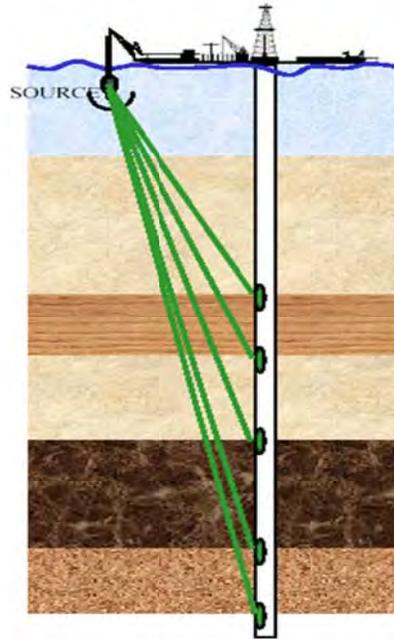


Figure 4. Schematic of ZVSP.<sup>1</sup>

Note: <sup>1</sup>Drillship *Discoverer* is shown; however, either it, or the drill vessel *Kulluk* will be used.

### ***Acoustic Data Analyses***

An important purpose of the measurements of sound level variation with time is to provide information that can be correlated with observations of bowhead whale deflections around the exploration drilling operations, should they occur. The calls of bowhead whales will be detected and located by the arrays of directional autonomous seafloor acoustic recorders (DASARs). The goal of that work will be to determine if changes in migration patterns can be correlated with changes in sound level output from the exploration drilling operations.

Drilling sound data will be analyzed to extract a record of the frequency-dependent sound levels as a function of time. Figure 5 shows the results of this type of analysis for a previous deployment of a bottom-founded recorder. These results are useful also for correlating measured noise events with specific exploration drilling operations and also for capturing marine mammal vocalizations. The analysis also provides absolute sound levels in finite frequency bands that can be tailored to match the highest-sensitivity hearing ranges for the various species of interest. For example, bowhead hearing is thought to be most acute in the 100 Hz – 1,000 Hz frequency range which corresponds with the blue dotted line in the upper plot of Figure 5.

The analyses will also consider sound level integrated through 1-hr durations (referred to as noise equivalent level (Leq)[1-hr]). Figure 6 (upper) shows an example of a Leq analysis of hydrophone data. Similar graphs for long time periods will be generated as part of the data analysis performed for indicating drilling sound variation with time in selected frequency bands. These levels will be of particular importance for correlation with bowhead location data obtained from directional acoustic recording arrays deployed for Shell's 2012 bowhead migration study.

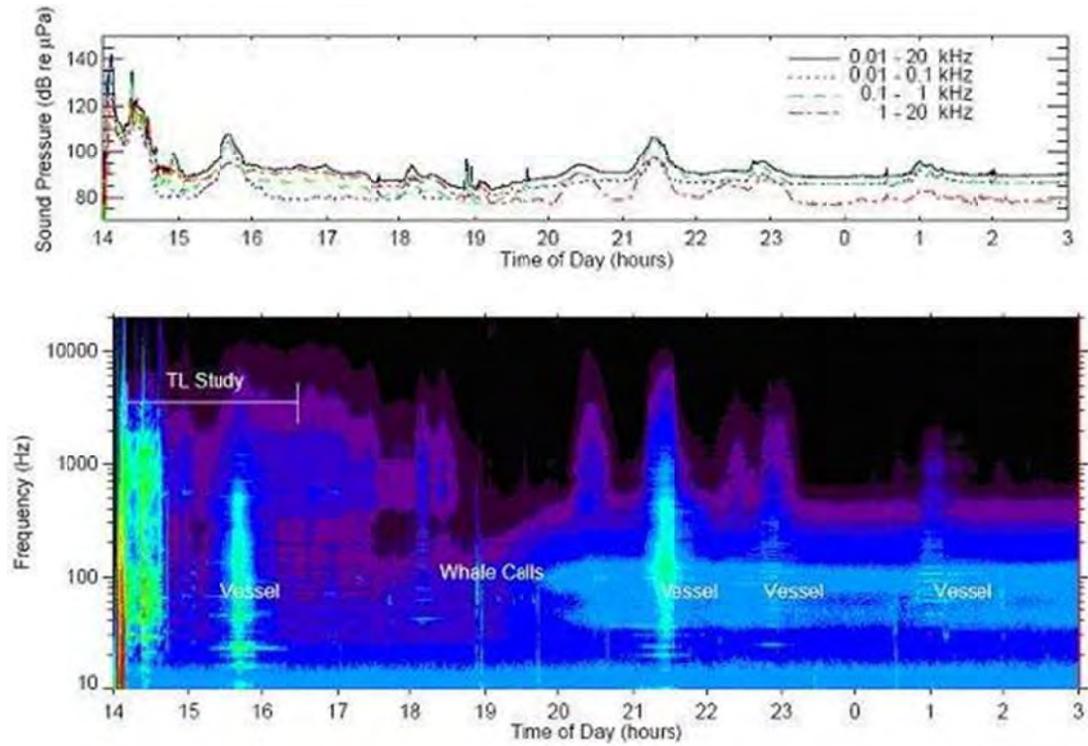


Figure 5. Lower: spectrogram of sound level measurements obtained from a hydrophone recording system. Upper: broadband and selected band level variation with time.

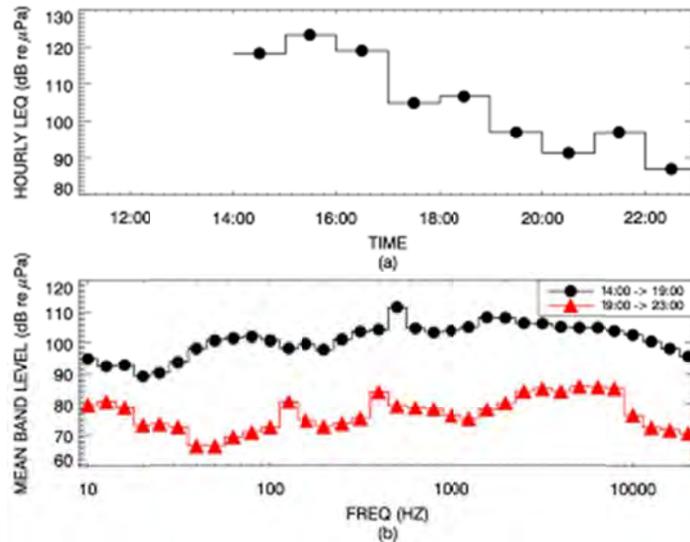


Figure 6. Upper: 1-hr Leq levels that will be calculated from acoustic measurements for use in correlating with bowhead whale deflection data.

### ***Reporting of Results***

Sound level results will be reported in the 90-day and comprehensive reports for this program. The results reported will include:

- Sound Source Levels for the *Kulluk* or *Discoverer* and all drilling support vessels;
- Spectrogram and band level versus time plots computed from the continuous recordings obtained from the hydrophone systems;
- Hourly Leq levels at the hydrophone locations. These values will be used to estimate actual sound levels at locations of deflected whales identified in Shell's Beaufort Sea Whale Migration study; and
- Correlation of drilling source levels with the type of exploration drilling operation being performed. These results will be obtained by observing differences in drilling sound associated with differences in the drilling vessel activity as indicated in detailed drilling vessel logs.

### **Acoustic Study of Bowhead Deflections**

Shell plans to deploy arrays of acoustic recorders in the Beaufort Sea in 2012, similar to that which was done in 2007 through 2010, and will be again in 2011 using DASARs supplied by Greeneridge. These directional acoustic systems permit localization of bowhead whale and other marine mammal vocalizations. The purpose of the array will be to further understand, define, and document sound characteristics and propagation resulting from vessel-based exploration drilling operations that may have the potential to cause deflections of bowhead whales from their migratory pathway. Of particular interest will be the east-west extent of deflection, if any (i.e., how far east of a sound source do bowheads begin to deflect and how far to the west beyond the sound source does deflection persist). Of additional interest will be the extent of offshore (or towards shore) deflection that might occur.

In previous work around seismic and drillship operations in the Alaskan Beaufort Sea, the primary method for studying this question has been aerial surveys. Acoustic localization methods will provide supplementary information for addressing the whale deflection question. Compared to aerial surveys, acoustic methods have the advantage of providing a vastly larger number of whale detections, and can operate day or night, independent of visibility, and to some degree independent of ice conditions and sea state—all of which prevent or impair aerial surveys. However, acoustic methods depend on the animals to call, and to some extent assume that calling rate is unaffected by exposure to industrial noise. Bowheads call frequently in fall, but there is some evidence that their calling rate may be reduced upon exposure to industrial sounds, complicating interpretation. The combined use of acoustic and aerial survey methods will provide a suite of information that should be useful in assessing the potential effects of exploration drilling operations on migrating bowhead whales.

### ***Objective***

The objective of this study is to provide information on bowhead migration paths along the Alaskan coast, particularly with respect to industrial operations, and whether and to what extent

there is deflection due to industrial sound levels. Using passive acoustics with directional autonomous recorders, the locations of calling whales will be observed for a six- to ten-week continuous monitoring period at five coastal sites (subject to favorable ice and weather conditions). Essential to achieving this objective is the continuous measurement of sound levels near the *Kulluk* or *Discoverer*. An example of the whale call locations measured from a similar array of DASARs in 2008 is presented in Figure 7 (Blackwell et al. 2010).

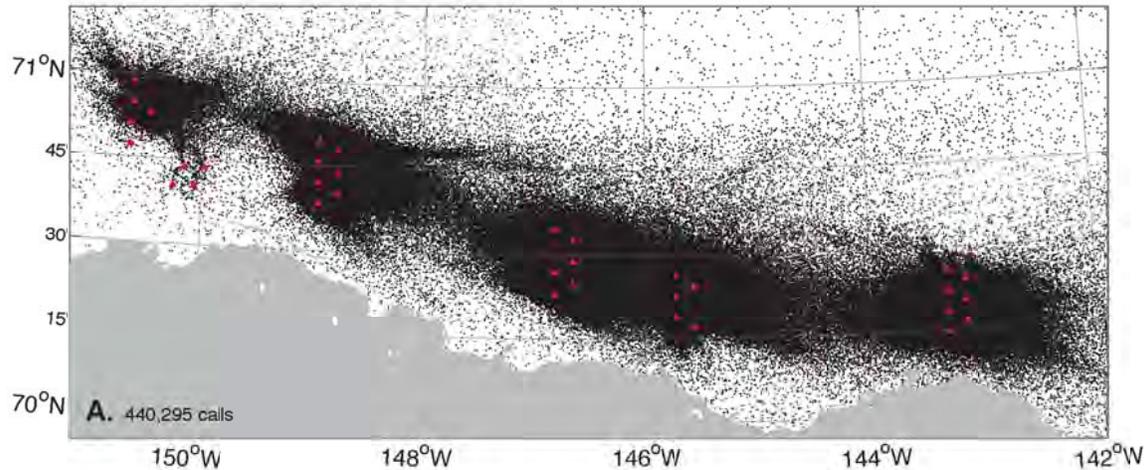


Figure 7. Bowhead whale call locations determined from the received bearings at five arrays of DASARs in the Beaufort Sea in 2008.

### ***Monitoring Plan***

Shell plans to conduct the whale migration monitoring using the passive acoustics techniques developed and used successfully since 2001 for monitoring the migration past Northstar production island northwest of Prudhoe Bay and from Kaktovik to Harrison Bay during the 2007 through 2011 migrations. Those techniques involve using DASARs to measure the arrival angles of bowhead calls at known locations, then triangulating to locate the calling whale. Hundreds of thousands, of whale calls were successfully located in 2007 and 2008.

In attempting to assess the responses of bowhead whales to the planned industrial operations, it will be essential to monitor whale locations at sites both near and far from industry activities. Shell plans to monitor at five sites along the Alaskan Beaufort coast, as shown in Figure 8. The eastern-most site (#5 in Figure 8) will be just east of Kaktovik ~62 mi [~100 km] west of the Sivulliq drilling area) and the western-most site (#1) will be in the vicinity of Harrison Bay (~47 mi [~175 km] west of Sivulliq). Site 2 will be located west of Prudhoe Bay (~68 mi [~110 km] west of Sivulliq). Site 4 will be ~6.2 mi (~10 km) east of the Sivulliq drilling area and site 3 will be ~15.5 mi (~25 km) west of Sivulliq. These five sites will provide information on possible migration deflection well in advance of whales encountering an industry operation and on “recovery” after passing such operations should a deflection occur.

The proposed geometry of DASARs at each site is comprised of seven DASARs oriented in a north-south pattern so that five equilateral triangles with 4-mi (7-km) element spacing are achieved. This geometry is illustrated in Figure 8. Three mi (5 km) spacing has been used successfully in the migration studies at Northstar, but whale calls are received reliably at greater

spacing and the 4 mi (7 km) spacing will result in greater coverage of whales along the north-south dimension, important in studying possible deflection.

DASARs will be installed at planned locations using a GPS. However, each DASAR's orientation, once it settles on the bottom, is unknown and must be determined to know how to reference the call angles measured to the whales. That is, where is true north relative to the DASAR orientation? Also, the internal clocks used to sample the acoustic data typically drift slightly, but linearly, by an amount up to a few seconds after six weeks of autonomous operation. Knowing the time differences within a second or two between DASARs is essential for identifying identical whale calls received on two or more DASARs. Solving these two problems is accomplished by transmitting known sounds at known times from known locations (by GPS) at six points around each DASAR at the beginning and at the end of the operational period. (Shell also will use a mid-season calibration.) Because of the equilateral triangular geometry, it requires 25 transmission stations for each site. Each set of transmissions requires less than half a minute. For the 3-mi (5-km) spacing, experience has been that it requires an hour to do 4 calibration transmissions, including transit. For our planned 4 mi (7-km) spacing, we estimate three calibration transmissions per hour. With 25 to do at each site, calibration of a site will require ~8 hours.

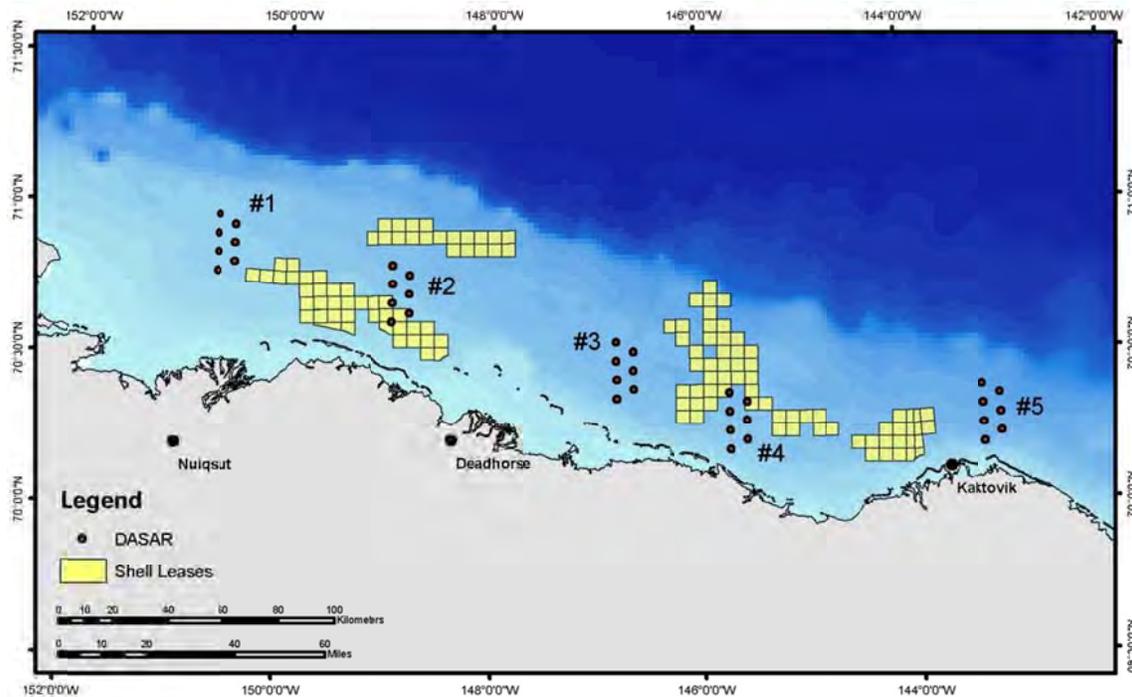


Figure 8. The Alaskan Beaufort Sea coast showing DASAR site locations for whale call location studies. The DASAR array locations at the five sites are shown to scale, with seven DASARs forming five equilateral triangles with a unit spacing of 4 mi (7 km) and a north-south extent of 13 mi (21 km) to aid being able to observe possible offshore deflection.

The calibration transmissions are made using a small projector easily deployed and retrieved over the side of a vessel by a single person. Maximum source level is only 150 dB re 1 $\mu$ Pa at 1 m.

The received level at a distance of 328 ft (100 m) will be ~110 dB, a level less than any known to cause disturbance to marine life.

Bowhead migration begins in late August with the whales moving westward from their feeding sites in the Canadian Beaufort Sea. It continues through September and well into October. However, because of the exploration drilling schedule, we will attempt to install the 21 DASARs at three sites (#3, #4 and #5 in Figure 8) in early August. The remaining 14 DASARs will be installed at sites #1 and #2 in late August. Thus, we propose to be monitoring for whale calls from before 15 August until sometime before 15 October.

At the end of the season the 4<sup>th</sup> DASAR in each array will be refurbished, recalibrated, and redeployed to collect data through the winter. The other DASARs in the arrays will be recovered. The redeployed DASARs will be programmed to record 35 minute every three hours with a disk capacity of 10 months at that recording rate. This should be ample space to allow over-wintering from ~mid-October 2012 through mid-July 2013.

Whale call analysis for the Northstar DASARs has been a manual process in which analysts observe acoustic spectrograms in one-minute periods, looking for patterns caused by a whale call. Listening to the sound, the analyst verifies that a sound is or is not a whale call, and when it is, the bearing is calculated and stored for localization if the same call is present at one or more other DASARs in an array. In the proposed 2012 project, machine-aided call detection software will be used to simplify and accelerate the call analysis. Such software was developed with Shell's sponsorship in 2006 and is described in Greene et al. (2007). The software has been tested and refined during data collection efforts in 2008 through 2010, and will be again with 2011 results.

When the call locations have been assessed for accuracy, the locations will be analyzed for evidence of migration deflection. However, one must assess where the migration path would have been in the absence of industrial activities. The migration path is known to vary from year to year as a consequence of various factors. To control for this inter-annual variation, array pairs east and west of industrial activities will be used to compare offshore distances prior to and after whales pass through areas exposed to varying levels of anthropogenic sound. All DASAR arrays, and potentially those deployed for other studies (i.e., those supporting BP's studies of migration past its Northstar development), could be used to quantify density contours of the bowhead whale migration corridor. This estimation of the migration corridor would amount to an unprecedented quantification in terms of the extent of the coastline covered and the amount of data included.

Many interesting analyses will be available from the data collected by the five array sites. Only two analyses are discussed here. One analysis will estimate the location of the migration corridor across the extent of our study area. The migration corridor will be estimated by contours for the distribution of whale locations along the coast from array #1 to array #5. Density contours will be estimated using kernel density estimation (Silverman 1998). To be included in this analysis, call precision must be high, or alternatively, calls will be inversely weighted according to the size of their error ellipse. Because Shell anticipates that calls occurring between arrays will have very low precision, the variance of density estimates in these areas will be high. If the migration corridor is generally close to shore at arrays #5 and #4, but far offshore at the locations of array #3, #2, and #1, an offshore displacement of the corridor near the planned exploration drilling activity might be inferred. Shell plans to use block bootstrapping (Lahiri 2003) of raw data to

assess variation in contours, when appropriate. Block bootstrapping accounts for potential autocorrelation among locations collected during short time intervals. This analysis does not depend on quantification of underwater industrial sounds emanating from exploration drilling operations.

A second analysis to assess deflection will relate changes in offshore distribution to changes in industrial sound levels. These analyses are predicated on the assumption that industrial sound levels will vary from below background to substantially above background throughout the season, and that reliable measurements of industrial sound at the source are available. Assuming source levels vary substantially throughout the season, this analysis will use periods of low industrial sound as “reference” periods, and relate shifts in the offshore distribution to increased levels of sound using regression or quantile regression analysis (Koenker and Park 1996; Koenker and Geling 2001; Koenker and Xiao 2002).

To illustrate the second analysis, consider DASAR sites #4 and #3 in Figure 8. Over a standard reporting period, for example 6 hr, calls located by these two arrays will be collected, as well as other environmental covariates such as water depth, ambient sound levels, time of day, etc. From these data, summary statistics for offshore distribution, and all covariates of interest will be calculated. For example, the 25th percentile of offshore distance may be calculated, as well as the average water depth of all call locations in the 6-hour reporting period. Differences in offshore summary statistics among arrays will then be calculated and used in a regression or quantile regression analysis. Using the example above, the difference in 25<sup>th</sup> percentile of offshore distance between array #4 and array #3 could be related to the average industrial sound level output by the source. Assuming displacement occurs somewhere between arrays #4 and #3, a constant difference in the 25th percentile of offshore distance when sound levels are low, and larger differences in offshore distance when industrial sound levels increase would be expected. A significant slope of the regression relating offshore distance difference to sound levels will indicate a statistically significant displacement between the arrays in question. This type of analysis can be run using any pair of DASAR arrays (e.g., between #5 and #3 or between #4 and #1, etc.).

***Analysis Assumptions:***

- That changes in the offshore distribution of call locations reflect either changes in whale locations or changes in calling behavior.
- That industrial sound levels will vary substantially throughout the season. “Substantial” means by a level that is both detectable and important to bowhead whales. In other words, extended periods of both low and high sound production need to be present.
- Industrial sound levels surrounding the drilling sources need to be accurately quantified at varying distances in such a way that industrial sound levels and whale locations can be matched. An accurate propagation model for industrial sounds hopefully can be constructed from the collected data.
- A large number of whales will swim through the areas where arrays can reliably locate their calls.

### **Post-90-day Report Analysis**

Analysis of all acoustic data will be prioritized to address the primary questions. The primary data analysis questions are to (a) determine when, where, and what species of animals are acoustically detected on each DASAR, (b) analyze data as a whole to determine offshore bowhead distributions as a function of time, (c) quantify spatial and temporal variability in the ambient noise, and (d) measure received levels of drillship activities. The bowhead detection data will be used to develop spatial and temporal animal distributions. Statistical analyses will be used to test for changes in animal detections and distributions as a function of different variables (e.g., time of day, time of season, environmental conditions, ambient noise, vessel type, operation conditions).

### **COMPREHENSIVE REPORT ON INDUSTRY ACTIVITIES AND MARINE MAMMAL MONITORING EFFORTS IN THE BEAUFORT AND CHUKCHI SEAS**

Following the 2012 exploration drilling season a comprehensive report describing the vessel-based, aerial, and acoustic monitoring programs will be prepared. The comprehensive report will describe the methods, results, conclusions and limitations of each of the individual data sets in detail. The report will also integrate (to the extent possible) the studies into a broad based assessment of industry activities, and other activities that occur in the Beaufort and/or Chukchi seas, and their impacts on marine mammals. The report will help to establish long-term data sets that can assist with the evaluation of changes in the Chukchi and Beaufort Sea ecosystems. The report will attempt to provide a regional synthesis of available data on industry activity in offshore areas of northern Alaska that may influence marine mammal density, distribution and behavior.

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## **Attachment C**

### **Bear Avoidance and Encounter Procedures**

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## **Attachment C**

### **Bear Avoidance and Encounter Procedures**

All personnel should understand and follow the procedures listed below to detect the presence of bears in work areas and avoid human/ bear encounters.

If your work assignment requires you to be outside of areas that are secure from bears (buildings, heavy equipment cabs, etc.) check directly with your supervisor for the latest report from the designated representative Bear Guard to find out whether bears or bear sign were reported. Potential at-risk situations are walking between enclosed structures at the shore base, outside vehicles and at various work locations.

Arrange with your crew foreman to maintain radio or visual contact with the designated Bear Guard so that you can be alerted immediately to select a secure place if a bear is sighted. Plan the best route in advance to reach safe locations at the shore base or on a vessel from your work area.

Be especially alert in dark conditions and areas of poor visibility outside where most pedestrian areas are illuminated.

Do NOT take food with you. If it is necessary to eat away from the vessel galley or shore base mess unit, make sure that all food is safely stored inside containers aboard ship or inside secure vehicles.

Do NOT leave food wastes or other material that may attract bears outside.

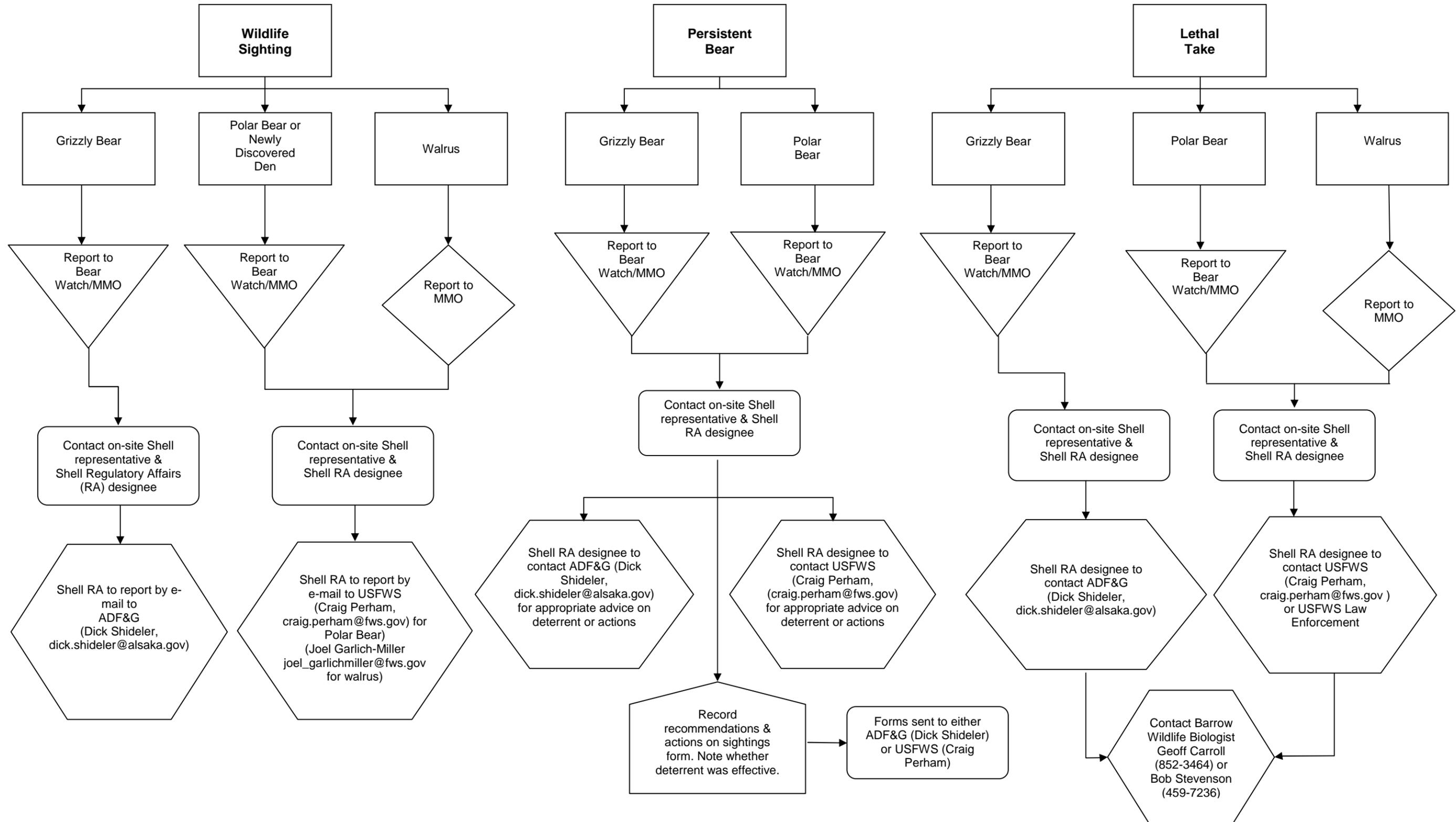
Report all bear sightings (including sign and tracks) immediately to the designated Shell representative when you are in a secure location. Do not expose yourself to look at the bear. Do not try to photograph a bear unless you are in a secure location. Early bear detection is essential to limit human/ bear encounters.

