SHELL OFFSHORE INC.

BEAUFORT SEA
REGIONAL EXPLORATION
OIL DISCHARGE PREVENTION
AND
CONTINGENCY PLAN

SHELL OFFSHORE INC.

ANCHORAGE, ALASKA

MMS COMPLETENESS FINAL SUBMITTAL

JANUARY 2007

MANAGEMENT APPROVAL AND MANPOWER AUTHORIZATION

OIL DISCHARGE PREVENTION AND CONTINGENCY PLAN
BEAUFORT SEA EXPLORATION
NORTH SLOPE, ALASKA

This Oil Discharge Prevention and Contingency Plan (C-Plan) has been prepared for offshore exploration activities in the Beaufort Sea, Alaska, conducted by Shell Offshore Inc.

This plan is approved for implementation as herein described. Manpower, equipment, and materials necessary for oil discharge prevention and response will be provided as required in accordance with this plan.

11-20-06

Rick Fox
Asset Manager, Alaska Operations
Shell Offshore, Inc.

Date

11/20/06

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RECORD OF REVISIONS

REVISION NUMBER	REVISION DATE	DATE ENTERED	SUMMARY OF REVISION

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OIL POLLUTION ACT OF 1990 (OPA 90)

U.S. MINERALS MANAGEMENT SERVICE

U.S. COAST GUARD

U.S. MINERALS MANAGEMENT SERVICE

BEAUFORT SEA DEVELOPMENT AREA
OIL DISCHARGE PREVENTION AND CONTINGENCY PLAN

CROSS REFERENCE TO
U.S. MINERALS MANAGEMENT SERVICE RESPONSE PLAN REQUIREMENTS
[30 CFR 254, SUBPART B]

REGULATION SECTION (30 CFR)	SECTION TITLE	PLAN SECTION
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254.23	Emergency Response Action Plan	Section 1.0
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(b)	Designation of Trained Spill Management Team Available 24 hours (including organizational structure and responsibilities and authorities of team members)	Sections 1.2 and 3.3
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(e)	List of Types of Oil Handled, Stored or Transported	Introduction and Appendix F
(f)	Procedures for Early Detection of a Spill	Sections 2.1 and 2.5
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(g)(2)	Methods to Monitor and Predict Spill Movement	Sections 1.6.4 and 1.6.13
(g)(3)	Methods to Identify and Prioritize Sensitive Areas	Sections 1.6.5, 3.2 and Appendix E
254.23 (g)(4)	Methods to Protect Sensitive Areas	Sections 1.6.5, 1.6.11, 1.6.12 and Appendix D
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(g)(6)	Methods for Storage of Recovered Oil (to allow containment and recovery to continue without interruption)	Sections 1.6.9, 1.6.10, 1.6.13, and Appendix C
(g)(7)	Procedures to Remove Oil and Oiled Debris from Shallow Areas and Along Shorelines and to Rehabilitate Oiled Waterfowl	Sections 1.6.12 and 1.6.13, Appendix E
(g)(8)	Storage, Transfer, and Disposal Procedures	Sections 1.6.9, 1.6.10, and Appendix E
(g)(9)	Methods to Implement Dispersant Use Plan and In situ Burning Plan	Sections 1.7 and 3.7

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OIL DISCHARGE PREVENTION AND CONTINGENCY PLAN

CROSS REFERENCE TO
U.S. MINERALS MANAGEMENT SERVICE RESPONSE PLAN REQUIREMENTS
[30 CFR 254, SUBPART B]
(CONTINUED)

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(b)	Procedures for Inspecting and Maintaining Spill Response Equipment (inspected monthly; records of inspections and maintenance kept for at least 2 years)	Section 3.6.2
254.25	Contractual Agreements (copies of contracts or membership agreements or certification that they are in effect; must ensure 24 hour availability)	Section 3.8
254.26	Worst Case Discharge Scenario	Section 1.6.13
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(b)	Trajectory Analysis (including maximum extent of oil travel)	Sections 1.6.13 and 3.2
(c)	List of Sensitive Areas That Could Be Affected (from C-Plan) and Strategies for Protecting Them	Sections 1.6.13, 3.10 and Appendix E
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CROSS REFERENCE TO
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[30 CFR 254, SUBPART B]
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(c)	Environmental Effects of Burn	Section 1.7
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(b)	Exercise Plans (for Annual Spill Management Team Tabletop, Annual Deployment of Equipment Staged Onshore, Annual Notification Exercise, Semiannual deployment for Equipment and Facility) (entire plan must be exercised once every 3 years); (National Preparedness for Response Exercise Program [PREP] can be used)	Sections 2.1 and 3.9

WORST CASE DISCHARGE VOLUME

ELEMENT	CAPACITY (BBL)	REFERENCE
Sum of Capacity of Oil Storage Tanks	594,274	Table 1-15
Daily Production Volume of Highest Capacity Well	5,500	18 AAC 75.434(b)
Total Worst Case Discharge (WCD)	165,000	Section 1.6.13

U.S. COAST GUARD

BEAUFORT SEA DEVELOPMENT AREA
OIL DISCHARGE PREVENTION AND CONTINGENCY PLAN

CROSS REFERENCE TO
U.S. COAST GUARD AND DEPARTMENT OF HOMELAND SECURITY
RESPONSE PLANS FOR OIL FACILITIES
TRANSFERRING OIL OR HAZARDOUS MATERIAL IN BULK
[33 CFR 154]

REGULATION SECTION (33 CFR 154)	SECTION TITLE	PLAN SECTION
1035(a)	Introduction, Plan Contents, and Cross Index	OPA 90 Addendum, Introduction
(a)(1)	Facility name, address, telephone and fax numbers, mailing address	Introduction
(a)(2)	Facility's geographic location	Introduction, Figure I-1, and Section 3.1
(a)(3)	24-hour procedure for contacting facility owner	OPA 90 Addendum, Sections 1.1, and 1.2
(a)(4)	Table of contents	Table of Contents
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(a)(6)	Record of changes	Record of Revisions
(b)	Emergency Response Action Plan	Section 1
(b)(1)	Notification procedures	Sections 1.1, 1.2, and 3.3
(b)(1)(i)(A)	List of response personnel (include Qualified Individual)	OPA 90 Addendum, Sections 1.1, 1.2 and 3.3
(b)(1)(i)(B)	Government agencies	Section 1.2.3, Tables 1-2, 1-3, and 1-4
(b)(1)(ii)	Notification form	Figure 1-2
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(b)(2)(i)(D)	Worst case discharge from non-MTR portion	Not applicable
(b)(2)(ii)(A)	Failure of manifold, loading arm, hoses, other	Section 1.6
(b)(2)(ii)(B)	Tank overfill	Sections 2.1.9 and 3.1
(b)(2)(ii)(C)	Tank failure	Not applicable
(b)(2)(ii)(D)	Piping rupture	Not applicable
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(b)(2)(iii)	List of equipment and responsibilities for mitigation of average most probable discharge	Sections 3.5 and 3.6
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U.S. COAST GUARD AND DEPARTMENT OF HOMELAND SECURITY
RESPONSE PLANS FOR OIL FACILITIES
TRANSFERRING OIL OR HAZARDOUS MATERIAL IN BULK
[33 CFR 154]
(CONTINUED)

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(b)(4)(ii)(A)	List of sensitive areas	Sections 1.6.12 and 3.10.2
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POTENTIAL DISCHARGES

Average Most Probable Discharge

The average most probable discharge is calculated as approximately 0.5 barrel (bbl) of diesel fuel, based on the definition contained in 33 CFR 154.1020 (the lesser of 50 bbl or 1 percent of the volume of the worst case discharge [WCD]).

Maximum Most Probable Discharge

The maximum most probable discharge is 5.0 bbl of diesel fuel, calculated from the definition contained in 33 CFR 154.1020 (the lesser of 1,200 bbl or 10 percent of the volume of the WCD).

Worst Case Discharge

The WCD (for the purposes of the USCG) is 2,000 gallons (48 bbl), as calculated in Section 1.6 based on the definition contained in 33 CFR 154.1029(b)(2), using the following values:

- *Maximum Time to Discover Release:* 5 minutes
- *Maximum Time to Shutdown Pumping:* 0.5 minutes (30 seconds)
- *Maximum Transfer Rate:* 320 gallons per minute (gpm) (based on representative fuel transfer pumps on the oil spill response vessel (OSRV) = 7.6 bbl/min
- *Total Line Drainage Volume:* 163 gallons (premising 4-inch by 250-meter (m) marine hose between the pump manifold on the barge and the delivery flange on the inlet piping at the drilling vessel) or 3.9 bbl.

Type of product spilled:	Low-sulfur Arctic diesel (Refer to Appendix E)
Cause:	Hose flange cracks and/or hose ruptures during diesel fuel transfer operations to the *Kulluk* or *Frontier Discoverer*
Environmental conditions:	Winds 10 knots northeast (prevailing wind direction), clear skies, average temperature 44° F (average for August)
Spill trajectory:	Approximately 10 percent of the spill is contained on the deck of the fueling barge, and 90 percent of the spilled diesel enters the water. Current is assumed to be 0.75 knots to the west-northwest.

