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November 26, 2013

Re: Submittal of the Shell Gulf of Mexico Inc. 2014 Integrated Operating Plan (IOP) for the Chukchi Sea

Shell Gulf of Mexico Inc. (Shell) is hereby submitting the 2014 Integrated Operations Plan (IOP) for the Chukchi Sea. This IOP submittal is in response to recommendations within the Department of the Interior's March 8, 2013 report titled *Review of Shell's 2012 Alaska Offshore Oil and Gas Exploration Program*. Within this report, Section II.A, it was recommended that Shell "*… should develop, and submit to DOI, a comprehensive and integrated operational plan describing in detail its future drilling program"*.

If there are any questions regarding this submissions please contact me at (907) 646-7112 or via email at Susan.Childs@Shell.com.

Thank you,

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Alaska Venture Support Integrator, Manager

Attachment:
Shell Gulf of Mexico Inc. 2014 Integrated Operations Plan for the Chukchi Sea

Cc:

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Shell Gulf of Mexico Inc.

2014
Integrated Operations Plan
For the Chukchi Sea

November 2013

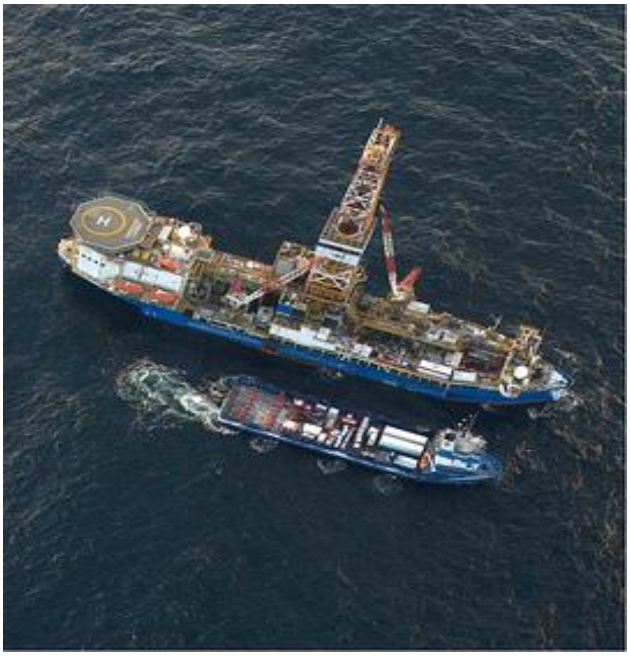


TABLE OF CONTENTS

INTRODUCTION 1

1.0 SCOPE OF OPERATIONS 3

1.1 Vessel Operations 4

1.2 Air Operations 7

1.3 Shore Facilities 8

1.4 Weather and Ice Forecasting 9

1.5 Ice Management 12

1.6 Communications, Monitoring and Tracking 13

1.7 Simultaneous Operations (SIMOPS) Plan and Coordinators 13

1.8 Pre-Season Preparations 14

1.9 Open Water Season Operations 14

2.0 DRILLING OPERATIONS 15

2.1 Contract Management of the Drilling Units 15

2.2 Drillship preparations for 2014 Arctic Service 15

2.3 Audits to Verify Operational Readiness 18

2.4 Management of Contractors Providing Equipment or Services 18

2.5 Compliance and Interruptions to Drilling Operations 19

2.6 Well Control Preparedness, Drills, and Assurance Activities 19

2.7 Pore Pressure / Fracture Gradient Information 19

2.8 Casing Design 20

2.9 Operational Monitoring 20

2.10 Pressure Control Equipment 21

2.11 Secondary Well Control 21

2.12 Surface Intervention – Capping and Containment (If Necessary) 22

2.13 ACS Dome Component Improvements 22

2.14 Relief Well Drilling 23

3.0 MARITIME AND LOGISTICS 24

3.1 Contractor Selection and Assurance 25

3.2 Maritime and Logistics Team 26

3.3 Maritime and Logistics Planning 26

3.4 Logistics Delivery Team 27

4.0 EMERGENCY RESPONSE PROGRAM 29
4.1 Contingency Response Planning 29
4.2 Incident Management 31
4.3 Oil Spill Response Capability and Mobilization 32
4.4 Responder Training 34
4.5 Incident Management Team 35
4.6 Maintenance Program 36
5.0 SHELL MANAGEMENT AND CONTRACTOR ASSURANCE 37
5.1 Shell Control Framework 37
5.2 HSSE Risk Management Approach 38
5.3 Integrated Activity Plan (IAP) 39
5.4 Assurance 39
5.5 Contractor Management 40
5.6 Alaska Maritime Assurance Process 42
5.7 Aviation Assurance 45
6.0 REGULATORY & PERMITTING 48
7.0 STAKEHOLDER RELATIONS 52
8.0 SCIENCE 54
9.0 CONCLUSION 55
10.0 LIST OF ACRONYMS AND ABBREVIATIONS 56

Figures

Figure 1: Notional 2014 Chukchi Sea Exploration Drilling Program 6
Figure 2: 2014 Helicopter Capabilities 7
Figure 3: Notional Mobilization and De-mobilization Scheme 9
Figure 4: SIWAC Sea Ice Chart for August 1, 2013 10
Figure 5: SIWAC Combined Sea State and Winds for Chukchi Sea 11
Figure 6: Arctic Containment System Dome and Improvements 23
Figure 7: Voyage Order Control Process 28
Figure 8: Helicopter Prioritization Process 28
Figure 9: Emergency Response Incident Notification 30
Figure 10: Incident Command System Organization 31
Figure 11: Classification of Contracts by Risk and Value 40
Figure 12: Contract Management 41

Tables

Table 1: 2014 Fleet Capabilities 5
Table 2: Primary Maritime and Logistics Support Requirements 24

INTRODUCTION

Shell Gulf of Mexico Inc. and its affiliates engaged in exploration activities in the Chukchi Sea (Shell) have prepared this Integrated Operations Plan (IOP) describing the scope of Shell's Alaskan Arctic drilling and its support activities planned for 2014, in addition to the management processes that ensure their integration.[1] Safe and efficient drilling and evaluation of the Burger Prospect in the Chukchi Sea, while remaining in full compliance with all issued regulatory approvals and permits, is the objective of Shell's 2014 exploration drilling program.

Planning for 2014 operations incorporates all of Shell's operating experience in the Alaskan Arctic. Shell will build upon its most recent six years (2007-2012) of experience in: Arctic offshore planning, asset readiness, regulatory preparations, stakeholder engagements, and the experience gained during the late-1980s through the early-1990s, when Shell drilled four exploration wells in the Chukchi Sea and participated in a fifth well. Specific areas where Shell's 2014 plans incorporate this experience are described in this IOP as follows:

- Organizational and planning improvements to ensure operations are fully integrated.
- Enhanced contractor management and assurance of contractor performance in offshore Alaska waters.
- Enhanced logistical procedures and planning.
- Upgraded asset capabilities, including the drilling unit, the *Discoverer*.
- A fully approved and effective Oil Spill Response Plan (OSRP) and associated response organization, including an operationally tested and certified Arctic Containment System (ACS) ready for deployment.
- Continued support of an extensive science program to better inform operational activities and contribute to an enhanced understanding of the Arctic.

Shell's planning and operating principles are based on its commitment to safe and responsible exploration of Alaska's offshore resources. Shell is seeking to carry out an exploration program free of accidents and incidents of any type. This IOP summarizes the procedures and competency assurance programs put in place to achieve these goals.

Shell will rely primarily on contracted assets to meet its 2014 program objectives. The assurance that these contractors remain fully ready for, and undertake, safe operations is an essential part of the 2014 operations. This IOP summarizes the assurance activities to be undertaken, and how they are integrated within Shell's overall management and oversight of its contractors.

[1] The Bureau of Ocean Energy Management's (BOEM's) requirement that Shell submit an IOP goes beyond any regulatory requirement promulgated pursuant to the OCS Lands Act or other legal authority, either as they now exist or as they existed at the time Shell acquired its leases. While Shell is responding to BOEM's request, Shell does not waive or make any election with respect to the rights it possesses and the legal claims it may have under the leases.

Shell maintains a highly capable emergency response planning and management program, covering the full spectrum of natural and human-sourced emergencies that may occur. The Chukchi Sea Regional Exploration Program OSRP is a fundamental component of the response program. Building upon the 2012 Bureau of Safety and Environmental Enforcement (BSEE) approved OSRP, Shell continues to enhance and improve its Oil Spill Response (OSR) program to effectively respond to a potential Worst Case Discharge (WCD), in the highly unlikely scenario of an exploration well control event.

Shell recognizes the concerns of Alaska's coastal Chukchi Sea residents, and the potential of exploration activities to affect their lifestyle. Accordingly, Shell has invested considerable efforts in outreach and engagement activities in the various Arctic communities, and is committed to a continuing robust level of communications and consultation with residents. Shell considers the North Slope communities to be strategic partners, and continues its active stakeholder engagement program for 2014 operations.

Shell continues to support a robust level of scientific research in the Alaskan Arctic, recognizing not only the importance of sound science as a foundation for its activities, but also the need to increase knowledge of this unique area.

1.0 SCOPE OF OPERATIONS

The drilling unit Discoverer will be deployed to the Chukchi Sea for exploration drilling. A second drilling unit, the *Polar Pioneer*, will be positioned in Dutch Harbor and remain on standby as a secondary relief well drilling unit for the 2014 season. The ACS and its supporting vessels will be located in the vicinity of Kotzebue Sound and remain on standby during the season. The secondary relief well drilling unit and ACS will deploy into the Chukchi Sea only in the unlikely event of an incident.

A second drilling unit, the *Polar Pioneer*, will be positioned in Dutch Harbor and remain on standby as a secondary relief well drilling unit for the 2014 season. The ACS and its supporting vessels will be located in the vicinity of Kotzebue Sound and remain on standby during the season. The secondary relief well drilling unit and ACS will deploy into the Chukchi Sea only in the unlikely event of an incident.

Drilling at the Burger Prospect in the Chukchi Sea area may occur during the period of July through October, demobilizing from the area by late October into November. Ice management resources will be available on scene to mitigate sea ice intrusions deemed a risk to drilling or vessel operations in accordance with the IMP. Intensive weather and ice forecasting assets will provide real-time information for drilling, vessel, and aircraft operations.

All drill site operations in Alaska will be supported by aircraft and vessels possibly into November, following cessation of drilling operations. A shore-side presence will be maintained in Dutch Harbor, Kotzebue, Wainwright, and Barrow, as well as an Anchorage embarkation terminal, to facilitate offshore and remote area operations, possibly into November as demobilization proceeds.

Shell intends to deploy numerous vessels and both rotary and fixed-wing aircraft in support of 2014 operations, as depicted in Figure 1. Equipment and vessels will be staged in Dutch Harbor during the month of June 2014 and will mobilize northward during the latter part of June or first part of July depending on ice forecasts and timing of regulatory approvals.

The planned 2014 operations may encounter many challenges. Vast distances, harsh weather and sea conditions, possible volcanic and earthquake activity, and sparse shore-based infrastructure represent some of the considerable obstacles that must be planned for and accommodated. Conversely, the open water season, long daylight periods, shallow water, dedicated oil spill response equipment, ice management vessels, the Shell Ice and Weather Advisory Center (SIWAC) mitigate many of these challenges. Shell's operational planning was most recently thoroughly tested during 2012 operations and has been carefully structured to meet these challenges and ensure the safety of personnel, the environment, and equipment. The following sections discuss planned operational activities in greater detail.

1.1 Vessel Operations

Shell's planned vessel mobilization will occur in the February through June 2014 timeframe; although the vessel selection and contracting process began well in advance (see the Logistics and Contractor Management and Assurance sections of this plan).

Table 1 provides a nominal listing of support vessels and vessel types necessary for 2014 Chukchi Sea operations. This table includes vessels which will be based in Dutch Harbor. It should be noted that the employment of specific vessels and the number of vessels may change before the 2014 season. Table 1 illustrates the broad range of capabilities that will be available to support drilling operations in an Arctic environment. Ice capability ranges from Polar-class ice management vessels (Nordica and Fennica) to anchor handling, offshore supply, and contingency response vessels that are appropriate for this Arctic Alaskan environment. All vessels will be winterized and assessed to confirm they meet Shell maritime technical assurance standards in addition to maintaining appropriate society classification (e.g., American Bureau of Shipping or Det Norske Veritas (DNV)) guidelines.

The 2014 marine fleet will possess a number of helicopter decks and personnel transfer-rated cranes to facilitate safe and efficient transfer of personnel between ships and to and from shore. Planning anticipates that a number of support vessels will have towing capability, providing a broad range of options for planned and emergency towing and other contingencies. The mix of complementary vessel capabilities is derived from previous operating experience in the area and is designed to address both routine and contingency operations, safely and effectively.

Most vessels will assemble in Dutch Harbor to prepare for northward deployment as conditions permit. The secondary relief well drilling unit, as well as various support vessels, will remain in Dutch Harbor for immediate contingency deployment. The ACS and some support assets will stand by in the vicinity of Kotzebue Sound. The planned locations of specific vessels and shorebase surface assets during drilling operations are shown in Figure 1, and the planned scheme of maneuver for positioning these assets are illustrated in Figure 3. Specific details may change as conditions dictate and plans continue to mature.

Table 1: 2014 Fleet Capabilities

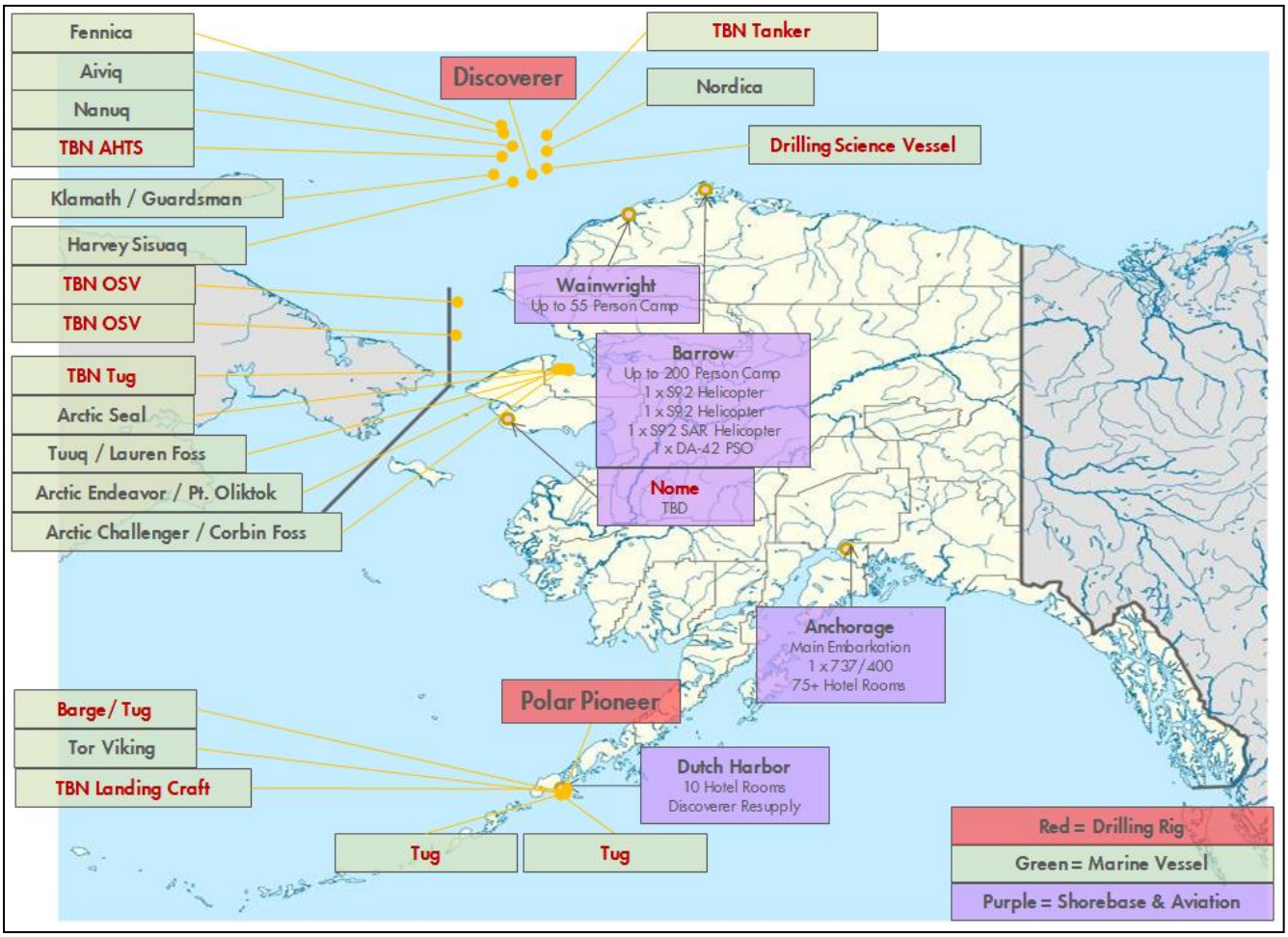
VESSEL	Type/Class	Flag	Owner	Length (feet)	Breadth (feet)	Draft (feet)	Ice Class	Winterized	Power	Helideck	Tow Capa-bility	Built
NORDICA	POLAR CLASS / MULTIPURPOSE	FINLAND	Arctia Offshore	380	85	27	POLAR 10 (DNV)	Included in Ice Class	29,502 HP	Yes	Yes	1994
FENNICA	POLAR CLASS / MULTIPURPOSE	FINLAND	Arctia Offshore	380	85	27	POLAR 10 (DNV)	Included in Ice Class	29,502 HP	Yes	Yes	1993
TOR VIKING	ICE CLASS AHTS	SWEDEN	Trans Viking	274	59	20	ICE 10 (DNV)	Included in Ice Class	18,300 HP	No	Yes	2000
AIVIQ	AH OFFSHORE SUPPORT VESSEL	USA	ECO	361	80	24	A3 (ABS)	Included in Ice Class	21,776 HP	Yes	Yes	2012
TBN	AH SUPPLY VESSEL	USA	ECO	~250	~50 - 60	~18	No	No	13,500 HP	No	Yes	TBN
NANUQ	OSV/OSR	USA	ECO	301	60	21	A1 (ABS)	Included in Ice Class	7,268 BHP	No	Yes	2007
TBN	OSV	USA	TBN	240 - 300	54 - 64	15 - 20	No	Yes	4,500 - 10,000 HP	No	No	2003 - 2012
TBN	OSV	USA	TBN	240 - 300	54 - 64	15 - 20	No	Yes	4,500 - 10,000 HP	No	No	2003 - 2012
SISUAQ	OSV	USA	Harvey Gulf	300	64	20	No	Yes	9,789 HP	No	No	2012
Science Vessel	OSV	USA	TBN	240 - 300	54 - 64	15 - 20	No	Yes	4,500 - 10,000 HP	No	No	2003 - 2012
ARCTIC ENDEAVOR	OSR BARGE	USA	Crowley	205	90	15	Ice-strengthened	Yes		No	No	1982
POINT OLIKTOK	ENDEAVOR TUG	USA	Crowley	90	32	9	Ice-strengthened	Yes	2,110 BHP	No	Yes	1982
GUARDSMAN	TUG : OSR	USA	Crowley	126	34	20	No	Yes	7.200 BHP	No	Yes	1976
KLAMATH	BARGE : OSR	USA	Crowley	350	76	22	Ice-strengthened	Yes		No	No	1990
TBN	TUG	USA	TBN	146	46	25	No	No	~10,000 HP	No	Yes	TBN
TBN	Deck Barge	USA	TBN	400	99	19	No	No		No	No	TBN
Arctic Challenger	Barge / Containment System	USA	Superior	na	na	na	PC 6	Yes		No	Yes	2012
Corbin Foss	TUG	USA	TBN	150	40	20	Ice-strengthened	Yes	~8,000 HP	No	Yes	TBN
Tuuq	Ware Barge	USA	TBN	400	99	19	No	No		No	No	TBN
LAUREN FOSS	TUG	USA	Foss	150	40	19	Ice-strengthened	Yes	8,200 HP	No	Yes	2002
TBN	TANKER (Fuel & OSR)	TBN	TBN	853	112	45	ICE-1A	Yes	~12,000 HP	No	No	TBN
TBN	Landing OSR	TBN	TBN	134	32	7	No	Yes	~700 HP	No	No	TBN
NOBLE DISCOVERER	MODU	Liberia	Noble Drilling	514	85	27	Ice-strengthened	Yes		Yes	No	1976
POLAR PIONEER	MODU	Panama	Transocean	279	233	30	No	Harsh Environment		Yes	No	1985
TBN	POLAR PIONEER Tugs (2)	TBN	TBN	146	46	21	No	No	~10,880 BHP	No	Yes	TBN
TBN	Landing Craft	TBN	TBN									TBN
TBN	Tug	TBN	TBN									TBN
TBN	Tug	TBN	TBN									TBN
TBN	Barge	TBN	TBN									TBN