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**Attachment D**  
**Wildlife Notification Flow Chart**

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## WILDLIFE NOTIFICATION FLOW CHART



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**Attachment E**  
**Polar Bear Sighting Report**

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United States Department of the Interior

FISH AND WILDLIFE SERVICE  
1011 E. Tudor Road  
Anchorage, Alaska 99503-6199

**POLAR BEAR SIGHTING REPORT**

Date: \_\_\_\_\_ Observer name: \_\_\_\_\_  
Time: \_\_\_\_\_ Contact number/email: \_\_\_\_\_

**Location:** \_\_\_\_\_

Latitude: \_\_\_\_\_ Longitude \_\_\_\_\_ Datum: \_\_\_\_\_

**Weather conditions:** Fog \_\_\_\_\_ Snow \_\_\_\_\_ Rain \_\_\_\_\_ Clear \_\_\_\_\_ Temperature \_\_\_\_\_ F/C

Wind speed \_\_\_\_\_ mph/kts  
Wind direction \_\_\_\_\_

Visibility: Poor \_\_\_\_\_  
Fair \_\_\_\_\_  
Good \_\_\_\_\_  
Excellent \_\_\_\_\_

**Number of bears:**

\_\_\_\_\_ Adult M/F  
\_\_\_\_\_ Sub-adult  
\_\_\_\_\_ Unknown

\_\_\_\_\_ Sow/cub(s)  
\_\_\_\_\_ Sow/yearling(s)  
\_\_\_\_\_ Sow/2YO(s)

**Estimated distance of bear(s) from personnel** \_\_\_\_\_ (meters) **and facility** \_\_\_\_\_ (meters)  
(closest point) (closest point)

**Bear behavior (Initial Contact):** \_\_\_\_\_

**Bear behavior (After Contact):** \_\_\_\_\_

**Description of encounter:** \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Duration of encounter:** \_\_\_\_\_ **Possible attractants present:** \_\_\_\_\_

**Deterrents used/distance:**

\_\_\_\_\_ Crackershell  
\_\_\_\_\_ Vehicle  
\_\_\_\_\_ Rubber bullet  
\_\_\_\_\_ Bean bag

\_\_\_\_\_ Horn/siren  
\_\_\_\_\_ Spotlight/Headlight  
\_\_\_\_\_ Other \_\_\_\_\_

**Agency/Contacts:**

USFWS\_Craig Perham (786-3810) (FAX: 786-3816) \_\_\_\_\_ Time \_\_\_\_\_ Date \_\_\_\_\_  
ADF&G\_Dick Shideler (459-7283) (FAX: 456-3091) \_\_\_\_\_ Time \_\_\_\_\_ Date \_\_\_\_\_

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**Attachment F**  
**Grizzly Bear Observation Form**

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Bear 10# \_\_\_\_ (ADF&G only)

### GRIZZLY BEAR OBSERVATION FORM

**Observer:** \_\_\_\_\_ **Company / Agency:** \_\_\_\_\_

**Observation Date:** \_\_\_\_\_ **Time: Start** \_\_\_\_\_ **Stop** \_\_\_\_\_

**Observation from:**  Vehicle  Ground  Building  Other \_\_\_\_\_

Observer's distance from bear: \_\_\_\_\_ meters

**General Location:**  Deadhorse  PB East  PB West  Kuparuk  Endicott

Milne Point  Lisburne  Point McIntyre  TAPS (MP#): \_\_\_\_\_

Other (latitude/longitude if known): \_\_\_\_\_

**Specific Location:** \_\_\_\_\_ meters \_\_\_\_\_ (direction) of \_\_\_\_\_ (facility name)

Dumpster present:  Yes  No  Unknown

**Weather:** \_\_\_\_\_ °F  Clear / Partly Cloudy  Rain  Fog  Snow

Direction of wind: \_\_\_\_\_ at \_\_\_\_\_ mph

**Bear Identification:** Earflag color: \_\_\_\_\_ Right \_\_\_\_\_ Left \_\_\_\_\_

(Note: "right" / "left" of bear, not observer)

Natural Markings (scars, torn ear, etc.): \_\_\_\_\_

**Other Bears Present:**  None  Cubs: # of cubs \_\_\_\_\_ # of yearlings \_\_\_\_\_ # of other \_\_\_\_\_

**Bear Activity:** When 1<sup>st</sup> seen, the bear was:  Resting  Feeding (natural food)

Feeding (garbage)  Feeding/Traveling  Traveling

Other: \_\_\_\_\_

**Bear's Reaction to observer:**  Ignore  Approach  Avoid

Were other people in area (i.e. not with observer):  Yes  No  Unknown

Bear's reaction to other people:  Ignore  Approach  Avoid

Comments: \_\_\_\_\_

**Deterrence Action Taken:**  Yes  No If "Yes", did you use:

Horn  Siren  Plastic Slugs  Cracker Shell  Firecracker

Birdshot  Other: \_\_\_\_\_

Bear Reaction:  Ignore  Approach  Withdraw

**Additional Remarks:** \_\_\_\_\_

Please return to: Dick Shideler, Alaska Department of Fish & Game  
1300 College Road, Fairbanks, Alaska 99701  
Phone: 907-459-7283, FAX: 907-459-3091

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## **Attachment G**

### **Walrus Sighting Report**

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United States Department of the Interior

FISH AND WILDLIFE SERVICE

1011 E. Tudor Road

Anchorage, Alaska 99503-6199

**WALRUS SIGHTING REPORT**

Date: \_\_\_\_\_

Time: \_\_\_\_\_

Location: (include GPS coordinates if possible) \_\_\_\_\_  
\_\_\_\_\_

Observer name: \_\_\_\_\_

Weather conditions: Fog\_\_\_\_ Snow\_\_\_\_ Rain\_\_\_\_ Clear\_\_\_\_ Approx. temperature\_\_\_\_\_

Wind speed\_\_\_\_\_ Wind direction\_\_\_\_\_

Total number of walrus: Adult\_\_\_\_ Sub-adult\_\_\_\_ Unknown\_\_\_\_

Estimated distance of walrus from personnel/facility: \_\_\_\_\_

Possible attractants present: \_\_\_\_\_

Walrus behavior: Curious\_\_\_\_ Aggressive\_\_\_\_ Predatory\_\_\_\_ Other \_\_\_\_\_

Description of encounter: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Duration of encounter: \_\_\_\_\_

Deterrents used/distance: Vehicle\_\_\_\_ Noise-maker\_\_\_\_ Firearms\_\_\_\_ Other \_\_\_\_\_

Injuries sustained: Personnel: \_\_\_\_\_

Walrus: \_\_\_\_\_  
\_\_\_\_\_

Agency/Contacts:

USFWS \_\_\_\_\_ Time \_\_\_\_\_ Date \_\_\_\_\_

ADF&G \_\_\_\_\_ Time \_\_\_\_\_ Date \_\_\_\_\_

CLIENT \_\_\_\_\_ Time \_\_\_\_\_ Date \_\_\_\_\_

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**Attachment H**  
**Plan of Cooperation Addendum**

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**Plan of Cooperation Addendum  
Revised Outer Continental Shelf Lease  
Exploration Plan Camden Bay  
Beaufort Sea, Alaska**

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**May 2011**

Prepared by

**Shell Offshore Inc.  
3601 C Street, Suite 1000  
Anchorage, AK 99503**



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## ACRONYMS & ABBREVIATIONS

4MP	Marine Mammal Monitoring and Mitigation Plan
AEWC	Alaska Eskimo Whaling Commission
ASRC	Arctic Slope Regional Corporation
BOEMRE	Bureau of Ocean Energy Management, Regulation and Enforcement
BOP	Blowout Preventer
CAA	Conflict Avoidance Agreement
CFR	Code of Federal Regulations
COCP	Critical Operations and Curtailment Plan
Com Centers	Communication and Call Centers
<i>Discoverer</i>	drillship M/V <i>Noble Discoverer</i>
EA	Environmental Assessment
EP	Exploration Plan
EPA	U.S. Department of Interior, Environmental Protection Agency
FONSI	Finding of No Significant Impact National Environmental Policy Act
ft	foot/feet
ICAS	Inupiat Community of the Arctic Slope
IHA	Incidental Harassment Authorization
IMP	Ice Management Plan
in.	inch/inches
km	kilometer/kilometers
LCMF	LCMF Corporation, a division of Ukpeagvik Iñupiat Corporation
LOA	Letter of Authorization
m	meter/meters
mi	statute mile/miles
min	minutes
MMO	Marine Mammal Observer
MMS	Department of the Interior, Minerals Management Service
M/V	Motor Vessel
NMFS	National Marine Fisheries Service
NSB	North Slope Borough

---

NWAB	Northwest Arctic Borough
OCS	Outer Continental Shelf
ODPCP	Oil Discharge Prevention and Contingency Plan
OSR	oil spill response
POC	Plan of Cooperation
ROV	remotely operated vehicle
SA	Subsistence Advisor
Shell	Shell Offshore Inc.
UIC	Ukpeagvik Iñupiat Corporation
USFWS	United States Fish and Wildlife Service

## 1.0 INTRODUCTION

Shell Offshore Inc. (Shell) seeks to revise its initial Camden Bay Exploration Plan (EP). The initial Camden Bay EP was submitted to the former U.S. Department of the Interior, Minerals Management Service (MMS) now Bureau of Ocean Energy Management, Regulation and Enforcement (BOEMRE) in May of 2009. In this initial EP, Shell identified two blocks (Flaxman Island 6610 and 6658) of interest in two prospects (Sivulliq and Torpedo), that contained two potential drill sites (Sivulliq N and Torpedo H). The initial Camden Bay EP consisted of an exploration drilling program, which would have been conducted during the 2010 drilling season, using the drillship Motor Vessel (M/V) *Frontier Discoverer* now known as the M/V *Noble Discoverer (Discoverer)*.

The initial Camden Bay EP was deemed submitted by BOEMRE on 10 August 2009. BOEMRE subsequently prepared and distributed an Environmental Assessment (EA) of the proposed exploration drilling program as detailed in the Camden Bay EP, issued a Finding of No Significant Impact (FONSI), and approved the Camden Bay EP on 19 October 2009. Shell was not able to conduct the exploration drilling program in 2010 or 2011 since the exploration activities were postponed when BOEMRE suspended all exploration drilling activities in the Arctic following the Deepwater Horizon incident in the Gulf of Mexico. Pursuant to a revised Camden Bay EP, Shell plans to conduct an exploration drilling program starting in 2012. This revised Camden Bay EP includes the Sivulliq N and Torpedo H location plus two additional wells, Sivulliq G and Torpedo J, which are located in the same area as Sivulliq N and Torpedo H. Shell is proposing to use either the *Discoverer* or the conical drilling unit *Kulluk (Kulluk)* but not both to execute this revised Camden Bay EP. Shell has also committed to collecting select waste streams rather than discharging these waste streams into the ocean. Therefore, Shell has prepared a revised Camden Bay EP and has submitted it to BOEMRE for approval.

BOEMRE Lease Sale Stipulation No. 5 (see Attachment A), requires that all exploration operations be conducted in a manner that prevents unreasonable conflicts between oil and gas exploration activities and subsistence resources and activities. This stipulation also requires adherence to United States Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS) regulations, which require an operator to implement a Plan of Cooperation (POC) to mitigate the potential for conflicts between the proposed activity and traditional subsistence activities (50 Code of Federal Regulations [CFR] § 18.124(c)(4) and 50 CFR § 216.104(a)(12)). A POC was prepared and was submitted with the initial Camden Bay EP. The following POC Addendum updates the POC with information regarding proposed changes in proposed exploration drilling program, and documentation of meetings undertaken to specifically to inform the stakeholders of the revised exploration drilling program and obtain their input. The POC Addendum builds upon the previous POC.

The POC identifies the measures that Shell has developed in consultation with North Slope communities and subsistence user groups and will implement during its planned Camden Bay exploration drilling program to minimize any adverse effects on the availability of marine mammals for subsistence uses. In addition, the POC details Shell's communications and consultations with local communities concerning its proposed exploration drilling program beginning in the summer of 2012, potential conflicts with subsistence resources and hunting activities, and means of resolving any such conflicts (50 CFR § 18.128(d) and 50 CFR § 216.104(a) (12) (i), (ii), (iv)). Shell has documented its contacts with North Slope communities, as well as the substance of its communications with subsistence stakeholder groups. Tables summarizing Shell's communications, and responses thereto, are included in Attachment B. This POC may be supplemented, as appropriate, to reflect additional engagements with local subsistence users and any additional or revised mitigation measures that are adopted as a result of those engagements.

Shell's Camden Bay exploration drilling program, planned for the Sivulliq prospect (two drill sites on one lease block) and Torpedo prospect (two drill sites, one on each lease block) in Camden Bay (Figure 1), is set-out in detail in the *Revised Outer Continental Shelf Lease Exploration Plan Camden Bay, Beaufort Sea, Alaska*, and the impacts of the project, as well as the measures Shell will implement to mitigate those impacts, are analyzed in the *Environmental Impact Analysis, Revised Outer Continental Shelf Lease Exploration Plan Camden Bay, Beaufort Sea, Alaska* (EIA). Shell will implement this POC, and the mitigation measures set-forth herein, for its Camden Bay exploration drilling program.

For additional details regarding the exploration drilling program, the reader is directed toward the revised Camden Bay EP and its appendices.

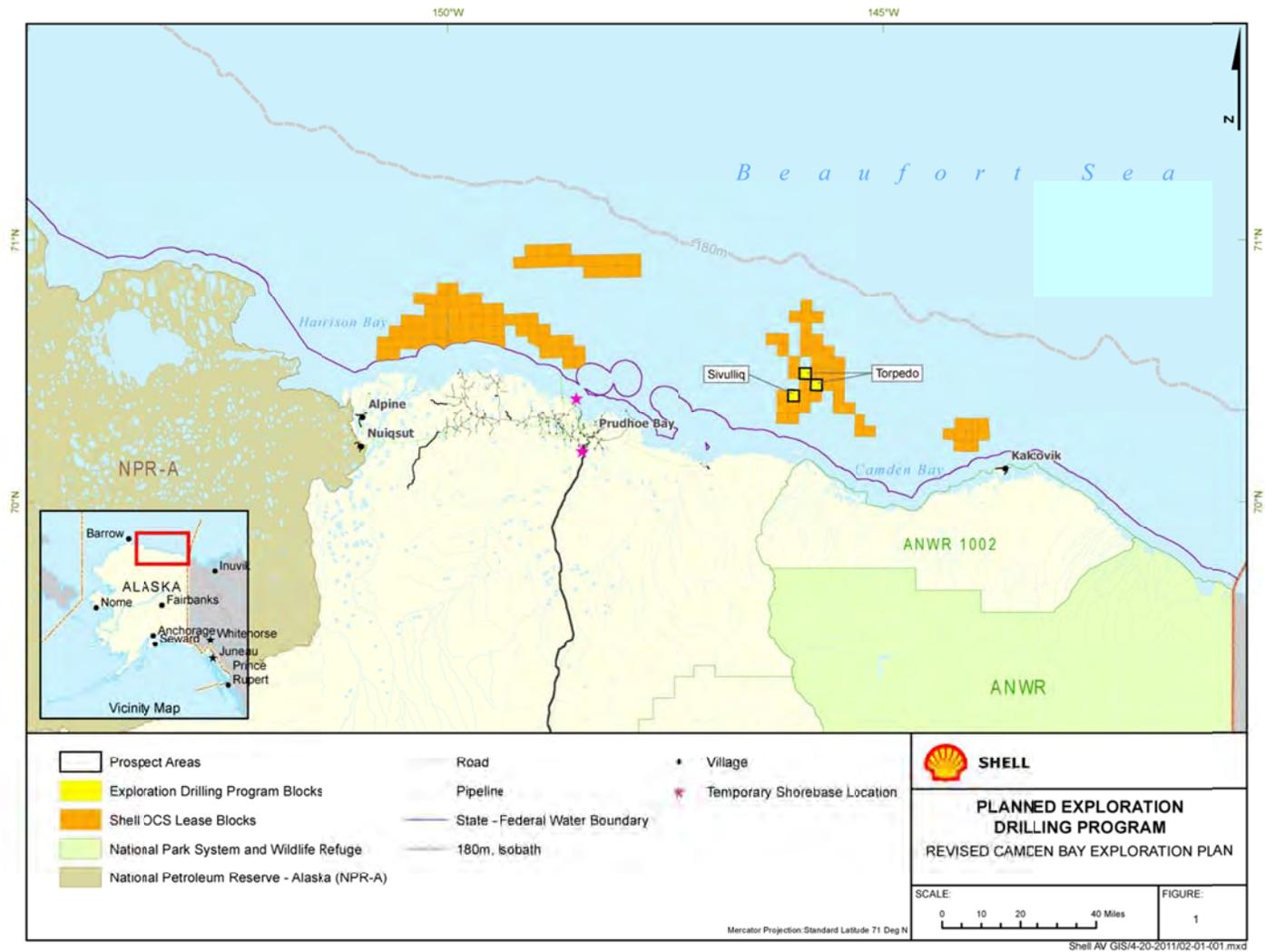
## **2.0 POC LEASE STIPULATION AND REGULATORY REQUIREMENTS**

BOEMRE Lease Sale Stipulation No. 5 (in Attachment A) requires that all exploration operations be conducted in a manner that prevents unreasonable conflicts between oil and gas activities and subsistence resources and subsistence hunting activities of the residents of the North Slope. Specifically, Stipulation No. 5 requires the operator to consult directly with potentially affected North Slope subsistence communities, the North Slope Borough (NSB), and the Alaska Eskimo Whaling Commission (AEWC).

Consultation is needed "to discuss potential conflicts with the siting, timing, and methods of proposed operations and safeguards or mitigating measures which could be implemented by the operator to prevent unreasonable conflicts." Stipulation No. 5 also requires the operator to document its contacts and the substance of its communications with subsistence stakeholder groups during the operator's consultation process.

The requirements of Stipulation No. 5 parallel requirements for receipt of a USFWS Letter of Authorization (LOA) and a NMFS Incidental Harassment Authorization (IHA). The LOA and IHA provide authorization for the nonlethal harassment of species protected by the Marine Mammal Protection Act. Both the USFWS and NMFS require an applicant to implement a POC to mitigate the potential for conflicts between the proposed activity and traditional subsistence activities (50 CFR § 18.124(c)(4) and 50 CFR § 216.104(a)(12)). The POC must identify the measures that will be taken to minimize any adverse effects on the availability of marine mammals for subsistence uses. In addition, both USFWS and NMFS require an applicant to communicate and consult with local subsistence communities concerning the proposed activity, potential conflicts with subsistence activities, and means of resolving any such conflicts (50 CFR § 18.128(d) and 50 CFR § 216.104(a) (12) (i), (ii), (iv)).

**Figure 1 Planned Exploration Drilling Program - Revised Camden Bay EP**



### 3.0 MEASURES IN PLACE

The following mitigation measures, plans and programs, are integral to this POC and were developed during consultation with potentially affected subsistence groups, communities, and the NSB. These measures, plans, and programs will be implemented by Shell during its exploration drilling operations in Camden Bay to monitor and mitigate potential impacts to subsistence users and resources. These measures are documented in the following sections:

- Mitigation Measures;
- Exploration Drilling Marine Mammal Monitoring and Mitigation Program (4MP); and
- Interaction and Avoidance Plan for Polar Bear and Pacific Walrus.

#### 3.1 Revised Camden Bay EP Mitigation Measures

The mitigation measures Shell has adopted and will implement during its revised Camden Bay EP exploration drilling operations are listed and discussed below. These mitigation measures reflect Shell's experience conducting exploration activities in Alaska since 2006 and its ongoing consultations with local subsistence communities to better understand their concerns and develop appropriate and effective mitigation measures to address those concerns. Shell's planned mitigation measures have been presented to community leaders and subsistence user groups starting in 2009 and have evolved since in response to comments and concerns expressed during the consultation process. Some mitigation measures appear under more than one sub-heading below, since they are pertinent to more than one "category" of mitigation measures.

##### 3.1.1 Subsistence Mitigation Measures

During each drilling season the *Kulluk* or *Discoverer*, either under tow (*Kulluk*), or by its own propulsion (*Discoverer*) and associated support vessels will transit through the Bering Strait into the Chukchi Sea on or after July 1, arriving on location near Camden Bay approximately July 10. Exploration drilling activities at the drill sites are planned to begin on or about July 10 and run until midnight October 31, with a suspension of all operations beginning August 25 for the Nuiqsut (Cross Island) and Kaktovik subsistence bowhead whale hunts. During the suspension for the whale hunts the *Kulluk* or *Discoverer* and support vessels will leave the Camden Bay project area and move to an area mutually agreed upon between Shell and AEWC. Shell will return to resume activities after the subsistence bowhead whale hunts conclude, and depending on ice and weather conditions, continue its exploration activities through 31 October 2010. In addition to the adoption of this project timing restriction, Shell will implement the following additional measures to ensure coordination of its activities with local subsistence users to minimize further the risk of impacting marine mammals and interfering with the subsistence hunt.

Communication, Vessel and Aircraft Travel:

- To minimize impacts on marine mammals and subsistence hunting activities, the drilling vessel and support fleet traversing north through the Bering Strait will transit through the Chukchi Sea along a route that lies offshore of the polynya zone. In the event the transit outside of the polynya zone results in Shell having to break ice (as opposed to managing ice by pushing it out of the way), the drilling vessel and support vessels will enter into the polynya zone far enough so that ice breaking is not necessary. If it is necessary to move into the polynya zone, Shell will notify the local communities of the change in the transit route through the Communication and Call Centers (Com Centers). As soon as the fleet transits past the ice, it will exit the polynya zone and continue a path in the open sea toward the Camden Bay drill sites.

- Vessels underway will alter course to avoid impacts to marine mammals including possible collisions, stampeding, and exclusion from access to critical resources.
- All vessels must maintain cruising speed not to exceed 9 knots while transiting the Beaufort Sea. This measure would reduce the risk of ship-whale collisions.
- Shell has developed a Communication Plan (See Attachment C) and will implement the plan before initiating exploration drilling operations to coordinate activities with local subsistence users as well as Village Whaling Associations in order to minimize the risk of interfering with subsistence hunting activities, and keep current as to the timing and status of the bowhead whale migration, as well as the timing and status of other subsistence hunts. The Communication Plan includes procedures for coordination with Com Centers to be located in coastal villages along the Chukchi and Beaufort Seas during Shell's proposed activities.
- Shell will fund the operation of Com Centers in the coastal villages to enable communications between Shell operations and vessels, local subsistence users, and Subsistence Advisors (SAs), thereby notifying the subsistence community of any vessel transit route changes and avoiding conflicts with subsistence activities.
- Shell will employ local SAs from the Beaufort Sea and Chukchi Sea villages to provide consultation and guidance regarding the whale migration and subsistence hunt. The SAs will use local knowledge (Traditional Knowledge) to gather data on subsistence lifestyle within the community and provide advice on ways to minimize and mitigate potential negative impacts to subsistence resources during the drilling season. Responsibilities include reporting any subsistence concerns or conflicts; coordinating with subsistence users; reporting subsistence-related comments, concerns, and information; and advising how to avoid subsistence conflicts. They will work approximately 8-hours per day and 40-hour weeks. SAs must be from a native village located on the North Slope, speak and understand Inupiaq and must have knowledge of subsistence practices for the area. After the initial recruitment and selection of potential candidates, the hiring process will consist of a two-part interview. During the first interview a full description of the job will be given including the schedule, type of work, conditions, and requirements (including drug testing, orientation, and specialized training). The second interview will assess the candidate's previous employment, subsistence hunting experience, communication skills and ensure they have good social skills. Each SA will be based out of their home village and will be given a SA handbook. The SA handbook will give an overview of the program, program objectives, discusses recruitment, hiring, and certification, and details the SA's responsibilities. The handbook will include several forms that the SA will be using along with a Traditional Knowledge Questionnaire and subsistence use maps. The handbook will provide the SA with the information needed to identify situation they are to be alert for, their responsibilities and their authorities.
- Aircraft shall not operate below 1,500 feet (ft) (457 meters [m]) unless the aircraft is engaged in marine mammal monitoring, approaching, landing or taking off, or unless engaged in providing assistance to a whaler or in poor weather (low ceilings) or any other emergency situations. Aircraft engaged in marine mammal monitoring shall not operate below 1,500 ft (457 m) in areas of active whaling; such areas to be identified through communications with the Com Centers. Except for airplanes engaged in marine mammal monitoring, aircraft shall use a flight path that keeps the aircraft at least 5 miles (mi) (8 kilometers [km]) inland until the aircraft is directly south of its offshore destination, then at that point it shall fly directly north to its destination.
- Shell will also implement non-marine mammal observer (MMO) flight restrictions prohibiting aircraft from flying below 1,500 ft (457 m) altitude (except during takeoffs and landings or in

emergency situations) while over land or sea. This flight will also help avoid disturbance of and collisions with birds.

#### Drilling Operations:

- Shell will collect all drilling mud and cuttings with adhered mud from all well sections below the 26-inch (in.) (20-in. casing) section, as well as treated sanitary waste water, domestic wastes, bilge water and ballast water, and transport them outside the Arctic for proper disposal in an Environmental Protection Agency (EPA) licensed treatment/disposal site. These waste streams will not be discharged to the ocean.
- Drilling mud will be cooled to mitigate any potential permafrost thawing or thermal dissociation of any methane hydrates encountered during exploration drilling if such materials are present at the drill site.
- Drilling mud will be recycled to the extent practicable based on operational considerations (e.g., whether mud properties have deteriorated to the point where they cannot be used further) so that the volume of the mud disposed of at the end of the drilling season is reduced.
- Lighting on the drilling vessel will be shaded and has been replaced with ClearSky lighting. ClearSky lighting is designed to minimize the disorientation and attraction of birds to the lighted drilling vessel to reduce the possibility of a bird collision (*see the Bird Strike Avoidance and Lighting Plan* in Appendix I of the revised Camden Bay EP).

### 3.1.2 Marine Mammal Mitigation Measures

Marine mammal mitigation measures will utilize MMOs to ensure that drilling and support vessel activities do not disturb marine mammal resources and avoid unreasonable interference with the subsistence hunt of those resources. MMOs will be stationed on all drilling and support vessels to monitor the exclusion zone (areas within isopleths of certain sound levels for different species) for marine mammals. For vessels in transit, if a marine mammal is sighted from a vessel within its respective safety radius, the Shell vessel will reduce activity (e.g., reduce speed and/or change course) and noise level to ensure that the animal is not exposed to sound above their respective safety levels. Full activity will not be resumed until all marine mammals are outside of the exclusion zone and there are no other marine mammals likely to enter the exclusion zone. Regular overflight surveys and support vessel surveys for marine mammals will be conducted to further monitor prospect areas. Shell will also implement flight restrictions prohibiting aircraft from flying below 1,500 ft (457 m) altitude (except during takeoffs and landings or in emergency situations), further reducing the likelihood of impacts.

Anchored vessels will remain at anchor and continue ongoing operations if approached by a marine mammal. An approaching animal, not exhibiting avoidance behavior, is likely curious and not regarded as harassed. The anchored vessel will remain in place and continue ongoing operations to avoid possibly causing avoidance behavior by suddenly changing noise conditions.

For complete MMO protocol refer to the 4MP (Appendix D of the revised Camden Bay EP).

In addition to the use of MMOs, Shell will implement the following measures to avoid disturbances to marine mammals that potentially could rise to the level of incidental take, and ensure coordination of its activities with local subsistence users to minimize further the risk of impacting marine mammals and interfering with the subsistence hunt.

### Vessel and Aircraft Travel:

- A 4MP protocol;
- Aircraft will not operate within 1,500 ft (457 m) of whale groups;
- Aircraft and vessels will not operate within 0.5 mi (0.8 km) of walruses or polar bears when observed on land or ice;
- When within 900 ft (274 m) of marine mammals, vessels will reduce speed, avoid separating members from a group and avoid multiple course changes;
- Vessel speed to be reduced during inclement weather conditions in order to avoid collisions with marine mammals;
- Aircraft shall not operate below 1,500 ft (457 m) unless the aircraft is engaged in marine mammal monitoring, approaching, landing or taking off, in poor weather (fog or low ceilings) in an emergency situation. Aircraft engaged in marine mammal monitoring shall not operate below 1,500 ft (457 m) in areas of active whaling; such areas to be identified through communications with the Com Centers. Except for airplanes engaged in marine mammal monitoring, aircraft shall use a flight path that keeps the aircraft at least 5 mi (8 km) inland until the aircraft is south of its offshore destination, then at that point it shall fly directly north through the Mary Sachs Entrance to its destination. Shell reserves the option to use an alternative flight route in the event that transit through the Mary Sachs Entrance is unsafe due to weather, other environmental conditions, or in the event of an emergency;
- Aircraft and vessels will not operate within 0.5 mi (0.8 km) of walrus or polar bears when observed on land or ice;
- Shell will also implement non-MMO flight restrictions prohibiting aircraft from flying within 1,000 ft (300 m) of marine mammals or below 1,500 ft (457 m) altitude (except during takeoffs and landings or in emergency situations) while over land or sea. This flight will also help avoid disturbance of and collisions with birds;
- The *Kulluk* or *Discoverer* and support vessels will enter the Chukchi Sea through the Bering Strait on or after July 1, minimizing effects on marine mammals and birds that frequent open leads and minimizing effects on spring and early summer bowhead whale hunting. All transit will be coordinated and collaborated with Com Centers as practicable.

### Drilling Operations:

- Exploration drilling activities at the Sivulliq or Torpedo drill sites are planned to begin on or about July 10 following transit into the Beaufort Sea and run through October 31, with a suspension of all operations beginning August 25 for the Nuiqsut (Cross Island) and Kaktovik subsistence bowhead whale hunts. During the suspension for the whale harvests, the *Kulluk* or *Discoverer* and support vessels will leave the Camden Bay project area and move to an area mutually agreed upon between Shell and AEW. Should the drilling vessel or support vessels anchor during the suspension, none will anchor in known environmentally, or archaeologically sensitive areas. Shell will return to resume activities after the subsistence bowhead whale hunts conclude. Exploration drilling activities will be concluded by October 31, depending on ice and weather; and
- During zero-offset vertical seismic profiling (see Section 2.4 of the revised Camden Bay EP Environmental Impact Analysis for details) airguns will be ramped up slowly to warn cetaceans and pinnipeds in the vicinity of the airguns and provide time for them to leave the area and avoid potential injury or impairment of their hearing abilities. A ramp up to the required level will not

begin until there has been a minimum of 30 minutes (min) of observation of the safety zone by MMOs to assure that no marine mammals are present. The safety zone is the extent of the 180 decibel (dB) radius for cetaceans and 190 dB for pinnipeds. The entire safety zone must be visible during the 30 min lead-in to an array ramp up. If a marine mammal(s) is sighted within the safety zone during the 30 min watch prior to ramp up, ramp up will be delayed until the marine mammal(s) is sighted outside of the safety zone or the animal(s) is not sighted for at least 15-30 min: 15 min for small odontocetes and pinnipeds, or 30 min for baleen whales and large odontocetes.

### **3.1.3 Mitigation Measures for Operations and Oil Spill Prevention and Response**

BOEMRE has concluded that the probability of a large oil spill occurring during an exploration drilling project is extremely remote. Nevertheless, as required by both federal and state regulations, Shell has developed and will implement a comprehensive Oil Discharge Prevention and Contingency Plan (ODPCP) during its exploration drilling operations, in addition to other operations plans including the Ice Management Plan (IMP) and Critical Operations and Curtailment Plan (COCP). The ODPCP will be reviewed and approved by both state and federal regulators to ensure that Shell has the spill response resources necessary to respond to any spill that might occur. While the probability of a spill is very remote, Shell will dedicate all necessary resources to respond to any spill that might occur. In addition to the maintenance and implementation of its ODPCP, Shell will implement the following additional measures to further minimize the risk of a spill that might impact marine mammals and interfere with the subsistence hunt:

- All vessel transit routes will avoid known fragile ecosystems and critical habitat areas and will include coordination through Com Centers.
- Shell has developed and will implement an IMP to ensure real-time ice and weather forecasting to identify conditions that might put operations at risk and modify its activities accordingly. The IMP also contains ice threat classification levels depending on the time available to suspend exploration drilling operations, secure the well and escape from advancing hazardous ice (see the IMP Appendix K of the revised Camden Bay EP, for details regarding Shell's IMP).
- Ice management will involve preferentially redirecting, rather than breaking, ice floes while the floes are well away from the drill site (see the IMP Appendix K of the revised Camden Bay EP).
- Real time ice and weather forecasting will be from the Shell Ice and Weather Advisory Center.
- Shell has developed and will implement a COCP, which establishes protocols to be followed in the event potential hazards, including ice, are identified in the vicinity of the exploration drilling operations (e.g., ice floes, inclement weather, etc.). Like the IMP, the COCP threat classifications are based on the time available to prepare the well and escape the location. The COCP also contains provisions for not initiating certain critical operations if there is insufficient time available before the arrival of the hazard at the drill site (see the COCP Appendix J of the revised Camden Bay EP).
- Shell has engineered each of its exploration wells (including hole sizing, mud program, casing design, casing cementing depth, hole sizing, and wellhead equipment, etc.) specifically to minimize the risk of uncontrolled flows from the wellbore due to casing or other equipment failures.

- The primary OSR vessel will be on standby at all times when drilling into zones containing oil to ensure that oil spill response capability is available within one hour, if needed.
- Shell will deploy an OSR fleet that is capable of collecting oil on the water up to the calculated Worst Case Discharge flowrate of a blowout in the unlikely event that one should occur. The primary OSR vessel will be on standby when drilling into zones containing oil to ensure that oil spill response capability is available within one hour, if needed. The remainder of the OSR fleet will be fully engaged within 72 hours.
- A polar bear culvert trap has been constructed in anticipation of oil spill response (OSR) needs and will be deployed near Point Thomson or Kaktovik prior to exploration drilling;
- The blowout prevention program will be enhanced through the use of two sets of blind/shear rams, increased frequency of blowout preventor (BOP) performance tests from 14 days to 7 days, a remotely operated vehicle control panel on the seafloor with sufficient pressured water-based fluid to operate the BOP, a containment system that includes both capping equipment and treatment and flaring capabilities, a fully-designed relief well drilling plan and provisions for a second rig (*Kulluk* or *Discoverer*) to be available to drill a relief well if the primary drilling vessel is disabled and not capable of drilling its own relief well.
- In addition to the OSR fleet, oil spill containment equipment will be available for use in the unlikely event of a blowout. The barge will be centrally located in the Beaufort Sea and supported by an Invader Class Tug and possibly an anchor handler. The containment equipment will be designed for conditions found in the Arctic including ice and cold temperatures. This equipment will also be designed for maximum reliability, ease of operation, flexibility and robustness so it could be used for a variety of blowout situations.
- Capping Stack equipment will be stored aboard one of the ice management vessels and will be available for immediate deployment in the unlikely event of a blowout. Capping Stack equipment consist of subsea devices assembled to provide direct surface intervention capability with the following priorities:
  - Attaching a device or series of devices to the well to affect a seal capable of withstanding the maximum anticipated wellhead pressure and closing the assembly to completely seal the well against further flows (commonly called “capping and killing”)
  - Attaching a device or series of devices to the well and diverting flow to surface vessel(s) equipped for separation and disposal of hydrocarbons (commonly called “capping and diverting”)
- Pre-booming is required for all fuel transfers between vessels (the Fuel Transfer Plan is located in Appendix M of the revised Camden Bay EP).