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OIL DISCHARGE PREVENTION AND CONTINGENCY PLAN

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LIST OF ACRONYMS

AAC	Alaska Administrative Code
ACP	Area Contingency Plan
ACS	Alaska Clean Seas
ADEC	Alaska Department of Environmental Conservation
ADNR	Alaska Department of Natural Resources
AES	ASRC Energy Service
AES	ASRC Energy Services, Inc. (Oil Spill Response Contractor)
AEWC	Alaska Eskimo Whaling Commission
ANWR	Arctic National Wildlife Refuge
AOGCC	Alaska Oil and Gas Conservation Commission
API	American Petroleum Institute
ARRT	Alaska Regional Response Team
ASI	Airborne Support, Inc.
ASRC	Arctic Slope Regional Corporation
ASTM	American Society for Testing and Materials
BAT	Best Available Technology
bbl	barrels
BLM	Bureau of Land Management
BMPs	Best Management Practices
BOP	Blowout Preventer
bopd	barrels of oil per day
BOPE	Blowout Prevention Equipment
BPXA	BP Exploration (Alaska) Inc.
CAA	Conflict Avoidance Agreement
CFR	Code of Federal Regulations
C-Plan	Oil Discharge Prevention and Contingency Plan
CRT	Crisis Response Team
DOT	U.S. Department of Transportation
EPA	U.S. Environmental Protection Agency
ESI	Environmental Sensitivity Index
FLIR	forward looking infrared radar
FOSC	Federal On-Scene Coordinator
GMDSS	Global Maritime Distress and Safety System
gpm	gallons per minute
H_2S	hydrogen sulfide
HAZWOPER	Hazardous Waste Operations and Emergency Response
HDPE	High-density polyethylene
HSE	Health, Safety, and Environment

IAP	Incident Action Plan
ICP	Incident Command Post
ICS	Incident Command System
IMT	Incident Management Team
IMT	Incident Management Team
ISB	In situ burning
Kg/m^2	kilograms per meter squared
kW	kilowatt
L/T	Level/Temperature
LMRP	Lower Marine Riser Package
LOSC	Local On-Scene Coordinator
LS	Level Sensors
m	meters
MAD	Mutual Aid Drill
MHz	megahertz
MMOs	Mammal Observers
MMS	Minerals Management Service
MODU	Mobile Offshore Drilling Unit
MSRC	Marine Spill Response Corporation
NIMS	National Incident Management System
NOAA	National Oceanic and Atmospheric Administration
NPRA	National Petroleum Reserve Alaska
NPREP	National Preparedness for Response Exercise
NRC	National Response Center
NRDA	Natural Resources Damage Assessment
NSB	North Slope Borough
NSSRT	North Slope Spill Response Team
OCS	Outer Continental Shelf
OIM	Offshore Installation Manager
OOPS	O'Brien's Oil Pollution Services
OPA 90	Oil Pollution Act of 1990
OSRB	Oil Spill Recovery Barge
OSRO	Oil Spill Removal Organization
OSRV	Oil Spill Response Vessel
PEL	permissible exposure level
PLC	programmable logic controller
PPE	personal protective equipment
PSI	Pounds Per Square Inch
psig	pounds per square inch gauge
QI	Qualified Individual

RAR	Real Aperture Radar
RPS	Response Planning Standard
RRT	Regional Response Team
RTOC	Real Time Operations Center
RTTI	Real Time Traffic and Travel Information
SAR	Synthetic Aperture Rada
SCAT	Shoreline Cleanup Assessment Technology
Shell	Shell Offshore Inc.
SMT	Spill Management Team
SOSC	State On-Scene Coordinator
SPCC	Spill, Prevention, Control, and Countermeasure
SRT	Spill Response Team
SSB	Single Sideband
TF	Task Force
UHF	Ultra High Frequency
USCG	U.S. Coast Guard
VHF	Very high frequency
VSAT	Very Small Aperture Terminal
WBS	Web-based System
WCD	Worst Case Discharge

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INTRODUCTION

This Oil Discharge Prevention and Contingency Plan (C-Plan) has been developed for Shell Offshore Inc. (Shell), and is one important element of Shell's overall commitment to conduct its operations in a safe and environmentally sensitive manner. Oil spill prevention is Shell's first priority. That commitment is evident throughout the multitude of plans developed by Shell for its Beaufort Sea exploratory drilling program, as well as the many local, state, and federal permit applications Shell has submitted or will submit to secure required authorizations prior to initiating its drilling program. This C-Plan is specifically designed to aid Shell in its efforts to prevent spills and, in the unlikely event of a spill, mitigate the impacts of that spill on the marine environment.

Shell Exploration and Production Company address, telephone, and fax numbers are provided below:

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The Shell Beaufort Sea Exploration Program goal is to permit and drill exploration wells within a geographic region representing current and future offshore lease holdings within the Beaufort Sea (see regional map Figure I-1) bounded by the following coordinates:

- 69º 57' 0" N – 71º 30' 0" N latitude, and
- 141º 48' 0" W – 156º 0' 0" W longitude.

The current and expected future leases and bottom hole locations are expected to be located on the federal Outer Continental Shelf (OCS) as regulated by the U.S. Department of Interior, Minerals Management Service (MMS), and all exploration activities will be conducted in compliance with applicable local, state, and federal laws.

Shell recognizes the harsh conditions associated with operating in the Arctic and is committed to the prevention of oil spills of any size. To achieve this goal, Shell's preparation in terms of personnel training, equipment and operating conditions are geared to the preservation of well control and prevention of oil spills:

- Fuel transfers will be conducted in strict accordance with U.S. Coast Guard-approved procedures on board each vessel.
- Pollution prevention equipment, maintenance and surveillance will be focused on the prevention of unauthorized discharges.
- The design of drilling procedures will ensure our ability to maintain primary well control at all times.
- Equipment for secondary well control will be maintained in top condition, including functional testing as required.

- A state of the art weather and ice forecasting and monitoring program will be in place to ensure safe operations.

- Deployment of ice breakers and the use of dynamic ice management will protect the drilling fleet enabling the rig to maintain station and ensuring the safety of personnel and operations.

- Real time operations monitoring using state of the art equipment will ensure early recognition of subsurface pressure increases and provide for a timely response to subsurface conditions.

Shell proposes to conduct its exploratory drilling activity using a minimum of two rigs. The first rig is the M.V. *Kulluk*, a Shell-owned Mobile Offshore Drilling Unit (MODU) with extensive prior experience drilling in the Chukchi and Beaufort seas, and the second is the *Frontier Discoverer*, a drilling ship which is currently being refurbished for use in the Arctic. Both drilling vessels will be operated by Frontier Drilling under Shell supervision.

Shell is confident that either of its drilling rigs could be moved quickly in the event of a blowout, allowing that rig to drill its own relief well; however, the availability of a second rig simply provides an additional level of confidence that well control could be secured under a broader range of possible conditions.

The first season in a multi-year program is anticipated to begin in 2007. During the 2007 season, Shell plans to mobilize the *Kulluk* and the *Frontier Discoverer* to drill several wells on up to two prospects:

- Sivulliq, located approximately 12 miles north of Flaxman Island, and
- Olympia, located approximately 16 miles northwest of the village of Kaktovik.

The *Kulluk* and *Frontier Discoverer* will be mobilized to well locations on these prospects from their current locations in McKinley Bay, Canada, and Singapore, respectively. The drilling rigs will be stocked with most of the drilling supplies needed to complete the 2007 program, although some deliveries of fuel and remaining items are expected to be performed by barge and helicopter during the season. Arctic-class ice-breakers and anchor handling vessels will accompany each drilling vessel. Access to the sites will be via helicopter and support vessels.

During mobilization and subsequent drilling operations, every reasonable effort will be made to minimize conflict with the fall bowhead whale migration and related harvest conducted by the villages of Kaktovik and Nuiqsut. Shell has commenced negotiations for a Conflict Avoidance Agreement (CAA) with the Alaska Eskimo Whaling Commission (AEWC), a non-profit organization that manages subsistence whaling activity that will include the mitigation of potential impacts arising from the proposed 2007 drilling program. In addition, it is Shell's intent to adopt a Good Neighbor Policy that specifically addresses and mitigates the impacts of a spill on the subsistence lifestyle of the local residents.

Shell currently expects to drill multiple wells on the Sivulliq and Olympia prospects during the Beaufort Sea open water season between August 1 and October 31, 2007. Non-critical drilling activities, including setting conductor casing and surface casing may be performed at either end or beyond the open water season, subject to consultation and approval by MMS, safe working conditions, weather, ice, and other environmental factors.