AH	Anchor handling	ABS	American Bureau of Shipping	OSR	Oil spill response
AHTS	Anchor handling tug supply	DNV	Det Norske Veritas	BHP	Brake horsepower
OSV	Offshore supply vessel	HP	Horsepower	TBN	To be named
MODU	Mobile offshored drill unit				
*	Or Similar				

At the conclusion of drilling operations, vessels will depart the Chukchi Sea and Kotzebue Sound as indicated in Figure 3. Drilling units and other ships will subsequently depart to various ports for off-season maintenance.

Vessels will follow permit compliance guidelines established to limit impact on marine life and subsistence hunting. All vessels will have Protected Species Observers (PSO) where and when required. Transit routes will avoid known fragile ecosystems and the Ledyard Bay Critical Habitat Unit in accordance with permit requirements. Interaction will be mitigated with wildlife as required by authorizations through such methods as; not operating within 1 mile (mi) or 1.6 kilometers (km) of walrus when observed on land or 0.5 mi (0.8 km) of walrus when observed on ice; not operating within 0.5 mi (0.8 km) of polar bears when observed on land or ice; reducing vessel speed when within 900 ft (274 m) of whales and during inclement weather conditions in order to avoid collisions. Vessels will be in regular communication with the Shell operation centers in Anchorage and Barrow, in addition to Communication Centers (Com Centers). All transits will be monitored to share marine wildlife sightings and subsistence hunting activities.

Figure 1: Notional 2014 Chukchi Sea Exploration Drilling Program



1.2 Air Operations

Aviation assets will be used to service vessels offshore with crew changes, re-supply, equipment and commodities as needed. Two twin-engine S-92 helicopters will be used for transportation between offshore vessels and the Barrow air support shorebase, a third S-92 will be on standby for SAR in Barrow as well. The SAR helicopter will have dual hoist capability, which will permit emergency lifts from the surface of the ocean or from vessels. Since 2006 the SAR helicopter has substantially improved emergency services in the Alaskan Arctic by augmenting the North Slope Borough's SAR helicopter and seasonal U.S. Coast Guard (USCG) assets deployed to the North Slope.

Figure 2 provides basic helicopter operating capabilities for 2014. All three S-92s will be equipped with anti-icing systems and onboard radar to enhance safety of flight. These aircraft capabilities are anticipated to significantly improve the on-time departure rate of helicopters in 2014. Detailed attention to safety of flight will govern all helicopter operations.

Figure 2: 2014 Helicopter Capabilities

S-92 Transport

Crew: 2 Pilots, 1 flight engineer

Capacity: 12 Passengers

Length: 68' 6"

Main Rotor Diameter: 56' 4"

Height: 17' 11"

Max Takeoff Weight: 26,500 lbs

Cruise Speed: 159mph/138kts

S-92 SAR

Crew: 2 Pilots, 1 SAR Swimmer, 1 Hoist Operator, 1 Medic

Capacity: 15 Passengers

Length: 68' 6"

Main Rotor Diameter: 56' 4"

Height: 17' 11"

Max Takeoff Weight: 26,500 lbs

Cruise Speed: 159mph/138kts

Helicopters will be primarily based at the Barrow airport; Wainwright may be used in the event of an emergency. Offshore refueling of helicopters will extend operational range. Planned helicopter operations will minimize interference with subsistence hunting activities. Coordination with the local stakeholders through the Shell Subsistence Advisers program, in addition to the routing and site selection for work requirements will be regularly updated to avoid conflict with subsistence hunters in offshore, nearshore and onshore areas.

Aircraft will operate in a manner that will mitigate adverse impacts on wildlife. Helicopters and fixed wing aircraft will normally operate at an altitude of 3,000 feet or greater (914 meters) or more than 1.0 mile (1.6 kilometers) of walrus groups observed on land. If aircraft must be operated at lower altitudes because of weather, the aircraft will avoid flying within 0.5 miles (850 meters) of known walrus or polar bear concentrations.

While in the Chukchi Sea theater, fixed-wing aircraft will be used for routine transport of crews, materials and equipment between hub airports such as: Anchorage, Barrow, Kotzebue, Dutch Harbor and Wainwright. A fixed-wing aircraft will also be used for PSO purposes, as well as opportunistic ice observations. Notional plans are for flight crews to use a camera system in order to gather imagery that can be reviewed by PSOs ashore; this will minimize the risk to and the number of people flying offshore.

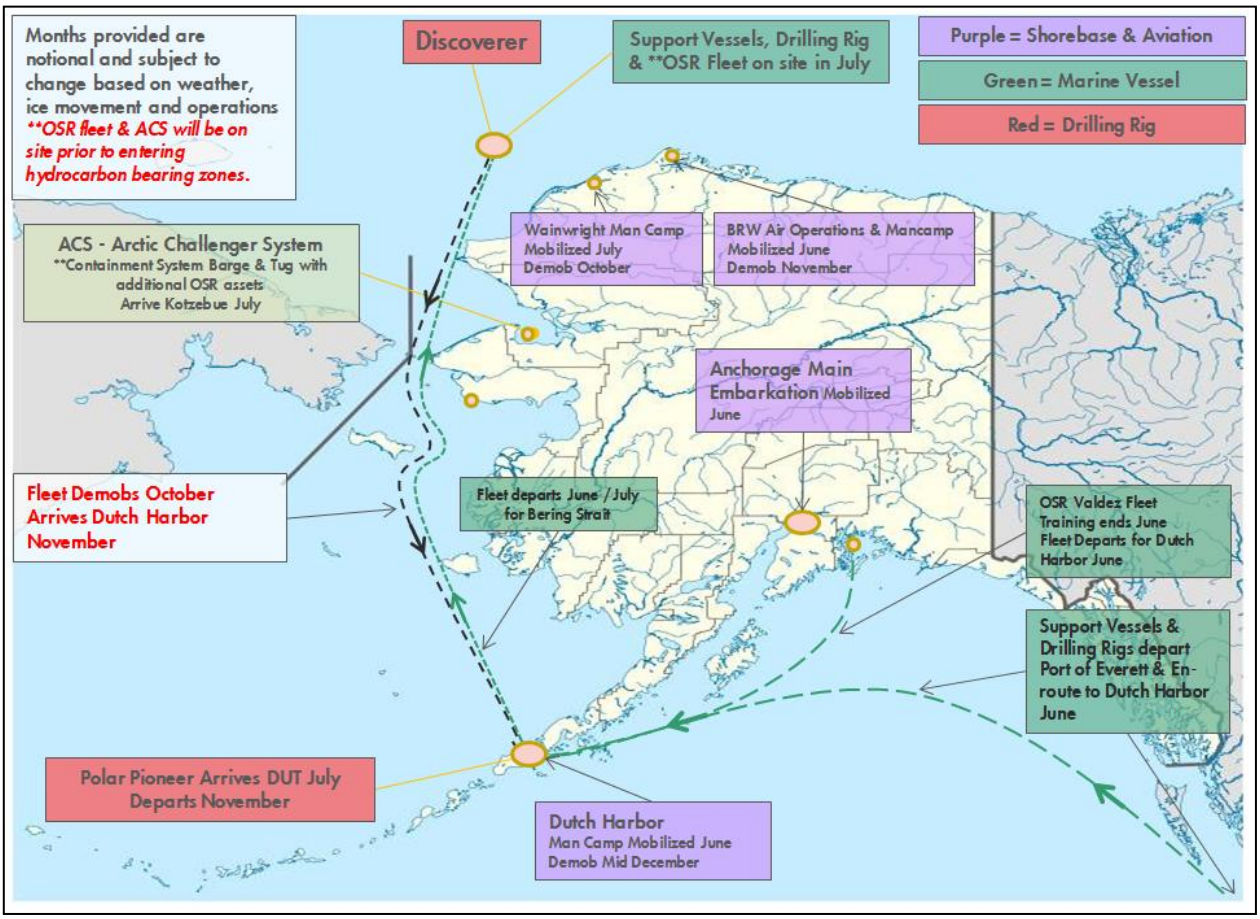
Aviation activities run year round with the requirement to visit communities for Plan of Cooperation meetings and other community engagements. Scheduled airline flights are used when possible; however, some locations do not have commercial air service or the commercial air service schedule is not fit for purpose, in these cases charter flights are arranged. During 2014 exploration drilling operations, the number of passengers to be moved on a daily basis may require charter of a commercial aircraft to provide regular service from Anchorage to Barrow and Kotzebue. A Shell passenger terminal or a commercial terminal at Ted Stevens International Airport in Anchorage will serve as a single point of entry for deploying personnel. The terminal will be managed in accordance with FAA and Shell aviation security requirements. This point of entry will facilitate efficient Health, Safety, Security and Environment (HSSE) training and personnel accountability.

1.3 Shore Facilities

2014 operations will rely on existing shore side infrastructure to the extent possible. Leased office facilities in Barrow will be used during the drilling season. Existing hotels and apartments may be used as accommodations for the shorebase staff, which is expected to be approximately 35 persons. In addition, a camp will be operated in Barrow to accommodate up to 200 persons, including a small staff and any crewmembers that are weathered-in.

Shore side facilities for oil spill response support and limited logistic support will be temporarily established in Wainwright and Kotzebue during the 2014 exploration drilling season. The airstrip located in Wainwright, which is owned and operated by the North Slope Borough, may be used as a secondary air support base for access by helicopters as a contingency in the event of an emergency and for fixed-wing aircraft shuttling supplies and other materials to the base.

Figure 3: Notional Mobilization and De-mobilization Scheme



1.4 Weather and Ice Forecasting

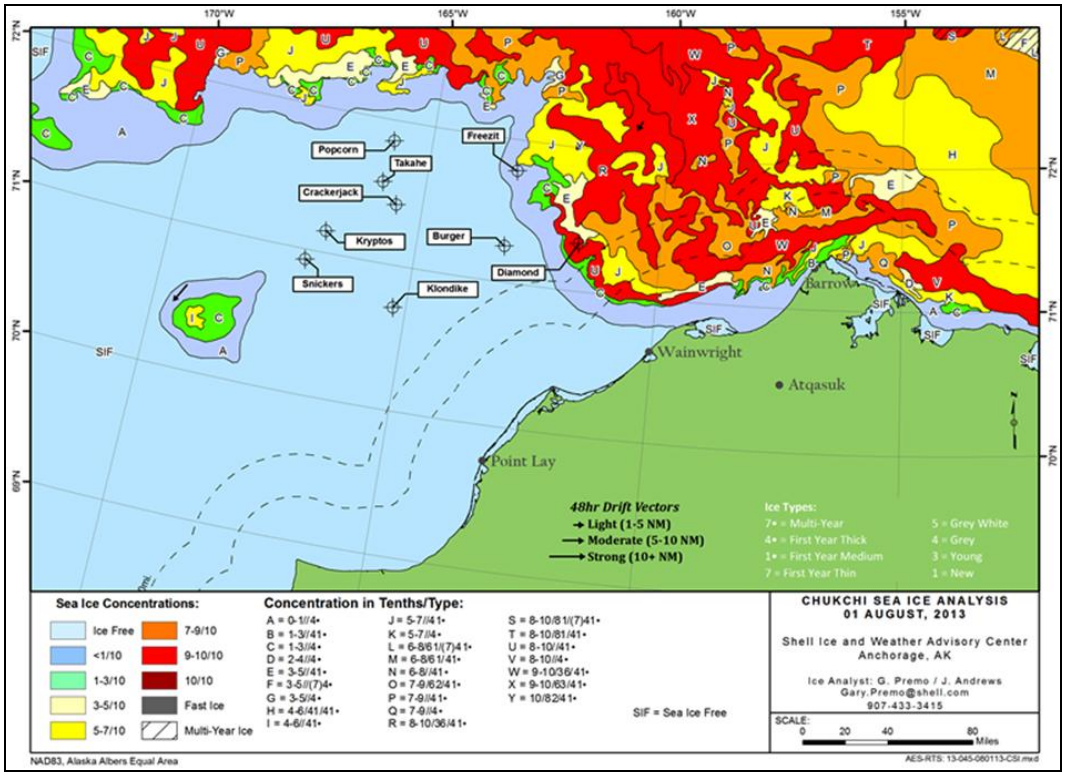
In order to ensure safe and efficient employment of surface and air assets, Shell developed and operates the Shell Ice and Weather Advisory Center (SIWAC). Started in 2007, the SIWAC is an integrated forecasting service tailored to the needs and demands of Shell's field operations in Alaska. SIWAC has evolved to be the most comprehensive and focused ice and weather operation covering the offshore and coastal areas from the Gulf of Alaska to the Canadian Beaufort.

A dedicated staff of weather forecasters and ice professionals are used instead of nationally operated ice and weather forecasting offices; this enables Shell to supply the level of service and quality of products necessary to make effective and efficient operational decisions such as: opportunity windows, logistical movements, operational curtailment, and season openings and closings.

Information and tools used by SIWAC include:

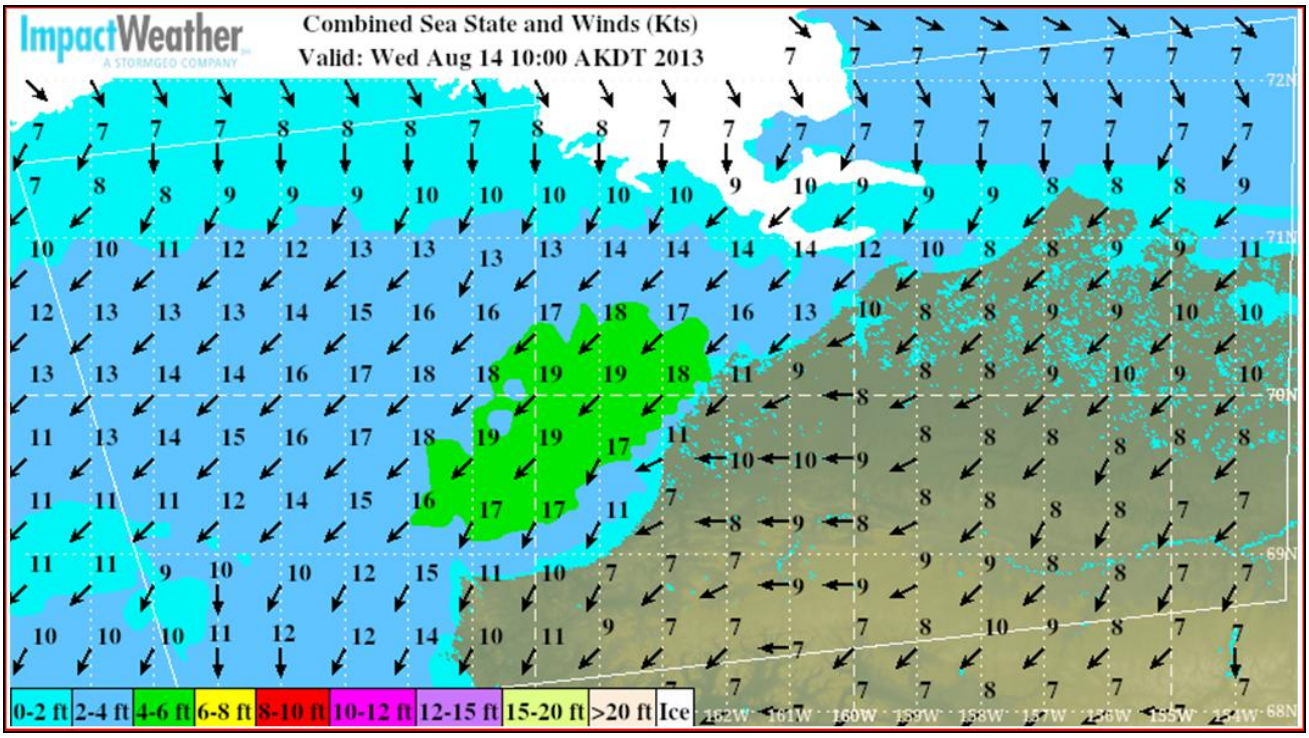
- High-resolution RADARSAT2 satellite imagery, which is unaffected by lack of sunlight or cloud cover.
- Strategically placed Metocean buoys deployed seasonally to report near real time measurements such as winds and temperatures.
- A network of field observers placed on Shell operated vessels to provide routine reporting of local weather, sea, and ice conditions.
- Position reporting buoys deployed to track movement of pack ice
- A co-sponsored array of University of Alaska Fairbanks operated HF Radar sites that map ocean currents over wide areas of the Beaufort and Chukchi Seas.
- Publicly available data and products such as Moderate Resolution Imaging Spectroradiometer (MODIS) and Advanced Very High Resolution Radiometer (AVHRR) satellite data, nationally operated weather stations, and numerical models.
- Geospatial software tools and bespoke forecast models.
- Advanced web mapping techniques used to combine select data sets into a Common Operating Picture that displays relevant environmental information in an interactive map in context with vessel and prospect positions.