### **3.2 Exploration Drilling Marine Mammal Monitoring and Mitigation Program**

Under 50 CFR 218.108, NMFS requires any holder of an IHA in Arctic waters to complete monitoring and reporting requirements established in the IHA and published regulations. Additionally, the USFWS requires all applicants for LOAs to conduct monitoring under 50 CFR 18.128. To meet these requirements, a 4MP was developed for the Camden Bay exploration drilling program. The 4MP is designed to avoid, minimize, and mitigate potential adverse impacts to marine mammal subsistence resources that may result from offshore activities. The 4MP for Shell’s exploration drilling activities has

been sent to NMFS with the Camden Bay exploration drilling IHA application and is included in Appendix D of the revised Camden Bay EP. The 4MP for the exploration drilling program includes the following provisions:

- MMOs – MMOs will be required to support the transit through the Chukchi Sea and all operations in the Beaufort Sea. The shipboard MMO program is designed to provide real time observations of marine mammals by trained observers from individual vessels to document exposure to industrial activities. MMOs will be present on vessels to monitor for the presence of marine mammals, assist maintenance of marine mammal safety radii around vessels, monitor and record avoidance or exposure behaviors, and communicate with the Com Centers and local subsistence hunters by marine radio. The experience and abilities of the NSB residents in sighting and identifying marine mammals during Shell's exploration programs contributed significantly to the success of Shell's previous monitoring and mitigation program.
- Manned Aerial Program – Aerial surveys to collect information in the vicinity of Camden Bay regarding distribution and abundance of bowhead whales and other marine mammals.
- Acoustic Recorders – A combination of recorder technology, such as pop-up or Directional Autonomous Seafloor Acoustic Recorder buoys, to monitor wide area distribution of marine mammals, specifically bowhead whales, in relation to Shell's proposed activities.
- Sound Modeling – of vessels utilized for exploration drilling activities.
- Sound Source Verification – Field measurement sound propagation profiles of the drilling vessel and support vessels utilized by Shell in the exploration drilling programs in Camden Bay.

### **3.3 *Interaction and Avoidance Plan for Polar Bear and Pacific Walrus***

Shell has prepared an interaction and avoidance plan for polar bear and Pacific walrus to meet the requirements of 50 CFR 18.128 for holders of LOAs issued by the USFWS. The plan outlines procedures for mitigating potential impacts to polar bear and Pacific walrus, as well as monitoring program requirements. A copy of the plan for Shell's exploration drilling activities outlined in the revised Camden Bay EP has been sent to the USFWS. Measures in the plan which cover all Shell activities are summarized here.

- New polar bear dens, identified by industry, local residents, and regulatory agencies are reported annually and will be incorporated into project plans to ensure both bear and worker safety. Bear dens discovered during operations will be reported to the designated USFWS representatives.
- Trash will be collected and separated so that all food-associated waste is placed in an appropriate bear-resistant dumpster.
- Hazardous wastes, if generated, would be transported off-site for disposal at an approved facility.
- Employees will be prohibited from directly feeding animals or deliberately leaving food for polar bears and other animals.
- If a polar bear is observed, all on-site personnel will be alerted so that work activities can be altered or stopped to avoid interactions. Personnel will contact the designated USFWS representative whenever a polar bear is sighted. Depending on the distance between the polar bear and the activities this may mean retreating to the safety of vehicles, emergency shelter, temporary buildings, or other safe haven.

- When a polar bear is observed, a designated bear watcher will be assigned to ensure continuous monitoring of the bear's movements. The On-Scene Shell Supervisor will be contacted before any bear hazing activities. Trained polar bear hazers and bear guards will support field operations.
- Exploration Drilling and support vessels will observe a 0.5 mi (0.8 km) exclusion zone around any bear observed on land or ice during transit.
- Aircraft will maintain 1,500 ft (457 m) minimum altitude within, 0.5 mi (0.8 km) of a hauled-out polar bear or Pacific walrus.
- Ice management mitigation measures, such as "ice scouting," will use radar, satellite imagery, observations from support vessels by trained Ice Pilots, and reconnaissance flights to monitor ice movement in areas near the prospect area prior to and during exploration drilling operations. These measures will provide an early warning of bears in the vicinity so appropriate measures can be taken to limit polar bear/human interference.
- Polar bear monitoring, reporting, and survey activities will be conducted in accordance with those outlined in 76 Federal Register 13454.
- Exploration drilling and support vessels will observe a 0.5 mi (0.8 km) exclusion zone around Pacific walrus observed on land or ice during transit.

## **4.0 AFFECTED SUBSISTENCE COMMUNITY MEETINGS**

Affected subsistence communities that were consulted regarding Shell's planned exploration drilling activities in Camden Bay include: Barrow, Nuiqsut, and Kaktovik. Shell conducted POC meetings in the Chukchi Sea communities of Wainwright, Point Lay and Point Hope to discuss a planned Chukchi Sea exploration drilling program, while also describing the mobilization of Camden Bay exploration drilling program vessels through the Chukchi Sea to and from the Beaufort Sea. Additionally, Shell met with subsistence groups including the AEWG, the Nanuq Commission, the Eskimo Walrus Committee, the Beluga Commission, the Ice Seal Commission, and the Native Village of Barrow, and presented information regarding the proposed activities to the NSB and Northwest Arctic Borough (NWAB) Assemblies, and NSB and NWAB Planning Commissions. Several one-on-one meetings were also held throughout the villages.

### **4.1 Consultation with Community Leaders**

Beginning in early January 2009, Shell held one-on-one meetings with representatives from the NSB, subsistence-user group leadership, the Inupiat Community of the Arctic Slope (ICAS), and Village Whaling Captain Association representatives. These meetings took place at the convenience of the community leaders and in various venues. Meetings were held starting on 12 January 2009 and have continued to date. Shell's primary purpose in holding individual meetings was to inform key leaders, prior to the public meetings, so that they would be prepared to give appropriate feedback on planned activities.

## 4.2 Community Meeting Summaries

Table 4.2-1 provides a list of public meetings attended by Shell while developing this POC, beginning in 2009 through 2011. Attachment B presents sign-in sheets and presentation materials used at the POC meetings held in 2011 to present the revised Camden Bay EP. Comment analysis tables for numerous meetings held during 2011 summarize feedback from the communities on Shell's planned activities beginning in the summer of 2012. These comments analysis tables, with responses from Shell and corresponding mitigation measures pertinent to the comment are included in Attachment B.

**Table 4.2-1 Meeting Dates and Locations**

2009	Meeting Location	Meeting Attendees – Position
12-13 January	Barrow	Harry Brower – Whaling Captain, AEWC Chairman and Assistant Director of the NSB Wildlife Department Edward Itta – Whaling Captain and Mayor of the NSB Eugene Brower – Whaling Captain, Arctic Slope Regional Corporation (ASRC) Board Member and President of the NSB Assembly Anthony Edwardson – Whaling Captain and President of Ukpeagvik Iñupiat Corporation (UIC) Andy Mack – NSB Assistant to the Mayor Harold Curran – NSB Chief Administrative Officer Robert Suydam – NSB Wildlife Department Biologist Cheryl Rosa – NSB Wildlife Department Research Biologist Craig George – NSB Wildlife Department Biologist
21 January	Point Hope	Steve Oomittuk - Mayor of Point Hope
21 January	Barrow	Charlie Hopson – Whaling Captain Representative, LCMF Incorporated employee, and AEWC alternate commissioner in Barrow Adeline Hopson – NSB Assembly Member Deano Oleuman – NSB Assembly Member
21 January	Barrow	Roy Koonuk – AEWC Commissioner and Point Hope Whaling Captain
21 January	Barrow	George Edwardson – Inupiat Community of the Arctic Slope (ICAS) President Juanita Smith – ICAS Natural Resource Director
21 January	Point Hope	Rex Rock Sr.; NSB Assembly Member and Tikiqag Representative
27 January	Kotzebue	Jackie Hill – Maniilaq Association Representative
27 January	Kotzebue	Martha Whiting – Mayor of the NWAB
27 January	Kotzebue	NWAB Assembly Meeting
27 January	Kotzebue	Chuck Greene, EJ Doll Garoutte, Walter Sampson, Gladys Pungowiyi - NANA Representatives
27 January	Kaktovik	Fenton Rexford NSB Assembly Member and Native Village of Kaktovik Executive Director
28 January	Kaktovik	Carla Sims – Kaktovik Vice Mayor
2 February	Barrow	NSB Assembly Workshop
2 February	Barrow	Plan of Cooperation Public Meeting
3 February	Barrow	Janice Meadows – AEWC Executive Director
3 February	Barrow	Vera Williams – Native Village of Barrow Realty Director Joseph Sage – Native Village of Barrow Wildlife Director
5 February	Kaktovik	Plan of Cooperation Public Meeting
4-5 March	Anchorage	AEWC 2009 Conflict Avoidance Agreement (CAA) Negotiations
24 March	Point Hope	Plan of Cooperation Public Meeting
25 March	Kotzebue	Plan of Cooperation Public Meeting
25 March	Kotzebue	NSB/NWAB Joint Planning Commission Meeting
26 March	Wainwright	Plan of Cooperation Public Meeting
2 April	Barrow	ICAS Monthly Meeting
20 April	Barrow	Native Village of Barrow Meeting
22 April	Point Lay	Plan of Cooperation Public Meeting
23 April	Kivalina	Community Meeting

**Table 4.2-1 Meeting Dates and Locations**

<b>2010</b>	<b>Meeting Location</b>	<b>Meeting Attendees – Position</b>
14 January	Barrow	ICAS Monthly Meeting
15 January	Anchorage	Eugene Brower – Barrow Whaling Captains Association President
22 January	Anchorage	George Oleuman – Deputy Mayor Eugene Brower – NSB Assembly President Taquilik Hepa – NSB Wildlife Director Bessie O'Rouke – NSB Law Department Marvin Olson – NSB Director Public Works Dan Forster – NSB Planning Director
24 February	Barrow	Plan of Cooperation Public Meeting
25 February	Point Hope	Plan of Cooperation Public Meeting
26 February	Kaktovik	Plan of Cooperation Public Meeting
26 February	Barrow	Edward Itta – Mayor of the NSB
1 March	Wainwright	Plan of Cooperation Public Meeting
2 March	Kotzebue	Community Meeting
5 March	Point Hope	Plan of Cooperation Public Meeting
1 April	Point Lay	Plan of Cooperation Public Meeting
8 April	Barrow	Martha Whiting – Mayor of the NWAB Walter Sampson – NWAB Assembly President
30 April	Barrow	Edward Itta – Mayor of the NSB
1 June	Barrow	NSB Assembly Meeting
1 June	Point Lay	Point Lay Community Meeting
2 June	Barrow	Barrow Community Meeting
3 June	Kaktovik	Kaktovik Community Meeting
8 June	Barrow	Utqiagvik Agviqsuqtit Aganangich Meeting
8 June	Barrow	Barrow Whaling Captains Association Meeting
24 June	Barrow	NWAB/NSB Joint Planning Commission Meeting
19 July	Barrow	Edward Itta – Mayor of the NSB
3 August	Barrow	NSB Assembly Meeting
7 September	Barrow	NSB Assembly Meeting
23 September	Nuiqsut	Nuiqsut Whaling Captains Association Meeting
23 September	Nuiqsut	Plan of Cooperation Public Meeting
24 September	Barrow	Plan of Cooperation Public Meeting
25 September	Kaktovik	Plan of Cooperation Public Meeting
8 November	Anchorage	Alaska Beluga Whale Committee Meeting
6 December	Anchorage	Alaska Beluga Whale Committee Members Ice Seal Committee Members Alaska Nanuq Commission Members Eskimo Walrus Commission Members
<b>2011</b>	<b>Meeting Location</b>	<b>Meeting Attendees – Position</b>
27 January	Barrow	Barrow Whaling Captains Association Meeting
27 February – 2 March	Dutch Harbor	Edith Vorderstrasse – UIC UMIAQ Consulting Division Manager Ray Koonuk, Sr. – Whaling Captain Christopher Oktolik – Whaling Captain John Long, Jr. – Native Village of Point Hope Council Member Joseph Frankson – Whaling Captain Franklin Sage – Native Village of Point Hope Council Member Caroline Cannon – Native Village of Point Hope President Luke Koonook, Sr. – Elder and Whaling Captain Alzred Oomittuk – City of Point Hope Council Member Bessie Kowunna – Shell Point Hope Community Liaison, Tikigaq Board Member, and City Council Member Theodore Frankson – Native Village of Point Hope Staff Aaron Oktolik – AEWK Commissioner for Point Hope and Whaling Captain Carl Brower – Whaling Captain Dora Leavitt – City of Nuiqsut Council Member

**Table 4.2-1 Meeting Dates and Locations**

		Thomas Napageak – City of Nuiqsut Mayor and Whaling Captain Edgar Kagak – Wainwright Health Board Oliver Peetook – City of Wainwright Vice Mayor Sandra Peetook – City of Wainwright Council Member Joseph Kaleak – AEWK Commissioner for Kaktovik and Whaling Captain George Tagarook – NSB Fire Department Fire Chief and Whaling Captain
28 February – 3 March	Dutch Harbor	William Tracey, Sr. – NSB Planning Commissioner and Point Lay Fire Chief Marie Tracey – NSB Village Liaison Emma Ahvakana – NWAB Assembly Member Enoch Mitchell – Noatak IRA President Ronald Moto, Sr. – Nana Board Member and City of Deering Mayor Cole Schaeffer – Kikiktugruk Inupiat Corporation President & CEO Nellie Wesley – NWAB Planning Commission EPA Assistant Anthony Edwardson – UIC President/CEO Troy Izat – Tikigaq Corporation COO Susan Harvey – Harvey Consulting, LLC and Consultant to the NSB Thomas Nageak – Barrow Whaling Captain and NSB Cultural Resource Specialist Roy Nageak Jr. – Native Village of Barrow Natural Resource Technician Michael Shults – Barrow City Council Mary Sage –North Slope Borough School District (NSBSD) School Board Member, Iisagvik College Board Member, and Native Village of Barrow Council Member Robert Suydam – NSB Wildlife Biologist Qaiyaan Opie – ICAS Environmental Director Lloyd Leavitt – City of Barrow Council Member Robert Nageak – City of Barrow Council Member Johnny Aiken – AEWK Executive Director Harry Brower, Jr. – AEWK Chairman
7-8 March	Anchorage	Arctic Open Water Meeting
21 March	Barrow	Plan of Cooperation Public Meeting
22 March	Kaktovik	Plan of Cooperation Public Meeting
23 March	Wainwright	Plan of Cooperation Public Meeting
23 March	Wainwright	Rossmann Peetok – AEWK Commissioner for Wainwright Jason Ahmaogak – Wainwright Whaling Captain
24 March	Nuiqsut	Plan of Cooperation Public Meeting
24 March	Nuiqsut	Isaac Nukapigak – AEWK Commissioner for Nuiqsut Herbert Ipalook – President of the Nuiqsut Whaling Captains Association Thomas Napageak – Nuiqsut Whaling Captain Carl Brower – Nuiqsut Whaling Captain Eli Nukapigak – Nuiqsut Whaling Captain
25 March	Point Lay	Plan of Cooperation Public Meeting
28 March	Point Hope	Plan of Cooperation Public Meeting
29 March	Kiana	Community Meeting
30 March	Kotzebue	Community Meeting
31 March	Kivalina	Community Meeting
2 April	Nome	Vera Metcalf – Eskimo Walrus Commission Charlie Johnson – Alaska Nanuq Commission
5 April	Barrow	NSB Assembly Meeting
7 April	Kotzebue/ Anchorage (Teleconference)	Willie Goodwin – Alaska Beluga Whale Committee
8 April	Anchorage	John Goodwin – Ice Seal Committee
15 April	Anchorage	Vera Metcalf – Eskimo Walrus Commission
25 April	Savoonga	Community Meeting
26 April	Shishmaref	Community Meeting
27 April	Gambell	Community Meeting

### **4.3 Project Information and Presentation Materials**

To present consistent and concise information regarding the planned exploration drilling program, Shell prepared presentation materials (listed below and attached in Attachment B) for meetings with stakeholders across the North Slope.

#### **Camden Bay Exploration Drilling Presentation Summary**

- Summary of Shells Science Accomplishments
- Summary and explanation of Shell's revised Camden Bay EP
- Summary of Shell's drilling discharge mitigated program
- Summary of Shell's proposed drill sites for the revised Camden Bay EP

### **4.4 Meeting Process**

Prior to Shell's public meetings, communities were contacted to determine an optimal meeting date and subsequently notified by public advertising. Meeting notices and flyers were sent to each city council and Native council for public posting well in advance of the meeting dates. Public notices were also published in the *Arctic Sounder*, the local paper that serves most of the North Slope region, and announcements were made on the local radio station KBRW 680 AM and KOTZ 720 AM.

Community meetings are designed to allow the public to voice their concerns and speak one-on-one with project experts. Kiosks manned by subject matter experts were set-up in communities where this form of communication is deemed acceptable to facilitate direct communications, and comment cards supplied for each station. Comment cards with a Shell return address were left with the communities and a toll free phone number and e-mail address were provided in case questions arose after the meeting. Food was provided and door prizes were given out to create a friendly environment and encourage attendance. Every effort was made to ensure the maximum amount of feedback was received and that all questions were addressed and answered to the fullest extent possible.

After each meeting, comment cards were gathered and compiled in a comment analysis table. A separate comment analysis table was completed for each POC meeting, the NSB Assembly Meeting, and each community meeting. These tables are included in Attachment B.

## **5.0 CONCLUSION**

As discussed in Section 4, and detailed in the documents attached here, stakeholders have been provided information relevant to the project and have been invited to offer input on potential environmental, social, and health impacts, as well as and proposed mitigation and conflict avoidance measures. Shell is seeking alignment with stakeholders and, where appropriate and feasible, will incorporate the recommendations of stakeholders into project planning.

As required by applicable lease sale stipulations, as well as anticipated IHA and LOA stipulations, Shell will continue to meet with the affected subsistence communities and users to resolve any conflicts and to notify the communities of any changes in its planned operations. This POC may be supplemented, as appropriate, to reflect additional engagements with local subsistence users and any additional or revised mitigation measures that are adopted as a result of those engagements. Shell respectfully submits that this POC meets its obligations under Stipulation No. 5, as well as the POC requirements established by applicable USFWS and NMFS regulations (50 CFR 216.104, 50 CFR 18.124 and 128).

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**Attachment A**  
**OCS Lease Sale 195 and 202 Stipulations**

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# ***Leasing Activities Information***



U.S. Department of the Interior  
Minerals Management Service  
Alaska OCS Region

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## **Lease Stipulations Oil and Gas Lease Sale 195 Beaufort Sea March 30, 2005**

- Stipulation No. 1. Protection of Biological Resources
- Stipulation No. 2. Orientation Program
- Stipulation No. 3. Transportation of Hydrocarbons
- Stipulation No. 4. Industry Site-Specific Bowhead Whale-Monitoring Program
- Stipulation No. 5. Conflict Avoidance Mechanisms to Protect Subsistence Whaling and Other Subsistence-Harvesting Activities
- Stipulation No. 6. Pre-Booming Requirements for Fuel Transfers
- Stipulation No. 7. Lighting of Lease Structures to Minimize Effects to Spectacled and Steller's Eider

***Stipulation No. 1. Protection of Biological Resources.*** If biological populations or habitats that may require additional protection are identified in the lease area by the Regional Supervisor, Field Operations (RS/FO), the RS/FO may require the lessee to conduct biological surveys to determine the extent and composition of such biological populations or habitats. The RS/FO shall give written notification to the lessee of the RS/FO's decision to require such surveys.

Based on any surveys that the RS/FO may require of the lessee or on other information available to the RS/FO on special biological resources, the RS/FO may require the lessee to:

- (1) Relocate the site of operations;
- (2) Establish to the satisfaction of the RS/FO, on the basis of a site-specific survey, either that such operations will not have a significant adverse effect upon the resource identified or that a special biological resource does not exist;
- (3) Operate during those periods of time, as established by the RS/FO, that do not adversely affect the biological resources; and/or
- (4) Modify operations to ensure that significant biological populations or habitats deserving protection are not adversely affected.

If any area of biological significance should be discovered during the conduct of any operations on the lease, the lessee shall immediately report such findings to the RS/FO and make every

reasonable effort to preserve and protect the biological resource from damage until the RS/FO has given the lessee direction with respect to its protection.

The lessee shall submit all data obtained in the course of biological surveys to the RS/FO with the locational information for drilling or other activity. The lessee may take no action that might affect the biological populations or habitats surveyed until the RS/FO provides written directions to the lessee with regard to permissible actions.

**Stipulation No. 2. Orientation Program.** The lessee shall include in any exploration or development and production plans submitted under 30 CFR 250.203 and 250.204 a proposed orientation program for all personnel involved in exploration or development and production activities (including personnel of the lessee's agents, contractors, and subcontractors) for review and approval by the RS/FO. The program shall be designed in sufficient detail to inform individuals working on the project of specific types of environmental, social, and cultural concerns that relate to the sale and adjacent areas. The program shall address the importance of not disturbing archaeological and biological resources and habitats, including endangered species, fisheries, bird colonies, and marine mammals and provide guidance on how to avoid disturbance. This guidance will include the production and distribution of information cards on endangered and/or threatened species in the sale area. The program shall be designed to increase the sensitivity and understanding of personnel to community values, customs, and lifestyles in areas in which such personnel will be operating. The orientation program shall also include information concerning avoidance of conflicts with subsistence, commercial fishing activities, and pertinent mitigation.

The program shall be attended at least once a year by all personnel involved in onsite exploration or development and production activities (including personnel of the lessee's agents, contractors, and subcontractors) and all supervisory and managerial personnel involved in lease activities of the lessee and its agents, contractors, and subcontractors.

The lessee shall maintain a record of all personnel who attend the program onsite for so long as the site is active, not to exceed 5 years. This record shall include the name and date(s) of attendance of each attendee.

**Stipulation No. 3. Transportation of Hydrocarbons.** Pipelines will be required: (a) if pipeline rights-of-way can be determined and obtained; (b) if laying such pipelines is technologically feasible and environmentally preferable; and (c) if, in the opinion of the lessor, pipelines can be laid without net social loss, taking into account any incremental costs of pipelines over alternative methods of transportation and any incremental benefits in the form of increased environmental protection or reduced multiple-use conflicts. The lessor specifically reserves the right to require that any pipeline used for transporting production to shore be placed in certain designated management areas. In selecting the means of transportation, consideration will be given to recommendations of any advisory groups and Federal, state, and local governments and industry.

Following the development of sufficient pipeline capacity, no crude oil production will be transported by surface vessel from offshore production sites, except in the case of an emergency. Determinations as to emergency conditions and appropriate responses to these conditions will be made by the RS/FO.

**Stipulation No. 4. Industry Site-Specific Bowhead Whale-Monitoring Program.** Lessees proposing to conduct exploratory drilling operations, including seismic surveys, during the bowhead whale migration will be required to conduct a site-specific monitoring program approved by the RS/FO; unless, based on the size, timing, duration, and scope of the proposed operations, the RS/FO, in consultation with the North Slope Borough (NSB) and the Alaska Eskimo Whaling Commission (AEWC), determine that a monitoring program is not necessary. The RS/FO will provide the NSB, AEWC, and the State of Alaska a minimum of 30 but no longer than 60 calendar days to review and comment on a proposed monitoring program prior to approval. The monitoring program must be approved each year before exploratory drilling operations can be commenced.

The monitoring program will be designed to assess when bowhead whales are present in the vicinity of lease operations and the extent of behavioral effects on bowhead whales due to these operations. In designing the program, lessees must consider the potential scope and extent of effects that the type of operation could have on bowhead whales. Experiences relayed by subsistence hunters indicate that, depending on the type of operations, some whales demonstrate avoidance behavior at distances of up to 35 miles. The program must also provide for the following:

- (1) Recording and reporting information on sighting of other marine mammals and the extent of behavioral effects due to operations;
- (2) Inviting an AEWC or NSB representative to participate in the monitoring program as an observer;
- (3) Coordinating the monitoring logistics beforehand with the MMS Bowhead Whale Aerial Survey Project (BWASP);
- (4) Submitting daily monitoring results to the MMS BWASP;
- (5) Submitting a draft report on the results of the monitoring program to the RS/FO within 60 days following the completion of the operation (the RS/FO will distribute this draft report to the AEWC, the NSB, the State of Alaska, and the National Oceanic and Atmospheric Administration-Fisheries [NOAA]); and
- (6) Submitting a final report on the results of the monitoring program to the RS/FO (the final report will include a discussion of the results of the peer review of the draft report and the RS/FO will distribute this report to the AEWC, the NSB, the State of Alaska, and the NOAA Fisheries).

Lessees will be required to fund an independent peer review of a proposed monitoring plan and the draft report on the results of the monitoring program. This peer review will consist of independent reviewers who have knowledge and experience in statistics, monitoring marine mammal behavior, the type and extent of the proposed operations, and an awareness of traditional knowledge. The peer reviewers will be selected by the RS/FO from experts recommended by the NSB, the AEWC, industry, NOAA Fisheries, and MMS. The results of these peer reviews will be provided to the RS/FO for consideration in final approval of the monitoring program and the final report, with copies to the NSB, AEWC, and the State of Alaska.

In the event the lessee is seeking a Letter of Authorization (LOA) or Incidental Harassment Authorization (IHA) for incidental take from the NOAA Fisheries, the monitoring program and review process required under the LOA or IHA may satisfy the requirements of this stipulation.

Lessees must advise the RS/FO when it is seeking an LOA or IHA in lieu of meeting the requirements of this stipulation and provide the RS/FO with copies of all pertinent submittals and resulting correspondence. The RS/FO will coordinate with the NOAA Fisheries and advise the lessee if the LOA or IHA will meet these requirements.

This stipulation applies to the following blocks for the time periods listed and will remain in effect until termination or modification by the Department of the Interior, after consultation with the NOAA Fisheries and the NSB.

**Spring Migration Area: April 1 through June 15**

**OPD: NR 05-01, Dease Inlet.** Blocks included:

6102-6111	6302-6321	6508-6523	6717-6723
6152-6167	6354-6371	6560-6573	
6202-6220	6404-6423	6610-6623	
6252-6270	6455-6473	6659-6673	

**OPD: NR 05-02, Harrison Bay North:** Blocks included:

6401-6404	6501-6506	6601-6609	6701-6716
6451-6454	6551-6556	6651-6659	

**Central Fall Migration Area: September 1 through October 31**

**OPD: NR 05-01, Dease Inlet.** Blocks included:

6102-6111	6354-6371	6610-6623	6856-6873
6152-6167	6404-6423	6659-6673	6908-6923
6202-6220	6455-6473	6706-6723	6960-6973
6252-6270	6508-6523	6756-6773	7011-7023
6302-6321	6560-6573	6806-6823	7062-7073
			7112-7123

**OPD: NR 05-02, Harrison Bay North.** Blocks included:

6401-6404	6601-6609	6801-6818	7001-7023
6451-6454	6651-6659	6851-6868	7051-7073
6501-6506	6701-6716	6901-6923	7101-7123
6551-6556	6751-6766	6951-6973	

**OPD: NR 05-03, Teshekpuk.** Blocks included:

6015-6024	6067-6072
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**OPD: NR 05-04, Harrison Bay.** Blocks included:

6001-6023	6157-6173	6309-6324	6461-6471
6052-6073	6208-6223	6360-6374	6513-6519
6106-6123	6258-6274	6410-6424	6565-6566

**OPD: NR 06-01, Beechey Point North.** Blocks included:

6901-6911	6951-6962	7001-7012	7051-7062
			7101-7113

**OPD: NR 06-03, Beechey Point.** Blocks included:

6002-6014	6202-6220	6401-6424	6618-6624
6052-6064	6251-6274	6456-6474	6671-6674
6102-6114	6301-6324	6509-6524	6722-6724
6152-6169	6351-6374	6568-6574	6773

**OPD: NR 06-04, Flaxman Island.** Blocks included:

6301-6303	6451-6459	6601-6609	6751-6759
6351-6359	6501-6509	6651-6659	6802-6809
6401-6409	6551-6559	6701-6709	6856-6859

**Eastern Fall Migration: August 1 through October 31**

**OPD: NR 06-04, Flaxman Island.** Blocks included:

6360-6364	6560-6574	6760-6774	6961-6974
6410-6424	6610-6624	6810-6824	7013-7022
6460-6474	6660-6674	6860-6874	7066-7070
6510-6524	6710-6724	6910-6924	7118-7119

**OPD: NR 07-03, Barter Island.** Blocks included:

6401-6405	6601-6605	6801-6803	7012-7013
6451-6455	6651-6655	6851-6853	7062-7067
6501-6505	6701-6705	6901-6903	7113-7117
6551-6555	6751-6753	6962-6963	

**OPD: NR 07-05, Demarcation Point.** Blocks included:

6016-6022	6118-6125	6221-6226	6324-6326
6067-6072	6169-6175	6273-6276	

**OPD: NR 07-06, Mackenzie Canyon.** Blocks included:

6201	6251	6301	6351
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**Stipulation No. 5. Conflict Avoidance Mechanisms to Protect Subsistence Whaling and Other Subsistence-Harvesting Activities.** Exploration and development and production operations shall be conducted in a manner that prevents unreasonable conflicts between the oil and gas industry and subsistence activities (including, but not limited to, bowhead whale subsistence hunting).

Prior to submitting an exploration plan or development and production plan (including associated oil-spill contingency plans) to MMS for activities proposed during the bowhead whale migration period, the lessee shall consult with the directly affected subsistence communities, Barrow, Kaktovik, or Nuiqsut, the North Slope Borough (NSB), and the Alaska Eskimo Whaling Commission (AEWC) to discuss potential conflicts with the siting, timing, and methods of

proposed operations and safeguards or mitigating measures which could be implemented by the operator to prevent unreasonable conflicts. Through this consultation, the lessee shall make every reasonable effort, including such mechanisms as a conflict avoidance agreement, to assure that exploration, development, and production activities are compatible with whaling and other subsistence hunting activities and will not result in unreasonable interference with subsistence harvests.

A discussion of resolutions reached during this consultation process and plans for continued consultation shall be included in the exploration plan or the development and production plan. In particular, the lessee shall show in the plan how its activities, in combination with other activities in the area, will be scheduled and located to prevent unreasonable conflicts with subsistence activities. Lessees shall also include a discussion of multiple or simultaneous operations, such as ice management and seismic activities, that can be expected to occur during operations in order to more accurately assess the potential for any cumulative effects. Communities, individuals, and other entities who were involved in the consultation shall be identified in the plan. The RS/FO shall send a copy of the exploration plan or development and production plan (including associated oil-spill contingency plans) to the directly affected communities and the AEWIC at the time they are submitted to the MMS to allow concurrent review and comment as part of the plan approval process.

In the event no agreement is reached between the parties, the lessee, the AEWIC, the NSB, the National Oceanic and Atmospheric Administration - Fisheries (NOAA), or any of the subsistence communities that could be affected directly by the proposed activity may request that the RS/FO assemble a group consisting of representatives from the subsistence communities, AEWIC, NSB, NOAA Fisheries, and the lessee(s) to specifically address the conflict and attempt to resolve the issues before making a final determination on the adequacy of the measures taken to prevent unreasonable conflicts with subsistence harvests. Upon request, the RS/FO will assemble this group if the RS/FO determines such a meeting is warranted and relevant before making a final determination on the adequacy of the measures taken to prevent unreasonable conflicts with subsistence harvests.