Activities at each drilling location may vary slightly. Plans, diagrams, and specific information for each proposed well for a specified exploration season are provided in annual project-specific permit application packages submitted to the agencies for review. MMS and the Alaska Department of Environmental

Conservation (ADEC) will receive a detailed package and be able to review the well location for coverage under this C-Plan.

Shell's Beaufort Sea Exploration C-Plan regional applicability is based on demonstrating a spill response capability up to 150 miles from a known infrastructure, such as Prudhoe Bay, or remote year-round aircraft-supported infrastructure. The plan is based on the deployment of oil spill response vessels and equipment "on the water," capable of providing an immediate response to oil spills in two discrete planning regimes:

- A spill response scenario written in compliance with MMS and ADEC regulations, based on open water conditions; and
- An associated response strategy that demonstrates regional response capability under different accessibility criteria and assumptions.

It is Shell's intent that the C-Plan serve as a regional oil spill response plan for the Beaufort Sea Exploratory Drilling Program, which is anticipated to run through 2009. This C-Plan is intended to be a planning document to help identify and establish the basis for Shell's oil spill prevention and recovery in the event of an oil spill, and as such, by its very nature, it cannot anticipate all possible contingencies. Shell plans to submit permit applications to local, state, and federal agencies containing site-specific well locations and other data in advance of each exploratory drilling season, which premises that drilling may be underway on up to two exploration wells at any given time. Federal and state regulators will be able to review the project-specific updates for a specified season and determine whether the Shell Beaufort Sea Exploration C-Plan is applicable for the individual well(s). Depending on the outcome of its exploration activities, Shell anticipates, in due course, to submit future applications for permits to proceed with development of its leases. This development would necessarily require a separate C-Plan to address the facilities and activities related to such development. The C-Plan follows the ADEC format set forth in Title 18 of the Alaska Administrative Code Chapter 75, Part 425 (18 AAC 75.425). Controlled copies of the plan are available at the ADEC office located at 555 Cordova Street, Anchorage, Alaska, 99501.

The C-Plan also addresses federal oil spill planning regulations of the MMS and The U.S. Coast Guard (USCG).

OBJECTIVES

The objective is to minimize potential environmental impacts and to provide for the safety of personnel during drilling operations by preventing petroleum hydrocarbon releases. Safety is a core value for Shell and is never compromised. This C-Plan also provides Shell with the background information and response planning guidelines necessary to implement an efficient, coordinated, and effective spill response.

The following types of facilities and operations are covered by this plan:

- Drilling vessels and facilities, support vessels, and related operations;
- Well testing operations;
- Storage operations (including recovered oil spill fluids); and
- Transfer options (including fuel and recovered oil spill fluids) involving Shell exploration and related support vessels.

ALASKA CLEAN SEAS TECHNICAL MANUAL

Shell is a member of Alaska Clean Seas (ACS). ACS is the primary response contractor for nearshore and shoreline spill response activities. This C-Plan incorporates references to the ACS *Technical Manual*, consisting of Volume 1, Tactics Description; Volume 2, Map Atlas; and Volume 3, Incident Management System.

Shell's primary offshore response action contractor is ASRC Energy Services (AES), a subsidiary of Arctic Slope Regional Corporation (ASRC). AES's scope of work will include the provision of oil spill response equipment and response personnel available on standby while critical drilling operations are underway as well as response in the event of an actual oil spill incident, including related maintenance, ongoing assurance of response capabilities and coordination of all training activities. AES will conduct response activities using ACS tactics, as defined in the ACS *Technical Manual*, or otherwise as defined in this C-Plan.

PLAN DISTRIBUTION

The C-Plan is distributed to Shell management, staff, and regulatory agencies as appropriate. This C-Plan is accessible to Shell employees and contractors on Shell's intranet website.

UPDATING PROCEDURES

The C-Plan is reviewed and updated when major changes occur in the ability to respond to the worst case discharge, or when such changes could affect the implementation of the C-Plan. Below is a list of key factors that may cause revisions to the plan:

- Changes to response planning standards,
- Change in oil spill response organizations,
- Change in Qualified Individual (QI),
- Changes in a National Contingency Plan or Area Contingency Plan that have a significant impact on the appropriateness of response equipment or response strategies,
- Change in response procedures, or
- Change in ownership.

In addition, it is Shell's intent to provide administrative updates to drilling locations, vessel names, and other routine information of a project-specific nature, in advance of each exploration season, either as an update to the C-Plan or as part of annual permit applications, as appropriate.

TABLE I-1
RENEWAL REQUIREMENT

AGENCY	CITATION	REQUIREMENT
ADEC	18 AAC 75.415	Every five years from the date of approval or when changes are made that diminish the ability to respond.
MMS	30 CFR Part 254.30	Every two years, or when there is a reduction in response capabilities.
USCG	33 CFR Part 154	Annual review by operator. Resubmit every 5 years.

Amendment or updates to the C-Plan are submitted to the appropriate regulatory agency for review and approval. Once the amendment or update has been approved, it is posted on the intranet site, and hardcopies are distributed to all plan holders. Plan holders are requested to replace the hard copy pages. Revisions are documented in the Record of Revisions history table, which is included with each approved amendment distribution. It is the responsibility of each plan holder to incorporate amendments or updates into the plan.

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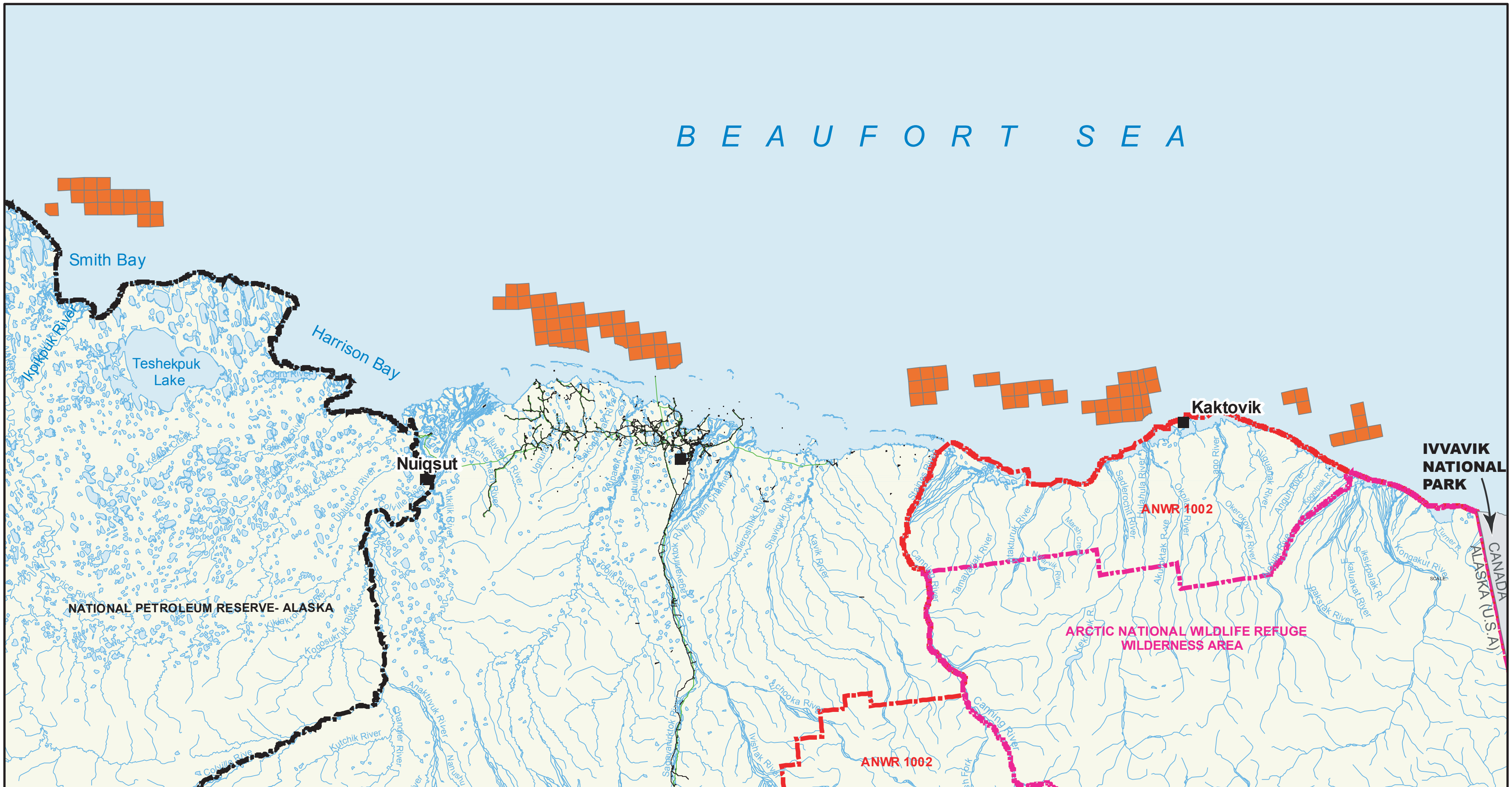
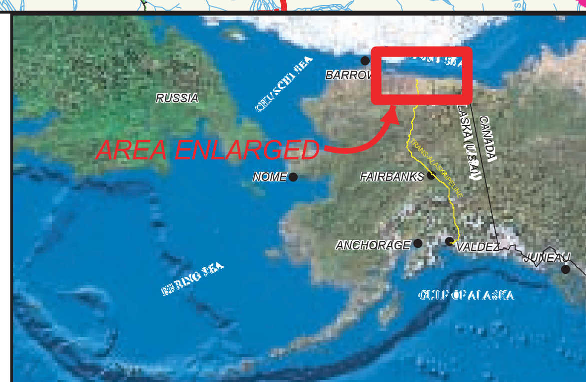


■ Populated Places
Roads
Pipelines
Arctic National Wildlife Refuge (ANWR)
ANWR Wilderness Area
National Petroleum Reserve - Alaska
Shell Oil & Gas Leases

Projection Alaska Albers Equal Area Conic.
Lease data provided by Mapmakers
Alaska Inc. (© 2001 Mapmakers Alaska).