Figure 4: SIWAC Sea Ice Chart for August 1, 2013



An example of a SIWAC sea ice chart is shown in Figure 4, and a large-area wind speed chart is shown in Figure 5. In addition to providing direct operational support to Shell users, the information developed and analyzed at SIWAC is also provided to the National Oceanic and Atmospheric Administration (NOAA) and certain others.

Figure 5: SIWAC Combined Sea State and Winds for Chukchi Sea



Non-routine vessel transits receive both a route study and real-time route support for weather and sea conditions. Before a non-routine transit, the route is characterized for wind speed and wave height expectations based on ocean weather hind cast products and sophisticated probability modeling tools. This may result in an alteration to the planned route to avoid statistically extreme locations or use of other mitigating strategies for the transit. Once underway, the full time ice and weather team advises operations and the vessel on present and expected conditions along the route. Routine transits such as the ones between Alaskan ports of call and the prospect sites, do not typically get a statistical route study since these are frequently navigated waters during the milder open water season; however, these routine transits receive the same full time ice and weather forecasting support.

1.5 Ice Management

Ice information from past years indicates that the Burger Prospect area in the Chukchi Sea should be mostly free of sea ice during the period of exploration drilling operations planned for 2014. A comprehensive Ice Management Plan (IMP) based on SIWAC informational products is used to predict ice movement that may affect drilling operations. Adaptive ice management procedures for monitoring and reacting to ice in the prospect areas are provided in the Critical Operations and Curtailment Plan (COCP) and the IMP. The COCP and the IMP are appendices to the Revised Chukchi Sea Exploration Plan, Revision 1.

Shell's ice management philosophy is designed to enable execution of the exploration program, in addition to managing and mitigating risks posed by drifting sea ice at the drill site. This philosophy is built around the following elements:

- Appropriate ice management vessels, with robust ice capabilities. The Fennica will likely serve as the primary ice management vessel at the drill site, supported by other vessels as required.
- Experienced ice advisors aboard the ice management support ships. Ice advisors provide the masters of ice management vessels with specialized expertise for predicting and mitigating ice intrusions into the area.
- Timely and relevant information using a multi-layered systematic approach combining satellite imagery, meteorological buoy data, numerical models, local radar and field observation. Information is relayed by fit-for-purpose data, communication links, and integrated display equipment.
- Strategies and processes to optimize results from vessels, people, and information.

The multi-layered ice management strategy first involves early prediction and monitoring of sea ice movement. If necessary, timely and environmentally-appropriate interventions by ice management vessels will be implemented with the goal of redirecting, rather than breaking up threatening ice formations. Finally, an orderly shutdown of drilling activity and potentially evacuation of the site will be ordered if ice interventions prove unsuccessful.

Prior to the 2012 season, Shell developed an adaptive approach to ice management in areas occupied by Pacific Walrus; this provides processes and procedures for mutual engagement of Shell and U.S. Fish & Wildlife biologists during periods of ice management, where the potential exists for the presence of walruses.

1.6 Communications, Monitoring and Tracking

Command and control of these operational activities require real-time information to ensure safe, effective and efficient use of assets. A 24-hour operations center in Anchorage is operated from approximately April through December to monitor the locations of all vessels, aircraft, and personnel in the field. Co-location with the SIWAC permits the integration of weather and ice information. The RTOC provides remote monitoring information from the well site to technical personnel in Anchorage and Houston. Shell's proprietary common operating picture combines the following information inputs for near-real time displays:

- Automatic Identification System (AIS) and Long Range Tracking information, collected by the Marine Exchange of Alaska system, permits tracking of all Shell vessels as well as others in the vicinity.
- An aircraft tracking system provides location information on aircraft movements.
- Shorebase camps and facilities are displayed, as well as regulated marine exclusion areas, planned tracklines, etc.
- Overlaid weather and ice information from the SIWAC

The graphic display of this combined information significantly enhances the ability to make timely operational and logistic decisions.

Field activities are coordinated by scheduled daily phone calls from vessels, aviation terminals and camps to update ongoing activities and handle issues as they arise.

A similar common operating picture system is maintained with capabilities for additional information overlays from government agencies and other sources for crisis management and emergency response purposes.

1.7 Simultaneous Operations (SIMOPS) Plan and Coordinators

The SIMOPS Plan defines guidelines for planning, evaluating, and executing operations that occur simultaneously on numerous vessels and aviation assets in accordance with their respective Manual of Permitted Operations (MOPO). The SIMOPS Plan provides a structured method for recognizing, avoiding, and mitigating risks created when multiple operations are performed in the theater. The overall objective is to protect individuals, wildlife, the environment, and working assets.

The SIMOPS Plan is executed through a comprehensive process involving planning, evaluation, execution, and monitoring. This process presents the Alaska Operations SIMOPS coordinators an opportunity to apply SIMOPS guidelines once operational activities begin.

1.8 Pre-Season Preparations

SIMOPS coordinators participate in all planning phases of projects that will be conducted within the theater. If a potential conflict between projects and/or third-party operators is identified, the SIMOPS coordinator facilitates appropriate solutions. The SIMOPS matrix encompasses all activities occurring within the entire operating theater and illustrates relationships and impacts of projects and activities. The SIMOPS analysis also helps identify risk mitigation measures and opportunities for improving operational efficiency.

1.9 Open Water Season Operations

While 2014 offshore operations are in progress, SIMOPS coordinators will be stationed in Barrow to monitor field activities. A series of daily teleconferences involving key field and office personnel address: drilling operations, marine operations, Subsistence Advisors (SAs), ice advisors, protected species overflights, aviation operations, and general operations. The SIMOPS coordinators carefully review proposed daily work scopes from a simultaneous activity perspective to ensure that all activities can be done safely and efficiently. Potential conflicts or other issues are reported to Shell management for resolution or reprioritization.

SIMOPS coordinators also monitor third-party activity in the operating area such as: other oil and gas exploration activity, tourism, scientific research, military operations, and commercial cargo operations. Third-party representatives are invited to participate in daily SIMOPS meetings to enhance coordination and prevent conflicts, an approach that has been recognized as an industry best practice. SIMOPS coordination with the USCG in Barrow has proved valuable in previous seasons.

A late afternoon fleet and asset-wide teleconference is held to review planned activities for the next 24 hours. A detailed ice and weather forecast is provided. The SIMOPS coordinators will validate that no conflicts are present and approve the work package for the next 24 hours. When a conflict is identified the SIMOPS coordinators have the responsibility to resolve the conflict and provide feedback as appropriate with safety being the top priority.

During the course of field operations SIMOPS will track and monitor the movements of all Shell vessel and aviation traffic, using redundant tracking data sites. SIMOPS coordinators review vessel voyage instructions and will contact vessels if they appear off-track or away from expected operating areas. Coordinators will also review aircraft lift-offs, and ensure that flight plans meet safety, regulatory and local stakeholder commitments.

In the event of an emergency or incident involving a Shell asset, the SIMOPS coordinator is one of the first points of contact. The SIMOPS coordinator serves as the initial On-Scene Incident Commander and ensures that appropriate response actions are initiated. Due to the remote operating area, the SIMOPS coordinator may also receive third-party requests for assistance. Over the past 7 years the coordinators have developed a relationship with the North Slope Borough that has fostered excellent cooperation and coordination.

2.0 DRILLING OPERATIONS

The *Discoverer* self-propelled drillship will be used for 2014 drilling operations in the Chukchi Sea. The *Polar Pioneer*, a harsh environment semi-submersible suitable for Chukchi Sea exploration, will be staged in Dutch Harbor as a secondary relief well drilling unit to the *Discoverer* in the unlikely event it is needed. Drilling unit characteristics are shown in Table 1. Drilling operations will be supported by a variety of other vessels as shown in Figure 1.

2.1 Contract Management of the Drilling Units

The safe and efficient drilling of wells in the Chukchi Sea with the *Discoverer* in full compliance with all issued regulatory approvals and permits remains the primary objective for the 2014 drilling season. In order to ensure safe and compliant drilling, it is essential that management and assurance oversight of the contractors performing the work, as well as others providing support is diligently executed.

Some of the applicable standards which will be audited as part of this assurance oversight effort include:

- DNV classification rules.
- USCG requirements.
- International Maritime Organization (IMO) Safety of Life at Sea (SOLAS) requirements.
- International Convention for the Prevention of Pollution from Ships 73/78 (MARPOL) regulations.
- Environmental Protection Agency (EPA), Bureau of Ocean Energy Management (BOEM), etc., pollutant discharge requirements.

All 2014 Chukchi Sea exploration drilling operations will be conducted under the provisions of 30 CFR Part 250 Subpart D, in addition to other applicable regulations and notices, including those regarding the avoidance of potential drilling hazards, safety hazards, and pollution control.

2.2 Drillship preparations for 2014 Arctic Service

The *Discoverer* successfully completed drilling operations during the time available in the 2012 season. Since the end of 2012 operations, the *Discoverer* has undergone a rigorous maintenance and upgrade program implemented by Noble Drilling with Shell's involvement. Improvements in the scope of work include modifications based on lessons learned during the 2012 season as well as maintenance items to preserve the ship's operability and reliability in preparation for further work in Alaskan offshore waters. This program has included work to the hull, as well as to major ship systems with a focus on improving safety and environmental performance and operational efficiency.

Some highlights of the ship's capabilities that have or are being upgraded are listed below.

- Replaced the existing steam system above-deck by a more robust glycol-based heating loop supplemented with additional electric heaters.
    - Back-up electric heaters in the living quarters to provide 100% redundancy
    - Two new 60 M3/Day reverse osmosis water makers with pre-heaters, improving water-making performance in low temperatures
    - A new sewage treatment plant, improving sewage treatment performance in low temperatures
- Upgraded the below-deck steam heating system, improving its performance
- Increased the height of wind walls on the forward side of the drill floor

Station-Keeping Enhancement Capability

Extended the existing sponson aft beyond the after perpendicular to enhance the rig's station keeping capability. This modification was to move the drillship's Center of Gravity aft of its original location to improve yaw characteristics, and will be validated as part of the DNV class survey.

Vessel Habitability and Winterization

- Added:
    - Thermal insulation to some interior areas of the hull to ensure acceptable minimum internal air temperature is maintained without adding more heating capacity
    - Variable-speed controls to ventilation fans
- Fitted:
    - Exterior areas with windbreaks to the extent possible without compromising hazardous zoning areas
    - Bridge windows with heaters to prevent icing and fogging in order to improve visibility
- Heat-traced and insulated:
    - Firewater systems
    - Drains designed to collect any spilled fuel on the helicopter landing deck in order to retain full functionality during freezing weather conditions
- Heat traced new fire hose boxes to ensure functionality in freezing weather conditions.
- Enclosed:
    - Helicopter foam firefighting system in a heated structure
    - Lifeboat winches
- Winterized lifeboats with heaters

Safety

- Coated all walkways with a non-skid finish
- Fitted additional lighting around the drill floor area
- Increased railing heights in areas of perceived personnel risk
- Added:
    - Railings in the steering gear compartment to enhance personnel mobility in an emergency
    - A fire-resistant trunk and associated watertight doors have been added to allow escape from the lowest level of the main engine room in the event of a fire
    - A launching davit for the existing Fast Rescue Craft (FRC)
    - Additional monitoring of gas bottle storage areas
- Upgraded fire and gas detection systems and added additional monitored points.
- Installed:
    - A stand-alone H2S monitoring and alarm system with associated distributed breathing air system
    - A fast-acting high fog fire fighting system meeting current regulations
- The *Discoverer* is fitted with lifeboats, a fast rescue craft, survival suits, and other personal protective equipment (PPE) according to Class and SOLAS requirements.

Water Discharge Controls

- Reconfigured the bilge system in conjunction with the new main engine.
- Installed a new MI SWACO Multiphase Clarifier to enhance drill floor drain management.
- Added enhancements to deck drain management system.

Maintenance

- Constructed new double bottom and main engine foundations, inclusive of lube oil drain tank, cofferdams, and waste oil tanks.
- Performed hull maintenance and painting
    - Replaced hull, sea chest, rudder, propeller and thruster tunnel anodes.
- Rig contractor performed inspections and renewals of class records. Shell Shipping & Maritime has inspected and approved.

This maintenance and upgrade program was performed in conjunction with and under the management oversight of a Shell project team. This project team verifies that the *Discoverer* is in full regulatory compliance of all applicable standards during pre-season activities. Once shipyard work is complete, the rig will go through a process of audit and acceptance prior to its deployment to perform 2014 drilling operations.

Drills and training for incident response have also had significant focus. Drills simulating emergency evacuations are routinely held to ensure that all onboard personnel are familiar with lifesaving equipment, evacuation procedures, and use of safety equipment. In order to provide emergency treatment and evacuation options for the *Discoverer* and other vessels operating nearby, the vessel is equipped with an onboard hospital facility and medics, as well as a helideck and a crane with personnel transfer capability to allow transport back to shore based medical facilities.

2.3 Audits to Verify Operational Readiness

After work in the shipyard is complete, new equipment and systems will be commissioned on the *Discoverer* to ensure they are operational. Starting well in advance, but completed prior to mobilization into Arctic Alaskan waters, both the *Discoverer* and the *Polar Pioneer* will have undergone audits and inspections by various internal Shell groups as well as various external audit teams to confirm that these systems are compliant with applicable standards. Shell Internal Audit (SAI) surveys will include the following company elements:

- Global Rig Startup
- Shell Aircraft International
- Shell Shipping and Maritime
- Well Control Compliance
- Health Safety and Environment
- Medical Response

Audits and inspections may be performed by:

- USCG
- EPA
- BOEM
- BSEE
- Republic of Liberia (*Discoverer* flag state)

In addition to these audits, after loadout with all equipment and supplies, the *Discoverer* will also undergo a period of testing and training to re-familiarize the crew with the equipment and systems on board. This training will be done with all crew onboard prior to departing for theater to ensure readiness is maintained while waiting for the season to start.

2.4 Management of Contractors Providing Equipment or Services

Contractors involved in drilling operations will have assurance programs in place to verify their own performance to Shell's expectations. Shell's management and oversight of contractors will include:

- Alaska Facility Safety Environmental Management System (SEMS) audit.
- Contractor Safety Management Program (CSMP) assessment.
- Direct oversight of some operations (e.g., witnessing pressure tests, verifying cement recipes, etc.).
- Engineering review of programs by Professional Engineers (PE).

2.5 Compliance and Interruptions to Drilling Operations

During drilling operations, a number of assurance activities will be carried out to ensure the operations remain in compliance throughout the season. These include:

- Drilling operations will not be implemented if potential hazards (ice floes, inclement weather, etc.) are in the vicinity and sufficient time to finish an operation that could be impacted with the arrival of the hazard at the drill site is not anticipated.
- Shell supervision and staffing will be on board to ensure compliance with HSSE, all permits, regulations and operational standards. In addition, a BSEE representative will be on board 24/7.
- Data monitoring will check compliance with discharge, wildlife, and other permit conditions.
- Periodic management visits from both Shell and contractors will be conducted.

Plans and mitigation measures are in place that will accommodate any forced or voluntary suspension of operations during the 2014 season. Forced suspension of operations could result from conditions such as weather, ice conditions, drill rig mechanical conditions, or downhole conditions, among others. In order to facilitate a possible suspension of operations, several operational plans have been developed containing suspension or temporary abandonment procedures and protocols. If the hazardous condition (e.g., ice) does not permit moving back over the well, re-mooring, re-entering and continuing drilling/evaluation operations before the end of any drilling season, the well will remain temporarily abandoned until the next drilling season.

2.6 Well Control Preparedness, Drills, and Assurance Activities

The location of the well is selected to avoid or minimize the following shallow hazards:

- Shallow faults that extend to the mudline.
- Overpressure water sands created by rapid depositional environments.
- Overpressure gas sands pressured by biogenic gas from rapidly decaying biologic materials in rapid depositional environments.

To protect the well, a Mud Line Cellar (MLC) will be used to keep the wellhead casing (and blow-out preventer (BOP), if left on site) far enough below the seabed to avoid potential ice gouge events. Vessel anchoring systems employed during operations will be removed upon permanent abandonment of each well. Permanent well facilities will be limited to the casing, wellhead housings, and the permanent guide base remaining after well abandonment.

2.7 Pore Pressure / Fracture Gradient Information

Casing setting points and mud weights are based on reviewed and approved pore pressure/fracture gradient information. These plots are based on the best technical data at the time of generation, reviewed and then subsequently approved by Shell's technical authorities in this area. The data set can include 3-D seismic data, shallow seismic surveys, and known offset well information. Casing points and mud weights are planned to provide the maximum well control potential, isolation of shallow over pressured zones, unconsolidated zones, and maximum borehole stability.

2.8 Casing Design

Loads are based on Shell's Casing and Tubing Design Manual and 30 CFR 250 Subpart D requirements, depending on which set of requirements has the most stringent design/assurance protocol. Shell's manual outlines conventional well loads and survival loads to be placed on the casing strings based on the specific tubular function. Each well design is reviewed and assured by Shell's well design technical authority. Additional screening and confirmation applied to wells drilled in Outer Continental Shelf (OCS) waters are as follows:

- In addition to Shell's standard survival loads, additional well containment is demonstrated with the JITF/BSEE Well Containment Screening Tool.
- Well designs, barriers and cementing programs are developed with the involvement of a registered PEs.
- Minimum CFR requirements for margins between pore pressure, mud weight and fracture gradient are applied to the design.