The lessee shall notify the RS/FO of all concerns expressed by subsistence hunters during operations and of steps taken to address such concerns. Lease-related use will be restricted when the RS/FO determines it is necessary to prevent unreasonable conflicts with local subsistence hunting activities.

In enforcing this stipulation, the RS/FO will work with other agencies and the public to assure that potential conflicts are identified and efforts are taken to avoid these conflicts.

Subsistence whaling activities occur generally during the following periods:

**August to October:** Kaktovik whalers use the area circumscribed from Anderson Point in Camden Bay to a point 30 kilometers north of Barter Island to Humphrey Point east of Barter Island. Nuiqsut whalers use an area extending from a line northward of the Nechelik Channel of the Colville River to Flaxman Island, seaward of the Barrier Islands.

**September to October:** Barrow hunters use the area circumscribed by a western boundary extending approximately 15 kilometers west of Barrow, a northern boundary 50 kilometers

north of Barrow, then southeastward to a point about 50 kilometers off Cooper Island, with an eastern boundary on the east side of Dease Inlet. Occasional use may extend eastward as far as Cape Halkett.

**Stipulation No. 6 - Pre-Booming Requirements for Fuel Transfers.** Fuel transfers (excluding gasoline transfers) of 100 barrels or more occurring 3 weeks prior to or during the bowhead whale migration will require pre-booming of the fuel barge(s). The fuel barge must be surrounded by an oil-spill-containment boom during the entire transfer operation to help reduce any adverse effects from a fuel spill. This stipulation is applicable to the blocks and migration times listed in the stipulation on Industry Site-Specific Bowhead Whale-Monitoring. The lessee's oil-spill-contingency plans must include procedures for the pre-transfer booming of the fuel barge(s).

**Stipulation No. 7. Lighting of Lease Structures to Minimize Effects to Spectacled and Steller's Eider.** In accordance with the Biological Opinion for the Beaufort Sea Lease Sale 186 issued by the U.S. Fish and Wildlife Service (FWS) on October 22, 2002, and FWS's subsequent amendment of the Incidental Take Statement on September 21, 2004, lessees must adhere to lighting requirements for all exploration or delineation structures so as to minimize the likelihood that migrating spectacled or Steller's eiders will strike these structures.

Lessees are required to implement lighting requirements aimed at minimizing the radiation of light outward from exploration/delineation structures to minimize the likelihood that spectacled or Steller's eiders will strike those structures. These requirements establish a coordinated process for a performance based objective rather than pre-determined prescriptive requirements. The performance based objective is to minimize the radiation of light outward from exploration/delineation structures. Measures to be considered include but need not be limited to the following:

- Shading and/or light fixture placement to direct light inward and downward to living and work structures while minimizing light radiating upward and outward;
- Types of lights;
- Adjustment of the number and intensity of lights as needed during specific activities.
- Dark paint colors for selected surfaces;
- Low reflecting finishes or coverings for selected surfaces; and
- Facility or equipment configuration.

Lessees are encouraged to consider other technical, operational and management approaches to reduce outward light radiation that could be applied to their specific facility and operation.

If further information on bird avoidance measures becomes available that suggests modification to this lighting protocol is warranted under the Endangered Species Act to implement the reasonable and prudent measures of the Biological Opinion, MMS will issue further requirements, based on guidance from the FWS. Lessees will be required to adhere to such modifications of this protocol. The MMS will promptly notify lessees of any changes to lighting required under this stipulation.

These requirements apply to all new and existing Outer Continental Shelf oil and gas leases issued between the 156<sup>0</sup> W longitude and 146<sup>0</sup> W longitude for activities conducted between May 1 and October 31. The MMS encourages operators to consider such measures in areas to the east of 146<sup>0</sup> W longitude because occasional sightings of eiders that are now listed have been made there and because such measures could reduce the potential for collisions of other, non-ESA listed migratory birds that are protected under the Migratory Bird Treaty Act.

Nothing in this protocol is intended to reduce personnel safety or prevent compliance with other regulatory requirements (e.g. U.S. Coast Guard or Department of Occupational Safety and Health) for marking or lighting of equipment and work areas.

Lessees are required to report spectacled and/or Steller's eiders injured or killed through collisions with lease structures to the Fairbanks Fish and Wildlife Field Office, Endangered Species Branch, Fairbanks, Alaska at (907) 456-0499. We recommend that you call that office for instruction on the handling and disposal of the injured or dead bird.

Lessees must provide MMS with a written statement of measures that will be or that have been taken to meet the objective of this stipulation. Lessees must also include a plan for recording and reporting bird strikes that occur during approved activities to the MMS. This information must be included with an Exploration Plan when the EP is submitted for regulatory review and approval pursuant to 30 CFR 250.203. Lessees are encouraged to discuss their proposed measures in a pre-submittal meeting with the MMS and FWS.

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# Leasing Activities Information

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U.S. Department of the Interior  
Minerals Management Service  
Alaska OCS Region

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## Lease Stipulations

### Oil and Gas Lease Sale 202 Beaufort Sea April 18, 2007

- Stipulation No. 1. Protection of Biological Resources
- Stipulation No. 2. Orientation Program
- Stipulation No. 3. Transportation of Hydrocarbons
- Stipulation No. 4. Industry Site-Specific Bowhead Whale-Monitoring Program
- Stipulation No. 5. Conflict Avoidance Mechanisms to Protect Subsistence Whaling and Other Subsistence-Harvesting Activities
- Stipulation No. 6. Pre-Booming Requirements for Fuel Transfers
- Stipulation No. 7. Lighting of Lease Structures to Minimize Effects to Spectacled and Steller's Eider

**Stipulation No. 1. Protection of Biological Resources.** If biological populations or habitats that may require additional protection are identified in the lease area by the Regional Supervisor, Field Operations (RS/FO), the RS/FO may require the lessee to conduct biological surveys to determine the extent and composition of such biological populations or habitats. The RS/FO shall give written notification to the lessee of the RS/FO's decision to require such surveys.

Based on any surveys that the RS/FO may require of the lessee or on other information available to the RS/FO on special biological resources, the RS/FO may require the lessee to:

- (1) Relocate the site of operations;
- (2) Establish to the satisfaction of the RS/FO, on the basis of a site-specific survey, either that such operations will not have a significant adverse effect upon the resource identified or that a special biological resource does not exist;
- (3) Operate during those periods of time, as established by the RS/FO, that do not adversely affect the biological resources; and/or
- (4) Modify operations to ensure that significant biological populations or habitats deserving protection are not adversely affected.

If any area of biological significance should be discovered during the conduct of any operations on the lease, the lessee shall immediately report such findings to the RS/FO and make every reasonable effort to preserve and protect the biological resource from damage until the RS/FO has given the lessee direction with respect to its protection.

The lessee shall submit all data obtained in the course of biological surveys to the RS/FO with the locational information for drilling or other activity. The lessee may take no action that might affect the biological populations or habitats surveyed until the RS/FO provides written directions to the lessee with regard to permissible actions.

**Stipulation No. 2. Orientation Program.** The lessee shall include in any exploration or development and production plans submitted under 30 CFR 250.201 a proposed orientation program for all personnel involved in exploration or development and production activities (including personnel of the lessee's agents, contractors, and subcontractors) for review and approval by the RS/FO. The program shall be designed in sufficient detail to inform individuals working on the project of specific types of environmental, social, and cultural concerns that relate to the sale and adjacent areas. The program shall address the importance of not disturbing archaeological and biological resources and habitats, including endangered species, fisheries, bird colonies, and marine mammals and provide guidance on how to avoid disturbance. This guidance will include the production and distribution of information cards on endangered and/or threatened species in the sale area. The program shall be designed to increase the sensitivity and understanding of personnel to community values, customs, and lifestyles in areas in which such personnel will be operating. The orientation program shall also include information concerning avoidance of conflicts with subsistence, commercial fishing activities, and pertinent mitigation.

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The lessee shall maintain a record of all personnel who attend the program onsite for so long as the site is active, not to exceed 5 years. This record shall include the name and date(s) of attendance of each attendee.

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Following the development of sufficient pipeline capacity, no crude oil production will be transported by surface vessel from offshore production sites, except in the case of an emergency. Determinations as to emergency conditions and appropriate responses to these conditions will be made by the RS/FO.

**Stipulation No. 4. Industry Site-Specific Bowhead Whale-Monitoring Program.** Lessees proposing to conduct exploratory drilling operations, including seismic surveys, during the bowhead whale migration will be required to conduct a site-specific monitoring program approved by the RS/FO; unless, based on the size, timing, duration, and scope of the proposed operations, the RS/FO, in consultation with the North Slope Borough (NSB) and the Alaska Eskimo Whaling Commission (AEWC), determine that a monitoring program is not necessary. The RS/FO will provide the NSB, AEWC, and the State of Alaska a minimum of 30 but no longer than 60 calendar days to review and comment on a proposed monitoring program prior to approval. The monitoring program must be approved each year before exploratory drilling operations can be commenced.

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- (5) Submitting a draft report on the results of the monitoring program to the RS/FO within 60 days following the completion of the operation (the RS/FO will distribute this draft report to the AEWC, the NSB, the State of Alaska, and the National Oceanic and Atmospheric Administration-Fisheries [NOAA]); and
- (6) Submitting a final report on the results of the monitoring program to the RS/FO (the final report will include a discussion of the results of the peer review of the draft report and the RS/FO will distribute this report to the AEWC, the NSB, the State of Alaska, and the NOAA Fisheries).

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In the event the lessee is seeking a Letter of Authorization (LOA) or Incidental Harassment Authorization (IHA) for incidental take from the NOAA Fisheries, the monitoring program and review process required under the LOA or IHA may satisfy the requirements of this stipulation. Lessees must advise the RS/FO when it is seeking an LOA or IHA in lieu of meeting the requirements of this stipulation and provide the RS/FO with copies of all pertinent submittals and resulting correspondence. The RS/FO will coordinate with the NOAA Fisheries and advise the lessee if the LOA or IHA will meet these requirements.

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6451-6454	6551-6556	6651-6659	

**Central Fall Migration Area: September 1 through October 31**

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6202-6220	6455-6473	6706-6723	6960-6973
6252-6270	6508-6523	6756-6773	7011-7023
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**OPD: NR 05-02, Harrison Bay North. Blocks included:**

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6451-6454	6651-6659	6851-6868	7051-7073
6501-6506	6701-6716	6901-6923	7101-7123
6551-6556	6751-6766	6951-6973	

**OPD: NR 05-03, Teshekpuk. Blocks included:**

6015-6024                      6067-6072

**OPD: NR 05-04, Harrison Bay. Blocks included:**

6001-6023                      6157-6173                      6309-6324                      6461-6471  
6052-6073                      6208-6223                      6360-6374                      6513-6519  
6106-6123                      6258-6274                      6410-6424                      6565-6566

**OPD: NR 06-01, Beechey Point North. Blocks included:**

6901-6911                      6951-6962                      7001-7012                      7051-7062  
7101-7113

**OPD: NR 06-03, Beechey Point. Blocks included:**

6002-6014                      6202-6220                      6401-6424                      6618-6624  
6052-6064                      6251-6274                      6456-6474                      6671-6674  
6102-6114                      6301-6324                      6509-6524                      6722-6724  
6152-6169                      6351-6374                      6568-6574                      6773

**OPD: NR 06-04, Flaxman Island. Blocks included:**

6301-6303                      6451-6459                      6601-6609                      6751-6759  
6351-6359                      6501-6509                      6651-6659                      6802-6809  
6401-6409                      6551-6559                      6701-6709                      6856-6859

**Eastern Fall Migration: August 1 through October 31**

**OPD: NR 06-04, Flaxman Island. Blocks included:**

6360-6364                      6560-6574                      6760-6774                      6961-6974  
6410-6424                      6610-6624                      6810-6824                      7013-7022  
6460-6474                      6660-6674                      6860-6874                      7066-7070  
6510-6524                      6710-6724                      6910-6924                      7118-7119

**OPD: NR 07-03, Barter Island. Blocks included:**

6401-6405                      6601-6605                      6801-6803                      7012-7013  
6451-6455                      6651-6655                      6851-6853                      7062-7067  
6501-6505                      6701-6705                      6901-6903                      7113-7117  
6551-6555                      6751-6753                      6962-6963

**OPD: NR 07-05, Demarcation Point. Blocks included:**

6016-6022                      6118-6125                      6221-6226                      6324-6326  
6067-6072                      6169-6175                      6273-6276

**OPD: NR 07-06, Mackenzie Canyon. Blocks included:**

6201                                      6251                                      6301                                      6351

**Stipulation No. 5. Conflict Avoidance Mechanisms to Protect Subsistence Whaling and Other Subsistence-Harvesting Activities.** Exploration and development and production operations shall be conducted in a manner that prevents unreasonable conflicts between the oil and gas industry and subsistence activities (including, but not limited to, bowhead whale subsistence hunting).

Prior to submitting an exploration plan or development and production plan (including associated oil-spill contingency plans) to MMS for activities proposed during the bowhead whale migration period, the lessee shall consult with the directly affected subsistence communities, Barrow, Kaktovik, or Nuiqsut, the North Slope Borough (NSB), and the Alaska Eskimo Whaling Commission (AEWC) to discuss potential conflicts with the siting, timing, and methods of proposed operations and safeguards or mitigating measures which could be implemented by the operator to prevent unreasonable conflicts. Through this consultation, the lessee shall make every reasonable effort, including such mechanisms as a conflict avoidance agreement, to assure that exploration, development, and production activities are compatible with whaling and other subsistence hunting activities and will not result in unreasonable interference with subsistence harvests.

A discussion of resolutions reached during this consultation process and plans for continued consultation shall be included in the exploration plan or the development and production plan. In particular, the lessee shall show in the plan how its activities, in combination with other activities in the area, will be scheduled and located to prevent unreasonable conflicts with subsistence activities. Lessees shall also include a discussion of multiple or simultaneous operations, such as ice management and seismic activities, that can be expected to occur during operations in order to more accurately assess the potential for any cumulative effects. Communities, individuals, and other entities who were involved in the consultation shall be identified in the plan. The RS/FO shall send a copy of the exploration plan or development and production plan (including associated oil-spill contingency plans) to the directly affected communities and the AEWC at the time they are submitted to the MMS to allow concurrent review and comment as part of the plan approval process.

In the event no agreement is reached between the parties, the lessee, the AEWC, the NSB, the National Oceanic and Atmospheric Administration - Fisheries (NOAA), or any of the subsistence communities that could be affected directly by the proposed activity may request that the RS/FO assemble a group consisting of representatives from the subsistence communities, AEWC, NSB, NOAA Fisheries, and the lessee(s) to specifically address the conflict and attempt to resolve the issues before making a final determination on the adequacy of the measures taken to prevent unreasonable conflicts with subsistence harvests. Upon request, the RS/FO will assemble this group if the RS/FO determines such a meeting is warranted and relevant before making a final determination on the adequacy of the measures taken to prevent unreasonable conflicts with subsistence harvests.

The lessee shall notify the RS/FO of all concerns expressed by subsistence hunters during operations and of steps taken to address such concerns. Lease-related use will be restricted when the RS/FO determines it is necessary to prevent unreasonable conflicts with local subsistence hunting activities.

In enforcing this stipulation, the RS/FO will work with other agencies and the public to assure that potential conflicts are identified and efforts are taken to avoid these conflicts.

Subsistence whaling activities occur generally during the following periods:

**August to October:** Kaktovik whalers use the area circumscribed from Anderson Point in Camden Bay to a point 30 kilometers north of Barter Island to Humphrey Point east of Barter Island. Nuiqsut whalers use an area extending from a line northward of the Nechelik Channel of the Colville River to Flaxman Island, seaward of the Barrier Islands.

**September to October:** Barrow hunters use the area circumscribed by a western boundary extending approximately 15 kilometers west of Barrow, a northern boundary 50 kilometers north of Barrow, then southeastward to a point about 50 kilometers off Cooper Island, with an eastern boundary on the east side of Dease Inlet. Occasional use may extend eastward as far as Cape Halkett.

**Stipulation No. 6 - Pre-Booming Requirements for Fuel Transfers.** Fuel transfers (excluding gasoline transfers) of 100 barrels or more occurring 3 weeks prior to or during the bowhead whale migration will require pre-booming of the fuel barge(s). The fuel barge must be surrounded by an oil-spill-containment boom during the entire transfer operation to help reduce any adverse effects from a fuel spill. This stipulation is applicable to the blocks and migration times listed in the stipulation on Industry Site-Specific Bowhead Whale-Monitoring. The lessee's oil-spill-contingency plans must include procedures for the pre-transfer booming of the fuel barge(s).

**Stipulation No. 7. Lighting of Lease Structures to Minimize Effects to Spectacled and Steller's Eider.** In accordance with the Biological Opinion for the Beaufort Sea Lease Sale 186 issued by the U.S. Fish and Wildlife Service (FWS) on October 22, 2002, and FWS's subsequent amendment of the Incidental Take Statement on September 21, 2004, lessees must adhere to lighting requirements for all exploration or delineation structures so as to minimize the likelihood that migrating spectacled or Steller's eiders will strike these structures.

Lessees are required to implement lighting requirements aimed at minimizing the radiation of light outward from exploration/delineation structures to minimize the likelihood that spectacled or Steller's eiders will strike those structures. These requirements establish a coordinated process for a performance based objective rather than pre-determined prescriptive requirements. The performance based objective is to minimize the radiation of light outward from exploration/delineation structures. Measures to be considered include but need not be limited to the following:

- Shading and/or light fixture placement to direct light inward and downward to living and work structures while minimizing light radiating upward and outward;
- Types of lights;
- Adjustment of the number and intensity of lights as needed during specific activities.
- Dark paint colors for selected surfaces;

- Low reflecting finishes or coverings for selected surfaces; and
- Facility or equipment configuration.

Lessees are encouraged to consider other technical, operational and management approaches to reduce outward light radiation that could be applied to their specific facility and operation.

If further information on bird avoidance measures becomes available that suggests modification to this lighting protocol is warranted under the Endangered Species Act to implement the reasonable and prudent measures of the Biological Opinion, MMS will issue further requirements, based on guidance from the FWS. Lessees will be required to adhere to such modifications of this protocol. The MMS will promptly notify lessees of any changes to lighting required under this stipulation.

These requirements apply to all new and existing Outer Continental Shelf oil and gas leases issued between the 156<sup>0</sup> W longitude and 146<sup>0</sup> W longitude for activities conducted between May 1 and October 31. The MMS encourages operators to consider such measures in areas to the east of 146<sup>0</sup> W longitude because occasional sightings of eiders that are now listed have been made there and because such measures could reduce the potential for collisions of other, non-ESA listed migratory birds that are protected under the Migratory Bird Treaty Act.

Nothing in this protocol is intended to reduce personnel safety or prevent compliance with other regulatory requirements (e.g. U.S. Coast Guard or Occupational Safety and Health Administration) for marking or lighting of equipment and work areas.

Lessees are required to report spectacled and/or Steller's eiders injured or killed through collisions with lease structures to the Fairbanks Fish and Wildlife Field Office, Endangered Species Branch, Fairbanks, Alaska at (907) 456-0499. We recommend that you call that office for instruction on the handling and disposal of the injured or dead bird.

Lessees must provide MMS with a written statement of measures that will be or that have been taken to meet the objective of this stipulation. Lessees must also include a plan for recording and reporting bird strikes that occur during approved activities to the MMS. This information must be included with an Exploration Plan when the EP is submitted for regulatory review and approval pursuant to 30 CFR 250.201. Lessees are encouraged to discuss their proposed measures in a pre-submittal meeting with the MMS and FWS.

**Attachment B**  
**Communication and Consultation with North Slope Subsistence Stakeholders**

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Issues	Comments	Shell Response	Mitigation Measures*
<b>Credible Science:</b> Baseline Studies	You mentioned the word catastrophe, what's the closest fault line?	There are not active faults in this area but it is a requirement of the BOEMRE that we conduct shallow hazard surveys to ensure that we do not drill through a fault. All of the planned wells are located a good distance away from all faults in the area, and each of those faults is dormant. They have not moved in several million years.	N/A
Baseline Studies	I want to see that-90 foot drop, that hole in the ocean floor. I read a lot of literature of Shell and it's not all exactly what you guys say.	That's why we are having these discussions.	N/A
Biological Environment	What's the polynya zone?	It's an area near the shore where there are open leads along the Chukchi Sea coast with currents where there is a lot of food. The whales follow these currents in the open areas to get their food source.	N/A
Traditional Knowledge	Some large blocks of ice blocked ice from moving from Greenland some time ago.		I
<b>Operational Impacts:</b> Discharge	Can you explain "Cutting after 20" casing"? What is casing?	Casing is the pipe that transmits the cuttings to the surface and keeps the hole from caving in. Cuttings are small chips of rock that the bit grinds up. We capture the cuttings and drilling mud in containers instead of discharging them into the sea. We transport those out of the Arctic for disposal.	K
Drilling	Because of that the amount of drilling, does Shell feel like the expert now because of that?	Shell doesn't just rely on our own internal expertise, we work with people all over the world. We work with all kinds of people even those in communities and with Subsistence Advisors, etc.	E and L
Health & Safety	If one does encounter an emergency will there be Search and Rescue equipment?	Yes. We will have a dedicated helicopter stationed in Barrow to perform search and rescue and evacuation operations.	J

Issues	Comments	Shell Response	Mitigation Measures*
Health & Safety	Can you describe what kind of infrastructure you envision for those programs?	We have a big white hangar in Barrow you may have seen. We will be using this for our air operations for the Chukchi Sea and for search and rescue operations. In Deadhorse, we have a base that is associated with the other infrastructure there for supporting operations in Prudhoe Bay. In the Chukchi Sea we will have a small marine operations station in Wainwright.	J
Health & Safety	What are the minimum guidelines for Shell flying helicopters here? My point is that there were people doing impact contract, due to fog and the minimum safety reason, since you say you're going to have the SAR and with these kinds of deadlines, you will not be able to monitor the ice.	We use the same acronyms for two things. SAR for Synthetic Aperture Radar and for Search and Rescue. We are required to follow the FAA guidelines for aircraft operations including not flying if conditions are below flight minimums. It is no different for our air operations than for anyone else.	J
Ice Management and Monitoring	What is your plan if ice is coming suddenly?	We have a Critical Operations and Curtailment Plan, that includes ice. We have the real time satellite imaging, radar and ice management vessels doing real time ice reconnaissance. The main ice management vessel works from 3-25 miles away from the drill site. The anchor handler works from the drilling vessel to about 5 miles out so we have far and near ice information. If they think we will not be able to manage the ice we will stop drilling, secure the well to make it leak-proof, recover the moorings and move offsite.	I
Ice Management and Monitoring	Has Shell monitored Ellesmere Island ice? It was in the news quite a few years back.	Our ice monitoring is in the area we are operating. We also use the NOAA Ice Center and they are tracking it on a more global basis. Our monitoring is more intensive during our season. The dominant currents in the Arctic tend to move ice toward the ice. If large floes of multi-year ice are entering our area of operation we will be able to track them in a highly detailed manner for several days before they would impact us.	I

Issues	Comments	Shell Response	Mitigation Measures*
Ice Management and Monitoring	BP documented some ice that got stuck in shallow areas a couple years ago.	We are evaluating ice gouging in our lease areas on a yearly basis. This information is really important for development. Our platform must be able to resist the ice and maintain position in the ice all the time we are drilling and producing wells. It is evident that ice frequently grounds on shallow areas like Hanna Shoal and remains there well into the season. These are substantial pieces of ice. We survey the ice by airplane prior to the season and track ice on a daily basis during operations.	I
Ice Management and Monitoring	I have concerns about ice slamming against the platform.	The way we've developed our platforms are conical. They shear the ice and the ice goes around them.	I
Ice Management and Monitoring	The ice that we have up here and the broken pieces that are underneath the water surface will affect you. Your anchor points and your structure underneath. You need to study the glacier ice. There are big pieces of ice that you can't see.	The way we've developed our platforms are conical. They shear the ice and the ice goes around them.	I
Ice Management and Monitoring	I would like to see your plan in place to understand when and how the decisions are made to pack up and move. I want to see on paper who will make the call and it would be very important to get that together. Some days the ice is flat and over night there could be a lot of ridges.	It has to be on paper. We will resubmit our Ice management plan from previous submissions. We are required by the BOEMRE to submit what is called the Critical Operations and Curtailment Plan. Part of this involves hazardous ice that could threaten the drilling vessel. This Ice Management Plan outlines our procedures, and both the state and BOEMRE must approve it before we can drill.	I and L
Ice Management and Monitoring	Do you consider State of Alaska and Federal Government to be experts? If an iceberg came and knocked off the blow out preventer below the seafloor, what would you do? Based on his questions, there is ice that looks invisible and it could come	We must submit our plans to the state and the federal government for approval and issuing permits. They do have expertise in dealing with arctic operations. Shell has also operated in the Arctic for a long time, and we are experts in drilling oil and gas wells in the Arctic. We also need input from the local residents along the coast since you know more about this specific area than anyone. That's one of the reasons we're here: to get your input. The color of the ice is irrelevant to the	I and L

Issues	Comments	Shell Response	Mitigation Measures*
	and cause a problem.	radars that we use for mapping.	
Ice Management and Monitoring	Can you see the thickness of the ice with the satellite? What kind of danger if you can't determine the thickness of the ice?	No, but there are characteristics that tell us when it is multi-year ice and single-year ice. The multi-year ice is constantly tracked. You can tell by the density of it, but we are tracking and we look at subsequent images the direction of the movement.	I
Ice Management and Monitoring	Taking pictures of the water and the currents, if the wells start producing, they will be under the ice seven months out of the year and that's my concern. We need to know which way the currents are going during that time of the season. There is somewhere the currents are going and it will help you track oil, so we can catch it. Especially in the areas where you are.	We have been studying currents for many years, and the trends for oil slick migration (sometimes, toward Russia far offshore in the Chukchi Sea) are important as we plan for response options, anticipate tracking needs, stage shoreline protection equipment, etc.	H and I
Ice Management and Monitoring	There's a different signal that comes back with high-density ice with your ice monitoring methods?	Yes. We can tell from the return radar signals whether it is more dense, meaning multi-year ice, and less dense, meaning first-year ice.	I
Ice Management and Monitoring	On the eastern side of the Beaufort, the ice was all on your tracts. Can you explain that?	There are some heavy ice years, if we can't get out there we can't drill. We have the history of ice accumulations in previous years, and we are aware that there have been years when the ice was very severe. If it is that bad, we simply will not be able to drill that year. That's part of the risk of doing exploration drilling in the Arctic and we accept that risk.	I
Ice Management and Monitoring	Interested in Marine Mammal Observer data from last year. Made point when looking at ice maps that historically there was much more ice than what we are seeing today.	We have the history of ice accumulations in previous years, and we are aware that there have been years when the ice was very severe. If it is that bad, we simply will not be able to drill that year. That's part of the risk of doing exploration well drilling in the Arctic and we accept that risk.	I

Issues	Comments	Shell Response	Mitigation Measures*
Ice Management and Monitoring	I've never seen the ice in the Beaufort Sea that big. I think mother nature was trying to communicate to us. That we have to be very cautious. That ice will keep coming back.	If that is the case we will not get out there to drill. That is a risk we just have to understand and accept.	I
Oil Spill Prevention & Response	At any given time will they have oil spill containment?	We will have an oil spill barge and additional vessel very near the drilling vessel so that we can respond to a spill within 1 hour. There will also be an arctic tanker and a containment vessel that can reach the drilling vessel in a matter of a few days with capping and containment capability.	H and L
Oil Spill Prevention & Response	How often will you be changing your pipes (casing)? Cause that's what caused the GOM spill.	It had to do with a BOP and riser. New regulations require that we have to fully inspect and recertify the entire BOP stack every three to five years.	L
Oil Spill Prevention & Response	What year was your boom manufactured? Are they obsolete? How often do you replace them?	Most of the booms were designed in the last ten to fifteen years. They don't really become obsolete. In the GOM you heard of booms failing. Some of the booms, especially in the shoreline protection mode, were not used properly. The first ones were developed in the early 1970s. They evolved over the last 30-40 years. The life expectancy of a boom depends on how they are being used, and under what kind of conditions. They can get punctured or damaged if used around heavy debris, floating branches, etc.	H
Oil Spill Prevention & Response	That 21-foot Packman boat – is that a standard vessel?	Yes, and it is very reliable for shallow-water transport of equipment, boom handling and anchoring, etc.	H
Oil Spill Prevention & Response	Are those booms made for different types of water, like cold or hot water and ice conditions and so on?	There are different kinds of booms for very specific needs – open ocean, shallow-water, shoreline, river/stream, etc. They are constructed for different purposes, different currents, different degrees	H

Issues	Comments	Shell Response	Mitigation Measures*
		of ice exposure, etc.	
Oil Spill Prevention & Response	Do you have booms that can recover oil under ice? Do boats tow the booms? How will oil be recovered in ice?	It would not be practical to use booms under ice as they could get snagged under the ice, miss oil trapped in the cavities of the under-ice surface, etc. We have other tactics for dealing with oil under ice, including the possible exposure of the oil with vessels, tipping of ice cakes to encourage flow to surrounding water, allowing oil to become entrained within the ice and then accessed later on, etc.	H
Oil Spill Prevention & Response	Do you monitor currents for the boom?	Yes. We are doing a lot of scientific studies on currents right now. There are instruments that are deployed, like upward looking sonar buoys sitting on the sea floor that map the water and currents by sending a sonar signal upward and collecting the reflected data that show currents, temperature differences and salinity. There's a lot of information being gathered in research and traditional knowledge.	H and I
Oil Spill Prevention & Response	Based on the GOM, the boom had water nearshore that went over the top and the waves were not even that big. What is the height of the boom?	Some of the booms in the GOM were used inappropriately in the nearshore/shoreline environment where breaking waves could splash oil over and under the boom. They should be used in relatively quiet water areas - that's what small shoreline protection booms are intended for. All booms have limitations for effective containment when the wind and seas become excessive.	H
Oil Spill Prevention & Response	Will the containment and capping system be ready by 2012?	Yes, it's being developed now and it will be deployed and ready to go for May, 2012.	L
Oil Spill Prevention & Response	The part where the three yellow caps, what kind of suction device will it be using for the containment (containment system slide)?	Our first option would allow for us to latch back onto the wellhead and shut off the flow like what happened on the BP Macondo blowout in the Gulf of Mexico. That's how BP shut off the flow in that well – by capping. The second option, if that connection wasn't available, would be to use one of those domes to collect the oil underwater and pipe it aboard the vessel. Each dome has a pump that will push the oil into separation vessels on the containment vessel where the oil, water and gas will be pulled off. The gas will be flared. The oil will either be collected and offloaded into the tanker or incinerated. The water will be released back into the sea.	L

Issues	Comments	Shell Response	Mitigation Measures*
Oil Spill Prevention & Response	In the 80's when you went out and I wasn't aware and I was actually shocked. We have to tend to those old wells.	Those wells were fully capped.	N/A
Vessel Logistics	Are you constructing a large icebreaker?	Yes, it's a hundred feet longer than the Nanuq. The Nanuq will be in the Chukchi and the new vessel called Hull 247 will be in the Beaufort Sea.	N/A
Vessel Logistics	Between the two drilling locations, will there be traffic between the two locations? Will there be ships going back and forth regularly?	Each drillship will come with its own assets and shouldn't require any transport unless there is an emergency. We will have a shore base in each area with an air operations base between the two seas in Barrow.	A, B, C, D, E, and J
Vessel Logistics	Will there be maritime infrastructure?	No. We will utilize West Dock only. We will have no other marine operations bases in the Beaufort Sea.	N/A
<b>Permits:</b> Process	Offshore development must be done in a way that benefits the local people; in sense of caring for the resources and communities. They are being asked to take the risks but not necessarily getting the benefits. At what point does tribal sovereignty play a role in relation to federal government? How far offshore does this reach? The state is limited to 3 miles, so does sovereignty extend as far as federal?	Thank you for your comment.	N/A
Quality	Based on the fact that there was some secret drilling out there before. How do we trust you people? That drilling that took place.	We have to get permits and we are here. I am not sure what the regulatory regime was at that time in the mid-1980s and early-1990s. We are here in Barrow talking about our plans to be sure you know what we are planning to do. This question was a follow on to a comment that was made that we drilled in the 1980s and 1990s and people in Pt. Hope had no memory of that drilling. This historic drilling	N/A

Issues	Comments	Shell Response	Mitigation Measures*
		was not secret. It was subject to similar permitting and public disclosure and discussion that we have today. The point of the original comment is that the drilling in the 1980s and 1990s did not leave lasting memories of problems or damage.	
<b>Quality of Engagement:</b> Positive/Feedback	Very impressed by Kulluk Visit. 120 photos taken. Copied to CD (got a copy).	Thank you for your comment.	N/A
Positive/Feedback	Just hired on at UMIAQ for spill response, big supporter	Thank you for your comment.	H
<b>Value Proposition:</b> Jobs	I would enjoy joining an oil response team in near future for offshore drilling		N/A

Notes:

\*Mitigation Measures are only assigned to applicable comments.