SCALE: 0 10 20 40 Miles



SHELL OFFSHORE, INC.

EXPLORATION PLAN-2007
PROGRAM REGIONAL MAP

December 2006	Figure I-1

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TABLE I-2
LEASES OWNED BY SHELL AND PARTNER COMPANIES
IN THE EASTERN BEAUFORT SEA (AS OF NOVEMBER 2006)

PROTRACTION AREA	OPD NO.	BLOCK NO.	MMS LEASE # OCS-Y-
Barter Island	NR 07-03	7067	1848
Barter Island	NR 07-03	7117	1849
Demarcation Point	NR 07-05	6019	1852
Demarcation Point	NR 07-05	6020	1853
Barter Island	NR 07-03	6962	1845
Barter Island	NR 07-03	6963	1846
Barter Island	NR 07-03	7013	1847
Flaxman Island	NR 06-04	6657	1804
Flaxman Island	NR 06-04	6658	1805
Flaxman Island	NR 06-04	6659	1806
Flaxman Island	NR 06-04	6707	1807
Flaxman Island	NR 06-04	6708	1808
Flaxman Island	NR 06-04	6709	1809
Flaxman Island	NR 06-04	6757	1812
Flaxman Island	NR 06-04	6758	1813
Harrison Bay	NR 05-04	6173	1742
Harrison Bay	NR 05-04	6222	1743
Harrison Bay	NR 05-04	6223	1744
Beechey Point	NR 06-03	6152	1761
Beechey Point	NR 06-03	6202	1762
Beechey Point	NR 06-03	6203	1763
Beechey Point	NR 06-03	6204	1764
Beechey Point	NR 06-03	6253	1767
Beechey Point	NR 06-03	6254	1768
Beechey Point	NR 06-03	6255	1769
Beechey Point	NR 06-03	6256	1770
Beechey Point	NR 06-03	6303	1772
Beechey Point	NR 06-03	6304	1773
Beechey Point	NR 06-03	6305	1774
Beechey Point	NR 06-03	6306	1775
Beechey Point	NR 06-03	6307	1776
Beechey Point	NR 06-03	6308	1777
Beechey Point	NR 06-03	6309	1778
Beechey Point	NR 06-03	6353	1780
Beechey Point	NR 06-03	6354	1781
Beechey Point	NR 06-03	6355	1782
Beechey Point	NR 06-03	6356	1783
Beechey Point	NR 06-03	6406	1788
Beechey Point	NR 06-03	6411	1791
Beechey Point	NR 06-03	6412	1792
Beechey Point	NR 06-03	6460	1793
Beechey Point	NR 06-03	6461	1794

TABLE I-2 (CONTINUED)
LEASES OWNED BY SHELL AND PARTNER COMPANIES
IN THE EASTERN BEAUFORT SEA (AS OF NOVEMBER 2006)

PROTRACTION AREA	OPD NO.	BLOCK NO.	MMS LEASE # OCS-Y-
Beechey Point	NR 06-03	6462	1795
Beechey Point	NR 06-03	6463	1796
Beechey Point	NR 06-03	6512	1799
Beechey Point	NR 06-03	6513	1800
Beechey Point	NR 06-03	6404 A	1787
Flaxman Island	NR 06-04	6712	1810
Flaxman Island	NR 06-04	6713	1811
Flaxman Island	NR 06-04	6764	1816
Flaxman Island	NR 06-04	6814	1822
Flaxman Island	NR 06-04	6815	1823
Flaxman Island	NR 06-04	6765	1817
Flaxman Island	NR 06-04	6766	1818
Flaxman Island	NR 06-04	6767	1819
Flaxman Island	NR 06-04	6817	1824
Flaxman Island	NR 06-04	6818	1825
Flaxman Island	NR 06-04	6773	1820
Flaxman Island	NR 06-04	6774	1821
Flaxman Island	NR 06-04	6822	1826
Flaxman Island	NR 06-04	6823	1827
Flaxman Island	NR 06-04	6824	1828
Flaxman Island	NR 06-04	6873	1833
Flaxman Island	NR 06-04	6874	1834
Flaxman Island	NR 06-04	6923	1837
Flaxman Island	NR 06-04	6924	1838
Barter Island	NR 07-03	6751	1839
Barter Island	NR 07-03	6752	1840
Barter Island	NR 07-03	6801	1841
Barter Island	NR 07-03	6802	1842
Barter Island	NR 07-03	6851	1843
Barter Island	NR 07-03	6901	1844
Demarcation Point	NR 07-05	6017	1850
Demarcation Point	NR 07-05	6018	1851
Beechey Point	NR 06-03	6358	1784
Beechey Point	NR 06-03	6359	1785
Beechey Point	NR 06-03	6360	1786
Beechey Point	NR 06-03	6409	1789
Beechey Point	NR 06-03	6410	1790
Flaxman Island	NR 06-04	6870	1830
Flaxman Island	NR 06-04	6871	1831
Flaxman Island	NR 06-04	6872	1832
Flaxman Island	NR 06-04	6921	1835
Flaxman Island	NR 06-04	6922	1836

TABLE I-2 (CONTINUED)
LEASES OWNED BY SHELL AND PARTNER COMPANIES
IN THE EASTERN BEAUFORT SEA (AS OF NOVEMBER 2006)

PROTRACTION AREA	OPD NO.	BLOCK NO.	MMS LEASE # OCS-Y-
Harrison Bay	NR 05-04	6369	1699
Harrison Bay	NR 05-04	6370	1700
Harrison Bay	NR 05-04	6419	1701
Harrison Bay	NR 05-04	6420	1702
Harrison Bay	NR 05-04	6421	1703
Beechey Point	NR 06-03	6352	1704
Beechey Point	NR 06-03	6402 & 6403	1705
Harrison Bay	NR 05-04	6272	1745
Harrison Bay	NR 05-04	6273	1746
Harrison Bay	NR 05-04	6320	1747
Harrison Bay	NR 05-04	6321	1748
Harrison Bay	NR 05-04	6322	1749
Harrison Bay	NR 05-04	6323	1750
Harrison Bay	NR 05-04	6371	1751
Harrison Bay	NR 05-04	6372	1752
Harrison Bay	NR 05-04	6373	1753
Harrison Bay	NR 05-04	6374 & 6424	1754
Harrison Bay	NR 05-04	6418	1755
Harrison Bay	NR 05-04	6422	1756
Harrison Bay	NR 05-04	6423	1757
Harrison Bay	NR 05-04	6468	1758
Harrison Bay	NR 05-04	6469	1759
Harrison Bay	NR 05-04	6518 & 6519	1760
Beechey Point	NR 06-03	6251 & 6301	1765
Beechey Point	NR 06-03	6252	1766
Beechey Point	NR 06-03	6302	1771
Beechey Point	NR 06-03	6351 & 6401	1779

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State Approval

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MMS Approval Letter

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USCG Approval Letter

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PART 1 RESPONSE ACTION PLAN [18 AAC 75.425(e)(1)]

The environment for drilling activities lies outside Alaska state waters in the Beaufort Sea. For planning purposes, a hypothetical blowout involves oil that travels upwards from the well at the ocean floor to the water surface. The resulting plume of oil is driven by ocean currents and wind. Stochastic spill modeling based on current and wind information suggests that spilled oil is not likely to reach land in less than 24 to 48 hours, even if no containment and recovery operations took place.

These timelines have been used to plan the mobilization of ACS equipment and response personnel to protect sensitive environmental sites along the shoreline (see Section 1.6.12).

1.1 EMERGENCY ACTION CHECKLIST [18 AAC 75.425(e)(1)(A)]

The person reporting an oil spill to the immediate supervisor or Qualified Individual may be required to supply minimum spill assessment information to provide as complete an understanding of the incident as possible. Some initial spill response actions and information that may be reported are included in Table 1-1 and Table 1-2.