Using these principles, the well design has the required integrity to perform safely and without undue risk during conventional drilling scenarios and survive extreme loads placed on the system during well containment efforts.

2.9 Operational Monitoring

Operational monitoring is conducted to minimize the potential for penetrating an overpressure zone resulting in a loss of hydrostatic overbalance.

- Flow checks are conducted with the mud pumps off to confirm the static mud weight over balances pore pressure.
- Frequent pit drills and mock well control drills are planned and conducted.
- Yearly full-scale Well Control drills are conducted and assessed by regulators.
- Drilling Contractor/Shell Staff have relevant and current Well Control Certificates.
- Shell requires its operational staff to attend and pass its internal Advanced Well Control Training.
- Real-time monitoring of the well and operational parameters is conducted by the Real Time Operations Centers (RTOC) in Anchorage and Houston, staffed by a team of experts (i.e., drilling engineers, reservoir engineers, and subsurface teams) on a 24/7 basis. Any anomalous signals or indications are immediately relayed to the rig. Real-time monitoring offers increased safety and efficiency as well as minimizing the potential for loss of situation awareness by the drilling team.

2.10 Pressure Control Equipment

Shell specifies and maintains pressure control equipment in accordance with 30 CFR 250 Subpart D and Shell's Pressure Control Manual. The minimum compliance level is based on the stricter requirement for pressure control equipment. Specific requirements applied to pressure control equipment in Alaskan OCS waters include:

- Documentation and review of well control equipment/processes for permit approval.
- Confirmation by onsite BSEE representatives witnessing pressure testing of critical well control equipment.
- Testing of the casing and BOP equipment meeting at a minimum the Maximum Allowable Static Pressure (MASP) + 500 psi to demonstrate the equipment can successfully operate at the highest pressures expected in a well control event.
- Physical shear tests are done on the same make and model of the BOP equipment to demonstrate that in a well control situation the equipment performs as designed with the planned drill pipe.
- The BOP is independently reviewed and approved by a 3rd party as being suitable for the given well design and well conditions.

The minimum requirements in Shell's Pressure Control Manual and the requirements in 30 CFR 250 Subpart D provides assurance the BOPs will operate in the planned manner if required.

2.11 Secondary Well Control

In the unlikely event that primary well control is lost a series of responses are planned to regain primary well control by establishing borehole hydrostatic pressure above formation pore pressure. Shell will also initiate Incident Command, Source Control Teams and contingency/response equipment.

The first response is to close the BOP. There are four functions on the BOP capable of closing around pipe, two of which are annular preventers, designed to close around a range of pipe sizes and shapes. Once the BOP has been closed, conventional well control methods will be employed to reestablish hydrostatic overbalance, these steps include Wait & Weight, Driller's Method and/or Bull Head Kill Methods. If there is no pipe in the hole, or if the functions above fail, the shear rams will be closed and hydrostatic overbalance reestablished by the Bull Head kill or similar method.

If these well control measures fail the *Discoverer* will disconnect the Lower Marine Riser Package (LMRP) and pull away to a site up-wind and up-current from the blowout location and initiate relief well drilling operations. A dead man system is incorporated in the BOP controls to close the BOPs when the rig disconnects if they have not already been closed. This feature is tested during the stump testing/initial run of the BOP at the location.

A Remotely Operated Vehicle (ROV) can also interface with the Remote Controlled BOP Panel (ROBOCOP) located on the seafloor that is connected to the BOP Intervention Panel subsea and close the BOP. The ROBOCOP panel is a self-contained accumulator/BOP control system that can activate the BOP in a contingency situation. This ROBOCOP system is attached to the BOP and is function tested in the same manner required for conventional BOP Intervention Panels in 30 CFR 250 Subpart D.

2.12 Surface Intervention – Capping and Containment (If Necessary)

Two additional separate subsea devices will be assembled for the 2014 drilling season, the capping stack and the Arctic Containment System (ACS), to provide direct surface intervention capability with the following priorities:

1. Attaching a device or series of devices to the well to establish a seal capable of withstanding the Maximum Anticipated Wellhead Pressure (MAWP) and closing the assembly to completely seal the well against further flows (commonly called "capping and killing").
2. Attaching a device or series of devices to the wellhead and diverting flow to designated surface vessel(s) equipped for separation and disposal of hydrocarbons (commonly called "capping and diverting").

The capping stack portion includes a ram-type BOP body equipped with blind rams, spacer spools, flow crosses (or mud crosses) for pumping kill weight fluid into the well or for flowing the well in a controlled manner through piping to the surface and connectors to attach to the upper H4 connector mandrel, the wellhead housing if the entire BOP stack has been removed or the flanged connection on top of the LMRP. This component will be affixed to an ice management vessel with a marine crew aboard, warm-stored and ready for use. It is anticipated that surface intervention efforts would successfully stop the flow from a blowout in less time than would be required to drill a relief well.

The ACS will be deployed as a last resort measure to contain the uncontrolled flow of hydrocarbons prior to the completion of a relief well. The ACS is designed to receive oil and gas from either a capping stack or collection (containment) dome with a capacity of 25,000 barrels of oil/day, which exceeds Shell's Burger Prospect WCD projection. The system is composed of a barge-mounted processing system, high-pressure hoses to connect to the capping stack and a collection (containment) dome, and associated connecting hoses. The system is classed by the American Bureau of Shipping (ABS) as a Floating Offshore Installation (FOI) and has a Certificate of Inspection (COl) from the USCG.

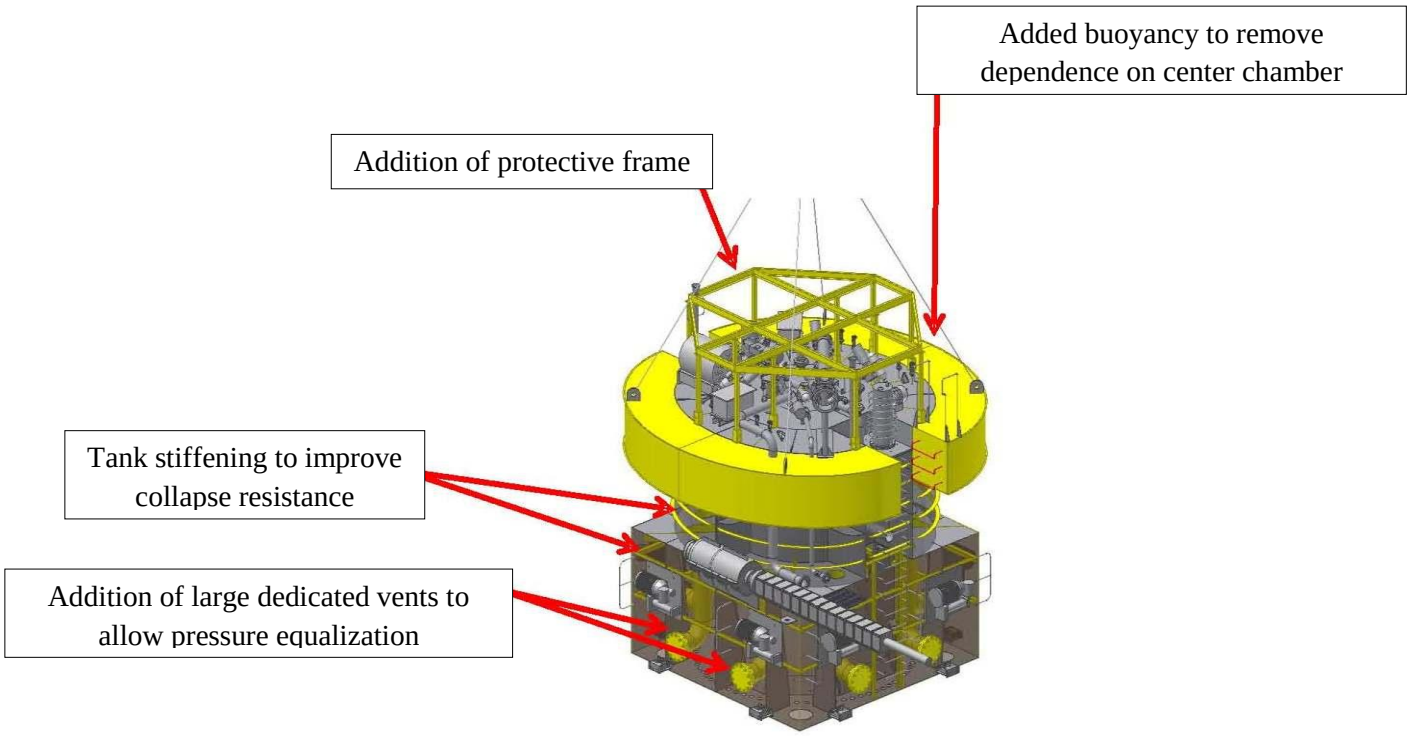
All of the separation equipment on the ACS is designed for conditions found in Arctic offshore waters. The ACS is designed for reliability, ease of operation, flexibility, and robustness so that it can be utilized for a variety of uncontrolled hydrocarbon release situations. The ACS and ancillary equipment are positioned on an ice-strengthened barge (*Arctic Challenger*) with an associated tug, ready for mobilization from Kotzebue Sound and ready for deployment if needed. The collection (containment) dome component of this system went through an extensive redesign and modification process described below.

2.13 ACS Dome Component Improvements

A number of improvements have been made to the ACS dome, shown in Figure 6:

- Added buoyancy to remove dependence on the center chamber
- Added a protective frame on top of the center chamber
- Added tank stiffening to improve collapse resistance
- Added large dedicated vents to allow pressure equalization
- Improved operating procedures and training

Figure 6: Arctic Containment System Dome and Improvements



Prior to mobilizing to Kotzebue Sound from Bellingham, Washington, the ACS will be deployed during the first half of 2014 to ensure its systems remain fully operational as tested and certified.

2.14 Relief Well Drilling

As a precautionary measure, relief well preparation operations are initiated in parallel with surface capping/intervention methods being employed on the incident well. The relief well drilling procedure is provided in the Well Control Plan in Appendix L of the Chukchi Sea EP Revision 1 and Chukchi Sea EP Revision 2. In the unlikely event of an uncontrolled release, the *Discoverer* will serve as its own primary relief well drilling unit in accordance with the Well Control Plan. The second drilling unit, *Polar Pioneer* on standby in Dutch Harbor, will be towed to the site to be ready to serve as the secondary relief well drilling unit used to drill a relief well.

When the incident well is intercepted with the relief well, a dynamic kill will be performed to re-establish hydrostatic overbalance. Once the incident well is controlled it will be abandoned in accordance with 30 CFR 250 Subpart Q and Shell's Abandonment Manual, followed by abandonment of the relief well.

3.0 MARITIME AND LOGISTICS

Shell's 2014 exploratory program is a significant logistics undertaking. Logistics are challenged by the lack of established support infrastructure in Alaska and the influence of potentially adverse environmental conditions. Accordingly, Shell has invested heavily in a robust, self-sufficient, multi-layered logistics organization and capable assets to ensure safe and efficient drilling operations with minimal impact on the environment. Shell's logistical organization and processes are built and refined not only on its extensive operating experience in offshore Alaska waters since 2006, but on Shell's world-wide expertise in offshore drilling.

Logistical support requirements for the 2014 season in Alaska are shown in Table 2. These requirements will be accomplished by appropriate assets, i.e., equipment, vessels, aircraft and shore-based facilities. All assets must be capable not only of conducting specific logistical functions in the Alaska offshore environment, but must also meet permitting and regulatory requirements. Assets will be winterized as necessary to ensure reliability while operating in the Arctic.

Table 2: Primary Maritime and Logistics Support Requirements

Requirement	Support Type	Support Location
Load out support for vessels and rigs	Shore-based Terminals Support	Pacific Northwest Alaska
Mobilization of drill vessels and ACS into theater	Towing Vessels Anchor Handlers Shore-based Terminal Support	Pacific Northwest Dutch Harbor Kotzebue Chukchi Sea
Installation of mooring systems for drill vessels	Offshore Supply Vessels Anchor Handlers Tugs & Barges	Dutch Harbor Chukchi Sea
Mobilization of drilling materials, equipment, and provisions into theater	Offshore Supply Vessels Tugs & Barges	Pacific Northwest Dutch Harbor Chukchi Sea
Establishment of a marine support fleet to sustain operations in theater	Offshore Supply Vessels	Dutch Harbor Chukchi Sea
Oil Spill Response Capability in theater	Offshore Supply Vessels & Tanker (with Oil Spill Response Capability) Near and On Shore Assets	Chukchi Sea Kotzebue Wainwright
Ice Management Support	Ice Management Vessels Anchor Handlers	Chukchi Sea
Search & Rescue Support in theater	Dedicated Helicopter Support	Barrow
Protected Species Observation Over-flights	Fixed-Wing Aircraft	Barrow Wainwright
Crew change and resupply support for drilling vessels and supporting fleet	Dedicated Helicopter Support Passenger Processing Facility Camp Support Fixed Wing Commercial & Charter Aircraft Support	Barrow Anchorage Dutch Harbor Kotzebue Wainwright
Tracking of people, materials & assets	Tracking & in-transit visibility systems	Pacific Northwest to/from Theater
Refueling of drilling vessels and supporting fleet in theater	Tanker	Chukchi Sea
Retrieval of mooring systems for drill rigs	Offshore Supply Vessels Anchor Handlers Tugs & Barges	Chukchi Sea Dutch Harbor
De-mobilization of drill vessels, ACS, and marine fleet from theater	Towing Vessels Anchor Handlers Shore-based Terminal Support	Chukchi Sea Kotzebue Dutch Harbor Pacific Northwest

3.1 Contractor Selection and Assurance

Shell will rely on carefully selected contracted assets to meet its 2014 program requirements. The selection of contractors and assurance that these contractors remain fully ready for safe operation is a critical logistics function. Assurance involves assets, contractor organizations, and people. Critical assurance activities include:

- Third-party qualifications, such as vessel class society certification, flag state and port state certification and inspections (e.g., U.S. Coast Guard Certificates of Inspection (COI) and compliance (COC), and personnel licensing standards).
- Shell Global Control Framework audits to conduct gap assessments to gauge level of readiness for the services being considered. Contracting is conditional on the outcome of this assessment and the safety rating assigned.
- Offshore Vessel Inspection Database (OVID) inspections, to evaluate maritime assets against specific regulatory and safety standards in addition to an assessment of operator capability to ensure each vessel is capable of undertaking the activities required by the operation.
- Integrated Field Leadership Team (IFLT) engagements use periodic conferences of Shell and contracted personnel, to ensure all contractors understand the expectations of Shell throughout the duration of an operation and that contracted personnel are properly trained and can work in the Alaskan Arctic environment.
- Table-top exercises are used to examine each of the critical support activities with the specific contractors and staff responsible for execution, clarifying responsibilities, tasks, and "what-if" scenarios.
- Pre-start readiness reviews involve Shell assurance representatives visiting aviation assets, terminals and marine vessels as well as camps and terminal locations where logistics throughput will occur to ensure they meet specifications outlined in the plan.

An Alaska maritime assurance process is utilized to elaborate these general assurance procedures in greater detail. The maritime assurance process establishes vessel assurance requirements and contractor interfaces, in addition to other assurance frameworks (e.g., Health-Safety-Environment Management System (HSE-MS)) and a Contractor Safety Management Program (CSMP)). Vessels used must meet minimum Alaska specifications, have a cold climate (winterization) gap evaluation, and meet project-specific Alaska vessel specifications.

3.2 Maritime and Logistics Team

In order to effectively enable and support the planned drilling activities with needed logistics services, maritime assurance and robust logistics support teams have been developed to ensure the necessary level of strategy development, resource planning, assurance, and operations management. The primary objectives of the Maritime and Logistics Team include:

- Enable effective logistics delivery in support of the 2014 Exploration Plan (EP).
- Create a sustainable and efficient Logistics Team environment and culture.
- Create structured, standardized, and repeatable business processes.
- Execute effective assurance processes, emphasizing on contractor safety and contracted assets and facilities.
- Execute plans effectively emphasize demand management, resource planning and optimization.
- Exercise effective oversight of support vessels, aviation assets, and terminal activities to ensure safe and efficient operations.
- Ensure logistical assets are fit for purpose and capable of performing safely in arctic environments.
- Ensure appropriate levels of redundancy in resource plans.

3.3 Maritime and Logistics Planning

To enable the operation and ensure efficient delivery of logistics, fit-for-purpose resource logistics support inputs have been included in the Integrated Activity Plan (IAP) process. The IAP will outline key assets, vendors, and facilities to be used and will describe flow of materials, equipment, and people required to meet the requirements of the 2014 drilling program. The plan will further reflect detailed crew change and resupply schedules based on demand forecasts in the operation.

3.4 Logistics Delivery Team

The Logistics Delivery Team was established to support tactical level coordination and oversight of current logistics operations. These operations consist of marine vessel movements, the conduct of resupply and refueling in theater, and movement of people throughout the operation via ships and aircraft.

Key team functions include:

- Coordinate movement of offshore support vessels, dedicated aircraft, land-based assets, and issue marine voyage orders during operations to ensure that resource plans are successfully executed. Figures 7 and 8 illustrate the development of voyage orders and coordination/prioritization processes for aircraft supporting vessel crew changes and cargo transfers respectively.
- Maintain and issue daily vessel and aviation status reports and other reports as needed.
- Maintain communication with all assets for Alaska projects in relation to logistics.
- Maintain a 24-hour operations center capable of providing information to assets, employees, and contractors involved in the project.
- Maintain a 24-hour operations center capable of displaying a common operating picture of the location of all offshore and onshore assets.
- Maintain an accurate account of personnel on board at all remote/off-shore locations.
- Coordinate execution of crew change and resupply schedules.
- Work within existing procedures to minimize conflicts that might affect operations.
- Seek opportunities to optimize schedules and maximize safe and effective use of logistics assets.