"Not applicable" (N/A) is used to designate comments that do not require mitigation measures as a course of action. See [Mitigation Measures Index](#) definitions according to assigned letter.

**2011 Proposed Mitigation Measures**

- A-Communication Plan for avoiding conflicts with subsistence users.
- B-Collaboration and Communication with Whaling Associations
- C-Plan of Cooperation (will work to obtain a CAA)
- D-Will honor 2010 Camden blackout dates for Nuiqsut and Kaktovik whaling.
- E-Subsistence Advisors based in Chukchi and Beaufort Sea Villages and Kotzebue
- F-Marine Mammal Observers
- G-Robust Marine Mammal Monitoring Protocol
- H-Oil Spill Response Fleet on standby 24/7 near drilling location
- I-Real time Ice and Weather Forecasting
- J-Crew change by helicopter and collaboration on routes to and from shore base
- K-Zero discharge of: drilling fluids and cuttings after the 26-in casing; gray and treated black waters; bilge and ballast waters
- L-Enhanced blowout prevention and mitigation measures (i.e., second set of blind shear rams, increased frequency of BOP testing, redundant ROV hot stab panel, capping stack and containment system, and relief well plan with designated standby relief well drilling unit).



SHELL EXPLORATION AND PRODUCTION COMPANY  
SIGN-IN SHEET – Barrow Plan of Cooperation Community Open House Meeting  
Inupiat Heritage Center, Barrow, Alaska  
March 21, 2011

Name (Please Print)	Representing	Mailing Address	Phone No.	Fax No.	Email
Nelda Nungasak					
CRAWFORD PATKATUK					
Pearl BROWER					
Lucy M AKA					
Wayne Mathews					
John Brower					
Mike Foster					
Olive Brower					
Ellen Brown					



SHELL EXPLORATION AND PRODUCTION COMPANY  
SIGN-IN SHEET – Barrow Plan of Cooperation Community Open House Meeting  
Inupiat Heritage Center, Barrow, Alaska  
March 21, 2011

Name (Please Print)	Representing	Mailing Address	Phone No.	Fax No.	Email
DANAS-LEE Brower					
Brad Weyionanna Michelle Weyionanna					
LEANDRA DE SOUSA					
<del>Yvonne Sargent</del>					
Georg Olemarr					
Renee Powell					
John Howlett					
Rachel Edvardson					
Emma Kohns					



SHELL EXPLORATION AND PRODUCTION COMPANY  
SIGN-IN SHEET – Barrow Plan of Cooperation Community Open House Meeting  
Inupiat Heritage Center, Barrow, Alaska  
March 21, 2011

Name (Please Print)	Representing	Mailing Address	Phone No.	Fax No.	Email
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Lindi S.					
Kathleen H.					
Johnny Adams					
Margie Fischer					
BERTHALEE LEAVITT					
Howard Peetod					
S Macumber Susan					
Myron Macumber					



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Inupiat Heritage Center, Barrow, Alaska  
March 21, 2011

Name (Please Print)	Representing	Mailing Address	Phone No.	Fax No.	Email
Charles Brown					
Marilyn Arrington					
Richard Magarath					
RICK L RICE					
Shelley BA					
Cindy Skults					
David Sagant					
Thomas Browne					
Edith Nagech					



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MIKE SHUCTS					
Anthony E. Edwards					
Dobby Edwards					
Bradley Thompson					
Beverly Fayett Hugo					
Michael Riley					
Samantha Goodwin					
DAN FORSTER					



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Della					
Robert Eskola					
Patricia M. Aweoyanna					
Walter Akpik					
KATHY LEARY					
Glen H. Siedak					
Jerry Alykka					
Doreen Brown					
Ka Alynbrown					



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Myrna Loy & George Sarren					
May Akpik					
Tony Kaliss					
David Ongley					
Nelle Gomez					
Larissa Kalide					
EVELYN Rubottom					
Sara Boen					



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Mary Sage					
Robert Lisburn					
Pat Saggans					
Bruce G. Rexford					
MARY K. RICE					
ABRAHAM STINE					
MAX ADAMS					
JLONT KEMP					
Perry Marmey					



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Name (Please Print)	Representing	Mailing Address	Phone No.	Fax No.	Email
George Suuk					
NORA ADTMS					

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Issues	Comments	Shell Response	Mitigation Measures*
<b>Credible Science:</b> Air Quality	How is our air quality? Are we going to see more of a Prudhoe Bay or less?	We have new tier-four engines that are very clean. We are replacing the engines on the <i>Kulluk</i> . We will have a very clean operation. We will have to monitor the air emissions at a certain level. We will not have a Prudhoe Bay situation.	N/A
<b>Offshore Education:</b> Technology- Containment and Capping	Was that technology available for BP? If it was not and that much technology changes in a year or two, why not wait another five years to drill?	The technology is not new – it has been used for shallow wells since Hurricane Katrina blew over several platforms in the Gulf of Mexico. There is a photograph in the slide presentation showing work using a containment vessel in shallow water in the GOM. There was no similar technology used before the BP Macondo blowout in deep water. The technology that was used was not new, just enhanced for deep water. For shallow water, this technology is not new and it has been used in the past.	L
<b>Operational Impacts:</b> GOM - Macondo	What is the well (reservoir) pressure differences between the deepwater GOM wells and these wells in the Beaufort Sea?	15,000 psi in the GOM versus about 3,000 psi in the Beaufort Sea.	N/A
GOM - Macondo	How many ships did they have in the GOM to response to the Macondo blowout?	There were around 130. It's not about the quantity of ships, but the quality and appropriate use of ships. We have much more storage capacity than is needed based on current understandings of potential recovery. In the Gulf of Mexico there were many vessels that had skimming capability; however, the onboard storage was not always sufficient to handle the volume of oil/emulsion that was available for recovery. Other factors, such as aerial guidance or spotting, oil transfer systems, etc. are important for successful skimming operations.	H and L
GOM - Macondo	Another thing to realize is that they weren't prepared in the GOM, but here they are and they are making every effort to be prepared.	Thank you for your comment.	H and L
GOM - Macondo	Wasn't Shell the cause of the GOM spill?	No. It was BP. And they weren't fully equipped to handle either the blowout or a spill of that magnitude.	H and L
GOM - Macondo	Were any of these vessels used in the GOM oil spill?	None of these ships were used in the GOM.	H and L
Health & Safety	Are we doing any drills to get the people off the rig?	Yes. These drills are part of all marine operations. We will also have dedicated Search and Rescue helicopters available as long as the weather is good to evacuate people. We will also have standby anchor handlers that can house 60-80 people in case of an emergency.	H and J

Issues	Comments	Shell Response	Mitigation Measures*
Health & Safety	How high will the helicopters fly?	1,500 feet, that is the elevation that we were told will not spook the caribou herd. This is a plan and if it doesn't work, we can make adjustments. We can do this with the Subsistence Advisor Program. There is a lot of flexibility. They fly a pattern that will go north, than run 5 miles inside the coast line due east and then fly due south to the drilling vessel. We selected this flight path and the elevation after consultations with the caribou hunters to avoid spooking the herd with our helicopter flights.	G and J
Oil Spill Prevention & Response	We had 95 mile an hour winds here and an iceberg could come at you very fast.	We would not work in severe conditions that put lives at risk. There might have to be a period we wait and track the oil. We look at all response operations and we look at how working in ice and cold water can help us. Cold water does a number of things to oil, it makes oil thicker and the ice can serve as a boom. If you can keep it thick, oil will burn better.	I
Oil Spill Prevention & Response	Do you have skimmers that will work in ice that is 4 feet thick?	We won't be using skimmers in heavy ice. I will show you pictures of what we would do in heavy ice. We are not planning to drill in heavy ice.	H
Oil Spill Prevention & Response	How new are the skimmers? And when were they put on the vessels?	There brand new, some have been in place for the past couple of years.	H
Oil Spill Prevention & Response	Will you use the villages on standby just in case of an oil spill?	Alaska Clean Seas will manage the Village Response Teams and there will be a plan for shoreline cleanup in the highly unlikely event of a spill that will involve the villages.	H
Oil Spill Prevention & Response	I've seen some oil spill boom and they don't work good in rough waters. We get a lot of wind here and you need something that will work here.	Most boom will work effectively in f light to medium waves. You need to work them in a fairly quiet area (if possible), outside of choppy or breaking waves. That's where the challenges are. One tactic is to use the lee side of the ship to create quiet water so the oil can be skimmed from the water's surface, or to tow containment boom with the wind (same direction) to minimize turbulence within the boom.	H
Oil Spill Prevention & Response	Are the booms flexible, will they freeze?	They are very flexible and they have to be durable enough to be able to work in limited ice conditions, and to be able to maneuver between ice cakes with small vessels.	H
Oil Spill Prevention & Response	You said you have ships that will break the waves down?	You operate vessels with the skimmer on the leeward side, if possible, to try to stop breakers from carrying oil over the boom.	H
Oil Spill Prevention & Response	Has this equipment been tested? Where?	A lot of the systems have been tested most recently in extreme northern waters with ice, and in trials with and without ice in large test facilities.	H

Issues	Comments	Shell Response	Mitigation Measures*
Oil Spill Prevention & Response	Has this been tested before in Russia, Iceland or Greenland? Is it theory or are the people here going to be the guinea pigs?	These systems have been tested including booms, skimmers, fire booms and they tested several devices off of Svalbard, Norway, off Canada, and other cold regions. There have been several field tests and tank tests over the past 10 to 15 years.	H and L
Oil Spill Prevention & Response	I saw some pictures where you said you did your Norway recovery tests. You made it sound like you were working in heavy ice. I saw you working with young ice. In your picture it looks like young ice. We need to find equipment that will work in 3-4 feet of ice.	I don't know the pictures you are referring to but the experiments in Norway involved a range of ice concentrations and ice thicknesses. The SINTEF trials, shown in the photos and video at our kiosk help provide insight at to the actual ice conditions in which we have tested equipment for containment, skimming, burning and the use of chemical dispersants.	H
Oil Spill Prevention & Response	Does Shell have any intention to use dispersants? And what are the effects?	We have the capability. We have no intent to use it in the Beaufort Sea where waters could be too shallow. If conditions are right, and their use is approved, dispersants could be used in deeper water where there is good mixing and dilution of the treated oil. If there was a situation where skimmers and booms were not working well because of high wind and sea conditions, the government and industry could make an assessment of the trade-offs of using and not using dispersants, and then approve a limited use of them to test their effectiveness. Right now, mechanical cleanup is preferred, followed by burning, if appropriate.	H
Oil Spill Prevention & Response	Will Alaska Clean Seas continue training sessions with the community to respond to an oil spill?	Yes.	H
Oil Spill Prevention & Response	When you capture the oil can you pump it onto the tankers?	Yes, if we need to store it we can lighter it off the containment barge using other vessels. The tanker has a single-point mooring system meaning that it swings around a bow anchor. We can't tie it to the barge, but we can move the oil from the barge to the tanker using the storage capacity we have in our oil spill response vessels.	H
Vessel Logistics	Are those the same anchors as the ones used on the movie clip that they use on the drillrig?	For the <i>Kulluk</i> , we do have some that are a little larger, they are the big anchors, the Sevpris New Generation anchors are 7.5 tons. But, we have 12 anchors instead of 8 like the <i>Discoverer</i> in the video clip. We also have some Bruce anchors. They are very large and heavy.	N/A
Vessel Logistics	What are the weights of the anchors?	7.5 tons each and they are about the size of this meeting room, seems like. We pull test all the anchor lines, than we pre-tension each line to keep the drilling vessel right over the well.	N/A
Vessel Logistics	How far offshore are you going to drill?	20 miles.	N/A

Issues	Comments	Shell Response	Mitigation Measures*
<b>Threat to Subsistence:</b> Terrestrial Wildlife & Habitat	You're going to be using helicopters in July and August? That's our caribou hunting migration time.	Yes. That is why we have the communication plan and Subsistence Advisors.	A, B, C, D, E, G, and J
<b>Value Proposition:</b> Jobs	I'm the Kaktovik delegate for the North Slope Science Initiative. Will there be Com Centers in Pt. Lay?	Yes.	A and B
North Slope Borough Science Agreement	Of that \$5M, will that money be monitored to how it is spent? Who is monitoring the funding? When you give NSB money they tend to only direct it to Barrow.	They will be audited internally on how they spend the funds, and Shell is also auditing too. It has to be high quality science that has to be peer reviewed. Any contract left to doing science is subject to be reviewed by other scientists. The steering committee will be comprised of each coastal committee and the NSB.	N/A

Notes:

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- F-Marine Mammal Observers
- G-Robust Marine Mammal Monitoring Protocol
- H-Oil Spill Response Fleet on standby 24/7 near drilling location
- I-Real time Ice and Weather Forecasting
- J-Crew change by helicopter and collaboration on routes to and from shore base
- K-Zero discharge of: drilling fluids and cuttings after the 26-in casing; gray and treated black waters; bilge and ballast waters
- L-Enhanced blowout prevention and mitigation measures (i.e., second set of blind shear rams, increased frequency of BOP testing, redundant ROV hot stab panel, capping stack and containment system, and relief well plan with designated standby relief well drilling unit).



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John Tagarook					
Annie Tagaruk					
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BRUCE INGLANGA					
Darlene Linn					
Cardyn Kulukhon					
Harry Ford					



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Amanda Kakeak					
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Nora-Jane Burns					
Stephanie A. Shanna	CH				
Juanita Akootchank					
Peter Taprook					
Mendonso	Hea				



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Leonard Gordon					
Georgianna Doty					
Susan Gordon					
Melissa Kayou...					
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Flossie Lampe					
Archie Brower					
Yvonne Lampe					



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Mildred Aschman					
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Betty Ann Brown					
Jeanne Godamus					
Jimmy Sople					
Maggie Hoing					



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Melody Gallagher					
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Noveen Kileak					
Nathan Gorda <sup>gr</sup>					
Norma Gorda					
Natasha Gorda					
Felisha Brower					
Clarice Akootchak					

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Issues	Comments	Shell Response	Mitigation Measures*
<b>Credible Science:</b> Baseline Studies	Will the North Slope Science Agreement be affected by the next NSB Mayoral election?	No, it will not. It is separate from politics and is managed by the Wildlife Department. Mayor Itta signed the original document, but the initiative will not be run by the mayor's office. The Wildlife Department will.	N/A
<b>Operational Impacts:</b> Discharge	How will the mitigation (zero discharge) in the Chukchi Sea, will it be comparable to the Beaufort Sea too?	We have chosen zero discharge in the Beaufort because our operations are so much closer to shore. The Chukchi program is many miles from shore unlike the Beaufort Sea well sites.	N/A
Health & Safety	Can we use your boats for whaling?	We will commit our vessels to help anyone who gets into trouble. This is a normal part of marine operations in the open ocean. If you get in trouble during whaling we will be available to help. You can get in touch with our vessels through the Com Centers.	A and B
Oil Spill Prevention & Response	Can you clean oil in broken ice?	Yes, we have had opportunities to clean up oil during small spills and field trials in ice; however, because we have never had a significant spill in the Arctic, we have not tested our large recovery systems under such conditions.	H and K
Oil Spill Prevention & Response	How many times have you cleaned oil on ice?	Numerous times. I have personally cleaned oil in ice 15-18 times over the past 25 to 30 years; but these experiences have, once again, been of relatively small size. Thankfully, we have not had to experience such spill events, and therefore depend upon controlled field trials and tank tests. Generally, efficiencies with some of the latest skimmer designs show efficiencies that are in the 70-80% range. It all comes down to our ability to access the oil when it is mixed with ice.	H and K
Oil Spill Prevention & Response	Will you have a shut-off valve below the surface to stop a flow?	Yes. We have blow out preventers that are located in a mudline cellar below the seafloor. (In a meeting following the presentation, Michael and others were shown a video animation of how the mudline cellar is constructed and how the BOP stack is protected to prevent damage to these valves so they are available to shut off flow from the well if necessary).	K
Oil Spill Prevention & Response	How long will it take to connect the containment system?	It won't be immediate. If you remember the Macando incident, there were damaged risers in the way and had to be removed. It took nearly a month for that debris to be cleared. We will have a crane on site for that purpose so it will probably take 2-3 days maximum to get the	H and K

Issues	Comments	Shell Response	Mitigation Measures*
		capping device in place.	
Oil Spill Prevention & Response	In the meantime will you have equipment to contain the oil in the water?	Yes, we will. We will have skimmers and booms to start gathering to pick it up.	H and K
Oil Spill Prevention & Response	How many oil spill response boats will you have?	We'll have at least six vessels with advanced skimming capability offshore, and many smaller boats that could assist with nearshore and shoreline containment/recovery operations.	H
Oil Spill Prevention & Response	Has this equipment been tested in ice conditions?	Yes, both in actual spills, controlled field trials, and large tank tests with oil.	H and K
Oil Spill Prevention & Response	Are you able to contain the lighter oil that comes up from a spill?	Yes, we have skimmers that can handle a range of oil viscosities from very light low viscosity material to oil and emulsions that could take on the consistency of mayonnaise to something almost as viscous as peanut butter.	H and K
Vessel Logistics	The platform you showed us in ice – does that come in pieces?	Probably 2 pieces with the production and drilling equipment in one piece called “topsides” that sits on top of a base called a “jacket.”	N/A
<b>Permits:</b> Process	Obama just announced that he was going to allow drilling in the Arctic. Can that happen without anyone in the communities knowing about it?	We cannot drill without permits and part of those requirements are that we come to the communities and talk about our plans and incorporate those comments into our Exploration Plans.	C
<b>Quality of Engagement:</b> Positive/Feedback	Know that the captain whaler are getting mad not get much whale this year. So that we young elder stand up and let you get the answer. So that why lot's of items pass on. And we take over. So be happy. We young elder take over the oldest Elder, and God bless you all and keep on praying or read bible John 3:16 from: Sister in Christ.	Thank you for your comment.	N/A

Issues	Comments	Shell Response	Mitigation Measures*
Positive/Feedback	In favor of oil drilling. Running out of oil and need more.	Thank you for your comment.	N/A
<b>Threat to Subsistence:</b> Marine Mammals	The whales run 60-70 miles offshore there too.	There are some that migrate out there, but for the most part the whale migration expands once the whales pass Barrow. One group goes to the north and ends up in Russian water. Others scatter throughout the Chukchi Sea. In the Beaufort Sea, the entire bowhead whale population travels closer to shore in a corridor that is about 10 miles wide. It turns out that our drilling operations there are very close to the center of that corridor. The whale hunters there have asked that we suspend operations to avoid disruptions to their fall hunts. We will be so far from the shoreline in the Chukchi Sea that we should not impact many whales at all.	A, G, C, D, E, F, and G
<b>Value Proposition:</b> Jobs	Will the money from the Science Program create any temporary jobs?	It is possible – we will get direction from the steering committee and some of the projects may involve local residents participating in field work.	N/A
Jobs	If you have an oil spill will you hire local people?	Yes. Most spills that I've ever worked on have included a heavy reliance upon the expertise and knowledge of the local community.	H
Jobs	Do local oil spill responders need special certification?	Not, necessarily "certification"; however, they do need some training like HAZWOPER. It might be the 40-hour course or it might be as little as 24 hours depending on what the duty of the individual is during the response.	H
Jobs	Do local oil spill responders have to pass a drug test?	Yes.	N/A

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<i>Leo Sogum</i>					
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<i>Charles Astak</i>					
<i>Terry Tagarook</i>					
<i>Bonfonce</i>					



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Lily Ann WAPAKIK					
GENE Agunluk					



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Danny AKPIK					
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Ida Panik					
Jack Panik					
L E H U I O					



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Nellie Agulik					
Elizabeth Phillips					
Nathaniel Phillips					
Cardyn Akpik					
Ellen Phillips					



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Blair Patkotak					
Cora Akpik					
Nancy Akpik					



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Billy Bodfish					
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Ray Joe Akpik					
Fannie Stone					
Joel Akpik					
<sup>Aun</sup> Fredricka Ahmooget					
Clara Ahvakana					



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Della Tukle					
ELLEN TUHUK					
LeeAnn Panik					
Fannie E. Ahmaogak					
Verna Szeen					
DAVID NINGEOK JR					



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Name (Please Print)	Representing	Mailing Address	Phone No.	Fax No.	Email
Rosellen Swain					

Issues	Comments	Shell Response	Mitigation Measures*
<b>Credible Science:</b> Baseline Studies	Do you have the depth from the surface to the seafloor?	120 feet	N/A
Baseline Studies	The fish come into the river. And they will stop going down the river. When I've flown back and forth between here and Barrow I noticed many rivers. I am trying to understand and I am concerned how it will affect the fish going to the major rivers.	The fish that come up from the rivers for the most part, most of the fish are born in the MacKenzie Delta and they come and move back and forth near the shoreline and they come up the rivers to grow and spend 1-3 years and come back out and go back over to breed in the MacKenzie River. Most of their life cycle is up in the rivers or close to shore. They stay near the ice. Because we will not be discharging any muds, cuttings or sanitary waters, there will not be any pollution. We will not be doing anything onshore, but flying over. There shouldn't be any problem with that, but we are doing scientific evaluations.	J and K
Baseline Studies	Have you studied the currents farther out in the Sivulliq area where the Arctic Cisco migrate to our rivers? There is a lot of fish out there that needs to be studied.	We have been doing fish studies, this year we're working with BOEMRE. There will be another fish study this year. There have been lots of studies close to shore, a total of 30 years on fish. We're doing one farther offshore this year in the Beaufort. We have three years of data in the Chukchi and we will have four years of data after this year. We're looking at currents, ice, plankton, the animals on the seafloor (e.g. clams, coral, fish and mammals). We're looking at many many mammals taking samples and collecting data.	N/A
<b>Offshore Education:</b> Technology	What is the depth from the seafloor to the valve?	It is 8.2 feet for Sivulliq and Torpedo. That's the depth of the deepest ice scour into the seafloor that we've seen in previous year's shallow hazards surveys. The normal ice scour is about three feet deep.	N/A
Technology	If there are large icebergs, can't they scour deeper than 8.2 feet?	It is possible. However, the seafloor north of the Beaufort Sea coast is very flat. So, if a large iceberg that would gouge more than 8.2 feet were to advance toward our drill site, it is likely that it would ground out and stop before it reached us. Also, we have vessels that can divert even a large ice feature so that it would not approach the drill site. Even if the subsea BOP remaining on the wellhead were to be bent or damaged, we will have other plugs	L

Issues	Comments	Shell Response	Mitigation Measures*
		inside the wellbore to keep the well from flowing. The BOP stack is just a safety device; the well is already plugged so it won't flow even if the BOP is sheared completely off. So, the probability of such a large iceberg causing a spill is very, very remote.	
Technology	This looks to be a really good classroom science project. I invite you to the Trapper School. Let's not wait for three years, let's do it this year.	I would like to help out with that. As a follow-up with Dora, it was suggested that basic courses in both drilling and oil spill response might be good topics for discussions with students. Al and Les have taught these classes in schools in other villages in the past. If we are invited, we would be happy to teach these basic classes in Nuiqsut as well.	N/A
Oil Spill Prevention & Response	What is the strength on these booms?	The potential strength on these booms is up to 15,000 pounds or more. When you're towing the booms, the tension on the towlines may only be a few hundred pounds to 1,500 to 2,000 pounds, unless jerked temporarily by a towing vessel. The booms are typically over constructed with robust tension members and fabric to handle occasional high loadings of tension and contact with ice.	H
<b>Operational Impacts:</b> Emissions	There's always a yellow smoke in Prudhoe and it looks like it's going offshore. A yellow haze, does that pollute the ocean?	Yes it does. If it falls in the ocean, it does pollute. This is at very low levels though. We have collected water samples in the Arctic. Though you can certainly detect some of these pollutants, they are at very low levels, below a level that would cause health effects. We are monitoring these levels and will be able to detect if they start going up to levels of concern.	N/A
Emissions	Does the pollution from Prudhoe Bay flares cause harm to the animals in the land and ocean?	There is a possibility that there could be harm but levels are not there yet. But our drilling air emission permits is the strictest standard in the nation. Stricter than any for Prudhoe Bay. Shell Oil has to meet the strictest standards.	N/A
Emissions	Will you catch a disease from the air emissions dissipating on the land and ocean, the Prudhoe Bay yellow haze?	Pollutants can get into the tissues in the fish, if it gets to high levels it could be dangerous. We don't see anything at dangerous levels at this time.	N/A
Emissions	Fish eat other fish and krill. After that yellow haze from Prudhoe Bay dissipates and falls in the ocean and the small krill eat it and the fish eat it.	Thank you for your comment.	N/A

Issues	Comments	Shell Response	Mitigation Measures*
Emissions	That yellow haze that we see from Prudhoe and Alpine, she remembers many years ago before there was a haze. She has been to many meetings and expressed her concerns. We have an east and west wind and sometimes we don't have a wind and if there is a southeast wind it will bring the pollution haze to the village.	Thank you for your comment.	N/A
Emissions	I want to thank Shell for coming and answering questions. She realizes that they've already breathed in this pollution from Prudhoe Bay and Alpine. I hope it will be less in the future.	We have really really stringent air permit requirements, the most stringent in the nation. Our air permits are the first ones issued by the EPA since they adopted the new air emissions standards. So our emissions must be control more strictly than anything in the past.	N/A
GOM Macondo	You do your tests in GOM and not here. I don't think you will be able to do it here. They couldn't clean it up in the GOM either.	Keep in mind there is a much higher flow rate in the GOM. If it happens it is only coming up a hundred feet or so and it is coming up at a point or so. In the GOM it could come up at times within a region of 10 by 15 miles, surfacing within existing older slicks. It was hard to know where it would come up, a situation very different from a spill source in only 100 feet of water or less.	H
GOM Macondo	What if you're BOP fails, just like in the GOM? What if your equipment fails and it could be just like the GOM?	In the BP Macondo blowout, the well was drilled to 18,000 ft. We will only be at about 8,000 ft. Reservoir pressure at the Macondo well was nearly 15,000 psi. The wells in the Beaufort Sea will be around 3,000 psi or a little more. We have a 10,000 psi BOP stack with two sets of blind-shear rams instead of one. If the first set of blind-shear rams fail, we have a back-up set to close in the well. We have multiple layers of barriers to prevent flow, and prevention is the key to our planning. We must be responsible and have a plan to respond to any emergency situation, including a spill, but we rely on avoiding all spills through a very thorough prevention program.	H and L
Health & Safety	Other companies say they will stop flying the helicopters, they still fly them.	It will be difficult to sneak out to Camden Bay. A long time ago, we specifically talked to Kaktovik, because they were concerned about the altitude we were flying our helicopters. They requested we fly them at 1,500 feet and not 1,000 feet. We agreed to this and it is in the CAA.	C, G, and J

<b>Issues</b>	<b>Comments</b>	<b>Shell Response</b>	<b>Mitigation Measures*</b>
Ice Management and Monitoring	After you settle your vessel in the Beaufort Sea, if there is any iceberg coming at you, what is the time frame for you to move? We've seen the thick glacier ice. While you're out you might get hit by this.	Typical time is 36 hours to move from the site. We will put cement down the well and plug the well. Then we will disconnect from the well and move offsite. The video shows how we set cement and mechanical plugs in the well, then leave the bottom portion of the BOP stack attached to the well. We can either recover the anchors or use the Rig Anchor Releases to separate the anchor wires from the chain. If we get into a very serious situation, we can suspend the well and move the rig off in six hours or less.	H, I, and L
Ice Management and Monitoring	There is a heavy ice out there in the Beaufort Sea, if there is an oil spill out there and you will not be in control with your vessels.	We have equipment and vessels that are always monitoring the ice. The drilling rig will move offsite if we encounter ice we cannot manage.	H, I, and L
Ice Management and Monitoring	Would there be a phone number for ice updates, so the whalers can find out where the ice is?	Yes, there is a website. We can get something set up to provide that information to the villages. This includes both weather and ice forecasts that are detailed each day and sometimes more often.	I
Ice Management and Monitoring	If you get boxed in from the ice during a spill clean-up, what are you going to do about it?	We have synthetic aperture radar in satellites that look through clouds and fog to help spot approaching ice and keep us from getting boxed in. We also have ice management vessels that work up to 25 miles up-current and upwind to track ice movement. These are also equipped with conventional radar. Further, if we have an emergency situation in progress, we will cease drilling in the other basin and move all of the boats supporting the other drilling vessel. So, instead of just two ice management vessels tracking the ice, we would have four. Instead of two supply vessels assisting in operations, we would have four. We would employ both oil spill fleets. We would be tracking ice with fixed wing and rotary aircraft. If we have a spill we will throw everything we have at it because we want to minimize impacts as much as possible.	I, H and L
Ice Management and Monitoring	So, we can call in for an ice forecast?	Yes, we can put it in the Com Centers. We've thought about putting in a big screen in the Com Centers that reports ice, weather and sea states.	I

<b>Issues</b>	<b>Comments</b>	<b>Shell Response</b>	<b>Mitigation Measures*</b>
Ice Management and Monitoring	Would we be able to see a whale with this synthetic aperture radar. If we lose a whale can they see it in a picture?	We aren't sure if a whale would show up on satellite radar, but it could. It depends on the return signal.	I
Oil Spill Prevention & Response	So the booms will not be ruptured?	I will never say never. It could be torn with bad drivers towing fast in ice. The vessel drivers are trained to know the limitations of the equipment. We have other techniques as well. We have large skimmers that can work within a strong boom, and over-the-side skimmers like rope mops, drum skimmers and weir skimmers that can be placed in pockets of oil trapped by ice.	H
Oil Spill Prevention & Response	How do you get the oil under the ice?	Normally, oil will remain on the water and slide out from below ice cakes. If ice floes are big and trap oil beneath them, vessels can break the ice and expose the oil, they might tip the ice allowing oil to slide and surface next to the ice, or some ice may get trapped and then freeze in quickly, becoming surrounded with ice – we can access that oil later by tracking the oiled ice – skimming it when it surfaces, or burning it in place.	H
Oil Spill Prevention & Response	How about oil in the breathing holes of the bearded seals?	There is such a low likelihood of oil surfacing within those locations; however, we'd monitor for that possibility and work with specialists to take the best course of action to minimize exposure and impact.	A, B, C, E, F, G, H, I, and L
Oil Spill Prevention & Response	Two-percent left could still be a lot of oil, if there is only ninety-eight-percent effectiveness of insitu burning.	The remaining portion, as smoke or floating residue is so very small that such effectiveness is seen as very beneficial. The remaining portions missed are diluted, and dispersed to low levels quickly, and nature continues to work in evaporating and degrading the oil.	H
Oil Spill Prevention & Response	Is there a chemical reaction when you burn the oil, does it get all burned up?	When you burn oil the efficiencies are typically well over 90%, often as high as 98%. We can access the burn residue and recover it if that is the best use of personnel and resources. One weighs the benefits of collecting the residue, taffy-like tar balls with the lighter volatiles burned away, against the time being better used to collect and eliminate other oil slicks in the area.	H