TABLE 1-1
EMERGENCY ACTION CHECKLIST

EMERGENCY ACTION CHECKLIST	
INITIAL SPILL RESPONSE ACTIONS	**WHAT TO REPORT TO YOUR SUPERVISOR**
1. Protect people: Safety is first priority. Sound Alarm. Shut off ignition sources. Restrict Access. Evaluate as necessary and initiate rescue and response actions. 2. Notify your supervisor. 3. Stop the spill at source, if safe to do so. 4. Assess possible hazards: Fire and explosion potential of vapors at or near the source, Potential toxic effects of the discharge, Damage to facility affecting safety, and Recovery of the spilled product. 5. For a blowout, implement well control and evacuation procedures and activate Tier Ill Incident Command System (ICS).	1. Was anyone hurt? 2. Where is the spill? 3. What time did it happen? 4. What was spilled? 5. How much was spilled? 6. What is the rate of release? 7. What is the source? 8. What are the weather conditions? 9. What actions have you taken? 10. What equipment do you need? 11. Are there any immediate environmental impacts? 12. Who did you notify?

The emergency action and notification sequence varies depending on the size of the spill and required response. The spill classifications described below apply only to the emergency phases of containment and initial recovery of a spill.

Spill Classification Guidelines

Tier I Spill: Local spill that the affected asset can respond to effectively with equipment and personnel on board (such as deploying absorbent containment and recovery materials). No immediate off-site assistance is needed (Table 1-2).

Tier II Spill: Large spill that would require mobilization of the Incident Management Team and/or all dedicated response resources identified in this C-Plan (using ASRC Energy Services [AES] services deployed offshore and if necessary, the activation of Alaska Clean Seas [ACS]).

Tier III Spill: Large spill with potential to require mobilization of all resources listed above for Tier II plus additional national or international resources not specified in this C-Plan.

TABLE 1-2
INITIAL SPILL RESPONSE AND
NOTIFICATION PROCESS – TIER 1 SPILL

TIER I SPILL	
PERSONNEL	**ACTION TO BE TAKEN**
FIRST PERSON TO SEE THE SPILL	Assess safety of situation, determine whether source can be stopped, and stop the source of spill if possible. Immediately notify your supervisor. If your supervisor is not available, notify the on-scene Incident Commander/Qualified individual (QI).
INITIAL ON-SCENE INCIDENT COMMANDER/QI **(Drilling Foreman)**	From a safe distance, determine that the spill is stopped or contained. Call the Incident Commander/QI. Call Drilling Superintendent (if not available, call Wells Manager). Complete applicable spill report form (Figure 1-2). Respond as directed by Incident Commander to contain and recover spill.
INCIDENT COMMANDER/QI **(Asset Manager or designee)**	Activate appropriate components of Incident Management Team. Determine if Tier l, Tier II, or Tier III spill actions must be taken. Call the National Response Center (1–800–424–8802).

If the Initial On-scene Incident Commander or the Incident Commander determines that the spill is a Tier -II or -III event (Figure 1-1), the following additional responses and notifications should take place (Table 1-3). A summary of the emergency actions described in this manual is available for field personnel.

TABLE 1-3
INITIAL SPILL RESPONSE AND
NOTIFICATION PROCESS – TIER II OR TIER III SPILL

TIER II OR TIER III SPILL	
PERSONNEL	**ACTION TO BE TAKEN**
INCIDENT COMMANDER/QI	Gather information; assess magnitude/severity of the spill; and notify AES, ACS, and Shell management. Complete internal and external notifications. Notify the National Response Center (1–800–424–8802). Establish objectives and response strategies. Monitor status of incident, facility, and personnel. Work closely with Safety Officer to: assess any and all risks of accidental ignition of the blowout hot zone and safe operating distances for all operations; and need and practicality of safely and deliberately igniting the vapors over the surfacing oil plume. Mobilize resources (in addition to on-site equipment & personnel) if necessary.
LIAISON OFFICER	Confirm that all state and federal agencies and appropriate Native corporations and villages have been notified. Request safety zones for air and water. Request Notice to Mariners (U.S. Coast Guard [USCG]). Obtain approval to decant USCG. Prepare written reports to agencies.
PUBLIC INFORMATION OFFICER	Establish Joint Information Center. Activate mutual aid. Prepare for media interest. Keep the public informed. Coordinate media efforts through the Joint Information Center. Identify community concerns.
SAFETY OFFICER	Evaluate and monitor hazards. Notify offset operators. Obtain MSDS and prepare Site Safety Plan. Establish first aid posts. Coordinate search and rescue operations. Coordinate post-incident debriefing. Conduct air monitoring as may be needed. Establish initial site safety plan. Ensure HAZWOPER compliance. Investigate safety-related accidents and report to Incident Commander. Conduct safety inspections.
OPERATIONS SECTION CHIEF	Mobilize and direct on-scene response equipment and personnel. Coordinate all operations with AES, ACS, Shell's on-site response personnel, and village response teams. Ensure Shell representation at site/ staging areas. Consider pre-cleaning the shoreline prior to impact. Contact wildlife specialists and refuge managers for information. Oversee preparation of Air Operations Plan.
PLANNING SECTION CHIEF	Collect, process, and display incident information. Provide basic environmental support. Supervise development of Incident Action Plan.

1.2 REPORTING AND NOTIFICATION [18 AAC 75.425(e)(1)(B)]

1.2.1 Initial Reporting

Any Shell contractor or employee is required to report the spill to their immediate supervisor. The person in charge receiving the initial spill report, or possible spill, will assess the situation and then call the Incident Commander.

The Incident Commander will then initiate the internal and external reporting sequence to ensure proper notification of response personnel, appropriate company management and government agencies. Emergency contact telephone numbers for Shell, response action contractors, and Mutual Aid (if required) are included in Table 1-4. Agency and External Notification Information (including Native corporations and villages) are included in Table 1-5.

The Shell spill report form (Figure 1-2) must be completed for any reportable spills.