Figure 7: Voyage Order Control Process

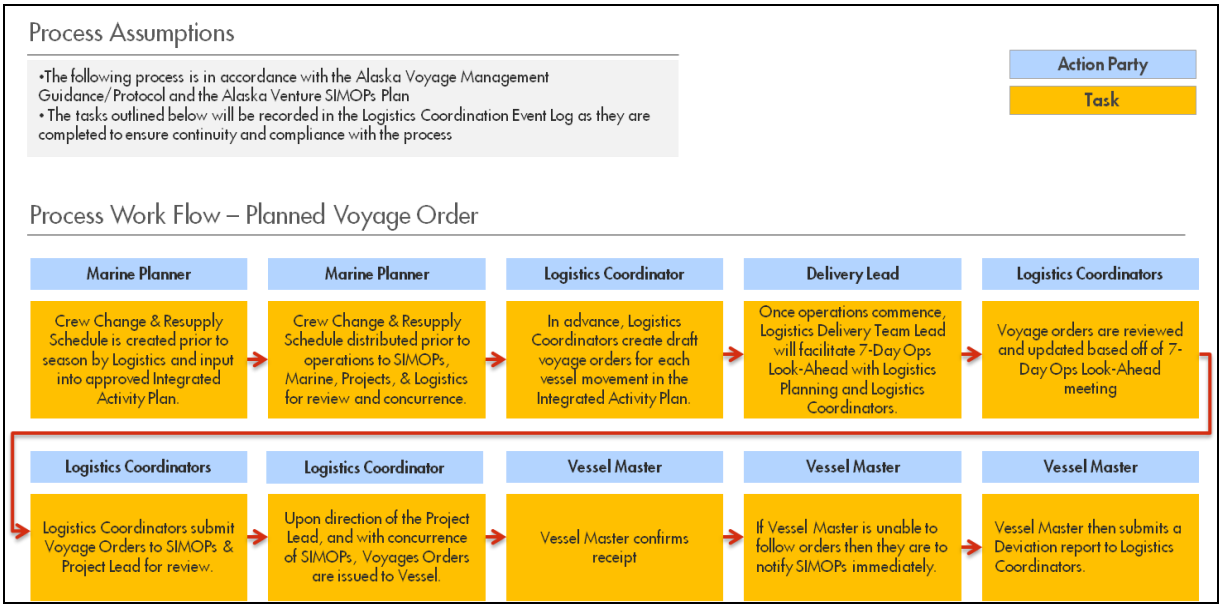
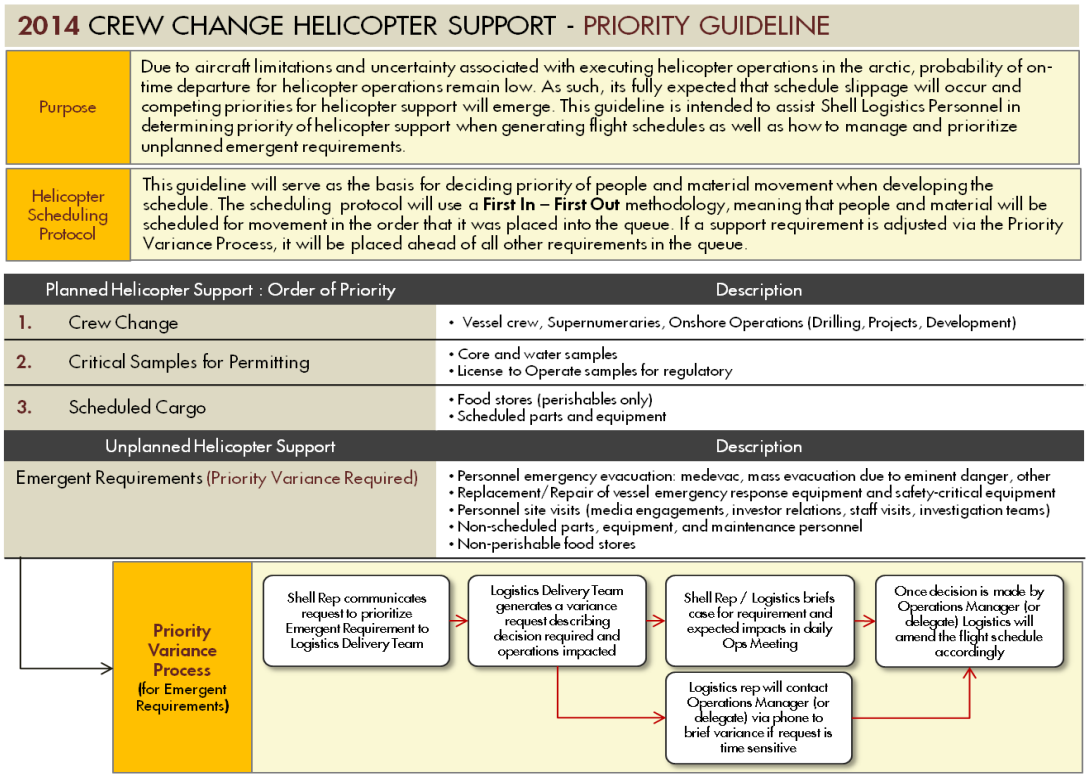


Figure 8: Helicopter Prioritization Process



4.0 EMERGENCY RESPONSE PROGRAM

The harsh environmental conditions, vast distances, and limited levels of infrastructure in the Chukchi Sea area have established accident and incident prevention and planning as a central focus of operational planning for activities in 2014. In addition to the commitment to preparedness, response and recovery planning is also an important feature of operations. Shell recognizes that even the most detailed planning efforts, intensive personnel training, and employment of capable resources cannot remove all risk from Arctic operations.

While oil spill response is a highly visible and crucially important component of emergency response, Shell's comprehensive and robust emergency management program also encompasses the full range of other potential man-made and natural emergencies. The following discussion will provide a general overview of Shell's emergency response posture, covering the broad spectrum of possible contingencies. Spilled oil is only one of these possible contingencies; detailed oil spill response procedures are described later in this section.

4.1 Contingency Response Planning

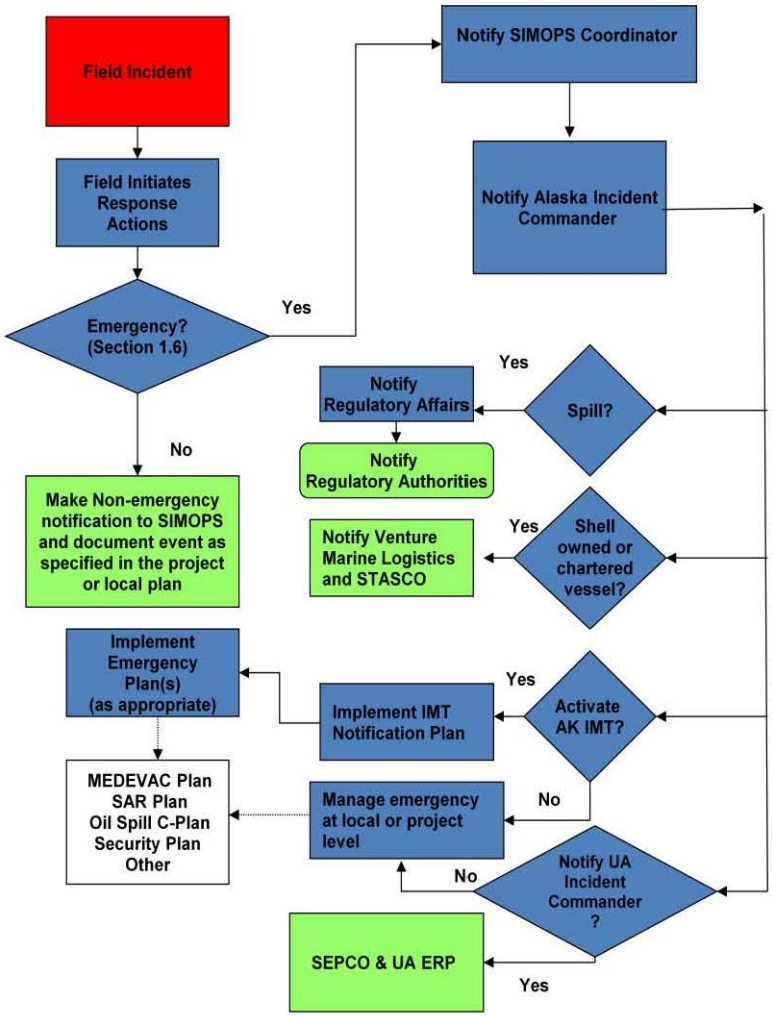
Shell maintains dedicated stand-by resources for unplanned events and contingencies of all types. The emergency response program is fully incorporated into the process, including the identification of key planning milestones.

The emergency response program includes a fully integrated team of emergency management professionals. This Incident Management Team (IMT) will immediately order appropriate resources to respond to the event, either from within Shell, from other available sources, or both. A core component of this team is on immediate recall around the clock to manage an incident beyond the scope of the SIMOPS Coordinator. Depending on the scale of the emergency, the IMT will be further augmented with additional expertise and resources as needed. Figure 9 shows the incident notification decision process that, depending on the circumstances, may result in the implementation of a MEDEVAC, SAR, oil spill contingency, security or other plan.

Emergency response is supported by having multiple, detailed contingency plans that include mitigation and response actions for fire, evacuation, earthquake, medical emergencies, spills and many other events. Each individual plan may be site specific, although some apply Shell wide. Each individual emergency plan involves a comprehensive risk analysis. Once those risks are identified, mitigation measures are put into place and contingency plans are developed in the event mitigation measures fail.

All types of potential emergencies are considered when putting together the umbrella emergency management program. Emergency management does not necessarily avert or eliminate the threats themselves, but allows better preparation if an incident of any kind should occur. Shell works in close coordination with government, industry partners and other stakeholders for incident support to ensure unity of effort and proper assignment of priorities and resources.

Figure 9: Emergency Response Incident Notification

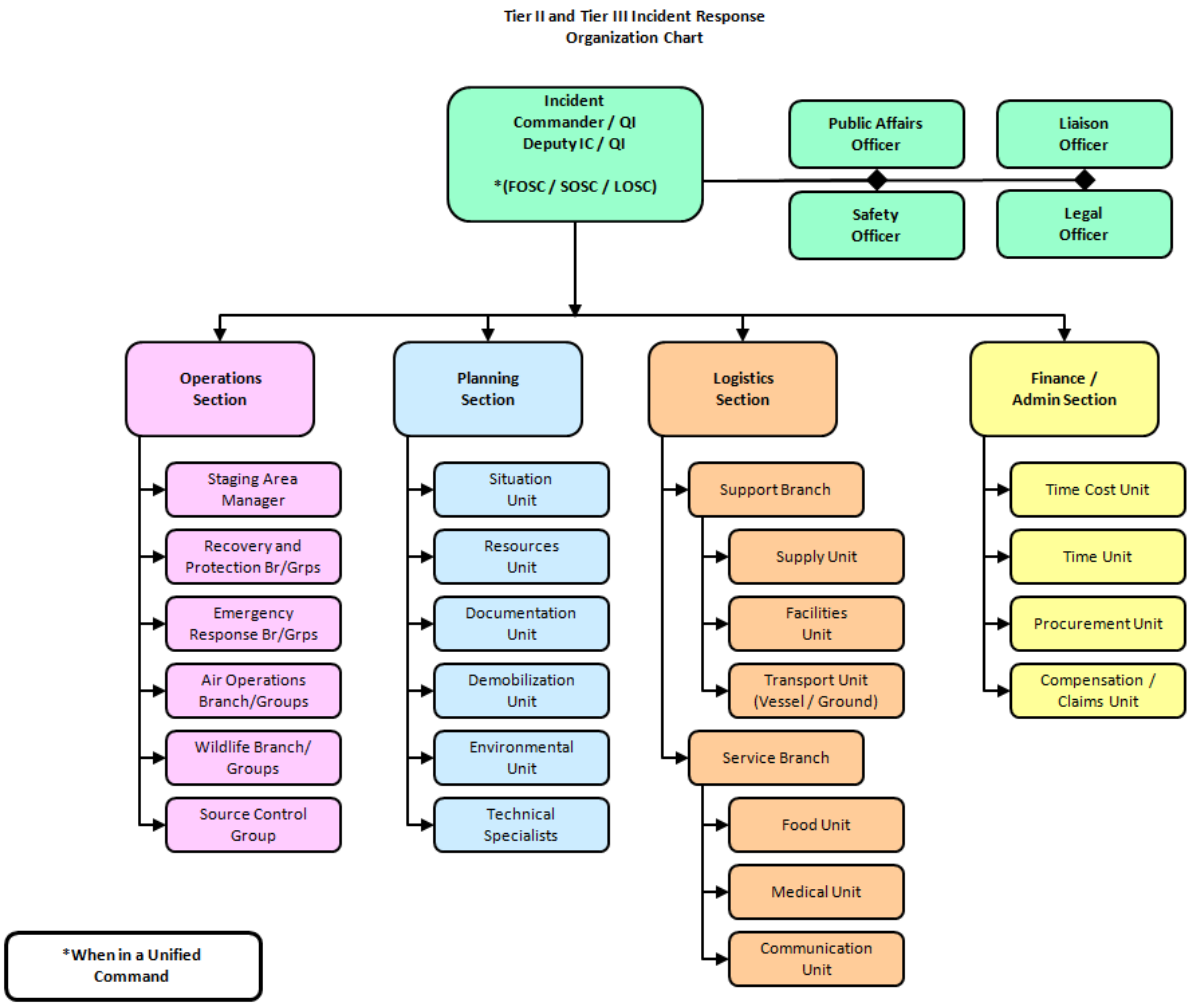


As a prominent part of 2014 operations, SAR helicopter capability will be maintained at the Barrow airport during the drilling season. This asset will permit rapid response to a personnel injury or illness aboard a vessel in the Chukchi Sea operating area or at other remote locations. If not engaged in Shell operations, it may also provide emergency support to North Slope communities in coordination with assets of the North Slope Borough or the U.S. Coast Guard. During seasonal operations, the SIMOPS coordinator in Barrow will coordinate helicopter operations.

4.2 Incident Management

The Incident Command System (ICS) is a key element of emergency management planning, to organize response efforts for all types of incidents. As part of the National Incident Management System, ICS provides standard response and operating procedures that can be applied in a scalable, flexible manner to meet the needs of a specific incident. Because of the widespread use of the system, federal, state, local and private response personnel can be quickly organized for major incident management. If an emergency plan is activated, Shell personnel are trained to fulfill ICS functions. As noted in the Scope of Operations section, SIMOPS coordinators will serve as the initial on-scene incident commander for a field incident during drilling season operations. Figure 10 shows the basic ICS organization, with an incident commander supported by staff sections for operations, planning logistics and finance/administration.

Figure 10: Incident Command System Organization



To support emergency response activities, an internal web mapping viewer has been developed to display selected GIS data from both internal and external sources. Similar in capability to Shell's common operating picture display system, the emergency response system is populated with additional data specifically useful for emergency management. Some typical GIS data maps include subsistence hunting grids, restricted area and permit boundaries, and locations of sensors, wells, moorings, etc. Sea ice charts, weather maps and sensor information, and tracking data for vessels, ground teams, vehicles and aircraft represent dynamic information that can be displayed. In the event of an incident, the web mapping viewer can display GIS data such as:

- BSEE Environmental Resource Areas.
- Alaska Department of Fish and Game (ADF&G) Most Environmentally Sensitive Areas and anadromous fish streams.
- NOAA Environmental Sensitivity Index (ESI) data.
- United States Geological Service (USGS) and Alaska Shore Zone index of links to coastline oblique photos.
- Native allotment location with links to the Bureau of Land Management (BLM) Alaska Case Retrieval Enterprise System (ACRES) website.
- Industry OSRP priority protection sites, pre-staged equipment locations, ESI coastline, staging areas, watersheds.
- Product trajectory, front, and observed sheen.
- Spill Response operational data such as primary incident locations and safety zones, planned and deployed boom locations, staging areas, command centers, equipment locations.
- OSR and ER equipment locations.
- Wildlife observation data.
- Shoreline Cleanup and Assessment Technique (SCAT) data.

This web mapping viewer represents a powerful incident management tool for almost any incident, when timely access to relevant data is crucial to effective response action.

4.3 Oil Spill Response Capability and Mobilization

The Chukchi Sea Regional Exploration Program OSRP is a fundamental component of the planned exploration drilling program. Building upon the 2012 BSEE approved the OSRP, Shell continues to enhance and improve the Chukchi OSRP to effectively respond to a potential WCD from an exploration well control incident. The OSRP is a comprehensive response program that incorporates all facets of OSR, including response capability, mobilization plans, responder training, incident management team organization, exercises, and the strategies and tactics used to implement effective and sustained spill containment and recovery operations.

A response program is based upon a regional capability of responding to a range of spill volumes, from small operational spills up to and including a highly unlikely WCD. OSR capabilities have been enhanced by investing in ice-classed vessels for emergency response and the latest in oil spill recovery technology suitable for Alaskan Arctic conditions during the exploration drilling program, including specific equipment modifications to support cold-climate operations and viscous oil pumping. Shell's program satisfies the response planning requirements of federal oil spill planning regulations.

In preparation for each drilling season, Shell activates resources to begin the exploration drilling off Alaska's Arctic coastline. After a thorough pre-season check up, assets and other oil spill response support resources are mobilized to various vessel-based platforms. Once installed, this equipment is again verified to be functional and response ready. As part of the assurance plan, a robust training and exercise program is maintained for all oil spill response personnel, both for responders in the field and the IMT. During the offseason, core personnel are retained for the safe and effective execution of oil spill response plans and maintenance of equipment. Shell's oil spill response program is further subjected to additional review by BSEE and the U.S. Coast Guard. Using a layered approach to spill response, Shell owns or has under contract a large amount of oil spill response equipment to effectively mitigate spilled oil from offshore, nearshore and shoreline environments. Onsite oil spill response capability consists of a fleet of specialized vessels, barges, booms, aircraft and other equipment pre-staged on-location prior to the start of any drilling.

For the offshore environment and prior to entering any hydrocarbon bearing zones, two dedicated ice-classed OSR vessels, with mechanical recovery equipment and trained responders, are on-site in the vicinity of the drillship. One OSR vessel is positioned within one-hour response time of the drilling vessel and another OSR vessel is positioned approximately three hours transit time from the drilling vessel. These open water recovery assets are capable of conducting oil recovery operations 24/7 and have the capability to contain, recover and store spilled oil for the initial operational period.