<b>Issues</b>	<b>Comments</b>	<b>Shell Response</b>	<b>Mitigation Measures*</b>
Oil Spill Prevention & Response	So what if the wind changes when you are doing the burns and it is not in your favor?	It takes about a half an hour to eliminate large volumes of oil trapped with a fire boom. The duration of the burn is short, and ignition is always done with careful consideration of where the smoke is likely to go, its direction and duration in light of the proximity of populations that could be nearby. We often insist that burns be at least 3 to 6 miles away.	H
Oil Spill Prevention & Response	Will you be able to recover in a pressure ridge or if it's in a crack with swells? What if there is a blizzard?	Good questions. We look for any barrier, such as ice ridges where oil might be trapped on water along such a ridge – it can sometimes help thicken the oil for recovery with skimmers or with controlled burning. Crack or leads in the ice, if filled with oil also help to enhance the recovery; or, if we can't get to it safely, we'll consider burning it in place. If a blizzard or storm comes up, our first goal is to protect personnel and vessels, and to sometimes simply wait until it is safe to access the oil by tracking the oiled ice and then dealing with it when conditions allow.	H and I
Oil Spill Prevention & Response	You said you would have to wait for the weather, you would have to go another 100 miles with the ice and that would be a lack of time for cleaning up. You can't win against mother nature. While that oil is traveling with the ice, you will have to clean up from end to end.	The ice is keeping it contained and away from shore. You are right, you may have to go 100 miles, but that is just the way it is. We will do whatever needs to be done to track and capture or burn the oil when it is safe to do so.	H and I
Oil Spill Prevention & Response	We will be devastated if that oil is taken in the ice in currents. Especially in the Chukchi Sea, there is heavy ice there.	Equipment had to be built and brought from hundreds of miles away in the GOM. If oil gets away from you, you cannot control the environment. Our first thing is to keep it from ever being released in the ocean.	H and L
Oil Spill Prevention & Response	So you will have a second rig that could be transported to drill a relief well?	Yes. That first rig should be able to drill its own relief well, and we will have two BOPs on each rig so the first rig can start drilling right away. If the rig is disabled, the drilling vessel in the other basin will stop drilling, temporarily abandon the well and mobilize to the drill site and start drilling the relief well in a matter of days. That's the best part about having two drilling vessels available for drilling in the Arctic.	H and L

Issues	Comments	Shell Response	Mitigation Measures*
Oil Spill Prevention & Response	Those blind ram shears will not be activated until the well is plugged right?	Generally, the last thing we do is close the blind shear rams. We have many other means of controlling a flow from a well and multiple barriers in place to avoid a blowout. If we must close the blind shears, cut the pipe and close in the well it means that all of the other measures have already failed. That is a very rare situation.	L
Oil Spill Prevention & Response	When you in-situ burn the oil does it pollute the air and the ocean?	The products of combustion have been studied now for nearly 25 years involving the controlled burning of oil. The duration of a burn is very short, the smoke looks bad, but is only for a brief time and at a high level, reaching very low concentrations within a few hundred meters at ground level, and barely visible concentrations up higher. The fall-out is extremely small, with more than 95% eliminated by combustion during a typical burn. The smoke is part of the trade-off that must be considered when evaluating the net benefit to the environment by burning.	H
Oil Spill Prevention & Response	If you abandon the well you still have a cement plug right?	Yes, we have multiple barriers. We have at least two plugs and we may have a third one. We would also have a cap on the wellhead. With all that, we would have at least five barriers against flow from the well. Again, even without the BOP stack in place, it is unlikely that there would be a spill from a plugged well.	L
Oil Spill Prevention & Response	We live in an area where there are earthquakes. If the earth shakes will it cause a plug to come loose?	It is very unlikely that an earthquake would dislodge a plug. These are very rugged devices. The cement plugs are usually over 100 ft in length and the mechanical plugs, such as a cast iron bridge plug, rarely release due to earthquakes. We have studied this possibility for several years, and I do not know of an earthquake ever causing a properly plugged well to start leaking. We do not locate our wells near faults, if possible. All the faults in the areas where we will be drilling are dormant. If a fault were to cut a well, the well would be effectively sheared off. We have studied wells in California where there are active faults that have cut wells, and there has been no leakage from any of them.	L
Oil Spill Prevention & Response	How do you clean up oil in ice?	We have had opportunities to clean up oil during small spills and field trials in ice; however, because we have never had a significant spill in the Arctic, we have not tested our large recovery systems under such conditions.	H

<b>Issues</b>	<b>Comments</b>	<b>Shell Response</b>	<b>Mitigation Measures*</b>
Oil Spill Prevention & Response	Do these rope mops work?	It is 20 feet across, 20 feet above the water and has 100 feet of mop.	H
Oil Spill Prevention & Response	How do you clean oil? How heavy is the skimmer?		H
Oil Spill Prevention & Response	Is the casing flexible?	Yes. There is a certain amount of flexibility in the pipe. It will bend a certain amount.	N/A
Oil Spill Prevention & Response	What is the length of the booms? How do these booms work?	500 – 1,000 feet is typical for towed U-configurations. When operating with an open-apex system to deflect and release oil at the bottom of the U-configuration, we might use enough boom to achieve up to 750 foot-wide openings to encounter the oil.	H
Oil Spill Prevention & Response	With the currents you will not be able to use your booms.	Currents and ice create enormous forces and challenges so that you don't attempt to control them – you work with them and not fight them. We don't try to drag the ice, you let the boom move with the ice and the ice helps to thicken the oil so you can pick it up better or burn it. With burning you have smoke and that's ugly, but you have to think of the trade-offs. We consider carefully, well in advance, the trade-off of smoke for a few hours in the air, versus not burning that oil, and risking it being in the water or approaching land over a much longer period of time.	H, and I
<b>Quality of Engagement:</b> Insufficient	You talk about this exploration drilling over and over. You might pollute the ocean. You might spill oil and kill the fish. We talk about this over and over.	Thank you for your comment.	H, K and and L
Positive/Feedback	The federal government sold the leases and Shell has to sign a CAA as insurance. They have a policy and money in place, if they spill in the ocean or hurt the ocean. Shell is good they	Thank you for your comment	A, B, C, D, H, I, and L

Issues	Comments	Shell Response	Mitigation Measures*
	<p>sign the CAA, the others do not. They have money to mitigate our hunt. They give money for gas and other things for whaling. Whaling is very expensive. They know this and they are studying the ocean. The federal government gives them the permission to do this in the ocean. The federal government has rules and regulations and they will sign the CAA.</p>		
<p><b>Threat to Subsistence:</b> Marine Mammals</p>	<p>Vessel traffic adversely impacts the whale hunt. He understands that we will leave on August 24<sup>th</sup>. Suggest we contact other vessels in the area not associated with our drilling program to request they stay out of the area as well (e.g. Crowley). They do not curtail their operations during whale hunt. May need to be educated and get some encouragement from Shell to stay out of the hunting area for time.</p>	<p>Thank you for your comment.</p>	<p>A, B, C, D, E, and F</p>
<p>Terrestrial Wildlife &amp; Habitat</p>	<p>No wonder we don't have caribou, because of the helicopters.</p>	<p>They signed the CAA and agreed to fly 1,500 feet, they will fly over the land to the east and then go straight out.</p>	<p>A, B, C, and E</p>
<p>Terrestrial Wildlife &amp; Habitat</p>	<p>Can you explain the helicopter route?</p>	<p>Caribou migrates at the coast line, so we agreed to fly.</p>	<p>G and J</p>
<p>Terrestrial Wildlife &amp; Habitat</p>	<p>1,500 feet is loud.</p>	<p>The Federal standard is 500 feet and Shell is going at 1,000 feet more.</p>	<p>G and J</p>
<p><b>Value Proposition:</b> Jobs</p>	<p>Will you be hiring MMO's from the villages?</p>	<p>Yes. We try to hire the best people we can and the local residents provide the best information available about the areas where we will be working.</p>	<p>E and F</p>
<p>Jobs</p>	<p>We want to have people hired from here. You should come here to train people.</p>	<p>Thank you for your comment.</p>	<p>E and F</p>

Issues	Comments	Shell Response	Mitigation Measures*
Jobs	Give Kuukpik a call, I will get people certified to be MMO's.	If the Nuiqsut Whaling Captains would recommend people from the village to be MMO's that would be very beneficial.	E and F
Jobs	I know there are people that moved to Anchorage and are MMO's, they still have the knowledge and are still qualified for the jobs.	Yes, we agree. Again, if the whaling captains recommend them we would be delighted to talk to them about work regardless of where they live.	E and F
Jobs	These jobs are posted up and because there is a urinary analysis people are not willing to apply for them.	Thank you for your comment.	E and F
Jobs	I agree that most people here in Nuiqsut's biggest problem is that they cannot meet the requirements.	Thank you for your comment.	E and F
Jobs	Would like information about employment and a contact with Shell to discuss this. (erica_k830208@hotmail.com, (907) 590-3830, and (907) 480-2007).	Thank you for your comment.	E and F

Notes:

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**2011 Proposed Mitigation Measures**

- A-Communication Plan for avoiding conflicts with subsistence users.
- B-Collaboration and Communication with Whaling Associations
- C-Plan of Cooperation (will work to obtain a CAA)
- D-Will honor 2010 Camden blackout dates for Nuiqsut and Kaktovik whaling.
- E-Subsistence Advisors based in Chukchi and Beaufort Sea Villages and Kotzebue
- F-Marine Mammal Observers
- G-Robust Marine Mammal Monitoring Protocol
- H-Oil Spill Response Fleet on standby 24/7 near drilling location
- I-Real time Ice and Weather Forecasting
- J-Crew change by helicopter and collaboration on routes to and from shore base
- K-zero discharge of: drilling fluids and cuttings after the 26-in casing; gray and treated black waters; bilge and ballast waters
- L-Enhanced blowout prevention and mitigation measures (i.e., second set of blind shear rams, increased frequency of BOP testing, redundant ROV hot stab panel, capping stack and containment system, and relief well plan with designated standby relief well drilling unit).



SHELL EXPLORATION AND PRODUCTION COMPANY  
SIGN-IN SHEET – Nuiqsut Plan of Cooperation Community Open House Meeting  
Kisik Community Center, Nuiqsut, Alaska  
March 24, 2011

Name (Please Print)	Representing	Mailing Address	Phone No.	Fax No.	Email
Marilyn Killbear					
Gordon Killbear Jr.					
Wendy Brower					
Carl Brower					
Sam Nuljig					
Joe Nuljig					
Ted Nuljig					
Dora Levitt					
Sarah Oyasak					



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Ella M. Stalker					
Fredrick Akpik					



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ELAINE SOVALUK					
William Hopson Jr					



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Kisik Community Center, Nuiqsut, Alaska  
March 24, 2011

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CLARENCE PAHNUPKANA					
<i>[Signature]</i>					
Eli Nukavog					
Jimmy Kia Gopiga					
Virginia Kasak					
Harry Ericklook					
Luby Ericklook					
Eunize Brower					
Rachel Nichols					



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Kisik Community Center, Nuiqsut, Alaska  
March 24, 2011

Name (Please Print)	Representing	Mailing Address	Phone No.	Fax No.	Email
Nannic Pausanna					
Margaret Brown					
Pevey Pausanna					
Veratagarcek					
Solomon Bet					
MARK BUKI					
Lepcha Anadik					

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Issues	Comments	Shell Response	Mitigation Measures*
<b>Operational Impacts:</b> GOM Macondo	Why did it take so long in the GOM? Won't that happen here?	Our oil spill response fleet will be on site within an hour. BP's had to be mobilized from long distances.	H and K
GOM Macondo	How did those deaths occur and could that have been prevented?	That was a sequence of errors that broke every level of prevention.	H and K
Oil Spill Prevention & Response	Our water is much colder. How do you plan to handle that for oil spill response?	Our technology has to be designed for the service and we have practiced using this equipment in cold weather climates around the world.	H and K
Oil Spill Prevention & Response	What will the containment boom do in our currents?	In 120 feet of water the oil will come to the surface very quickly and we have learned to work with the ice, not against it.	H and I
Oil Spill Prevention & Response	How big is the rope mop skimmer?	It is 20 feet across, 20 feet above the water and has 100 feet of mop.	H
Oil Spill Prevention & Response	What if the oil is trapped under the ice?	New ice will grow and entrap the oil and then we can track it. In the spring, the ice will migrate to the surface of the ice where it can be skimmed or burned.	H and I
Oil Spill Prevention & Response	Were all the oils spills you have worked on Shell's?	No, they weren't Shell's.	H and K
Oil Spill Prevention & Response	Location of domes, quantities, how many response vessels per drilling platform.	It's not about the quantity of ships, but the quality and appropriate use of ships. We have much more storage capacity than is needed based on current understandings of potential recovery.	H and K
Oil Spill Prevention & Response	Where are you planning to drill and how far from this community?	92 miles from Pt. Lay.	NA
<b>Permits:</b> Process	How many companies and agencies are involved?	Coast Guard, BOEMRE, NSB, ADEC, UIC, Alaska Clean Seas.	H
Process	Do you have a permit?	Some activities have yet to happen because there isn't a permit, but many things are already in place because much planning has to be done beforehand.	H and K

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G-Robust Marine Mammal Monitoring Protocol

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I-Real time Ice and Weather Forecasting

J-Crew change by helicopter and collaboration on routes to and from shore base

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SIGN-IN SHEET – Point Lay Plan of Cooperation Community Open House Meeting  
Point Lay Community Center, Point Lay, Alaska  
March 25, 2011

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Lily Annuskett					
Ben Hunsaker					
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SIGN-IN SHEET – Point Lay Plan of Cooperation Community Open House Meeting  
Point Lay Community Center, Point Lay, Alaska  
March 25, 2011

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Pearl J Neakok					
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Carrie P Henry					
Ron Murray					
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SIGN-IN SHEET – Point Lay Plan of Cooperation Community Open House Meeting  
Point Lay Community Center, Point Lay, Alaska  
March 25, 2011

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Maria Lisbonne					
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SHELL EXPLORATION AND PRODUCTION COMPANY  
SIGN-IN SHEET – Point Lay Plan of Cooperation Community Open House Meeting  
Point Lay Community Center, Point Lay, Alaska  
March 25, 2011

Name (Please Print)	Representing	Mailing Address	Phone No.	Fax No.	Email
Leonard Henry					
NIWAAN HENRY					
Cheryl Henry					
Sarah Bernick					
Ben Depies					
William Burt					
John Stalker					
GREGG WILBANKS					

Issues	Comments	Shell Response	Mitigation Measures*
<p><b>Credible Science:</b> Baseline Studies</p>	<p>There was a question about mitigation and baseline. A seismic program that lasted nine years running from the Canadian border to the Chukchi Sea. Every square inch was analyzed. In 1989, we noticed a lot of seals were sinking from malnutrition. We didn't know what it was from. We accused Red Dog Mine. It wasn't until a couple years ago that we learned about this nine year seismic program that resulted in skinny seals. Now we are going into the third and fourth year of seismic again. There are over 5,000 environmental studies that were done. I would like to see the data and see what the rate of recovery from that data is. Our tomcod has disappeared from our ocean around us. That is what our seals eat. They partially came back last year a little bit. I believed that was mentioned before. Why don't you answer the question before? How do we deal with trying to understand the impact of seismic over the years. NMFS is trying to list them as endangered at the same time they give authorization. I'm confused. How do you take this into consideration? Have you thought about the recovery of these animals from these activities? There's another series of seismic to come. But there was no explanation from NMFS or NOAA when they have questions from years ago. That's part of our food chain, we rely on those seals and they rely on those fish. Is this part of our mitigation?</p>	<p>We do conduct a very large and significant monitoring system of marine mammals and we talk about baseline studies, that benthic, plankton, in the mud on the bottom. We are looking at all of those. For our 4MP, we have recorders that are out there as well, we have airplanes out there, MMO's on every vessel. We've learned a lot over the last three years. The animals tend to move away from activities when there are activities that make noise. They move away for a period of time. Seals react less and bowheads react more. Bowheads get quiet and when the noise stops they will vocalize again. They will move away from noise to protect themselves. They move away and then they go back. I think it's important and it's part of the reason why Shell has entered into this agreement with the NSB, to hear the concerns from the people in the villages and shape science to their concerns. We are getting better and better to reacting and understanding concern. I wasn't here in the 80's and 90's. We have Subsistence Advisors in each of the communities to hear these kinds of things too.</p>	<p>E and G</p>
<p>Baseline Studies</p>	<p>Your studies are done on the areas where you've done seismic after?</p>	<p>We've done seismic at some of these locations. In the Beaufort Sea, we did the studies before the seismic there in some of the locations. Some of the areas we've done studies. For example to answer your question, we did seismic in Burger, we did not do seismic in Hammerhead.</p>	<p>N/A</p>

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Baseline Studies	That sounds like you are at least looking at it.	Thank you for your comment.	N/A
Baseline Studies	It could mean a case in 15 years?	It would mean a case in 30-50 years. Based on wells that we've drilled here we've seen 3-4 times less pressure than Macondo.	N/A
Baseline Studies	The formation out there is different than Cape Lisburne?	Some of the Lisburne. I don't know much about that and it doesn't seem to be an issue with what we're doing. There is nothing wrong or particularly difficult about where we're drilling.	N/A
Baseline Studies	Can you acknowledge what type of current is there? A whirlpool or	We've been doing several things. We've for the last three years had instruments that have been out all year round. Measuring currents even under the ice. We've deployed a met-oceanic buoy that measures the currents. We've worked Oceanic.	N/A
Baseline Studies	Have there been any fluctuations of ice in that area? I've seen publications of the National Science Foundation that we can compare with that data in the past few years.	We're required to do ice gouging studies. We're getting an understanding how frequently ice gouges occur for 15-20 and even 100's of years and looking at detail.	N/A
Baseline Studies	And you have that kind of ice gouge data available?	Yes.	N/A
Baseline Studies	How about the NS is known for having fluctuating pressures?	We don't share that opinion. There are other areas that have unknown pressures and fluctuations. Typically when you drill in an area that has been drilled before, and you can run into that. That will not be our case.	N/A
Baseline Studies	Have there been any studies on radioactive plankton?	I don't know. I'm sure there have been oceanographic studies in the 60-70's when they were doing nuclear testing.	N/A

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Baseline Studies	There are 90 wells in the McKenzie Delta. How many of them were Shell's and what is your experience with them?	Not sure, that would have been operated by our Canadian Group.	N/A
Biological Environment	How deep down at the seafloor will you be drilling?	It's at 120 feet to seafloor.	N/A
Biological Environment	Is this for every hole you drill and how many will that be?	Yes. In the Chukchi Sea drill possibly three and in the Beaufort Sea it's two wells each year.	N/A
Biological Environment	Can you explain how they are the same temperature all year around?	Have you ever gone swimming and it was warm at the surface until you go deeper and you suddenly hit a layer that is cold? Water forms layers called thermoclines that may be warmer or colder and they don't tend to mix unless they are stirred by the wind. So, even if it is very cold on the surface deeper layers may not be that cold because of layering and a lack of mixing.	N/A
Biological Environment	Is there any ice on the ocean bottom?	No, not at those water depths.	N/A
Traditional Knowledge	If you're talking shallow waters in the upper part of the world, there was a lot of land before and it eroded and there is ice coming in. There is erosion along the coast of Alaska.	Thank you for your comment.	C and E
<b>ENGO Opposition:</b> Partnerships	(Question is directed to Earl Kingik) Who brought you here? There's a company here to talk to the community. I haven't seen you for a long time and every time there is industry here you are here. We all don't have jobs and it takes money to travel. You said you were going to follow them around.	I work for Alaska Wilderness League. I work for a Liaison Member to DC to educate our Congress and our House of Representatives to ... We cannot let people to push us around anymore. Our aunties and uncles told us to protect our way of life and culture. It was good to see someone from Point Hope go out and do a little tally and say you are invited to tonight's meeting. Maktak or money? Lots of people say maktak. We have a hard time and we want to protect our way of life. Our language is disappearing. Our culture is disappearing. I am here because I love my people.	N/A

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<b>Offshore Education:</b> Technology	I'm concerned about Santa Barbara. How was that plugged and was that plugged at all? My understanding is that the ground tore.	1969, it was a completely different type of location. I typically know about the seeps that they had and the shallow wells. Natural seeps are found in that area of California. The Santa Barbara event drove changes in the design and hardware that is installed on wells to prevent that type of incident.	K
Technology	How would you cap that Santa Barbara well?	The Santa Barbara well was handled by the operator in coordination with the regulator.	K
Technology	Can you explain what happened to that?	Unocal was the operator, you have land movement and shifting in the area that damaged the subsea of the casing itself. It is also a heavier type oil. It was pretty close to shore. It was in 1969, lots of regulations were changed.	K
Technology	How did they stop the flow at Santa Barbara?	It required well intervention.	K
Technology	What does a formation mean?	More of a solid than a rock.	N/A
Technology	What is a rig?	It's our drilling ship.	N/A
Technology	After that you will be able to develop, for sale?	It will be 10-15 years to development. We're only doing exploration. We drill, look at the results of the wells and look at the project to see if it is supportable. From 7-10 years to develop the project from that. 10 to 15 years. It's a long time away from producing.	N/A
<b>Operational Impacts:</b> Discharge	I understand that the there is no pollution discharge in the Beaufort Sea, is there one in the Chukchi Sea?	Shell has committed to a zero discharge of muds and cuttings and sanitation in the Beaufort Sea. That is our choice; we have not gone to that in the Chukchi Sea. We don't have a zero-discharge policy in the Chukchi Sea today. We have a zero harmful discharge in both seas.	N/A

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Discharge	Why is there zero discharge in the Beaufort Sea and zero harmful in the Chukchi Sea?	All of the discharge is not harmful. In the Beaufort Sea it is so close to the shore. It is not in the path of the migrating mammals and their food source in the Chukchi Sea.	N/A
Discharge	What is your discharge in three weeks? Zero harmful discharge is million gallons and barrels.	EPA allows 18,000 barrels a day, per well. Our discharge is less than 1% per well.	N/A
Discharge	Each day it will be 2,970 gallons per a day for three wells and it will be 30 days. That will still be a lot. Times three wells. The wells are drilled one at a time. How much discharge will you do per a day per a well? You said 180 barrels a day. It's pretty close to a million.	The way the drillrig works, it will set up in the Chukchi Sea and it will move to another well and drill. At any given time, there will not be more than one well in the Beaufort Sea. If there was more time it would.	N/A
Discharge	Are you including, the sanitation, the oil?	No oil, but treated discharge.	N/A
Discharge	When you flush it where does the drilling muds and cuttings go?	We went back to those wellsites and sampled the mud from those sites and the animals from those sites. You can tell that a well was drilled there. The main reason is because something that's used in this mud called Barite. Barite is a non-toxic agent that comes from the ground and it's put in the mud to make it heavy. Has anyone ever had a digestive tract x-ray? You drink barium, it's used medically, it's non-toxic. We've looked for toxic things in the mud and the animals and . . .	N/A
Discharge	Will you dump your mud off the ships?	There will be some residual chloride, but they will be diluted. Typically we are not dumping whole mud off of the ship. The mud that enters the water is separated on a Shell shaker, the mud gets reused and recycled and it is clinging and goes overboard.	N/A
Discharge	What did you say?	A community member is calculating the discharge total.	N/A

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GOM Macondo	Keep in mind, NSB only has 3-5 miles. The ICAS could do the same thing in terms of a science agreement. Work with tribes and work together and it will be easier. Man makes mistakes. Look at Japan. I seen the GOM and how bad it is. We are not ready yet. We will not be ready when time comes. That little boy (pointing at a boy in the audience) might be in charge of oil spill response and my granddaughter might be the president of Shell Oil.	I know you were there. It was very heartbreaking. I'm from the GOM and it was hard to watch. You prevent what happens. It was human error, it could have been prevented. There are no guarantees and there are risks. There are risks to everything. We would like to show you our capping and containment systems.	K
GOM Macondo	Explain how you have ice at the bottom and the temperature is the same as the GOM.	We have instruments that are constantly recording the temperatures. When the air is really cold at the surface, but at the bottom it does not change much. The currents are coming from the Bering Sea and the Pacific Ocean. Even though you get a cold surface temperature. Ice floats, so there would not be ice on the bottom of the ocean. There could be gas hydrates, which are frozen methane because of the high pressure. Since there is no sunlight that penetrates to the deep ocean, there is nothing to warm the water, so it is very cold at deep depths but it doesn't freeze.	N/A
Ice Management and Monitoring	Can you imagine that kind of weather with a couple hundred piles of ice?	It would not happen here.	I
Ice Management and Monitoring	What kind of winds and how fast is that ice traveling (Sakhalin platform in ice video)?	That's real time.	I
Ice Management and Monitoring	What if you have had 90 foot seas?	You won't have that here. It is 15 years away at the soonest. You have to design a structure with engineers that have arctic experience.	I
Ice Management and Monitoring	I want to share a story, where we have a big storm and the ice covered the whole village of Point Hope. You should not underestimate the power of the ice flow.	Thank you for your comment.	I

<b>Issues</b>	<b>Comments</b>	<b>Shell Response</b>	<b>Mitigation Measures*</b>
Ice Management and Monitoring	Have you ever considered using NOAA for ice monitoring?	We do use NOAA resources like the MODIS information. We also use the NOAA Ice Center. But we also do a lot of processing that they don't do because we need more detail than they do. NOAA is very interested in getting the information that we have generated to improve their data set.	I
Ice Management and Monitoring	Where is T-3 it's a large piece of ice that ran ashore five years ago and it broke itself free? It's multiyear ice that has a flow station on it?	There are several ice islands that are in circulation in the Arctic. We are helping to fund drift buoys that are keeping track of where they are.	I
Ice Management and Monitoring	Can we have access to your ice monitoring? It would be very helpful to our whaling.	Yes. There will be a website.	I
Mitigation Measures	What is the meaning of mitigation? I want to know this in Inupiat?	The definition to minimize to lower or decrease any impacts that would occur because we are here.	A, B, C, D, E, F, and G
Oil Spill Prevention & Response	How long will the transit will that take. If you have an accident in the Beaufort Sea and you have to travel from the Chukchi Sea?	Three days. But there will be oil spill response vessels and equipment there with each drillship. We have very big vessels with those drillships. Some of the people in this room went to see one of the drillships and one of the oil spill response vessels.	H and K
Oil Spill Prevention & Response	Are the wells there already?	Yes, they were permanently capped.	H and K
Oil Spill Prevention & Response	You mentioned your BOP will be tested every seven days. Have you started and do you know if they will work in our arctic environment?	When the wells were drilled in the late 80's and 90's they worked fine.	K
Oil Spill Prevention & Response	What is the water temperature difference, and how do the divers dive in the winter?	We are only going to be doing it in open water. We would not be doing it when we have ice or solid ice. At the surface it is much different. In the GOM at 5,000 feet below the sea level it is only 1 degree or so different.	H and K

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Oil Spill Prevention & Response	How will you handle divers in the development?	Water temperature is about one degree or so different.  The BOPs work in Sakhalin and the North Sea.	K
Oil Spill Prevention & Response	We've heard about many oil spills off Norway.	The recent oil spill in Norway wasn't from drilling. It was from a cargo ship. It was fuel onboard the cargo ship.	H and K
Oil Spill Prevention & Response	That's going to the seafloor at 120 feet for the same water temperature?	Yes.	N/A
Oil Spill Prevention & Response	You are talking about drilling in 2012, how long before you get to the bottom and put out the BOP, will it be twenty days?	To get to where we put in the BOP it will be ten days.	K
Oil Spill Prevention & Response	How long after that will you finally get the oil?	Roughly twenty more days.	K
Oil Spill Prevention & Response	For five years, every time they come they keep bringing different people. Kind of a waste of our time listening to you guys coming here to talk about BOP, prevention taking place, by that time most of us will be gone. If we are a body to give you authority, we will be no less. We wouldn't be thinking about our children and grandchild, they will be observing this after we're gone. Most of us. I would never say, "Hey come and do it now." You say you have safeguards, I cannot say yes to it myself. I am more less going to kill my children and grandchildren. Industry would come and develop and I would be killing my children and grandchildren.	Thank you for your comment.	H and K

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Oil Spill Prevention & Response	How do you address the rubber seal in the pipe, that for some reason was to tighten and when they pulled the pipe out it tore the seal. And it came out of the rig? How will you address that? Is there some sort of preventative measure?	They have a diverter that was capturing. The biggest reason that failed, they should have recognized that they had gas above the riser.	K
Oil Spill Prevention & Response	What do you have to detect or monitor that?	To catch that influx get into the riser. That's much easier to do in shallower water. They were in 5,000 feet of water. Shell Layers of Prevention slide. We have instrumentation that would detect that immediately to hold those formation fluids back. The third thing we have is mechanical barriers. On phase four we have a capping and containment system. Our biggest priority is to not let the influx enter the well and happen. We do not plan to get any oil out of these wells.	K
Oil Spill Prevention & Response	If it did leak and it exploded, that oil is going to move fast and it will spread. What type of mitigation or agreement is there to address Pt. Barrow? It's going to hit them before it hits us. Will they come over here to do their whaling?	We have a 25 million dollar good neighbor policy. It is administered by Wells Fargo Bank it is available for immediate use for any kind of verifiable. When you take that money it does not prevent you from taking legal action. You can still participate in a class action suit. You could still take legal action you want.	H and K
Oil Spill Prevention & Response	Where will the Barrow whalers go whaling?	You're presupposing the oil will go to Barrow. I can't do that.	A, B, C, D, E, F, and G
Oil Spill Prevention & Response	Where would the Barrow whalers go?	We don't discuss that in the CAA negotiation. It's never come up with the Barrow Whaling Captains Association.	C
Oil Spill Prevention & Response	What's going to happen to those Barrow whalers? That question was never answered. You're always welcome cousin to come, but we've never really seen it. When was that agreement signed?	We just signed another agreement February of 2011.	C

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Oil Spill Prevention & Response	Don't those currents go to Barrow?	Part of it. There's a canyon off of Barrow that is like a bathtub drain. The coastal current will come along the coast and towards Barrow. What's out at Burger, the Hannah Shoal pushes the water to the east and west of it. Jack you mentioned a good point about oil in the Gulf that spread through the water column and did not come to the surface because of the extreme depths. Since our water depths are so shallow in the Chukchi and Beaufort, oil will not spread through the water column and pop in another area. It will all surface near the drilling area where our response fleet will be able to capture it. Our first line of defense is the have spill response vessels.	H and K
Oil Spill Prevention & Response	I would like to thank my Tikigagmiut. It's important for our people, our community, our whaling captains. We have to remember what our elders said. Pete, the majority of us have bad hearing, we don't know what they're really talking about. You heard that elder it has to be in place. I make a recommendation you hire a venue and we would like you to hold your meeting at the Qalgi. Our city government needs money too. I would honor what our elder said. And the meeting was just starting too. I myself, a Tikigagmiut, hunter, Qagmaktuuq. I would say "No development." You show me where those oil spill response crews will come from. They will have two ships. I don't believe it will take three days to get from the Chukchi Sea to the Beaufort Sea. It is less than that. I took a kayak trip. It's good to see you in here, trying to protect our way of life. Pete heard me many times. I speak for these people, our people, the culture that I love the most. We don't know what is going happen with radiation with animals that is contaminated from Japan. The two year Pollock, we got many more. Those adult fish spend time here and go back to Bristol Bay	Thank you for your comment	H and K