FIGURE 1-1
INTERNAL EMERGENCY NOTIFICATION PROCESS DIAGRAM

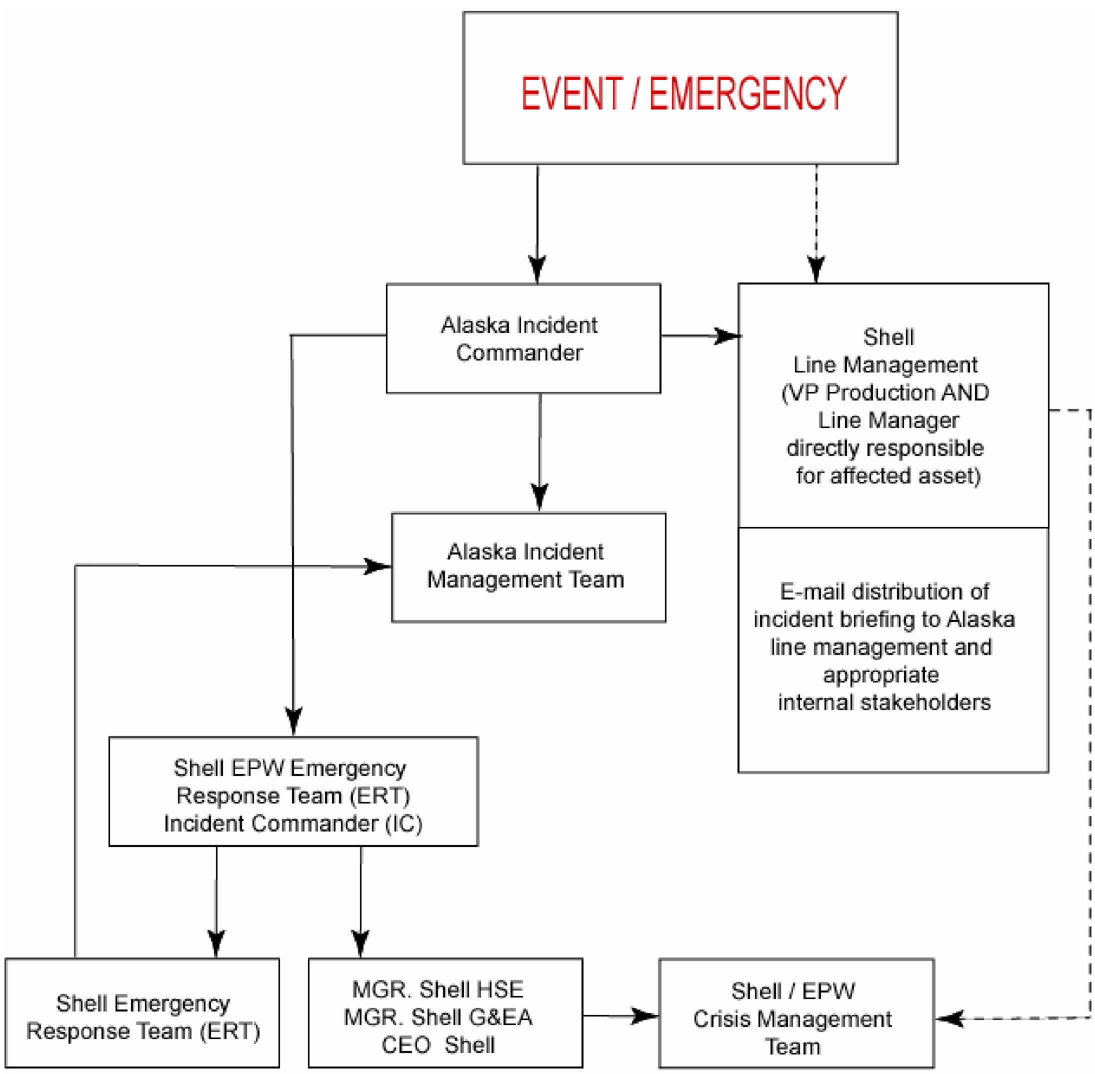


TABLE 1-4
EMERGENCY CONTACT LIST

SHELL OFFSHORE INC. CONTACT LIST		
SHELL OFFSHORE INC.	***KULLUK***	***FRONTIER DISCOVERER***
Security	(907) 264-7777	(907) 264-7777
Alaska Asset Manager (IC)	(907) 770-3700	(907) 770-3700
Wells Manager	(281) 544-2151	(281) 544-2151
Drilling Superintendent	(713) 546-6668	(713) 546-6668
Regulatory Affairs Manager	(504) 728-4252	(504) 728-4252
HSE Environmental Manager	(907) 854-0073	(907) 854-0073
Environmental / SD Advisor	(713) 546-6124	(713) 546-6124
Drilling Engineer	(713) 546-6674 Cell (713) 898-7104	(713) 546-6675
Drilling Team Leader	(713) 948-1169	(713) 948-1169
Technical Advisor, Spiltec (Al Allen) (425) 869-0988		

OIL SPILL RESPONSE ORGANIZATIONS	
ASRC Energy Services (AES), Address: 3900 C Street, Anchorage, Alaska 99503	
Main number Anchorage	(907) 339-6200
AES Operations Manager	(907) 339-6200
Alaska Clean Seas (ACS), Address: Pouch 340022, Prudhoe Bay, Alaska 99734	
Main Number Prudhoe Bay	(907) 659-2405
ACS Operations Manager	(907) 659-3202
North Slope Mutual Aid (if applicable) handled through ACS	(907) 659-2405

NOTE: PLEASE REFER TO TABLE 1-5 AGENCY AND EXTERNAL NOTIFICATION INFORMATION FOR FURTHER EMERGENCY CONTACT NUMBERS.

FIGURE 1-2
SHELL REPORT OF OFFSHORE ENVIRONMENTAL INCIDENT FORM

(Internal SEPCo HSE use only) **Incident Number______________.**

Report of Offshore Environmental Incident Form (OF-REI)

DIRECTIONS: This form is to be used to capture information that will be later entered into the IMPACT Safety database. When completing this form, please be as complete and specific as possible. When completing this form using MS Word you will only be able to enter information into the shaded portions of the form or by clicking on the check boxes. You can use the TAB key to move to the right or the DOWN ARROW key to move down on the form. You may also use your mouse to click on the cell that you want to complete.

Date of Incident	**Time of Incident**	**On SEPCo Premises** ☐ **Y** ☐ **N**

Incident Headline (Brief description of incident – 50 characters or less on the line below)

Incident Type and Location Information

☐ Spill ☐ Exceedance of discharge limits (Noncompliance) ☐ Produced water sheen
☐ Material lost overboard ☐ Complaint ☐ Fire ☐ Release ☐ Other(Describe)

Field Name	**Well No./Rig**	**Block**	**Platform**
Latitude	Longitude	OCS-G#	

Activity at Location
☐ Drilling/W.O./Completion ☐ Exploration ☐ Production ☐ Construction ☐ Other

Specific Operation

☐ Drilling	☐ Construction	☐ Operations	☐ Other
☐ Workover	☐ Crane operations	☐ Well servicing	
☐ Completion	☐ Equipment handling	☐ Air transport	
☐ Coil tubing	☐ Maintenance	☐ Boat/Ship	

Source (Check all that apply)

☐ Drip pan	☐ Flowline	☐ Other surface	☐ Sump	☐ Tank/Vessel	☐ Wellhead
☐ Flare	☐ Hoses	☐ Pipeline	☐ Rotating equipment	☐ Transfer equipment	☐ Other

Environment Affected
☐ Water ☐ Air

What was spilled or released?
Report spilled or released volume expressing liquid in gallons, dry chemicals in pounds and air emissions in Standard Cubic Feet.
Gallons (gal) **Pounds (lbs)** **Standard Cubic Feet (SCF)**

OIL SPILL INFORMATION

Sheen colors	☐ Barely Visible (spill factor = 0.000008)	☐ Silvery (spill factor = 0.000016)
	☐ Slight Color (spill factor = 0.000032)	☐ Bright Color (spill factor = 0.000065)
	☐ Dull (spill factor = 0.00022)	☐ Dark (spill factor = 0.00043)

Size of the sheen yards by yards Estimated volume of the spill (yards **x** yards **x** spill factor) = **gallons**

Was the sheen ☐ captured/cleaned up ☐ allowed to disperse naturally

How long did the sheen last before natural dispersion or cleaned up? hours

Weather Information

Est. current speed	Direction **(to)**	Estimated wave height	Est. wind speed	Direction **(from)**

Liquid Spill Properties (for spills larger than 6 barrels)

API Gravity	**Pour Point**	
Visibility(nautical miles)	Ceiling (feet)	Ambient temp. (°F.)

Source Control

Describe how and when the source of the spill or discharge was stopped

Describe what was/will be done specifically to prevent reoccurrence? (Procedures changed, equipment repaired, etc)

What was the cost of repairs/cleanup (Include equipment, repair time, transportation, etc.)

EXCEEDANCE OF DISCHARGE LIMITS (NONCOMPLIANCE)

Did a sample fail a Permit test? ☐ **Y** ☐ **N** ☐ **Static sheen** ☐ **Produced H_2O sheen**

Oil and Grease mg/l **Sanitary chlorine** mg/l **Toxicity** ppm

Full Description (How did the incident occur?)
(Attach additional sheets, if necessary, to complete event description)

(Internal SEPCo HSE use only) Incident Number______________.

INCIDENT IMPACT (Actual)					
Actual Impact on Environment	☐ **Slight Effect** – Less than 1 barrel spill	☐ **Minor Effect** – Greater than 1 barrel spill, INC or non-compliance	☐ **Localized Effect** – Greater than 5 barrels spilled or chemical reportable quantity (RQ)	☐ **Major Effect** – Spill response initialization required	☐ **Massive Effect**
Actual Impact on Assets ☐ **None**	☐ No disruption to operation	☐ Brief disruption	☐ Partial shutdown, can be restarted	☐ Partial operational loss up to 2 weeks	☐ Substantial or total loss of operation
Actual Impact on Reputation ☐ **None**	☐ Slight	☐ Limited	☐ Considerable	☐ Major National	☐ Major International

Type of Complaint (☐ **Check if none)**

☐ Blast/Vibration ☐ Lights ☐ Odor/Fumes ☐ Debris ☐Noise ☐Oil Spray ☐ Smoke ☐ Flaring
☐ Other (describe)

NOTIFICATIONS

	Notified	Person's Name	Date / Time	Report number
External Notifications				
National Response Center 1-800-424-8802 (If delegated to by Incident Commander)	☐		/	
	☐		/	
Internal Notifications (all incidents)				
Incident Commander	☐		/	
Area Leader/Drilling Superintendent	☐		/	
	☐		/	

Witness(es) to the Incident

Name (Typed or Printed)	Employer	Phone

I certify that all the above information is true, accurate and complete. Under Federal law, penalties can be assessed for recording false information including fines and imprisonment.

Report submitted by

Name (Typed or Printed)	Title	Phone	Date

Approvals and/or reviewers

Name (Typed or Printed)	Title	Phone	Date

Contact the HSE Incident Management Process Gatekeeper for you organization for submission instructions. You can also submit via e-mail address (incidents@shellus.com) or Fax to (907) 700-3636

SEPCo Offshore Report of Environmental Incident Form Page 2 of 2 Form OF-REI Rev. Jan 2002

1.2.2 External Notification Procedures

Appropriate agency verbal notifications and written reports may include:

- National Response Center
- MMS
- U.S. Bureau of Land Management
- U.S. Fish and Wildlife
- U.S. Environmental Protection Agency (EPA)
- USCG
- U.S. Department of Interior
- U.S Department of Transportation
- ADEC
- Alaska Oil and Gas Conservation Commission
- Alaska Department of Fish and Game
- Alaska Department of Natural Resources
- National Marines Fisheries
- North Slope Borough
- Village of Kaktovik
- Village of Nuiqsut
- Village of Barrow

See Table 1-5 for contact information.