Shell has access to pre-staged equipment and personnel for the nearshore and shoreline environments in Wainwright through three Primary Action Contractors (PRAC) for the Chukchi theater: ASRC-Response Organization (ARO), Arctic Response Services (ARS) and Alaska Clean Seas. Under Shell's direction, these three oil spill response organizations provide a large inventory of equipment, spill response oversight, spill management team support, and additional responders through Auxiliary Contract Response Teams (ACRT), North Slope Spill Response Team (NSSRT), and Village Response Teams (VRT). Alaska Clean Seas and ARO are U.S. Coast Guard certified Oil Spill Removal Organizations (OSRO), and ARS should be certified by the 2014 drilling season. Additionally, if needed, an ice strengthened OSR barge with significant skimming capability and a storage capacity will be mobilized and repositioned in the nearshore zone of the Chukchi Sea within 96 hours of anticipated shoreline impact. The OSR barge is further equipped with a skimming vessel, workboats, mini barges, and boom and duplex skimming systems for nearshore recovery and shoreline protection.

In the event of a WCD spill, an Arctic Oil Storage Tanker (OST), pre-positioned in an ice free area, can be mobilized on-scene within 24 hours. The OST possesses a liquid storage capacity of sufficient capacity to store all recovered oils (oil & emulsified water) for the initial 20 days of a 30-day blowout. By day 19, if necessary, a second OST chartered to Shell will arrive from outside the Chukchi Sea with sufficient capacity to store all recovered oil for the duration of a 30-day blowout. Within 42 hours, two additional dedicated response vessels could arrive at the spill site from their staging location to support skimming and recovery operations. See Appendix A "Response Equipment" in the OSRP, for a specific list of assets.

In the event weather conditions were to reduce mechanical recovery effectiveness and efficiency, Shell has extended capability by using alternative response technologies through the use of dispersants and in situ burning. Furthermore, Shell has supplemented its response capability by using viscous oil pumping and infrared technology for nighttime tracking and recovery of oil.

4.4 Responder Training

To ensure response operations personnel are prepared, Shell conforms to the National Preparedness for Readiness and Exercise Program (NPREP). This program was established and endorsed by the Department of the Interior (DOI), EPA and USCG. The NPREP provides continuity and familiarity for all supporting contractors to utilize. All training is documented and incorporated into meeting the NPREP guidelines. Shell's training and equipment readiness exceeds the minimum requirements set within the NPREP.

Appendix F "Training and Drill Information" in the OSRP, outlines the training Shell personnel participate in throughout the season. Training includes Incident Command System (ICS), Hazardous Waste Operations (HAZWOPER), and Hazard Communications (HAZCOM). This classroom and table top exercise training is conducted year round. The field training is also conducted year round with a heavier focus in the springtime as Shell brings on additional employees, many that work on the OSR assets from year to year, and remobilizes assets to their staging locations. Field training also occurs during the off season through participation in available external training events and by turning routine off season maintenance into additional training opportunities.

To ensure that response personnel are prepared, pre-mobilization training and exercises will be conducted prior to the mobilization of personnel and equipment to the Chukchi Sea, similar to what was accomplished in the spring of 2012. During this period, six weeks of oil spill response training was conducted in Valdez with approximately 70% of the training spent on the water, and more than 160 responders being trained.

Pre-startup, IMT command and control exercises were completed prior to the commencement of critical drilling activity. Regularly scheduled tabletop exercises were also performed to maintain response capability while drilling was underway on a host of emergency scenarios including: medical evacuations, oil spills, security threats, mass rescue, etc., to further test the command and control system, as well as response capabilities. Regular meetings and daily exchanges of asset movement plans were held with the U.S. Coast Guard to leverage respective response capabilities while operating in theatre. Invaluable on-scene experience was gained by conducting vessel-to-vessel refueling operations, and in developing techniques to safely boom the vessels. The added benefit of supporting these refueling evolutions with OSR assets was that they provided further opportunities to gain experience launching and recovering support vessels and boom in the Arctic environment, exercising on-scene coordination, and ensuring equipment readiness. The same training format will be followed in advance of the 2014 drilling season.

4.5 Incident Management Team

Oil spill incident response is one of the most visible incident management challenges. In building its oil spill response capabilities, Shell is well-versed in the Alaska Federal/State Preparedness Plan for Response to Oil & Hazardous Substance Discharges/Releases (Unified Plan), and its applicable Sub-area Contingency Plans to ensure federal, state and local oil spill prioritization requirements are thoroughly understood and met. In the unlikely event of an oil spill, IMT will work in close coordination, using ICS procedures with the Unified Command and the Alaska Regional Response Team as demonstrated during regulatory evaluated exercises. The Unified Command includes the U.S. Coast Guard as the Federal On Scene Commander, Alaska Department of Environmental Conservation (ADEC) as the State Representative, and the Local Representative from the impacted Borough; the BSEE and the NOAA provide technical and scientific support to the Unified Command.

Anchorage staff members are incorporated into the IMT and are trained to fill functional roles if the need were to arise. Shell maintains Oil Pollution Act 1990 (OPA-90) required designated Qualified Individuals with responsibility and authority to initiate clean-up actions and response activities while the IMT is mobilizing. During 2012, Shell gained depth and maturity in the qualifications and experience of their IMT:

- Initiated and conducted weekly notification drills with their IMT members from June to through November.
- From February to September IMT drills were conducted monthly, these drills emphasized a variety of critical objectives, such as well control.
- Established a strong relationship with members of Shell Americas Response Team (SART), ensuring a deep bench that is not only capable of strengthening the numbers of trained IMT personnel but filling those positions with personnel who are familiar and understand Alaska's unique challenges. The SART is composed of approximately 1,000 personnel from Shell Americas that are ICS-trained and can be rapidly deployed to any emergency through a callout process.

The expertise of Primary Action Contractors (PRAC), Alaska Clean Seas, ASRC Response Organization (ARO) and Arctic Response Services Company (ARS) are incorporated to fill specific functional roles within the ICS as needed.

4.6 Maintenance Program

In accordance with federal regulation 30 CFR § 254.43, all contractors providing assets or assets otherwise in support of Shell are held to maintenance standards to ensure the readiness and integrity of the oil spill response program. Contractors utilize a Computerized Maintenance Management System (CMMS) to facilitate the scheduling, tracking and reporting of maintenance activities. These records and reports are readily available for audit or verification purposes. Oil spill response support equipment such as booms, skimmers, vessels and other resources are part of an integrated maintenance program that is managed by each of the supporting contractors. In particular, the key memberships under contract with participating OSROs provide additional confidence in the readiness of the equipment, as OSROs are subject to direct USCG oversight that includes USCG supervised equipment verification and maintenance inspections.

Maintenance records are reviewed to validate compliance with: NPREP guidelines and expectations, Shell requirements, as well as to ensure all contractors are meeting this obligation and that they perform field deployments to verify the readiness of equipment. Personnel assigned with OSR responsibilities work closely with the contractors to ensure that the equipment is ready at all times during the drilling season. Equipment that is pre-staged on vessels or land-based is part of a defined routine maintenance program. OSR resources are kept in response ready status during the drilling season and are only demobilized at the end of each drilling season.

5.0 SHELL MANAGEMENT AND CONTRACTOR ASSURANCE

In 2014 Shell will rely on contracted assets to perform the seasonal drilling work in the Chukchi Sea. Active management of aspects including: contracted drill rigs, support vessels, aircraft, equipment, shore facilities and personnel, as well as effective assurance programs, are critical to Shell's success in Alaska. The following sections describe the overall Shell management approach, in particular how robust assurance processes are tailored to ensure successful and safe operations in Alaska.

5.1 Shell Control Framework

Shell has a single overall control framework that describes how organizational structures, processes and founding principles control business activities. Management strategies and assurance is built on this corporate framework.

Shell has a management system of governance, decision-making and control processes prescribed in the Shell Control Framework. Over-arching principles include: maintaining effective operational practices, keeping critical stakeholders at the forefront of business, maintaining transparency, and becoming a trusted member of the community. Roles and responsibilities of leadership and management personnel, and decision-making forums are based on "line of sight accountability" described in the Responsible, Accountable, Support, Consult, and Inform (RASCI) terms. A system of leadership teams that focus on the overall aspects of the business unit has been implemented.

The management structure has continued to evolve. Building on Arctic operating experience since 2006, Alaska has become a center of Arctic operating expertise within Shell. Staff numbers are growing and evolving to capture and retain high-performing personnel with Arctic experience in all functional areas. Shell has improved its Alaska organization as Arctic planning and activities have changed, to ensure spans of control and responsibility are appropriate staff resources are in place for 2014. For example, a new managerial position to oversee all marine assurance activities as part of the Maritime & Logistics organization will increase the oversight of drilling units as well as all other marine assets.

The Operational Excellence Standards provide a framework for managing operational activities. The following standards are particularly essential for 2014 exploration activities in Alaska.

Integrated Activity Planning

Efficient and effective operations are driven by planning. Planning processes incorporate plans for all activities into a multi-phase Integrated Activity Plan (IAP), described in more detail below.

Change Processes

A Management of Change (MOC) process is fundamental to provide assurance that, when changes are introduced, new risks are not unknowingly incurred, or the prevailing risk profile is not adversely changed without appropriate mitigation. The MOC process is a systematic way to assess the impacts of a proposed change before it is made; preventing changes that would threaten the achievement of project objectives; and encouraging changes that would add value.

Continuous Improvement

This concept is necessary not only to increase the levels of efficiency and effectiveness of processes and activities, but also to maintain performance. Tools available include Decision Quality Analysis and After Action Reviews (AAR), as well as audit findings. It is important to recognize positive activities and processes as much as areas for improvement. All Shell functions and groups undertook post-2012 and 2013 AAR's, and will undertake workshops to ensure integration and a common understanding of best practices and areas for improvement.

5.2 HSSE Risk Management Approach

The Hazards and Effects Management Process (HEMP) standard is followed, and in doing so has focused attention on identifying and mitigating the hazards unique to Alaska and working in Arctic conditions.

Identified hazards that could impact people, environment, assets, and reputation are managed in an effort to minimize or eliminate them. Risk management studies are applied to field operations, identifying lists of critical tasks and critical equipment, the tasks and equipment items are then used to control or recover from the identified major hazards.

The Hazards and Effects Register records information on all hazards identified during risk management studies, and includes:

- Scenarios that lead to hazardous conditions (Identify)
- Consequences (Assess)
- Prevention measures (Control).
- Detection, protection, and mitigation measures (Recover)
- Risk rating (Assess)

A widely-used risk management tool called the bow-tie methodology is used to link the causes and preventive controls of an undesirable event to recovery preparations and impacts. By graphically arraying threats and identified controls on the left side of a particular event (i.e., prevention), with recovery activities and consequences on the right side (i.e., mitigation), a bow-tie-shaped diagram can illustrate management options for developing standards and procedures, recovery control activities, performance measures, competencies, etc. Shell was one of the first to integrate bow-ties fully into business practices. The methodology now has wide applications in many industries and regulatory regimes.

5.3 Integrated Activity Plan (IAP)

The IAP is a comprehensive planning process integrating Shell's functional activity plans. These functions include drilling, logistics, projects, emergency response, regulatory affairs, human resources, and external communications. The primary objectives of the IAP are to:

- Reduce safety risk exposure by identifying and managing activity risks in a timely manner
- Optimize resource deployment and asset management
- Maximize availability of operational drilling time
- Serve as a common reference plan for controlling activity execution
- Ensure readiness and capability of activities as they mature through planning horizons
- Manage and control costs

The IAP planning team manages the process by incorporating planning information from the various functional activities and integrates this information into a project management software suite. The management software facilitates analysis of the information, helping to identify cross-functional dependencies, activity conflicts, and requirements for establishing priorities. IAP planners use an iterative process with functional managers to optimize asset utilization and validate resource requirements. The planning information is refined as decisions are made and the level of detail increases as the timeline advances.

The resulting IAP facilitates the identification of key milestones, and establishes a baseline for measurement of performance. Key performance indicators are identified and monitored as metrics. These metrics serve as a feedback loop for plan modification, to meet unforeseen events, weather, etc. The plan and key performance indicators are briefed at least monthly to Shell senior-level management.

5.4 Assurance

The assurance programs within Shell supports the delivery of a safe, effective operating season that is in compliance with all federal, state and local requirements and standards as well as Shell's standards.

Within Shell, accountability for performance including HSSE rests with the responsible leaders. In the 2014 season, the majority of the risk and exposure will rest with wells, operations and logistics. These operational areas take a structured approach to managing their HSSE performance using Safety Cases to identify and address major hazards, risk assessments (e.g. Hazard Identification (HAZID)) for specific activities, and a Hazards and Effects Register as described earlier in the IOP.

Hierarchies of tools are used to provide assurance, ranging from local audits and inspections to independent assessments by Shell. Shell has established a Business Assurance Committee where a holistic view of risks and exposures is taken, and an annual assurance plan is agreed upon. Feedback on progress against the assurance plan, along with status of open action items from either audits, or incident investigations is provided. The Business Assurance Committee is headed by the Executive Vice President for the Arctic, and composed of Arctic Leadership team members, together with representatives of Finance and Assurance providers.

Within Shell, a Risk and Assurance group has been formed within the HSSE team, to support the Business Assurance committee, and provide status reports to the operational teams on a monthly basis.

5.5 Contractor Management

The capability of contractors to manage and mitigate risks for the duration of a contract is assessed through the Contractor Safety Management Process (CSMP). This starts with pre-qualifying contractors to work for Shell and continues with oversight for the duration of the contracts. Contract bid reviews consider documented prior contractor performance as described in the asset assurance sub-sections below.

To manage and oversee each contract, Shell appoints a Contract Holder and Contract Owner. The Contract Owners assume accountability for the contract and the contract holders have responsibility for the contractor's performance. This oversight is accomplished through a variety of interfaces and evaluation processes as described in the assurance sub-sections below. Shell has developed guidelines that assure Contract Holders have a manageable span of control and responsibilities for overseeing contracts.

Large numbers of the contracts used have widely-varying levels of value and risk. Figure 11 shows the classification of contracts by value and level of risk. A contract of relatively low value and low risk, for example, can be managed by the Contract Holder with routine business procedures, whereas a high-value, high-risk contract requires more oversight and involvement by the Contract Owner. Figure 12 shows Shell's management expectations for contracts classified at the operational, tactical and strategic levels.

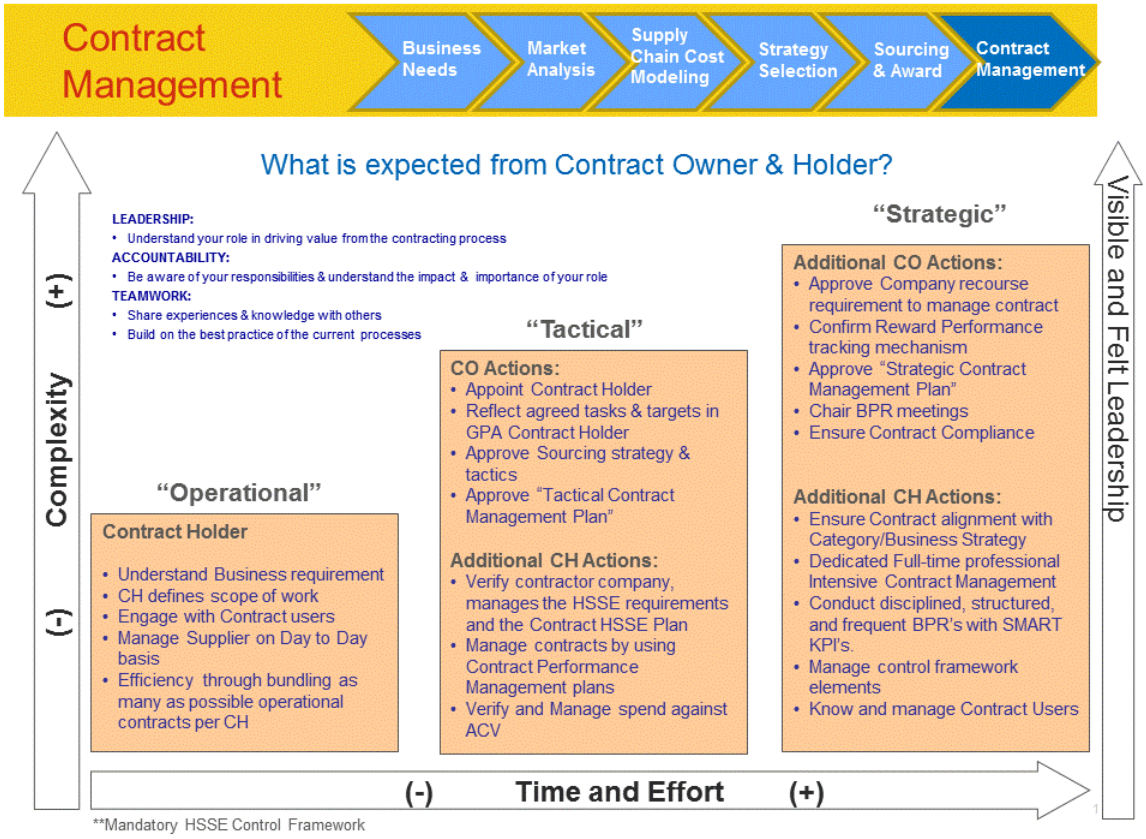
Figure 11: Classification of Contracts by Risk and Value

Segmentation

Classification of contracts by risk and value

HSSE risk (per RAM)	Contract Value High	Contract Value Medium	Contract Value Low
Low	Tactical	Operational	Operational
Medium	Strategic	Tactical	Tactical
High	Strategic	Tactical	Tactical

Figure 12: Contract Management



Assessment of HSSE Performance

IS Networld (ISN) is an on-line, industry database used within the CSMP to pre-qualify and monitor the HSSE performance of contractors. It is also used to house additional information related to HSSE evaluations. In addition a Contractor Safety Management Assessment (CSMA) will be conducted if:

- The contractor is not registered in ISN
- High-risk work is involved with the contract
- Nature of the contract is complex and high exposure exists; referred to as a Strategic Contract

The ISN process includes a quarterly update that reviews and verifies on-going HSSE compliance with Shell's expectations. Failure to maintain Shell's HSSE related expectations will result to lower ISN scores and could impact the contractor's eligibility to continue working for Shell.