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	and make more eggs. No activity until you say we can all be protected. I'm a Tikigagmi. We are having problems, we have to be ready for radiation. There might be only three people that come, but they have to make a report. This makes my heart feel. You have an interest in our way of life.		
Oil Spill Prevention & Response	You actually know if the oil is heavier or lighter? What is worse for a blowout?	It's not a function of the type of oil, it's the pressure, the depth. The deeper the water depth the more issues you have access. Working on top of a 500-foot building opposed to a 120 foot building.	H and K
Oil Spill Prevention & Response	How long would it to take to make that decision to cap your well and move offsite?	In the worst case scenario it would take approximately 30 days to drill a relief well, however the capping operation would be much less.	H and K
Oil Spill Prevention & Response	We're talking about the BOP and we're talking about both safety's not working?	Yes, that is correct, but the likelihood of that happening is extremely low.	H and K
Oil Spill Prevention & Response	What's the first safety of the BOP?	We have the levels of prevention.	H and K
Oil Spill Prevention & Response	You said you'll drill three wells in the Chukchi Sea? That's not counting Conoco and the others?	That's correct. We don't know what their plans are.	N/A
Oil Spill Prevention & Response	So will there be companies planning to drill too?	Thank you for your comment.	N/A
Oil Spill Prevention & Response	If they had a spill would your equipment be available to them too?	We are talking to the federal government. We are discussing that they should have their own equipment.	H and K

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Oil Spill Prevention & Response	I would like that an oil spill response would be a huge priority. I would think that you would work together.	We've raised the bar pretty high in OSR and the other companies should follow. If they want to go to the same high quality, we would be more than likely to discuss and share with them. I cannot promise anything.	H and K
Oil Spill Prevention & Response	Why can't work with the North Slope Borough? We in other communities when don't even see any of the contracts. Are the wells earthquake resistant? Due to global warming.	Thank you for your comment.	N/A
Oil Spill Prevention & Response	If there is an oil spill would you stop an oil spill by another company?	Let's say Crowley a company delivering fuel runs aground, we would turn around and help them. In regards to stopping our drill, we would have to assess. We do pick up oil as a routine day of business.	H and K
Seismic	I noticed reference to the Sakhalin Island, they were dealing with seismic at that same time. Those animals didn't have a place to go. It's a blanket inventory. We need to see where that seismic went on, to understand. We didn't know of all the seismic activity. We don't know what the rate of recovery is from this 3-D. There are exemptions from seismic activity. They're exempted from input. There's no recourse. No slowing down or taking another look at a significant impact. There's always a no-finding-of-significant-impact. I don't think Shell was involved, but it was done. And those impacts are there. We have concern of preserving and that our freezers remain at the same level not due to a lack of our knowledge. So that our recovery can take place. We don't want you to have such a big headache. The more that we state info. the less time we have to argue about it. I don't like arguing.	Thank you for your comment.	N/A

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Seismic	One question I've been wondering it has to do with the affect on plankton from seismic activity. They are probably disintegrated at impact. Will it change their eating habits or ability to reproduce? You're dragging this machine along the whole ocean, it's been brought up but it is important and we need to find out.	It has been studied in experimental situations where they have an airgun in an enclosed area. Anything within 7 feet can be impacted, but beyond 6-7 feet there is not a noticeable effect. There is a global current that comes into the Chukchi Sea from the Bering. This is one of only a few ways that water enters the Arctic. The plankton that occur in the Chukchi Sea are essentially brought in from the Bering and grow and develop there. So, there is essentially a conveyor belt of plankton constantly moving through the system. If there were impacts they would be very short term as the system replenishes itself.	N/A
Seismic	Will it affect the feeding ground near Greenland?	The waters around Greenland are a mixture of Arctic outflow that mixes with currents coming up from the south. It is very similar, in that the plankton are constantly refreshed and grow rapidly during the open water periods.	N/A
Vessel Logistics	There is going to be a ship in the Beaufort Sea and in the Chukchi Sea and they both will be drilling? And there will be a big storm and they both will get in trouble. What will you have then?	The likelihood is that it will not happen.	I
Vessel Logistics	How far is the drilling rig from shore?	204 miles from Point Hope, 78 from Wainwright and 92 from Point Lay.	N/A
Vessel Logistics	How many icebreakers do you have and will you use? Are they American or are they foreign?	Each drilling vessel has one ice management vessel that is foreign flagged.	N/A

<p><b>Permits:</b> Process</p>	<p>Do you have all your permits that are required to do offshore activities? Are you sure oil spill response will work? In the past, you just went right in there and started planning without our people. You have to get an IHA, CAA, and Clean Air is a big issue. Do you have all your permits in place? The government might say no, our people might say no. I want to make sure for my people here that you have your permits.</p>	<p>One of the ways we get permits is to come talk to you. There is not a federal agency that would issue a permit, if we didn't come talk to you. We don't have all our permits. We are here because you live on the Chukchi Sea. The federal government and Shell are here to make sure we are acting appropriately.</p>	<p>A, B, C, D, E, F, G, H, I, J, and K</p>
<p>Process</p>	<p>We're having this exploration up here in Alaska, but offshore exploration is not happening on the East or West Coast of the U.S. The eastern states like Rhode Island, the west coast said no. The U.S. Government honored that. Who said yes? We said no. We see this and they honor that and they won't touch. Is it the governor, the senator, the congressman. Those states they say no, they are not drilling over there. Who is saying yes? What's going on now? What did the U.S. Government honor the governor, State of Alaska, Tribes? What's the difference? Do you understand what I'm asking?</p>	<p>First of all, why the Chukchi Sea and Beaufort Sea, the scientist in the industry and government believe there is oil there. Today we discussed onshore, I would love to drill onshore, it would be much easier. We don't want to make things difficult. If we thought it was prospective, but the oil onshore is small quantity. The USGS looked at all the prospective areas. There is no further leasing on the West coast there is oil being produced. When one looks at those areas, the amount of oil is small in comparison to what we see in Alaska. I recognize the people in Point Hope, not all people, in other villages as well. We don't always get the same reception. The people of Wainwright, they're ok with what's been said. When they do polls in Alaska, three of every four people is in favor. That's the way it's worked. It's very important to us. There will never be a time in our lives where all people will agree with us. We can be responsible and drill our wells and work in an exploration process and to development process. We will never be successful, if we don't work with the communities. We will continue to come back and explain until we get a better understanding.</p>	<p>N/A</p>
<p>Process</p>	<p>In 2008, we had a lease sale on the Chukchi Sea. I protested the lease sale cause not even one cent will go to the State of Alaska. We won't even get any money. If you will give money to the State of Alaska and NSB and will you give money to the impacted communities? You gave how many millions to the NSB and State of Alaska? Can I have a big Seattle Seahawks stadium?</p>	<p>The money given to the Borough is meant to be shared with the communities. Concerned residents come to the committee and determine science. Shell is working with congressman Young and Senators Murkowski and Begich. All Borough communities will see significant amounts of revenue through property tax. The pipelines will come onshore and we will continue to pay property tax and put money into the economy that way. We will continue to work with ASRC and Tikigaq to put money in the hands of Alaskans, the Alaskans in this room. That's what we're trying to do.</p>	<p>N/A</p>

Process	NSB can't tax federal waters?	That is correct, but the NSB gets property taxes for pipelines and other facilities onshore.	N/A
Process	Who owns the OCS?	The Federal government.	N/A
Quality	The feds and industry don't have enough scientists and they are not ready.	Thank you for your comment.	N/A
<b>Quality of Engagement:</b> Feedback	To the young people, I want it on the record that we do have experts. I count 5-6 elders here.	Thank you for your comment.	N/A
Insufficient	I want to make sure that you honor the elders request and redo this meeting and because of their hearing issues. Many of them have hearing issues. They don't like to be told to sit here. We respect our elders. If you come into our community you must respect our community. Do an orientation to your staff. You don't disrespect our community. I will always oppose. I say it even now. I would never risk my food I eat.	We will hold another meeting with the proper equipment.	N/A
Insufficient	Is there a recorder? Does Shell have a recorder?	No we don't have one with us, we have staff recording comments and questions.	N/A
Insufficient	I'm an elder here. I tell you all to bring the proper equipment and stuff like that when you are going to hold a meeting. I can't hear nothing. I can't hear good. I just hear mumbblings. Get prepared first and talk to us. I would like to postpone this meeting until it's done with a PC system. Nothing wrong with that. You need loud speakers and stuff like that and we want the documents before ahead of time so we can review it. We so move.	We would be happy to come back later and keep going on with the meeting.	N/A
Insufficient	You guys are rich and could come back and forth.	The next time we come we will come with speakers and microphone. Because we have people here right now.	N/A
Insufficient	This is a second meeting that I've heard this complaint. This is what was said in Dutch Harbor.	Thank you for your comment.	N/A

Insufficient	There's no deal. I said it all ready.	We apologize for not having a microphone system. The principal just notified us that their system is down. We will bring a microphone with speakers in the future. There are many people here that have questions and comments and we are going to continue with the meeting.	N/A
Insufficient	Is this part of a POC that is required for your license? What evidence do you have that was asked as questions?	We've never been asked for a recorder and we can bring a recorder. We can send you a copy of the EP that documents all of these questions, our responses and the mitigation measures.	C
Insufficient	A recorder shows what questions have been asked. What is provided to the Feds and the POC is drawn up by your employee. We don't even review what is recorded. It is indisputable. There's something wrong with this. We always hear "We will get back to you." It's time to get beyond this arguing stuff. We need to get beyond this guessing game. I just wonder why you do this time after time without a recorder? It is so simple.	Thank you for your comment.	N/A
Insufficient	Jack has a very good point. You're taking us in circles and we do need answers. I agree with him. Our elders are the ones that need to hear this, we look for guidance from them. We need microphones.	Thank you for your comment.	N/A
Insufficient	All the last meetings that I've attended with industry, we've always had this problem. We have entities with recorders and loud speakers and microphones. If they were offered to be rented, I'm sure they would let you utilize these things. I've been to meetings where people have been able to talk right into a microphone. All you have to do is pay for it and utilize it.	Thank you for your comment.	N/A
Insufficient	Bring microphone system to the next community meeting.	Thank you for your comment.	N/A

Insufficient	Bring a recorder to the next meeting and send a copy of the transcript to the residents.	Thank you for your comment.	N/A
Insufficient	Use simple words in your PowerPoint and oral presentation.	Thank you for your comment.	N/A
Insufficient	I have trouble with the long words. Simple words would give us more understanding. Next time delete it and put simple words.	I will do that.	N/A
Positive/Feedback	Thank you for being here for the community. We've always had someone from the outside protecting our way of life. I have never heard of anyone that has come to explain how you will clean up oil spills in the ocean.	Earl said is it money or is it maktak. The question is do I need to choose? Instead we want people to say "Can I have both?" We want to work with the community for economic justice, where we're supporting people in their current lifestyles. Can I have both and can I take part in this and go forward? This is what we would want you to think about.	N/A
Positive/Feedback	I would like to thank you for continuing the meeting when an elder continued to tell you to stop or end the meeting. I know that this meeting helped inform me. The more meetings to inform our people the closer it will get to begin drilling.	Thank you for your comment	N/A
Positive/Feedback	First all I would like to thank Shell for visiting our community to try and explain your future operating plans and apologize for the few single minded who cannot go beyond their beliefs to even try to understand what is more than likely inevitable for Alaska's future. I worked last summer for ASRC as a Marine Mammal Observer both for Statoil and Shell and from my experience; I believe this can and will be done safely and efficiently as long as the planning is there. I look forward to possibly working again for Shell and will most definitely be a part of the operation for the long run. Thank you.	Thank you for your comment	N/A

Positive/Feedback	We thank you for doing this and helping it come together. There are protocols and guidelines. We need to do it along with Conoco and Statoil, it's better that way. We don't like to work by ourselves either. We don't know how many wells are being done by ConocoPhillips and Statoil. I don't know.	I appreciate you saying you appreciate all the good work that Shell, Conoco and Statoil have done together. We are really proud of our science program. It will have a lot of value in understanding potential impacts and climate change. We are closer now to understanding how this ecosystem works. We have a lot of information that we can provide to you.  I need to differentiate between exploration drilling and development. Exploration takes place in three months and number of years and 5,000 studies and ½ billion dollars. Development will require more work. The NSB will be a big help in incorporating the Traditional Knowledge. They will help in knowing what science we need. If we are ever successful.	N/A
Positive/Feedback	That's a good question. That's why we need these meetings to answer our questions.	Thank you for your comment.	N/A
Positive/Feedback	It's not just maktak. It's all the marine mammals in the sea.	Thank you for your comment.	N/A
Protocol	Where there any follow-ups or actions that came up from the last meeting? You should start off each meeting by going through them before with the community.	We document each of the comments and questions and they get put into tables organized in topical order with the comment/question and the response and if there is a mitigation measure that needs to take place it is recorded.	C
<b>Threat to Subsistence:</b> Marine Mammals	How do the animals get Barite in their system?	We've taken very detailed samples. We've gone back and looked and it was done 20 years ago. Today it is even more strict. If we discharge, we discharge much less.	N/A
<b>Value Proposition:</b> Development	Com Centers	Is it your preference that we build our own structure?	A
Development	No. I have no preference.	Our preference would be that we use an existing structure and pay a contract to a local organization.	N/A
Jobs	We want to be included.	Thank you for your comment.	C, E and F

Jobs	What are the Tikigaq contracts?	Waste disposal and compliance.	N/A
Revenue Sharing	When you start drilling, is there any way that Shell can set up shares for the project to the people other than the corporations? Some of the native corporations do not give back to the shareholders. If our people can get shares for the areas that are being drilled, this would be a good way to give back to our people. A lot of times, we don't see any of the money so this would be a good way to give back to the people. For those enrolled in the native village.	Thank you for your comment.	N/A

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Tikigaq School Multipurpose Room, Point Hope, Alaska  
March 28, 2011

Name (Please Print)	Representing	Mailing Address	Phone No.	Fax No.	Email
Crystal Hooper					
Mary Joe Attungano					
Ruby Hooper					
Henry Attungano					
Ray P. Dile					
Florence Oultolite					
Charles K.					
Leona Snyder					
Mae Han					



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Name (Please Print)	Representing	Mailing Address	Phone No.	Fax No.	Email
Dorcus Rodc					
Jack Lar-					
Bessie Kowun					
Peter Francon					
Ed Nafat					
Henry Atluagan III					
Xloreen Koonuk					
Ricky N.					
Raymond Att.					



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Name (Please Print)	Representing	Mailing Address	Phone No.	Fax No.	Email
Aggie Atlungana					
John Louisa					
Aaron Ohtella					
Donald Luy					
Doris Lusboe					
Susan Killeh					
Henrietta Atlungana					
Claudia Koonaloak					
Elise Nash					



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March 28, 2011

Name (Please Print)	Representing	Mailing Address	Phone No.	Fax No.	Email
Joseph Towksj'haa					
Ray Hooper					
Ned A. Weber Sr					
STEVEN LISBANE					
Dolly Atollit					
Mitchell III					
Lakisha Johnson					
Roselle Stone					
Kathy Tingook					



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Name (Please Print)	Representing	Mailing Address	Phone No.	Fax No.	Email
EARL KUNGIC					
Kenneth Attousing					
TOMI LORD					
Eric Uksuk					
Rhoda Long					
AQQI Hank					
Morris Nashookpak					
Lydia Nashookpak					
Boris Ipabok					



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Name (Please Print)	Representing	Mailing Address	Phone No.	Fax No.	Email
Jim Mash					
<del>Greg</del> Randy K					
Cloyd Vn					
Leonard Wood					
Loretta Nashotput					
Jan N. Skowronek					
Joe Jank					
Peggy Frank					
Lily Barger					



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Name (Please Print)	Representing	Mailing Address	Phone No.	Fax No.	Email
Leonard A Garger					
Hazel Estelle					
Diantha Oetlika					
MORRIS B. OIK					
Sally Bethel					
Minnie Johnson					
DAN MORENO					
Gail Gallahorn					
JAKI S Tureth					



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Name (Please Print)	Representing	Mailing Address	Phone No.	Fax No.	Email
Zrna Hunnicutt					
Hannah Teayome					
Diana Oktollic					
Jessie Annuk					
Lennie H. Neshookpak					
Shawn Stone					
Brett Oktollic					
Molly Annuk					
T. H. Neshookpak					



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Name (Please Print)	Representing	Mailing Address	Phone No.	Fax No.	Email
Eli Basth					
Elizabeth Dvick					
Heather Minix					
Amber Sweeney					
Kimey frankson					
George Vincent					
Joe Omnik					
Ella Omnik					



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**March 28, 2011**

Name (Please Print)	Representing	Mailing Address	Phone No.	Fax No.	Email
Pearl Saege					
Abraham Koumou					
ART COMMITTEE					
Isaac Allungama					
Brittany Otkolik					

Issues	Comments	Shell Response	Mitigation Measures*
<b>Cost/Access to Energy:</b> Cost/Access to Energy	Does North Slope oil cost more than other places?	Yes – I can't answer why fuel prices are high in rural Alaska. There have been lots of questions about Native Alaskan populations and we want Native Alaskans to be a significant part of our operations. In Brunei, where I worked before I came here, they had 95% local hire. We call this economic justice. There is a lot of discussion about environmental justice but longer term economic justice is just as important.	N/A
<b>Operational Impacts:</b> GOM Macondo	How did the big spill in Mexico affect everything?	It was a catastrophe for the oil and gas industry. We were very close to drilling last year and had conducted over 450 stakeholder engagements and the more we spoke with communities, the more people felt comfortable with Shell. The president put a moratorium on offshore drilling and the fallout from that accident has continued to follow us. We have to show what we can do not just talk.	H and K
GOM Macondo	The biggest fear people have is a repeat of the GOM accident.	We hear that a lot, people are fearful of oil spill and we have a spill response program to talk about tonight. And one of the most important things is prevention.	H and K
Oil Spill Prevention & Response	Will you have a team ready in case of spill and if you do, do you provide training?	Yes all the personnel have to be trained; We sent some of our personnel from up here to work on the BP spill and they gained experience.	H and K
Oil Spill Prevention & Response	What if you have a spill at the end of the season?	Our equipment can work in a certain amount of ice. We will attempt the capping and containment first and we should be able to control the well before ice becomes too much of a problem.	H and K
Oil Spill Prevention & Response	The ice might help with containment.	Yes the ice can actually help corral the oil.	H and K
Oil Spill Prevention & Response	Are the man made islands safer than the platform?	We really can't use man made islands in water depths higher than 20 feet so when we find production we use what is called concrete gravity based structures.	H and K
<b>Quality of Engagement:</b> Positive/Feedback	This is an excellent presentation very thorough.	Many of the people that helped in the Gulf were from Alaska were from the NANA Region.	N/A
<b>Threat to Subsistence:</b> Marine Mammals	What about whaling season – are you going to stop drilling during the whaling season?	We will have blackout dates in the Beaufort Sea on August 24 <sup>th</sup> and move our drilling rig and boats far offshore and wait until whaling is finished. In the Chukchi, we will continue to work because it is very far offshore.	A, B, C, D, E, F, and G

Issues	Comments	Shell Response	Mitigation Measures*
<b>Value Proposition: Jobs</b>	Do you have any Native people working for you?	We don't have many jobs available because we have not been able to move our program forward, but if we have a drilling program, there will be many jobs and we want Native Alaskans to have most of them.	E and F
Revenue Sharing	Can you give a projection of how Shell's success would affect the NWAB?	There isn't revenue sharing in the OCS but we looked at impacts to the state and nation over 50 years. We found that regionally there would be 4 Billion dollars revenue from taxation and other benefits but the biggest benefit is jobs resulting in \$145 billion over that timeframe. It would also impact the whole country.	N/A
Workforce Development	One of the benefits is employment and career opportunities and professional careers. At what time does Shell imagine a project that caters to NWAB and NSB people? There should be a mechanism that kicks in that helps this region because there aren't enough people to fill these jobs. As an Alaskan, I'd like to see this benefit Alaskans first.	Shell has started a program called Avante Guard which certifies teacher's aides with UAA to give them the credentials they need to become professional teachers. We are also working with a group called Polar Pairs which is an exchange program with teachers in Aberdeen. We also support ANSEP. I took a call from Kotzebue about jobs for roustabouts and I also hope there will be jobs in engineering, geologists. We are also trying to attract Native Corporations to build capacity to work offshore. We don't have a large pie now without a drilling program but we want to provide jobs.  We have identified that 5 <sup>th</sup> graders are the people that will take advantage of the jobs we will have to offer. The longer we wait, the further out that target moves.	N/A

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Kiana School Gymnasium, Kiana, Alaska  
March 29, 2011

Name (Please Print)	Representing	Mailing Address	Phone No.	Fax No.	Email
Rose A. Wood					
Carl Carlson					
Gilbert Thomas					
Lein Atomuk					
TERESA SMYKER					
Eva R Wells					
Meritha Capelle					
Sylvia Sheldon					
Lee Stachel					



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March 29, 2011

Name (Please Print)	Representing	Mailing Address	Phone No.	Fax No.	Email
Raven Jackson					
Annie Reed					
Jack Reed					
William Gooden					
Thomas W. Smith					
Elizabeth Bayou					
Ben Atoruk					
Daisy Johnson					
Leon Johnson					



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Name (Please Print)	Representing	Mailing Address	Phone No.	Fax No.	Email
Bertha Barr					
Kayana Barr					
VP SO Steven Rugg Louse Reed					
Nida Johnson					
Jackie Johnson					
Wm Johnson Jr					
Trukut Gedrecht-Cyrus					
Josie Brower					



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March 29, 2011

Name (Please Print)	Representing	Mailing Address	Phone No.	Fax No.	Email
Ivery Gerhardt- Cyrus					
Tom Cyrus					
Isabelle GC					
Donald Snee					
Dally Smith					
Mabel Good					
Annie Barr					
Issac Jackson					
Paula Oubroster					



Kiana 99749

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Name (Please Print)	Representing	Mailing Address	Phone No.	Fax No.	Email
Edward Gooden					
Linda R Stotts					
Ruth Sandvik					
Jason Turk					
Nelson Walker					
Debra Reed Thomas					
Blanche Cook					
Charlamente Reed					
Dale Stotts					



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Name (Please Print)	Representing	Mailing Address	Phone No.	Fax No.	Email
Katie Ankpuk					
Evelyn Johnson					
Kristy Walton					
Naomi Harris					
Colleen Westlake					
Daniel Atovuk					
Eugene Douglas					
Ida Jackson					
Pina Atovuk					



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Name (Please Print)	Representing	Mailing Address	Phone No.	Fax No.	Email
Lee Barr					
Lorena Walker					
Tina Outwater					
Pauline Jordan					
Lyla Ahwinona					
Thomas Jackson					
Alexis K. Richards					
Gene Sheldon					
Aaron Westlake					



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Name (Please Print)	Representing	Mailing Address	Phone No.	Fax No.	Email
Renee Cook					
Janet Henry					
Kimberly Henry					
James L. Stalker					
Gertrude Williams					
Army J Morris					
Rose Jackson					
Zonda Martin					
Oliver Reed					



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Name (Please Print)	Representing	Mailing Address	Phone No.	Fax No.	Email
Anna Thomas					
Vernon Abduk					
Darryl Johnson Jr					
Michael Westlake					



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Name (Please Print)	Representing	Mailing Address	Phone No.	Fax No.	Email
Julie Reed					

Issues	Comments	Shell Response	Mitigation Measures*
<b>Quality of Engagement:</b> Positive/Feedback	A suggestion was made that a good time for Shell to come to Kotzebue would be the Trade Fair on the 8 <sup>th</sup> and 9 <sup>th</sup> of July which is also the Manilaaq annual meeting.	Thank you for your comment.	N/A
Positive/Feedback	Another suggestion was made for Shell to participate in the Spring Clean Up by donating bikes. Sponsors get a lot of publicity.	Thank you for your comment.	N/A

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Kotzebue Middle/High School Multipurpose Room, Kotzebue, Alaska  
March 30, 2011

Name (Please Print)	Representing	Mailing Address	Phone No.	Fax No.	Email
Rich B Koutrak					
Cara Brown					
Christian Jidda					
Frank Tyatunguk					
WALTER Stanger					
EARL KWOK					
Cassie Norton					
William Sheldon					
Ryan West					



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Kotzebue Middle/High School Multipurpose Room, Kotzebue, Alaska  
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Name (Please Print)	Representing	Mailing Address	Phone No.	Fax No.	Email
Jenni Johns					
Kathy GTR					
Clare Greene					
Warren stalker					
Bentley J. Jock					
Leon Downey					
As M					
Minnie Kuback					



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Kotzebue Middle/High School Multipurpose Room, Kotzebue, Alaska  
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Name (Please Print)	Representing	Mailing Address	Phone No.	Fax No.	Email
Jayde Sheldon					
Michelle Tungiyah					
John Kubalack Jr					
Colin W. Schaeffer					
Robert W. Thompson					
Chester Fallet					
John Chase					
JAY A. DENSON					
Jerry McCall					



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Name (Please Print)	Representing	Mailing Address	Phone No.	Fax No.	Email
GRACE DOWNNEY					
Cora Downey					
Grant Hildreth					
Jeffrey Kowanna					
Aggie Kowanna					
Jerrri Kowanna					



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**March 30, 2011**

Name (Please Print)	Representing	Mailing Address	Phone No.	Fax No.	Email
Ukallayssaq & Igluq					
Anthony Buttram					
Jean Zinger					

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Issues	Comments	Shell Response	Mitigation Measures*
<b>Operational Impacts:</b> Oil Spill Prevention & Response	Have you used the capping and containment system in the Arctic?	We have used this equipment in many other places but we will fully test the equipment here before it is used.	K
Oil Spill Prevention & Response	Will you test the equipment during bad weather?	Yes we will test the equipment during all conditions we could imagine but if the weather gets too bad, we will suspend operations.	I, H, and K
Oil Spill Prevention & Response	How would you deal with an oil spill in ice?	We have equipment that is designed to operate in ice.	I, H, and K
<b>Permits:</b> Timing	You said there wouldn't be any activities in 2011. Is your decision related to HB 210?	No we made our decision before that bill was introduced.	N/A

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McQueen School Gymnasium, Kivalina, Alaska  
March 31, 2011

Name (Please Print)	Representing	Mailing Address	Phone No.	Fax No.	Email
Manam Norton					
Frank Wedg					
Billy Stone JR					
Doreen Baldwin					
Isabelle Stalker					
Amanda Dewey					
Jerry Norton Jr					
Carlos Hawley					
Ernest Hawley					



SHELL EXPLORATION AND PRODUCTION COMPANY  
SIGN-IN SHEET – Kivalina Plan of Cooperation Community Open House Meeting  
McQueen School Gymnasium, Kivalina, Alaska  
March 31, 2011

Name (Please Print)	Representing	Mailing Address	Phone No.	Fax No.	Email
DANIEL D. FOSTER					
Mark Turner					
Ikey Hank					
MYRA ADAMS					
BERT ADAMS					
Walter Swain					
Gene Booth					
General Lewis					
Seymour Tuzigayuk III					



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SIGN-IN SHEET – Kivalina Plan of Cooperation Community Open House Meeting  
McQueen School Gymnasium, Kivalina, Alaska  
March 31, 2011

Name (Please Print)	Representing	Mailing Address	Phone No.	Fax No.	Email
Chris Koons					
Shirley Stalker					
Audrey Jones					
Tracey Jones					
Tanaya Jones					
Ticalynn Adams					
Louise Wesley					
Paula Swa					
Carta					



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March 31, 2011

Name (Please Print)	Representing	Mailing Address	Phone No.	Fax No.	Email
Galen Swan					
Angelo Hawley					
Amos Hawley					
Janetta M. Hawley					
Gladys Adams					
Leety Swan					
Nikki Adams					
Miller Hawley					
Virgil Adams					



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Name (Please Print)	Representing	Mailing Address	Phone No.	Fax No.	Email
Austin Swan					
Irene Carter					
Andrea Baldwin					
Russell Adams					
Adrian J. Adams					
Vincent					
Quinn P. Hawley					
Josh Chel					
Myra Wesley					



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Name (Please Print)	Representing	Mailing Address	Phone No.	Fax No.	Email
Stanley Hawley					
Luke Koonook Jr.					
Josephine Hawley					
Robert Hawley					
Rhonda Norton					
Stephen R. Koenig					
Albert Norton Jr.					
Brenda K Norton					



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March 31, 2011

Name (Please Print)	Representing	Mailing Address	Phone No.	Fax No.	Email
Lona Adams					
Calib Wesley					
Lena Sage					
Theodore Bee					
Genny Swan					
Rita Ramoth					
Danielle Knox					
Franklin Knox					
Shirley Adams					



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March 31, 2011

Name (Please Print)	Representing	Mailing Address	Phone No.	Fax No.	Email
011 010801					
Margaret Baldwin					
Tillman Adams					
Jerry Knap					
Emma Stalker					
Jeremiah Kayoulik					
Hannieta Adams					
Alexis Hawley					
Jackie					



**SHELL EXPLORATION AND PRODUCTION COMPANY**  
**SIGN-IN SHEET – Kivalina Plan of Cooperation Community Open House Meeting**  
**McQueen School Gymnasium, Kivalina, Alaska**  
**March 31, 2011**

Name (Please Print)	Representing	Mailing Address	Phone No.	Fax No.	Email
Harry Norton					
Maria Koehing					



SHELL EXPLORATION AND PRODUCTION COMPANY  
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McQueen School Gymnasium, Kivalina, Alaska  
March 31, 2011

Name (Please Print)	Representing	Mailing Address	Phone No.	Fax No.	Email
Dolly E. Foster					
<i>Sally Lemell</i>					
Brenda Hawley					
Emeline Knox					
<i>Charles Knox</i>					
<i>Priscilla Soy</i>					
Lawrence Adams					
<i>Tommy Collins</i>					



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Name (Please Print)	Representing	Mailing Address	Phone No.	Fax No.	Email
Sylvester Swan III					
Eloria Adams					
John Norton					
JOLENE WESLEY					
Henry Swan					



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March 31, 2011

Name (Please Print)	Representing	Mailing Address	Phone No.	Fax No.	Email
Lucy S. Adams					
Lucy M Swan					
Joe Loening					
Koomalook Stone					
Angela Hawk					



SHELL EXPLORATION AND PRODUCTION COMPANY  
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March 31, 2011

Name (Please Print)	Representing	Mailing Address	Phone No.	Fax No.	Email
Danny Foster					
Oran Barger					

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Issues	Comments	Shell Response	Mitigation Measures*
Operational Impacts: Discharge	Will Shell also do the zero harmful discharge in the Chukchi where whales migrate like the Beaufort Sea?	We will not do zero volume discharge, we will be doing a zero harmful discharge of our muds and cuttings. We have looked back at the past wells from the 80's and 90's and have not found any significant change to the ocean flora, etc.	L
Quality of Engagement: Positive/Feedback	When will Shell host more meetings in Wainwright? I've been hearing back from youth there that they see the potential opportunity for careers. I would like to see Shell involved with the schools.	Shell experts would like to come out the village schools and work with youth. We would be able to do that.	N/A
Positive/Feedback	Shell is getting close to developing a partnership with NSB. I have concern about having two rigs working at the same time. There are some challenges there. I continue to see OSPR, discharge, air etc. as issues that will continue to come up in your programs.	Thank you for your comment.	K and L
Value Proposition: Workforce Development	Wants us to expand our job opportunities outside of Marine Mammal Observers and Subsistence Advisor's and Communication and Call Center Operators.	Thank you for your comment.	N/A

Notes:

\*Mitigation Measures are only assigned to applicable comments.