1.2.3 Written Reporting Requirements

Depending on the type and amount of material spilled, individual government agencies have written reporting requirements, which are the responsibility of Shell. MMS, USCG, and ADEC reporting requirements will be met in the following procedures. Agency and external notification requirements, and agency reporting requirements are summarized in Tables 1-5 and 1-6, respectively.

MMS regulations require all applicable federal, state, and regulatory agencies be notified.

ADEC regulation 18 AAC 75.300 requires notification of any spill on State lands or waterways. After notification of the discharge has been made to ADEC, the department will, at its discretion, require interim reports until cleanup has been completed (18 AAC 75.307). A written final report must be submitted within 15 days of the end of cleanup operations, or, if no cleanup occurs, within 15 days of the discharge (18 AAC 75.307). This process is outlined in the ACS *Technical Manual*, Tactic A-2.

TABLE 1-5
AGENCY AND EXTERNAL NOTIFICATION INFORMATION

AGENCY	PHONE	FAX
National Response Center (NRC)	(800) 424-8802	
Environmental Protection Agency (EPA) (NRC will call)	(907) 271-5083	(907) 271-3424
Carl Lautenberger (EPA) direct line	(907) 271-1273	
ADEC - Business Hours	(907) 451-2121	(907) 451-2362
ADEC - after hours and on weekends call AK STATE TROOPERS	(800) 478-9300	
ADEC - Sewage Spills Only (Abigail Ogbe)	(907) 451-2130	(907) 451-2187
Alaska Department of Natural Resources – Oil Spill Hotline Recording	(907) 451-2678	(907) 451-2751
North Slope Borough (NSB)	(907) 561-5144	(907) 562-1940
NSB Waska Williams (Office)	(907) 852-0440	(907) 852-5991
NSB Waska Williams (Cell Phone)	(907) 367-3930	
NSB Permitting and Zoning Division	(907) 852-0320	(907) 852-5991
NSB Risk Management	(907) 852-0248	(907) 852-0356
NSB Disaster Coordinator (Pat Patterson)	(907) 852-2822, (907) 852-6111 (24 hours on call)	(907) 852-2475
US Coast Guard	(907) 271-6700	(907) 271-6765
US Fish and Wildlife Service (spills that may impact ANWR)	(907) 456-0250	(907) 456-0248
Minerals Management Service	(907) 250 - 0546	(907) 334-5302
Alaska Department of Fish and Game - Fairbanks	(907) 459-7242	(907) 452-6410
Alaska Oil and Gas Conservation Commission - Anchorage	(907) 279-1433	(907) 276-7542
Alaska Oil and Gas Conservation Commission - North Slope Inspector	(907) 659-3607 Pager, (907) 659-2714	(907) 659-2717
BLM Anchorage – NPR-A	(907) 267-1210	(907) 267-1304
BLM Fairbanks – NPR-A (Don Meares) Report seismic spills to Fairbanks only; other spills to both Fairbanks and Anchorage	(907) 474-2306	(907) 474-2386
Prudhoe Bay Weather Village of Nuiqsut Village of Kaktovik City of Barrow North Slope Borough Mayor's Office	(907) 659-5888 (907) 480-6727 (907) 640-6313 (907) 852-5211 (907) 852-0200	

TABLE 1-6
AGENCY REPORTING REQUIREMENTS FOR OIL SPILLS

		ENVIRONMENTAL COMPLIANCE INITIAL AGENCY NOTIFICATION											ADMINISTRATIVE WRITTEN REPORT (fax is acceptable)			
		AS SOON AS POSSIBLE					WITHIN 48 HRS	MONTHLY		IMMEDIATE OR AS SHOWN BELOW			5 DAYS AFTER LOSS	15 DAYS AFTER LOSS	15 DAYS AFTER CLEANUP	30 DAYS AFTER EVENT
					SPECIFIC CONDITIONS											
		NRC (EPA)	ADEC ADNR	NSB	USCG[3] MMS[5] ADF&G[6]	BLM[10]	ADEC NSB ADNR	ADEC NSB ADNR	FEDERAL LAND ONLY BLM[10]	DOT	SPCO FAX W/IN 48 HR	AOGCC[2] CRUDE GAS	AOGCC CRUDE GAS	EPA[7,14] BLM	ADEC[8] ADNR NSB	DOT[12] SPCO
OFFSHORE (DISCHARGES TO WATER)																
Sewage[8]	Any quantity	X	X											X	X	
Any oil or chemical spill	(i.e., oil, drilling fluids, glycol, produced water, or brine)	X	X	X	X	X			X			X	X	X	X	
Seawater	To seawater environment (no report)															
	Any amount seawater to freshwater environment	X	X	X	X	X			X					X	X	
STAGING AREA																
Chemicals	Exceeds Federal RQ[1]	X	X	>55 gal		>100 bbl			X					>10 bbl	X	
	Less than RQ, or has no RQ		X	>55 gal		X[4]			X						X	
Selected Hazardous Substances[13]	>55 gallons		X	X					X						X	
	10 to 55 gallons							X	X						X	
	<10 gallons (no report)															
Seawater	To seawater environment (no report)															
	>55 gallons to freshwater environment					>100 bbl	X		X					>10 bbl	X	
	10 to 55 gallons to freshwater environment							X	X						X	
	<10 gallons to freshwater environment (no report)															
Sewage[8]	Any quantity						X[8]								X	
Oil	>55 gallons		X	X		>100 bbl or 500 mcf gas			X			X	X	>10 bbl or 50 mcf gas	X	
	10 to 55 gallons						X		X			>25 gal	X		X	
	1 to 10 gallons (<1 gallon = no report)							X	X				X		X	
IN CONTAINMENT																
Chemicals	Air release, with RQ	X	X						X						X	
	Less than RQ or has no RQ[15]															
Sewage[8]	Any quantity (no report)															
Oil, Glycol, and Select Hazardous Sub.[13]	>55 gallons (less than = no report)		X			>100 bbl or 500 mcf gas			X			X	X	>10 bbl or 50 mcf gas	X	

TABLE 1-6 (CONTINUED)
AGENCY REPORTING REQUIREMENTS FOR OIL SPILLS

Notes: “Oil” includes crude, diesel, gasoline, hydraulic fluid, transmission fluid, and therminol.

1. Chemicals with Federal RQs include ethylene glycol at 540 gal; methanol (pure) at 750 gal. Chemicals without RQs include sewage, produced water, and seawater.
2. Crude oil spills >25 gal; notify AOGCC Slope Rep. Crude spills >10 bbl, notify AOGCC Slope Rep.
3. All oil spills to or threatening navigable waters.
4. Offshore rig spills <42 gal, call NRC. Spills >42 gal, call MMS directly.
5. Any release to fish bearing water bodies.
6. EPA letter required for oil spills >1,000 gal, all off pad oil spills and storm water releases of oil or chemicals >RQ.
7. Sewage, including domestic wastewater and gray water, spills are reportable to ADEC Wastewater Program; written report due 7 days after event.
8. No notification required for snow covered tundra unless >100 bbl, or unless penetrates tundra.
9. Use Form MMS-3160. Reporting required for federal lands only.
10. See Off Pad, On Pad, Ice Pad/Ice Roads, and In Containment reporting requirements to determine reporting to these agencies.
11. Glycols, brines, drilling fluids, seawater, produced water, or methanol diluted with 40% or more water.
12. Detailed report must be submitted to EPA within 60 days if oil discharge is over 1,000 gal in a single event or more than 42 gal of oil in each of two discharges within any 12 month period.
13. Field Environmentalist must evaluate available information (MSDS, test data, or process knowledge) to determine if spilled substance is a hazardous substance. Reporting is not required if a non-hazardous determination is made.

Interim and final written reporting requirements are specified in 18 AAC 75.300. The report must contain the following information:

- Date and time of discharge;
- Location of discharge;
- Name of facility or vessel;
- Name, mailing address, and telephone number of person or persons causing or responsible for the discharge and the owner and the operator of the facility or vessel;
- Type and amount of each hazardous substance discharged;
- Cause of the discharge;
- Description of any environmental damage caused by the discharge or containment to the extent the damage can be identified;
- Description of cleanup actions taken;
- Estimated amount of hazardous substance cleaned up and hazardous waste generated;
- Date, location, and method of ultimate disposal of the hazardous substance cleaned up;
- Description of actions being taken to prevent recurrence of the discharge; and
- Other information the department requires to fully assess the cause and impact of the discharge.

1.3 SAFETY [18 AAC 75.425(e)(1)(C)]

Based on applicable safety standards, a description of the steps necessary to develop an incident-specific safety plan for conducting a response are included in the following documents:

- The ACS *Technical Manual* Tactics S-1 through S-6, include site entry procedures, site safety plan development, and personnel protection procedures.
- The AES *Response Tactics Manual*
- The *Shell Contractor Safety Handbook*
- Shell's HSE Policy Statement and HSE Management System.