In some cases, aviation or marine contractors are not required to be members of ISN and do not require a specific CSMA. These special situations involve aviation contractors that are assessed and approved by an equivalent/specific Shell aviation assessment process (see below) or marine contractors that are assessed and approved by Shell specific marine assessments for cargo vessels and European (non-US based) marine contractors. Those contractors performing low risk work or at contractor site where contractor operates within its own HSSE-MS (management system) that has no interfaces with Shell's HSSE-MS do not require a CSMA, or subscription to ISN.

Shell does not use ISN for aircraft suppliers since Shell has more stringent requirement for aircraft suppliers than standard industry requirements. Refer to the Aviation Assurance Section of this document.

Contractor Engagement

In addition to assessing and pre-qualifying contractors to determine acceptable HSSE standards, Shell's CSMP includes on-going reinforcement of expected safety-related activities. CSM Specialists work closely with the Contract Holders to drive continuous HSSE-related improvements through various and on-going activities (e.g. Business Performance Reviews or periodic contractor review meetings, field visits, reinforcement of developed HSSE plans, Contractor Forums, etc.). Contractor meetings are held throughout the year to share HSSE lessons learned and to highlight special HSSE subjects such as Stop Work Authority, Shell's Life Saving Rules in an effort to continuously improve HSSE for all stakeholders.

Safety Environmental Management System

The SEMS is a BSEE regulation that requires offshore operators for oil and gas exploration to develop and implement safety and environmental management systems. In addition to the CSMP, contractors are identified for SEMS applicability when contracted for U.S. Outer Continental Shelf offshore exploration support. These contractors, regardless of work activity risk (low, medium, or high), are also subject to a Contractor Interface Document (CID) specific to each contractor that describes how their work will be performed and followed with respect to each SEMS element. These contractors are reviewed for SEMS applicability and are part of Shell's SEMS auditing process.

5.6 Alaska Maritime Assurance Process

Maritime assurance is built on a hierarchy of controls:

- Federal and State
- Flag State for foreign vessels
- Classification Societies e.g. ABS
- Shell Health, Safety, Security, Environment and Social Performance (HSSE & SP) Control Framework Transport Manual—Maritime Safety (TMMS)
- Reference Documents: Shell Maritime Process Model; DEP'DEOP's, Maritime Management Guidelines etc.
- Specifics for the operating environment

Maritime assurance in Alaska is accomplished through compliance with the mandatory requirements of the HSSE and SP Control Framework TMMS as specified in the Shell Maritime Process Model.

As discussed in the Maritime and Logistics section of this IOP, the maritime emphasis of Shell places particular importance on the performance of maritime assets. Shell implements the TMMS and its mandatory requirements to meet the unique challenges of offshore Alaska waters.

Maritime assurance processes establish both vessel assurance requirements and contractor assurance interfaces. A vessel considered for use in Alaska must have been "Positively vetted" in line with TM-MS mandatory requirements, this will look at, amongst others, appropriate classification society certification, flag state certification, vessel inspection reports e.g. under the Offshore Vessel Inspection Database (OVID) system, port state control (e.g. USCG) reports and other maritime inputs which may impact the suitability for use. Vessel assessments and HSSE audits use the standard industry Offshore Vessel Inspection Database (OVID) and Contractor Safety Management Program (CSMP). All vessels used by Shell must meet Federal and State requirements and project-specific Alaska vessel specifications.

The pre-season process includes a vessel visit by a Shell representative, usually in Seattle or the load-out/mobilization port. A HSE-MS audit of the contractor is usually done in parallel with the CSMP audit. These audits assess readiness for safe and effective service in Alaskan offshore waters, with an emphasis on effective safety management and its condition and specifications.

The Maritime assurance team will coordinate a vessel inspection using the Offshore Vessel Inspection Questionnaire (OVIQ), evaluating the asset against Regulatory requirements and industry adopted operational standards and technical specifications to ensure it is suitable for the work required. The following requirements are amongst those checked and verified:

- USCG Certificates of Inspection (COI) for U.S. vessels
- Similar flag state documentation for foreign flag vessels
- Certificates of Compliance (COC) for foreign flag MODUs
- Classification society (e.g., ABS or DNV) requirements

Vessel crew licenses and documentation are reviewed and length of service of crew members is further examined to assure compliance with the contract requirements.

Following satisfactory close out of any observations identified during the inspection the vessel will then go forward for positive vetting; if the outcome is favorable the vessel may then be considered for employment under a Shell contract. As plans and schedules for season activities are developed with increasing levels of detail, a series of tabletop exercises will walk through the plan and each of the critical support activities. These exercises involve the contractors, Contract Holders, and logistics team members responsible for executing and monitoring the work. In particular, the tabletop exercises involve reviewing the sequencing of the operation, clarifying responsibilities and tasks, and discussing "what-if "scenarios. Typical exercises subjects include critical evolutions such as vessel-to-vessel transfers, moorings, anchor handling, and emergency towing. As documented in the IAP, a tabletop session will be held in late fall to review the plan in its developmental stage, and then again in early spring to exercise the plan in a more mature form. The basic objective is to ensure that the marine contractors can execute the plan, and modify it where necessary.

During the operating season, the Contract Holder or representative conducts monthly HSSE meetings with representatives of all vessels operating in the Arctic, to share operational, technical and safety information. The Contract Holder or representative also conducts at least a monthly Contractor Interface meeting with contractor representatives to discuss any contract issues, incidents or other issues as necessary. Shell Employees will conduct periodic site visits to meet with the master and appropriate crewmembers of vessels to discuss and review any issues that need addressing. While operations are in progress, Shell has Representatives on board each vessel to oversee HSSE compliance and performance.

Members of the Shell marine team and contract holders (or their representatives) also participate in IFLT engagements, which are conducted to ensure all contractors involved in the operation understand the expectations of Shell throughout the duration of an operation. Multiple IFLTs will be facilitated prior to operations and will focus on specific critical activities such as HSE issues, waste management, use of PSOs, etc. The Maritime Assurance team will perform task assurance throughout the season to ensure vessel operations are completed in compliance with their on board Safety Management System.

In the post-season period, "hot wash" sessions are held with vessel crews and company representatives to review the operating season just completed. The purpose is to clarify any issues, both successes and challenges, and formulate "lessons learned" that could improve future operations or apply to other vessels.

More specific requirements for Mobile Offshore Drilling Units (MODU) are included in separate guidelines (MODU Maritime Assurance Guide) to accommodate the specialized nature of these vessels. These Shell guidelines define responsibilities, specify pre-mobilization and in-service assurance procedures, provide guidelines for MODU movement (both wet tows and dry transportation), and designate regulatory compliance and industry best practices. Foreign flagged MODUs will have a COC issued by the USCG to ensure the vessels meet federal operating standards.

Towing is an important component of Shell's maritime assurance processes. The shipping and maritime assurance group has the technical authority to assess and approve plans; the "Marine Transportation of Floating Structures and Assets" specification has been developed to provide improved guidance and is in the final stages of approval. For vessel tows greater than 72 hours in duration, the Shipping & Maritime technical authority is required to review and approve the tow plan (developed by the towing company contracted to tow a particular vessel or MODU), prior to towing operations being executed. For tows less than 72 hours, a Maritime Safety Subject Matter Expert (SME) or Authorized Person (AP) completes the necessary reviews and approvals. Areas that are particularly reviewed for approval include:

- Rigging and towing hardware for the primary and emergency towing systems
- Tow management procedures
- Emergency response procedures
- Voyage planning, routing and weather conditions
- GO/NO GO criteria
- Marine warranty services
- Stowage of equipment
- Towing vessel(s) capabilities

A marine Warranty Surveyor will be appointed for all tows, except where less than 3 days and the SME Maritime Safety approves that the principles of marine warranty are managed by alternative means. All tow plans will also be reviewed by the masters of both the towed and the towing vessels.

5.7 Aviation Assurance

Aviation assurance is accomplished through compliance with the HSSE & SP Control Framework Air Transport Manual and the Shell Group Requirements for Aviation Operations (SGRAO).

Shell Aircraft International (SAI) acts as the global assurance entity for all aviation operations supporting Shell business activities. SAI auditors, who are experienced career aviators, assess aircraft types and aircraft operators for compliance with established Shell standards for operation. Shell Upstream Americas (UA) Aviation Logistics assesses airfields, heliports, helipads and helidecks for regulatory compliance and ensures Helideck Landing Officer competency. SAI personnel conduct pre-season start up audits of all aviation facilities to ensure operational readiness. The authority to approve contracted air operators rests with the contracting company; in this case Shell Offshore Inc.

Pre-contracting and recurrent SAI audits, which include assessments of the air operators' capability, aircraft types, equipment fit and their suitability for the intended task, are required. SAI will recommend an appropriate recurrent air operator audit frequency based upon the performance standard achieved by the air operator during audits.

The Aviation contract manager works with: contracted aviation operators, the Shell UA regional aviation manager, and SAI to ensure tracking and closure of SAI audit findings.

Prior to commencing operations, Alaska aviation assurance personnel participate in IFLT engagements, to ensure all contractors involved in the operation understand Shell's expectations for the project. Additionally, aviation HAZID engagements are held to proactively identify, evaluate, and eliminate or mitigate hazards associated with local operations.

During the operating season, the Alaska aviation contract manager conducts periodic site visits to ensure ongoing compliance with FAA requirements, the HSSE Control Framework, Air Transport Manual, and the SGRAO. The aviation contract manager conducts monthly meetings with all aviation operators to share operational and technical information and discuss contract issues, incidents or other issues as necessary. In addition, the Alaska aviation contract manager serves as a technical advisor to the logistics system, and coordinates requests for any variances or exceptions to aviation rules and guidelines.

5.8 Alaska Training

Training is essential for effective personnel performance in Alaska operations. The project training plan focuses on specific requirements for the particular project beyond those dictated by the Alaska Department of Labor (AKDOL), Occupational Safety and Health Administration (OSHA) or USCG regulations.

All Shell contractors are responsible for providing employees with applicable training required by regulatory agencies for specific disciplines prior to working for Shell. Contractors must ensure their employees receive any additional training identified in the Training Matrix that applies to the work location/operation. The Shell Training Coordinator validates with the contractor and project manager at the beginning of project activity that all training has been completed as outlined in the project training plan.

Acceptable exceptions will be approved through the variance process. Examples of the types of training tracked include:

- Shell crane operations and lifting equipment training.
- HSSE Bundle Training: This 4 hour awareness training includes topics such as the Safety, Environment Management System (SEMS), intervention awareness, Behavior Based Safety (BBS) expectations, marine trash and debris awareness (per BSEE requirements), hazard awareness, incident reporting process, journey management, Shell Life Saving Rules overview, security awareness, emergency response, environmental compliance awareness (e.g., waste, water, and air topics), and other topics related to environment and safety.
- Shell cultural awareness /environmental awareness training.
- Coldwater Helicopter Underwater Escape Training (HUET).
- Coldwater survival training.
- Cold weather gear requirements.
- Vessel-to-vessel personnel transfer training.
- Arctic specific training in their area of work (i.e., OSR, drilling, aviation, marine, etc.).
- Defensive driving with winter focus.
- ICS training.
- Project field leadership environmental and permit compliance training.
- Arctic fuel transfer procedures.
- Waste focal point training.
- Helicopter landing officer (HLO) training.

For Shell employees, training is tracked within the Shell learning management system called Shell Open University (SOU). Additionally, both Shell employees and contractors are tracked in a separate training base system for a subset of training requirements that are specific to and/or required by specific Alaska permits or agreements.

Additionally, assurance is checked with key training requirements for contractors and employees travelling by aircraft on Shell business in Alaska. This check is completed via a computer system, which also tracks Personnel Onboard (POB) for drilling rigs, vessels and aircraft. A ticket will not be issued if a worker's training certifications do not meet those required for their destination.

5.9 Health Management

Shell is responsible for protecting and promoting the health of employees and contractors by eliminating, reducing or mitigating health risks at the workplace.

Key focus areas in health include:

- *Medical Emergency Response* (MER), a risk assessment for medical infrastructure is conducted for each Alaska project to identify the medical resources needed to provide effective MER compliant with Shell's health policies. Since injured or ill parties may need to be stabilized for an extended period of time, medical providers such as physician's assistants as well as medical supplies and clinic space are located on larger vessels and onshore installations with more than 50 people.
- *The Hazards and Effects Management Process* (HEMP), including Health Risk Assessment (HRA) and Health Impact Assessment (HIA) is employed to identify and mitigate risk of harm to people due to health hazards, by carrying out the assessment process and implementing any control and recovery measures identified. HRAs are conducted to manage these health risks within Shell operations while HIAs are used to anticipate, prevent impacts and maximize the potential health benefits of Shell's programs to those outside of company operations. HRAs have been conducted for Alaska offices, logistics bases (including camps and terminals), drilling operations, marine seismic, and oil spill responders. HIA baseline health data have been gathered and reviewed for areas possibly impacted by Shell's exploration activities.
- *Fitness to Work* (FTW) medical protocols. Shell has implemented medical FTW protocols to assess a Shell employee's medical and physical ability to perform specific identified tasks in the work environment, and to mitigate the health risks associated with these tasks. Remote location (including offshore) Shell employees are considered a high-risk group because transit to a hospital may be prolonged, and the protocol for this type of work includes a cardiovascular risk assessment. In Alaska, all field locations north of the Bering Strait (except Barrow) are considered remote, and these medical protocols were implemented in 2009 for Shell employees. Shell works with its contractors to ensure that they have appropriate FTW protocols in place for their employees.
- *Fatigue Management*. Fatigue Management is where Shell emphasizes the importance of worker health and well-being by striving to ensure off-duty time is sufficient to achieve adequate rest and to identify and manage work-related fatigue issues. Shell has championed fatigue risk management by annually assessing each project and developing and implementing fatigue management plans. These plans outline controls in place for managing the risk of fatigue, that these controls are communicated to project workers, and that the effectiveness of controls is regularly reviewed and subjected to continual improvement.

6.0 REGULATORY & PERMITTING

Operating in the Alaska Outer Continental Shelf and specifically the Arctic Ocean Region has a complex regulatory regime of various regulations and permitting. The BOEM, BSEE, EPA, National Marine Fisheries Service (NMFS), USFWS, U.S. Army Corps of Engineers (USACE), and the USCG are the major federal agencies involved in permitting Alaska offshore drilling activity within U.S. jurisdiction.

Other state or local entities having a stake in Chukchi Sea offshore activities including:

- State of Alaska Department of Environmental Conservation
- State of Alaska Department of Natural Resources
- Office of the Mayor of the North Slope Borough
- North Slope Borough Planning Department
- North Slope Borough Department of Wildlife Management
- City of Wainwright
- Native Village of Point Hope
- Native Village of Point Lay
- Native Village of Kotzebue
- City of Point Hope
- City of Barrow
- Village of Barrow
- Inupiat Community of the Arctic Slope
- Alaska Eskimo Whaling Commission (AEWC)
- Eskimo Walrus Commission (EWC)
- Alaska Ice Seal Committee
- Alaska Beluga Whale Committee
- Alaska Nanuuq Commission
- Office of the Mayor of the Northwest Arctic Borough

With the diverse number of regulatory players involved, there are a variety of required operating practices to explore in the Chukchi Sea. Many of these practices are required by state law or regulation:

- Commitment to continue science data gathering and sharing to inform baseline studies and support for fact based decisions.
- Provision of a dedicated capping stack for 'cap and shut-in' scenarios (per the 2010-N10 updates).
- Local employment of Alaskans across the State and across the value chain of exploration operations.
- Collaborative programs and real-time interactions with subsistence hunters both onshore and offshore Alaska per the Conflict Avoidance Agreement with the Alaska Eskimo Whaling Commission.

Tangible results of these commitments include:

- An operational program providing not only an understanding of the Chukchi Sea component of in situ operations, but one that also recognizes the multiple supply chain and logistical challenges (distances and time frames) dictated by the Alaskan Arctic location, including:
    - An appropriate lead time of procurement and contracting of key marine assets in particular
    - An appropriately conservative plan for the safe movement of personnel.
    - A complete understanding of the challenges of operating in the Chukchi Sea when the nearest deep water supply base for marine assets is 1,000 nautical miles and five days sail away (e.g. re-fuelling and waste management)
    - Weather forecasting embedded in the business combined with an ice management fleet and capability completely integrated into the drilling operations window
    - Appropriate contingency plans to address the operational scope
    - A comprehensive OSRP, dedicated assets, and trained personnel that meet the demands of Federal and State requirements as well as those of local community stakeholders (identified above).
    - An emergency response capability with proven agency endorsement through drills and trials across the spectrum of possible incidents.
    - A sustainable investment strategy that recognizes the immaturity of support infrastructure offshore Northwestern Alaska.
    - A security intelligence network and direct security response capability to deal with direct action threats to assets, personnel, and brand.

Some of the above items are necessary steps for obtaining approval of an Exploration Plan (EP) and for an APD in the U.S.

Major approvals/requirements include:

- BOEM –EP
- BSEE – APD
- BSEE – Oil Spill Response Plan (see the Emergency Response Program section).
- EPA – Notices of Intent (NOI) to Discharge Wastewater under the Authorization to Discharge under the National Pollutant Discharge Elimination System (NPDES) for Oil and Gas Exploration Facilities on the Outer Continental Shelf in the Chukchi Sea, General Permit (GP) Permit No. AKG-28-8100 Discharge Authorizations
- NMFS – Marine Mammal Protection Act (MMPA), Incidental Harassment Authorization (IHA) for incidental harassment of whales and seals
- USFWS – MMPA Letters of Authorization (LOA) for incidental harassment of polar bears and pacific walrus
- USACE – Oil and Gas Structure, Nationwide Permits (NWP) #8 per sea and per drilling unit.
- USCG –COI for U.S Flag vessels and a Certificate of Compliance (COC) for the drilling units
- Classification Society (e.g., ABS or DNV)
- Flag State Certification

6.1 Air Emissions

Sources and maximum projected actual air emissions from 2014 Chukchi Sea exploratory activities are enumerated in the revised Chukchi Sea EP (EP Revision 2; Section 7.0 and Appendix O). Facility-wide maximum emissions have been conservatively calculated (i.e., emissions presented overstate what is actually expected), for purposes of demonstrating exemption from the BOEM Air Quality Regulatory Program (AQRP) in 30 CFR § 550.300 (Subpart C). Shell has implemented a number of emission reduction measures, such as using only ultra-low sulfur diesel fuel throughout the fleet, and installing particulate filters and selective catalytic reduction controls on the *Discoverer's* primary generation units. However, the maximum projected exemption analysis does not consider these emission control measures. Calculated projected emissions nevertheless fall below the BOEM exemption thresholds.