"Not applicable" (N/A) is used to designate comments that do not require mitigation measures as a course of action. See [Mitigation Measures Index](#) definitions according to assigned letter.

**2011 Proposed Mitigation Measures**

A-Communication Plan for avoiding conflicts with subsistence users.

B-Collaboration and Communication with Whaling Associations

C-Plan of Cooperation (will work to obtain a CAA)

D-Will honor 2010 Camden blackout dates for Nuiqsut and Kaktovik whaling.

E-Subsistence Advisors based in Chukchi and Beaufort Sea Villages and Kotzebue

F-Marine Mammal Observers

G-Robust Marine Mammal Monitoring Protocol

H-Oil Spill Response Fleet on standby 24/7 near drilling location

I-Real time Ice and Weather Forecasting

J-Crew change by helicopter and collaboration on routes to and from shore base

K-zero discharge of: drilling fluids and cuttings after the 26-in casing; gray and treated black waters; bilge and ballast waters

L-Enhanced blowout prevention and mitigation measures (i.e., second set of blind shear rams, increased frequency of BOP testing, redundant ROV hot stab panel, capping stack and containment system, and relief well plan with designated standby relief well drilling unit).



## Science Accomplishments:

Aspects of the Shell  
science program that  
reflect input and requests  
from the North Slope  
Borough



### Acoustic program in both the Chukchi and Beaufort

- Initiated in 2006 with CPAI & GXT
- Continued since that date with > \$10 million expended
- Despite setbacks, this is one of the biggest acoustic monitoring programs globally
- Generated greater understanding of many marine mammal species including walrus and bowhead movements

### Chukchi Sea aerial program

- 2006-2010 conducted aerial surveys within 25 miles of the Chukchi coast
- About \$10 million expended to date
- The first to document walrus haulouts on the Alaska Chukchi coast
- Documented downcoast (Barrow to Wainwright) movement of migrating bowheads

### Chukchi Sea Baseline studies

- 2008- 2010 added an extensive baseline program with CPAI, COMIDA, and others
- Includes – birds, mammals, plankton, benthos, contaminants, fishes, physical parameters
- Initiated following Mayor Itta's letter asking for baseline science
- > \$15 million expended to date
- Greater clarity of the ecological drivers of the Chukchi ecosystem

### Historic exploration well site evaluation

- Returned to Hammerhead (Beaufort) site in 2008
- Returned to Burger/Klondike (Chukchi) sites in 2009
- Evaluated contaminants issues and biological community structure

### Cumulative impacts analysis

- Since 2006 Shell has taken the lead in documenting all industry activities and the results of all industry monitoring efforts in the offshore
- The reports have taken a multi-year/multi-activity approach reporting total ensonification areas and reporting on multiple activities.

### Air monitoring stations

- 2008-2010 air monitoring stations at Reindeer Island and Wainwright



# EXPLORATION PLAN



## SHELL'S GOALS

To demonstrate that Shell does not cause undue or serious damage to the human, marine, or coastal environment, conforms to sound conservation practices, and is prepared to conduct exploration that is safe.



## WHY PREPARE AN EXPLORATION PLAN?

To discuss and explain the various operative activities associated with drilling.

## WHO REVIEWS THE EXPLORATION PLAN?

The North Slope Borough, potentially impacted communities, AEWG, marine mammal management groups, tribes, State of Alaska, and the federal government.

## WHAT IS INCLUDED IN THE EXPLORATION PLAN?

- Description of drilling vessels, and associated vessels and equipment
- Location and timing of operations
- Proposed type and amount of discharges
- Oil spill prevention and response measures
- Analysis of direct and indirect environmental impacts
- Mitigation measures
- Health and safety measures
- Geologic information assessment of any hazards to drilling
- Permit applications

## Exploration Plan Details

- Two EPs – Camden Bay EP in the Beaufort Sea and a Chukchi Sea EP
- Both are two year plans – starting in 2012
- Up to 2 wells per year in the Beaufort Sea
- Up to 3 wells per year in the Chukchi Sea, plus future well site work
- Noble Discoverer drillship and Conical Drilling Unit Kulluk
- Oil Spill Response capabilities on standby 24/7
- Crew change by helicopter – routes determined through coordination and communication

- Real time ice and weather forecasting
- Shorebase in Deadhorse, Barrow and Wainwright
- Robust marine mammal monitoring protocol
- Communications Plan to avoid conflicts with subsistence users
- Subsistence Advisors





# SHELL'S GOALS IN ALASKA'S BEAUFORT & CHUKCHI SEAS OUTER CONTINENTAL SHELF

## ENGAGEMENT PHILOSOPHY

Engage local residents and regulatory bodies to understand issues and concerns before design work is initiated

Utilize knowledge gained in design and operational feasibility studies, for example minimizing or mitigating the impact of a development.

Being a "good neighbor" to the residents of the North Slope, and all areas we operate within the state of Alaska.

## COMMITMENT TO NORTH SLOPE RESIDENTS

Integrate cultural and environmental protection considerations into the planning, design, construction and operational phases of our potential oil and gas activities.

Improve communication to ensure full and meaningful dialogue with residents.

Consult with NSB and NWAB staff and village residents during the planning and design stages in order to blend traditional and contemporary local knowledge with exploration technology in an appropriate manner.

## SHELL'S GOALS IN ALASKA'S NORTH SLOPE

To find and develop commercial hydrocarbon resources in the Beaufort and Chukchi OCS.

To support the community in benefiting from any potential offshore development both economically and socially.

To respect and enhance the way of life of the residents of the North Slope Borough and Northwest Arctic Borough.

## OBJECTIVES

Discuss the possible infrastructure needed to make Beaufort and Chukchi OCS development a reality, should it occur.

Review the potential social and economic benefits associated with increased infrastructure and development of Shell leases in the Beaufort and Chukchi OCS.

Discuss future engagement with the residents of the North Slope Borough and Northwest Arctic Borough.

## EXPERIENCE & COMMITMENT

Shell has experience in Arctic and other ice-covered offshore regions. Traditional knowledge and assistance goes a long way in helping to ensure success.

## POTENTIAL BENEFITS: JOBS & CAREERS

- Direct and indirect
- Local business contracting opportunities
- Workforce development and training



## POSSIBLE INFRASTRUCTURE NEEDS



Sakhalin

## WHY IS OFFSHORE INFRASTRUCTURE REQUIRED?

Many leases are more than 15 miles from shore

Longest land based reach to offshore sites is approximately 8 miles

## POTENTIAL BENEFITS: REVENUE

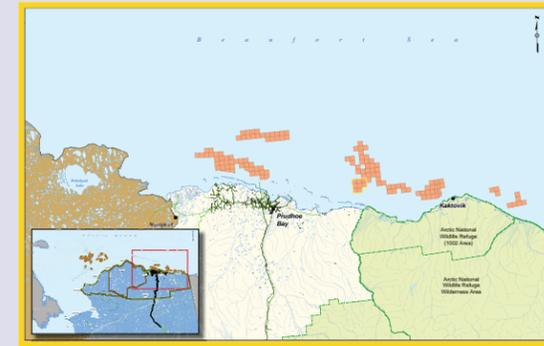
- Tax base from pipelines & support bases to address declining revenues
- Extending the life of TAPS and the pipeline tax base
- Additional infrastructure which could make other onshore fields economic and increase revenue



## SOCIAL & CULTURAL INVESTMENTS

- Socio-economic studies
- Marine mammal studies
- Environmental studies
- Additional social and cultural investments

## BEAUFORT SEA INFRASTRUCTURE: INITIAL DEVELOPMENT FOCUS



### Camden Bay:

Initial focus is the 1985 discovery of Hammerhead/Sivulliq.

- 14 to 18 miles offshore
- Water depth 100 feet

Development of Sivulliq is dependent upon factors including:

- Seismic results
- Appraisal drilling results

## CHUKCHI SEA INFRASTRUCTURE: INITIAL EXPLORATION FOCUS



The first public sale of leases in the Chukchi Sea since 1991 took place on February 6, 2008.

The Chukchi Sea Shelf is believed to hold up to 30 billion barrels (4.8x10<sup>9</sup> m<sup>3</sup>) of oil and gas reserves.

- Lease blocks are more than 50 miles offshore
- Water depth 130-200 feet

## ADDRESSING CHALLENGES THROUGH RESEARCH & DEVELOPMENT

Platform & vessel noise reduction to minimize impact to marine mammals

Production platform structure design to withstand ice loading

Oil spill prevention and response for development infrastructure

Vessel and platform re-supply

Offshore pipeline installation beyond landfast ice

Evacuation and rescue



## FUTURE ENGAGEMENT: THE WAY FORWARD

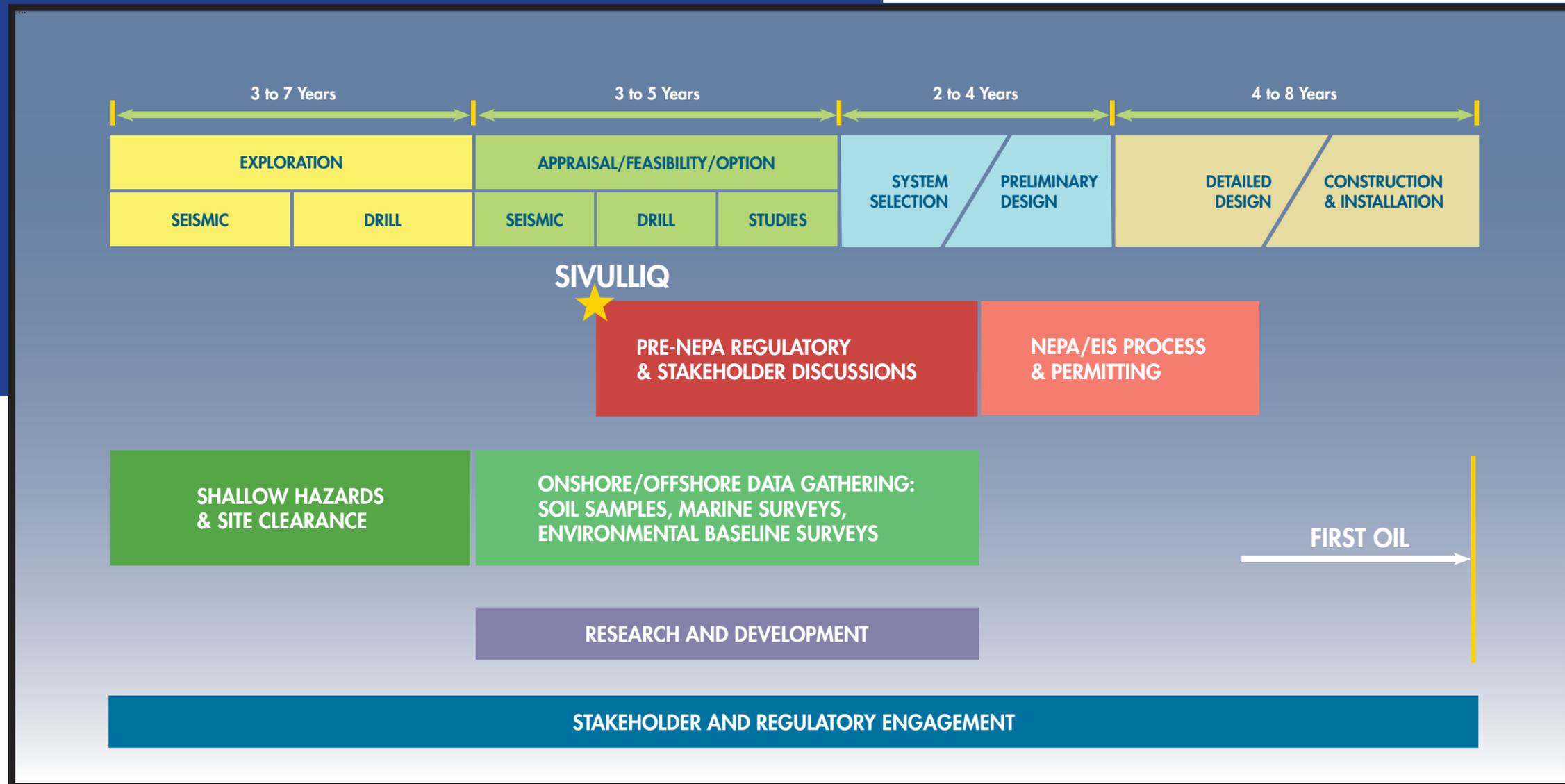
To succeed in meeting mutual goals, we must move forward together based on mutual respect and open dialogue:

- Discuss ideas on ways to engage, consult and work together;
- Validate our understanding of your concerns;
- Discuss issues, potential impacts and potential solutions & mitigation measures;
- Share ideas and feedback on economic development.

**"It is clear, that substantial involvement of all potentially affected parties including Alaska Natives is a prerequisite for a successful approach to the development of Arctic OCS Oil and Gas."**

—Environmental Information for Outer Continental Shelf Oil and Gas Decisions In Alaska by the National Research Council

# Typical Offshore Development Timeline





# **Shell Camden Bay and Chukchi Sea Program Update**

**March 2011**



# Shell In Alaska

- 2011 Program
- 2012-2013 Proposed Exploration Plans



# 2011 Program

# 2011 Shell Proposed Operations

## ■ Shell 2011 program:

- Marine mammal monitoring to support operations
- Non Shell operated Ecological science data gathering (offshore and onshore)
- Com Centers and Subsistence
- Advisors in Coastal Villages of North Slope:
  - Point Lay, Point Hope, Wainwright, Barrow, Deadhorse, Kaktovik, Nuiqsut





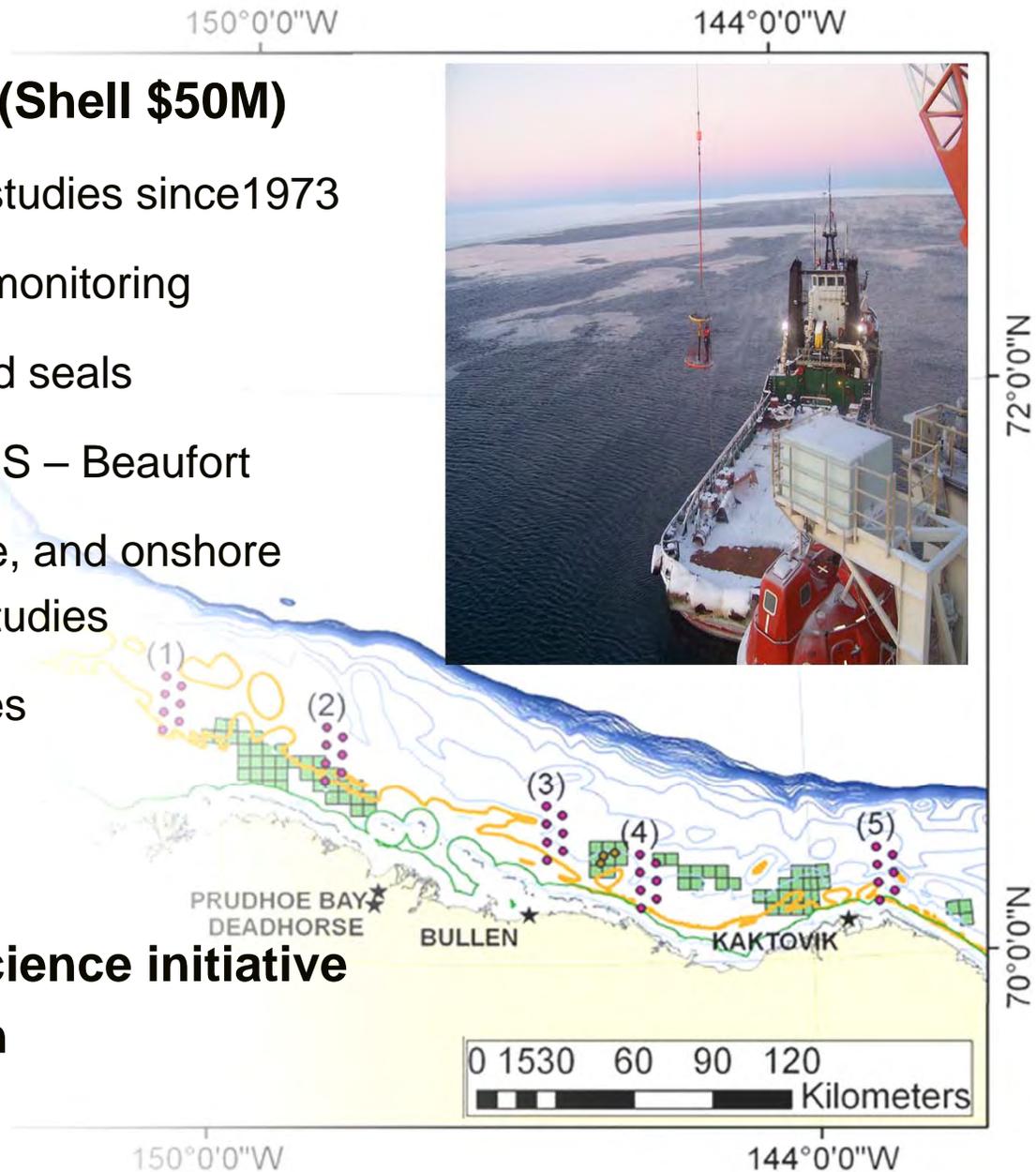
# Science

# Baseline Science Supports Exploration In Alaska

## ■ \$500 Million and growing (Shell \$50M)

- 5000 independent scientific studies since 1973
- 6 years of marine mammal monitoring
- Tagging studies – walrus and seals
- First air quality station in OCS – Beaufort
- Ongoing offshore, nearshore, and onshore ecological characterization studies
- Traditional knowledge studies
- Health impact assessments

## ■ Up to \$5 million annual science initiative with North Slope Borough



## Offshore, nearshore, onshore studies

- Marine Mammal
- Acoustic Recorders
- Ice & Metocean Buoys
- UAV Monitoring
- Stereo Photography
- Upward Looking Sonar
- Benthic Studies
- Sediment chemistry
- Current Meter
- Hydrology & Habitat Assessment
- Coastal Stability Studies
- Traditional Knowledge
- Bird Observations
- Fisheries Sampling
- Zooplankton
- Physical Oceanography

# NSB Collaborative Science Agreement

- Objective: To enable community members in coastal villages of the Chukchi and Beaufort Seas to participate and prioritize science being conducted related to the potential effects and impacts of oil and gas exploration and development in the outer continental shelf (OCS).
- Signed Sept. 24, 2010
- Funded annually by Shell for an initial term of five years, and administered by the NSB Mayor's Office
- 14-Member Steering Committee
  - Coastal Villages
  - NSB Wildlife Department and Mayor's Office
  - Independent Scientists
  - Shell





# **2012-13 Proposed Exploration Plans**

# Chukchi and Beaufort Seas



## 2012-13 Proposed Operations

- Drill up to three wells per year in Chukchi Seas during open water drilling season (July-October)
- Drill up to two wells per year in Beaufort Sea during open water drilling season (July-October)



- Continuation of Shell's long-term ecological characterization offshore and onshore



# Mitigation

## Mitigation Shell has committed to

- Communication Plan for avoiding conflicts with subsistence users
- Collaboration and Communication with Whaling Associations, Walrus, Nanuq and Seal Commissions
- Capping and Containment system
- Commitment to hire Subsistence Advisors
- Marine Mammal Observers on all vessels
- Robust Marine Mammal Monitoring Protocol
- Real time Ice and Weather Forecasting
- Crew change by helicopter and collaboration on routes to and from operations
- Deadhorse, Wainwright and Barrow shore bases
- No transiting, including within polynya zone, without communicating
- Relief rig capabilities



# Prevention and Response

## Commitments

- **Prevention Is the First Priority and Can Be Accomplished**
- **BOP – testing and enhancements**
  - Testing every 7 days instead of every 14 days
  - Use of second set of shear rams
  - Sub-sea remote operating panel relocation
  - ROV/Diver options on and near site
- **Arctic Cap and Containment System**
- **Full OSR capabilities for each sea**
- **Second rig relief well capability**

# Alaska Arctic Cap and Containment System





# **New and Traditional Oil Spill Contingency Planning**

## Shell Oil Spill Response Goals

- Immediate Onsite Response
- Latest Technology
- Flexible Environmental Response Capability
- Sustained Response

# Arctic Response Options

## Offshore:

Mechanical

In-situ Burning

Dispersants

(under select conditions)



## Nearshore:

Mechanical

In-situ Burning



## Onshore:

Mechanical

In-situ Burning



# Nanuq

- Multi-Purpose Vessel
  - Spill Response;
  - Onsite Command Center;
  - Anchor Handling;
  - Ice Management; and
  - Supply
- Ice Class A1 Vessel
- Dynamic Positioning Capability
- Full support for up to 41 crew and responders
- 2 Lamor LSC-5 Brush Skimmers & Power Packs
- Staging and Deployment of Boom-tending Work Boats
- Onboard storage: >12,000 bbl
- Rapid Transit for lightering recovered oil
- High Volume, Viscous Oil Lightering capability

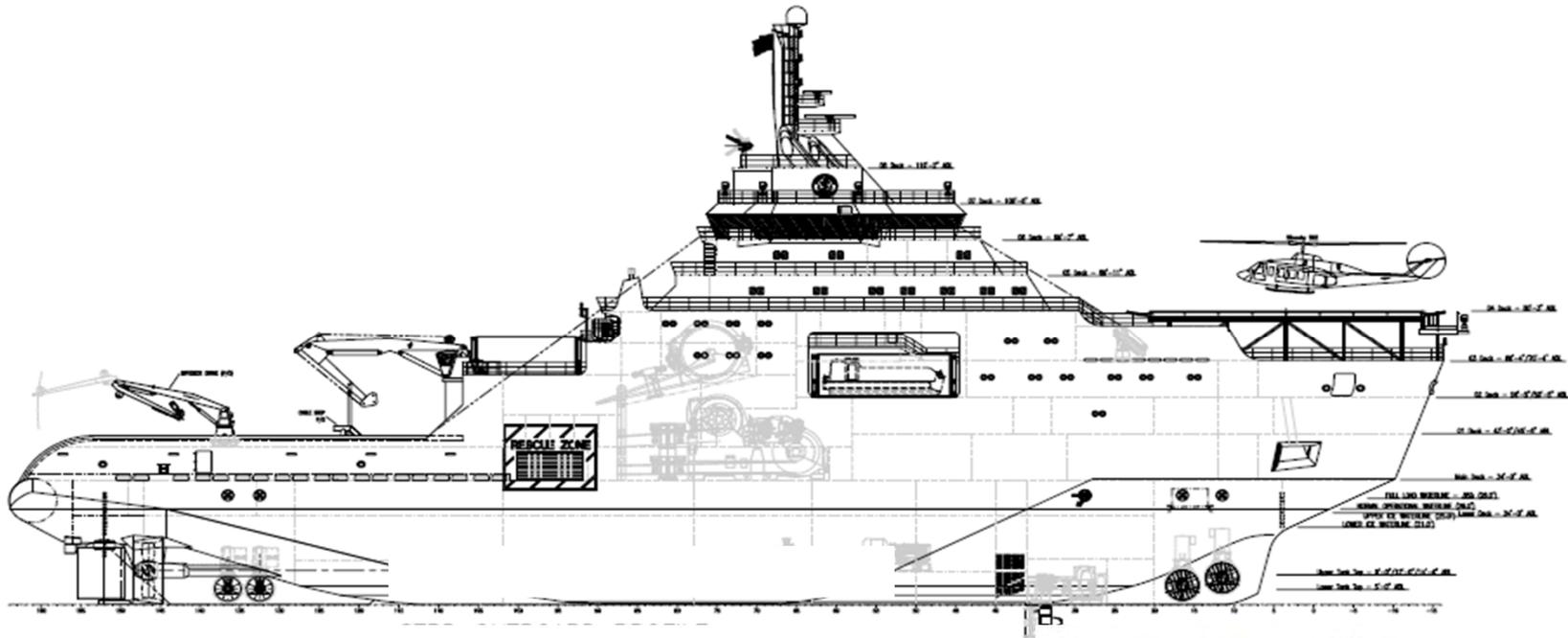


# Arctic Endeavor

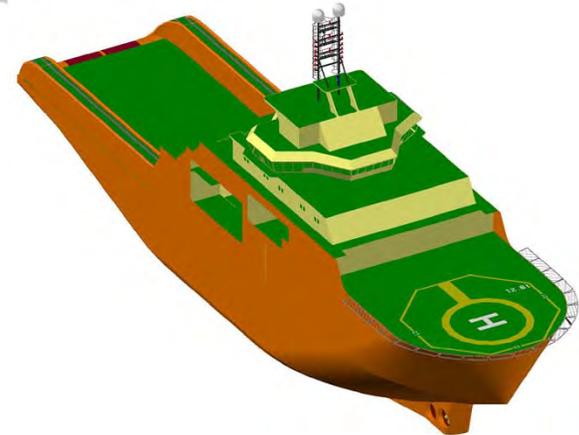
- Dedicated Oil Spill Response Barge with Tug Assist
- Ice Strengthened
- Onboard Field Command and Communications Center
- 2 Lamor LSC-5 Brush Skimmers & Power Packs
- Staging and Deployment of Boom-tending Work Boats and 249-bbl barges
- Staging and Deployment of 47' Skimmer with built-in Brush Skimmers
- Onboard storage: >18,000 bbl
- High Volume, Viscous Oil Lightering capability



# Hull 247



- Length Overall – 360' (110m)
- Beam – 80' (24.4m)
- Draft – 26' (normal)
- Anchor Handling Backup
- Polar Ice Classed
- High POB for contingency response
- Storage Capacity: 8,000 bbl



# Mechanical Recovery



Lamor Brush



TransRec 150



Ocean Buster



47' Kvichak w/ brush skimmer



Small Over-the-Side Skimmers



Rope Mop skimmer



# **Harsh Weather Operations**

## Brent 'B' production platform photographed in stormy weather.

The photograph shows the ferocity of the wind and waves during a storm in the North Sea. Winds of more than 100 mph produced waves reaching up to the underside of the deck which is 75 ft above sea level. Platform on calm day shown at bottom.



## Ice Against Platform Legs - video



**Thank You**



**END OF PRESENTATION**



**Attachment C**  
**Communication Plan**

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**COMMUNICATION PLAN  
EXPLORATION DRILLING PROGRAM  
CAMDEN BAY, ALASKA**

The following Communication Plan will be used during each exploration drilling season to coordinate activities with local subsistence users, including the Alaska Eskimo Whaling Commission (AEWC), Alaska Eskimo Walrus Commission (AWC), Alaska Nanuuq Commission (ANC), Alaska Beluga Whale Committee (ABWC), Ice Seal Committee (ISC), and village Whaling Captains Associations (WCAs). During each drilling season the drilling vessel *Kulluk* or *Discoverer*, either under tow (*Kulluk*), or by its own propulsion (*Discoverer*) and associated support vessels will transit through the Bering Strait into the Chukchi Sea on or after July 1, arriving on location near Camden Bay approximately July 10. Exploration drilling activities at the drill sites are planned to begin on or about July 10 and end on or before October 31, with a suspension of all operations beginning August 25 for the Nuiqsut (Cross Island) and Kaktovik subsistence bowhead whale hunts. During the suspension for the whale hunts, the *Kulluk* or *Discoverer* and support vessels will leave the Camden Bay area and move to an area mutually agreed upon by Shell and the AEWC. Shell will return to resume activities after the subsistence whale hunts conclude.

The Communications Plan will be implemented in two phases. Phase I describes the guidelines already in place to ensure proper communication during the drilling season. Phase II describes what to do in the event Shell Offshore Inc. (Shell) activities potentially affect subsistence activities and how to keep subsistence user groups informed of Shell activities. Phase I and II are designed to minimize the potential for interference of Shell activities with subsistence activities and resources and to keep operators up-to-date regarding the timing and status of the bowhead whale migration in Camden Bay as well as the timing and status of other subsistence hunts.

Drilling program operations will be performed in compliance with all applicable permits and authorizations, including the Plan of Cooperation, Letter of Authorization per U.S. Fish & Wildlife Service, Incidental Harassment Authorization per National Marine Fisheries Service and Lease Stipulation 5 from lease sales 195 and 202 per Bureau of Ocean Energy Management, Regulation and Enforcement.

**PHASE I**

- Shell will fund the operation of Communication and Call Centers (Com Centers) in the coastal villages to enable communications between Shell operations and vessels, local subsistence users, and Subsistence Advisors (SA), thereby notifying the subsistence community of any vessel transit route changes and avoiding conflicts with subsistence activities.

- Marine Mammal Observers (MMOs) will be onboard exploration drilling-related vessels with responsibilities to: monitor for the presence of marine mammals, assist with the maintenance of marine mammal safety radii around vessels, monitor and record avoidance or exposure behaviors, and communicate with the Com Centers and local subsistence hunters by marine radio.
- If a conflict arises with offshore activities, the MMO will immediately contact the vessel captain and the Com Centers. The Com Centers will then contact Shell's simultaneous operations emergency response team. If avoidance is not possible, the next phase will include communication between a Shell representative and a representative from the impacted subsistence hunter group(s) to resolve the issue and plan an alternative course of action by either industry or the subsistence groups.
- Shell will employ local SAs from the Camden Bay villages to provide consultation and guidance regarding the affected species migration, the subsistence hunt, and other subsistence activities. The SAs will work approximately 8 hours per day and 40-hour weeks each drilling season. Responsibilities of the SAs will include: reporting any subsistence concerns or conflicts, within 4 hours if the conflict appears imminent, to the Com Centers (who will then contact Shell's simultaneous operations emergency response team); coordinating with subsistence users to advise on location and timing of Shell's activities; reporting subsistence-related comments, concerns, and information to Shell staff; and, advising Shell how to avoid subsistence conflicts and subsistence users. A SA handbook will be developed and provided to each SA. The handbook will outline contact numbers, communication procedures, and communication timelines for reporting and communicating potential conflict situations.
- Helicopter traffic flight restrictions will be in place to prohibit aircraft from flying below 1,500 ft (457 m) altitude, (except during takeoffs and landings, in emergency situations or for MMO overflights), while over land or sea. If flights need to deviate from this path due to emergency landings or other unavoidable reasons, the new flight information will be immediately shared, as outlined by Shell Health, Safety, Security, and Environment requirements, with Com Centers so area subsistence users can be notified.
- Regular overflight surveys and support vessel surveys for marine mammals will be conducted to further monitor prospect areas and identify areas currently being used for subsistence activities to avoid potential conflicts with users.
- To minimize impacts on marine mammals and subsistence hunting activities, the drilling vessel and support vessels traversing north through the Bering Strait will transit through the Chukchi Sea along a route that lies offshore of the polynya zone. In the event the transit outside of the polynya zone results in Shell having to break ice, as opposed to managing ice by pushing it out of the way), the drilling vessel and support vessels will move into the polynya zone far enough so that ice breaking is not necessary. If it is necessary for any vessel to move into the polynya zone, Shell will notify the local communities of the change in the transit route through the Com Centers.

## **PHASE II**

All guidelines in Phase I will be adhered to in addition to the following:

- If potential conflicts are identified between Shell activities and subsistence activities; the Com Center Action Plan will be used to manage the issue.
- Shell will continue with engagements and regular communications with the AEW, AWC, ANC, ABWC, ISC, and the WCAs of Barrow, Wainwright, Point Lay, Point Hope, Kaktovik and Nuiqsut once transiting of vessels begins through Chukchi Sea on the way to Camden Bay, during drilling activities, and during mobilization from Camden Bay and through the Chukchi Sea.

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