Beyond technical compliance, Shell seeks to improve its performance with respect to reducing air emissions. For example, in addition to using ultra-low sulfur fuel exclusively and implementing engine controls, Shell is actively assessing technologies such as using micro-turbines for power generation in shore-side camps. In addition, assessing the air emission profile of a vessel's propulsion and electrical plant is one of the considerations in contracting support vessels.

6.2 Waste Management

Proper handling and disposal of waste materials is a critical part of operations in the Chukchi Sea theater. Under the EPA's NPDES GP regulations for oil and gas exploration facilities in the Chukchi Sea OCS, there are no discharges of free oil, foams, floating solids or anything that may create an oily sheen from the drilling unit once anchored at the drill site. Vessels underway (including the drilling units while in transit) must have a vessel general permit for normal vessel discharges (in US navigable waters) and/or comply with MARPOL rules; and make no discharges of food wastes or any sort of debris into the water.

Shell is committed to meticulous compliance with waste regulations and best practices. The Waste Management Plan covers all Shell activities in Alaska, including all contactors and contracted assets working for Shell. The plan provides comprehensive procedures for waste handling, from waste reduction measures to detailed instructions for identifying, separating, documenting, and disposal of all types of wastes. The plan requires that all wastes be disposed in a Shell-approved facility.

6.3 Permit Compliance and Assurance

Shell is committed to meeting the requirements of regulatory permits. An extensive compliance assurance program is in place to ensure regulatory compliance is attained throughout the multiple facets of the project. The compliance assurance program consists of:

- *Three Tiered Training Program* developed to ensure that everyone involved with the project has a baseline level of understanding in regards to regulatory compliance requirements and that personnel in specific roles have a deeper understanding of regulatory requirements.
- *Tier 1 Training* provides a high level overview of the types of regulatory programs that are applicable to present operations, a high level description of the mitigation measures that are required, and general reporting structure. This series is intended to provide a general familiarity to program requirements

- *Tier 2 Training* provides a greater level of awareness regarding each permit, authorization and agreement. This training provides a working knowledge of the permit.
- *Tier 3 Training* is intended for those with specialized duties and for those that need to know the details of particular permits, sampling requirements, reporting requirements, etc. Included in this level are those individuals who are responsible or have been identified as a backup to perform permit compliance duties. For example, personnel who have been identified to document additives to drilling mud(s) that will support the NPDES GP reporting requirements attend a Tier 3 level training.
- *Compliance Manual* a two- three volume binder with over 1500 pages has been compiled to ensure crews have the information they need with regard to authorizations, permits, and mitigation measures. The binders include a hard copy of each of the authorizations, permits, or agreements as well as a narrative/tabular description of how these documents impact the operations to be performed.
- *Quick Reference Guide* due to the complex nature of the multiple permits, authorizations, and agreements Shell must operate under. A quick reference guide has been produced to assist crews with finding regulatory compliance information. The quick reference guide consists of a one to two page summary of each permit, authorization, or agreement as well as a series of frequently asked questions and contact numbers. Additionally, frequently asked questions have been cross-referenced with the Compliance Manuals to ensure that the user can find additional information on the subject, should it be needed.
- *24-hour Regulatory Affairs Duty Phone* established throughout the operating season. A member of the regulatory affairs department is available 24 hours a day to answer any questions regarding environmental compliance or to promptly report a non-compliance issue. The field crews are empowered to use this resource to ensure activities are being conducted in compliance with issued permits, authorizations, and agreements.
- *Daily Compliance Checklists* in addition to the resources described above, each facility (vessel, helicopter, and project) completes a daily compliance checklist and send it into the Regulatory Affairs Department who will review it to ensure that all of the activities conducted that day meets Shell's requirements. These checklists provide an additional reminder to the field crews regarding regulatory compliance requirements.
- *Internal Regulatory Compliance Audits* prior to the season and throughout the season, internal regulatory compliance audits will be conducted to ensure continued vigilance around regulatory compliance. These audits can include a review of the permits, record keeping, monitoring requirements, and operational restrictions. Actions will be taken to correct any areas needing improvement and findings will be communicated to deck level workers at regular meetings.

7.0 STAKEHOLDER RELATIONS

Shell has found in operations worldwide, that communicating and working with local people as partners and supporting their pursuit of what matters most to them, is a valuable contribution that Shell can make. Since 2006 Shell has proactively participated in 500+ community engagements in the North Slope, Northwest Arctic and Bering Strait Regions. These engagements have occurred mostly through Plan of Cooperation (POC) meetings, AEWC meetings, North Slope Borough Assembly meetings, community meetings, marine mammal co-management meetings, small and large group sessions hosted by Shell and others, in technical and vessel tours and through educational/informational workshops which Shell has hosted in many remote community locations. In addition to community engagements, Shell provides information and two-way communication through social media (www.shell.us/alaska website, Facebook, Youtube and Twitter) and through a periodic newsletter, which is mailed to each North Slope post office box holders and placed on Shell's website. Many stakeholders have shared their appreciation for Shell's willingness to engage in meaningful conversation. These conversations have led Shell to make several changes to its program plans, demonstrating Shell's commitment to work cooperatively.

It is critical that Shell share its proposed operations effectively and receive feedback from local stakeholders. Shell is committed to minimizing negative impacts to the environment and people in the areas where it operates. Shell recognizes that subsistence activities in some cases constitute a substantial percentage of a tribal village's annual food source, and Shell makes significant effort to prevent and minimize negative impacts.

7.1 Stakeholder Communications

Shell maintains an annually updated Stakeholder Engagement Plan. Prior to seasonal operations, Shell employees will consult with all potentially affected stakeholders, including communities and subsistence management groups such as the AEWC, Alaska Nanuuq Commission, Beluga Whale Committee and Ice Seal Committee. These influential groups are important conduits of information. More local organizations, such as village whaling captains' associations, also receive information on intended marine activities and provide input on hunting activities such as the timing and status of the annual bowhead whale hunt. Shell employees attend meetings, symposiums, and other forums to maintain the corporate knowledge base of local issues.

7.2 Subsistence Advisors and Community Liaison Officers

A principal element of Shell's continuing outreach efforts is the employment of local Beaufort and Chukchi Sea village residents to serve as key points of contact. This is done in two ways, through SAs and Community Liaison Officers (CLOs).

SAs provide consultation and guidance regarding the animal migration/sightings and subsistence activities. Normally there is one SA per village, working approximately 8 hours per day and 40 hours per week during each drilling season. The SA will use traditional knowledge and gathers subsistence data from local residents within the community and advises Shell personnel in ways to avoid, minimize, and mitigate potential subsistence impacts of Shell's operations. Responsibilities of SAs include:

- Serve as a two-way subsistence liaison between Shell and local hunters
- Report any actual and planned subsistence activities, concerns and potential and actual conflicts
- Assist in coordinating daily program plans utilizing subsistence activity reports and traditional knowledge in daily teleconference calls

SAs have handbooks that specify their roles and responsibilities in more detail. Building on the success of SA linkages in the 2012 and 2013 seasons, Shell will continue their employment in the 2014 season. Shell will also continue to participate in the communication centers, which are based in Chukchi villages as another mechanism to avoid and minimize potential impacts to the fall bowhead whale hunt. The communication center operators are local residents who are familiar with the subsistence way of life and traditional geographical locations.

Community liaison officers (CLOs) are employed year-round and serve as a conduit for information to and from the communities in which they live. Shell currently has nine CLOs (two full-time and seven part-time) in the following communities: Barrow, Kotzebue, Point Hope, Point Lay, Wainwright, Nuiqsut, Kaktovik, Dutch Harbor, and Nome. CLOs are responsible for:

- Advising on culturally-appropriate communication methods and messages.
- Engaging with their communities and reporting out any local or regional concerns, interests, and issues on the weekly conference call.
- Supporting meaningful stakeholder engagement by involving and recommending, forums or meetings Shell should attend, participate in, or conduct.
- Attending local and regional meetings and providing summaries, recommendations, and action items.
- Extending Shells efforts to support community affairs and recommending community partnership opportunities and prospects.
- Assisting with meeting logistics, set-up and execution as well as any follow-up, as directed.
- Keeping the community and entities of their assigned communities fully informed on Shell's activities.

Bi-annual meetings are held to ensure alignment with the CLOs and Shell. This time also serves as a venue to share stories, host training sessions, and learn from each other's experiences. CLOs serve as an important link between Shell and any potentially affected communities. They are constantly monitoring and reporting on the events in their communities to keep Shell informed of any activities, issues, or concerns.

7.3 Protected Species Observers

Shell hires local residents whenever possible to provide income and training benefits to communities. Over one-third of the protected species observers are North Slope residents.

7.4 Employee Education

Shell provides cultural awareness training to all company and contractor employees that are deploying to locations outside of Anchorage. This training is given to ensure Shell personnel understand the unique culture and perspective of Native Alaskans, and that Shell-connected personnel can perform their jobs more effectively and in a manner respectful of local communities.

8.0 SCIENCE

Shell is cognizant of the important relationship of scientific knowledge to its success. The Arctic Ocean basin has attracted intensive interest in almost all science disciplines. Shell's science program is designed not only to support its immediate activities in Alaskan offshore waters, but also to collaborate with other science programs to increase basic human understanding of this unique geographic area. Shell is continuing its active support of science as part of the 2014 exploration program.

Investment in science represents a significant amount of the operational budget in Alaska. The budget for science activities in U.S. Arctic offshore waters is a significant component of the annual research budget for the U.S. Arctic Offshore. About 60% of Shell's science program is leveraged by close collaboration with other energy companies, government agencies, and educational organizations. A highlight of this collaborative approach is the North Slope Borough Science Agreement, to which Shell has committed $5 million per year for a five-year period to study local community priorities. Another example is the agreement with the NOAA to share data associated with weather and ice monitoring and forecasting.

The science programs are conducted to, among other things:

- Provide scientific information required for permit applications, and to comply with monitoring requirements of permits such as those contained in the Marine Mammal Protection Act, Clean Water Act, Endangered Species Act, and Clean Air Act.
- Support operational planning, decision-making and asset design by defining parameters and forecasting conditions.
- Provide and support innovative technical solutions to operational challenges.
- Ensure issues can be discussed with factual information.

Science programs can be generally categorized as environmental monitoring activities, baseline studies, and engineering and technology projects.

Monitoring Activities are in many cases driven by the requirements of permits, to document and better understand the environment where exploration activities will occur and the long-term impact of industry activity. Marine mammals are particularly important to Native subsistence cultures, and vessels operating in offshore areas will have dedicated observers onboard where and when required to detect all designated species, maintain a mammal-free operation zone, and record marine mammal behaviors. Threatened and endangered species are also monitored, as is air quality.

Baseline Studies provide a basis for project design and planning, and are used for environmental impact documents as well as ice and weather forecasting. In the lease areas, these studies include physical oceanography, currents, benthos, plankton, acoustics, fish, marine mammals and marine birds. Shell's acoustic studies in the Alaskan offshore region represent the largest non-military acoustics program in the world. On-shore studies include hydrology, habitat assessment, coastal processes (such as erosion), archaeology and coastal birds.

Engineering and Technology Studies are conducted to provide safer and more effective operating solutions for operating in challenging Arctic conditions. Examples of these studies include examining ice loads on structures, the effects of extreme temperatures on equipment in typical operations, and applications of radar when fog diminishes visibility.

The Alaska Science Program has been supported and enhanced by the traditional knowledge that has been part of Inuit culture for thousands of years. Traditional knowledge has been beneficial in studies of environmental change. Many observers in monitoring programs are drawn from communities on the North Slope, providing especially valuable insight and familiarity with local species. Subsistence advisors in North Slope communities serve as focal points for accessing traditional knowledge as well as providing real-time advice for operations.

9.0 CONCLUSION

This IOP describes the broad scope and inter-relationships of planning, management, and assurance activities for 2014 exploration activities in the Chukchi Sea. Shell continues to be committed to safe and responsible exploration of Alaska's offshore resources. Shell seeks to minimize its footprint, while conducting technical drilling activities proficiently, maintaining a robust preparedness and response capability, and managing the assets, contractors and people effectively. Shell is engaged with local stakeholders to minimize conflict and maximize social and economic benefits to those local stakeholders.

The Arctic offshore waters of Alaska present considerable challenges in terms of harsh environmental conditions, remoteness, and logistical obstacles; however, Shell has most recently been intensively engaged in Arctic Alaska since 2006, following exploration drilling in the Chukchi Sea in the 1980s and '90s and builds its 2014 plans on a solid foundation of practical operational experience in the region. Assets have been carefully selected to operate in Alaskan offshore conditions, in addition to employees and contract personnel being trained for these conditions.

Shell is a learning organization and its implementation of risk management and continuous improvement are central elements of this IOP for 2014 operations. Upgrades to the *Discoverer* drilling unit, as a prime example, involve improved system reliability, habitability, and reduced air emissions from diesel engines. Other noteworthy improvements include enhanced logistics management, improvements to the ACS, better contractor management procedures, focused audit and review plans, and improved overall program integration through the IAP and Shell integrated leadership teams.

Shell's essential organizational values are captured simply but clearly in its Goal Zero: No harm, No Leaks. Similarly, Shell's Alaska motto to Keep it safe, Keep it clean, and Respect our Neighbors articulates the same straightforward guidance for all of its endeavors.

10.0 LIST OF ACRONYMS AND ABBREVIATIONS

AAR – After Action Review

ABS – American Bureau of Shipping Classification Society

ACRT – Auxiliary Contract Response Team

ACS – Arctic Containment System

ACRES – Alaska Case Retrieval Enterprise System (Bureau of Land Management)

ADEC – Alaska Department of Environmental Conservation

ADF&G – Alaska Department of Fish and Game

AEWC – Alaska Eskimo Whaling Commission

AIS – Automatic Identification System

AKDOL – Alaska Department of Labor

APD – Application for Permit to Drill

APM – Application for Permit to Modify

ARO – ASRC Response Organization

ARS – Arctic Response Services Company

AVHRR – Advanced Very High Resolution Radiometer

BBS – Behavior-Based Safety

BLM – U.S. Bureau of Land Management

BOEM – U.S. Bureau of Ocean Energy Management

BOP – Blow-Out Preventer

BSEE – U.S. Bureau of Safety and Environmental Enforcement

CFR – U.S. Code of Federal Regulations

CID – Contractor Interface Document

CLO – Community Liaison Officer

CMMS – Computerized Maintenance Management System

COC – Certificate of Compliance

COCP – Critical Operations and Curtailment Plan

COI – Certificate of Inspection

CSMA – Contractor Safety Management Assessment

CSMP – Contractor Safety Management Process

DNV – Det Norske Veritas Classification Society

DOI – U.S. Department of the Interior

EP – Exploration Plan

EPA – U.S. Environmental Protection Agency

ESI – Environmental Sensitivity Index

EWC – Eskimo Walrus Commission

FAA – Federal Aviation Administration

FOI – Floating Offshore Installation

FTW – Fitness to Work

HAZCOM – Hazard Communication

HAZID – Hazard Identification

HAZWOPER – Hazardous Waste Operation

HEMP – Hazardous Effects Management Process

HIA – Health Impact Assessment

HLO – Helicopter Landing Officer

HRA – Health Risk Assessment

HSE – Health, Safety and Environment

HSE-MS – Health, Safety and Environment Management System

HSSE – Health, Safety, Security and Environment

HSSE & SP – Health, Safety, Security, Environment and Social Performance

HUET – Helicopter Underwater Escape Training

IAP – Integrated Activity Plan

ICS – Incident Command System

IFLT – In-field leadership Team

IHA – Incidental Harassment Authorization

IMO – International Maritime Organization

IMP – Ice Management Plan

IMT – Incident Management Team

IOP – Integrated Operations Plan

ISN – IS Networld Data Base

LMRP – Lower Marine Riser Package

LOA – Letter of Authorization

MASP –Maximum Allowable Static Pressure

MAWP – Maximum Anticipated Wellhead Pressure

MARPOL -- International Convention for the Prevention of Pollution from Ships 73/78

MEDEVAC – Medical Evacuation

MER – Medical Emergency Response

MLC – Mud Line Cellar

MMPA – Marine Mammal Protection Act

MOC – Management of Change

MODIS – Moderate Resolution Imaging Spectroradiometer

MODU – Mobile Offshore Drilling Unit

MOPO – Manual of Permitted Operations

NMFS – U.S. Marine Fisheries Service

NOAA – U.S. National Oceanic and Atmospheric Administration

NOI – Notice of Intent

NPDES – National Pollutant Discharge Elimination System

NPREP – National Preparedness Response Exercise Program

NSSRT -- North Slope Spill Response Team

NWP – Nationwide Permit

OCS – Outer Continental Shelf

OSHA – U.S. Occupational Safety and Health Administration

OSR – Oil Spill Response

OSRP – Oil Spill Response Plan

OSRO – Oil Spill Removal Organization

OST – Oil Storage Tanker

OVID – Offshore Vessel Inspection Database

PE – Professional Engineer

POB – Personnel Onboard

POC – Plan of Cooperation

PSO – Protected Species Observer

PRAC – Primary Action Contractors

RASCI – Responsible, Accountable, Support, Consult, Inform

ROBOCOP – Remote Controlled BOP Panel

ROV – Remotely Operated Vehicle

RTOC – Real-Time Operations Center

SA – Subsistence Advisor

SAI – Shell Aircraft International

SAR – Search and Rescue

SART – Shell Americas Response Team

SCAT – Shoreline Cleanup and Assessment Technique

SEMS – Safety Environmental Management System

SGRAO – Shell Group Requirements for Aviation Operations

SIA – Shell Internal Audit

SIMOPS – Simultaneous Operations

SIWAC – Shell Ice and Weather Advisory Center

SOLAS – Safety of Life at Sea

SOU – Shell Open University

TMMS – Transport Manual-Marine Safety

UA – Shell Upstream Americas

USACE – U.S. Army Corps of Engineers

USCG – U.S. Coast Guard

USFWS – U.S. Fish and Wildlife Service

USGS – U.S. Geological Service

VRT – Village Response Team

WCD – Worst Case Discharge