  Mandatory safety orientations are conducted for all Shell employees and contractors working at Shell operated facilities, including additional training for employees in safety-critical positions.

The Shell well plans, prepared for each drilling operation conducted in the Beaufort Sea, are designed to ensure drilling activities are performed in a safe and environmentally sound manner. Each plan identifies the procedures, systems, and equipment employed in drilling; uses the best technical information available concerning subsurface formation characteristics and pressures; and provides information critical to the success and safety of the drilling program. The site-specific evacuation plan is maintained on all Shell-owned or Shell-contracted drilling vessels and is posted throughout these facilities as part of the "Station Bill." Weekly drills are held to assure compliance.

The North Slope Borough Emergency Services Director, or designee, will work through the State On-Scene Coordinator (SOSC) within the command structure to represent affected communities.

In the event that conflicts arise with the above referenced documents while developing an incident specific safety plan, Shell procedures will take precedence as identified by the Incident Management Team (IMT) Safety Officer.

1.4 COMMUNICATIONS [18 AAC 75.425(e)(1)(D)]

1.4.1 Communications Plan

Effective communication during a spill response requires that all parties understand and use the assigned radio frequencies and telephone numbers. Use of pre-programmed and designated frequencies ensures that emergency communications are established immediately for a response. As spill response efforts grow, additional frequencies and telephone numbers may be added to a complete Communications Plan that is distributed to all parties.

The Communications Unit Leader is responsible for establishing a plan that provides coverage in the field and between the field and a command post. Communication requirements are determined by many factors, the most important of which are the location and nature of the spill response activities, and the number of staff placed in the field. Specific requirements include:

- Communications systems must be self-contained, compact, highly portable, and capable of providing all on-site and off-site communication links for the duration of the response.
- Communication equipment used in the immediate vicinity of spilled or recovered product must be intrinsically safe (explosion proof).

Field teams will work in close proximity to each other, and generally require only a single tactical communication link operating over a distance of several miles. A repeater radio link would be required to bridge worst-case distances from the field to the staging area and support teams.

A description of the statewide communications plan developed by the crude oil spill cooperatives (ACS, Cook Inlet Spill Response, Inc., Ship Escort Response Vessel System) is provided in Table 1-7. The frequencies noted have been licensed for use statewide on oil spills. The plan provides for eight fixed VHF repeaters in each cooperative area of responsibility, and six portable VHR repeaters. The radio plan also provides up to 20 VHF tactical channels and includes VHF marine channels. The plan has provisions for adding other area specific channels unique to individual cooperatives or Member Companies and uses exclusively VHF channels in the 150 to 174 MHz band.

The Alaska Statewide Frequency Plan consists of 47 channels, designated OS-29 through OS-76. When referring to these channels, the channel number is always prefixed with the letters “OS.” This clarifies the identity of the channel under discussion and minimizes potential confusion that the channel might represent a marine channel, or some other internal company channel.

TABLE 1-7
SUMMARY OF ALASKA STATEWIDE FREQUENCY PLAN CHANNELS

CHANNEL	TYPE	DESCRIPTION
OS-1 through OS-28		Reserved for individual and unique use by Member Companies and cooperatives.
OS-29 through OS-32	Tactical channels	Match marine radio channels.
OS-33 through OS-52	Fixed repeater channels (and associated talk-around channels)	Located on the North Slope, along the Alyeska Pipeline corridor, and in Cook Inlet or Prince William Sound. The talk-around channels are available for tactical use when operating in an area not covered by the associated repeater channel.
OS-53 through OS-76	Portable repeater channels (and associated talk-around channels)	Licensed for use statewide. The talk-around channels are available for tactical use when operating in an area not covered by the associated portable repeater channel.
OS-65 through OS-76	Marine Channels OS-72 is Marine 11 OS-75 is Marine 80A OS-76 is Marine Repeater 85	For both tactical, operations, and logistics use, as required. Note that marine channels are specifically given OS designations that do not reflect the actual marine channel number.
OS-77 through OS-100		Reserved for potential future expansion of the Plan.

1.4.2 Communications Equipment

ACS provides for an extensive communications network in the North Slope region, built on the basis of Very High Frequency (VHF) radio coverage. In their inventory, ACS has a satellite earth station system. Also, Ultra High Frequency (UHF) radio can be linked to VHF systems via an ACS UHF-VHF link. Details of the ACS communications resources and systems are provided in the ACS *Technical Manual* (see Tactics L-5 and L-11A).

The communication systems that may be employed in a given location or spill situation include:

- **Telephone Circuits.** Telephone systems at many company facilities are generally sufficient to handle the volume of phone calls associated with most spills. Sparsely populated areas, however, may have very limited phone service, or the reserve capacity of the system may be so small that temporary service to remote control centers cannot be quickly provided. Solutions to such potential telephone bottlenecks might include establishing microwave or satellite links to these areas using contracted resources.
- **Cellular Telephone Systems.** Standard cellular coverage in Alaska is limited to populated areas primarily in South-Central and Southeast Alaska, but coverage continues to expand rapidly within the state. The increasing availability of satellite-based cellular coverage is expected to make cellular telephone the communications system of choice. Battery-powered cellular phones are preferred, to free the user from dependence on commercial power or vehicle batteries.
- **VHF-FM Marine Radio (156-158 megahertz (MHz).** On-water cleanup operations are expected to use licensed marine VHF radio equipment for inter-vessel, ship-to-shore, or response personnel communications. Marine channel 16 is the international distress and hailing frequency. Marine VHF radios can also be used to warn other, non-response vessels about ongoing cleanup operations. Marine radios can be used for coordinating the cleanup operations, although UHF radios are also suitable for this purpose.

- **VHR-AM Aircraft Radio (118-136 MHz).** These VHF frequencies are used for ground-to-air communications, although most aircraft can also monitor VHF Marine and many UFG channels. Ground-to-air communications are very important for relaying surveillance information, as well as coordinating the transport of equipment and personnel.
- **UHF (454/459.000 MHz).** UFR radio systems are typically used for land-based operations, although they are also acceptable for marine use. UHF radios are often limited to just a few frequencies or channels that are preset into the units. Most UHF radios are 3- or 6- (but can be up to 16) channel models with the actual frequencies dependent on the license of the particular facility or company.
- **HR Single Sideband Radio (2-20 MHz).** For communication over long distance at sea and in undeveloped areas, operators may consider obtaining high-frequency single sideband voice radio equipment. Radio propagation by this mode changes widely over daily and yearly cycles, and is strongly influenced by changes in solar activity. Communications may be excellent with a station 50 km away at a given time, and barely audible a few hours later.
- **INMARSAT Satellite.** INMARSAT systems can be installed on vessels or at remote locations and, where approved for voice and facsimile communications to standard telephone lines, almost anywhere in the world. The associated costs are high, but these systems can be invaluable in areas where other forms of communication are unavailable or inconsistent or facsimile transmissions are critical.
- **MSAT.** MSAT is a satellite system based on the world's most powerful commercial mobile satellite. MSAT has extended mobile telephone, fax, and data communications to all of North America and up to 400 km offshore in coastal water.
- **Paging Systems.** Pagers are one-way radio communication systems that enable persons within range of the paging system transmitter to be alerted or to receive a brief message.
- **700 Mhz.** Radio communication networks provide broadband wireless connectivity primarily in the Prudhoe Bay area westward to Alpine, including coverage offshore in short distances (<10 miles).

The communications equipment maintained on site at the drill rig is listed below. With repeaters installed across the North Slope, response radio coverage is provided from National Petroleum Reserve Alaska (NPRA) to Badami. The range for each repeater is approximately 30 to 50 miles, depending on topography and, to some extent, on weather. Additional repeaters may be located throughout the proposed exploration area to assure that coverage is available to the drill site. In addition, an on-site satellite system will provide a communications link with off-site resources, agencies, and company contacts.

AES communications systems and equipment will be compatible with ACS systems.

Rig Communication

In order to ensure radio communication between the North Slope Spill Response Team (NSSRT) radio network at Deadhorse and the proposed exploration drill sites, ACS will have operational repeaters in place on board the rigs unless it is determined that existing systems can reach these distances without repeaters. ACS will strategically preposition a repeater and portable communications tower for use during each summer drilling season, where needed. A complete list of communication repeaters (mobile and portable) is found in the ACS *Technical Manual,* Tactic L-5.

Communication onboard the rigs will initially use VHF radios, tied to a repeater in the ACS wide-area VHF radio network as Channel OS-33.

- Once the rigs are on site, satellite communication will be available. The rigs will have a Ku Band satellite communication package functioning as the primary means of communication for telephone lines, facsimile lines, and data network access lines.
- In addition, the drill rigs will also have a back-up satellite cellular system. There will be multiple telephone and facsimile lines for the drill rigs. Telephone numbers will be provided prior to spud.

Intercom System, *Frontier Discoverer*

Barkway intercom system units are located in mud utility, bulk, mechanical and electrical areas, drill floor, and manager's office. The systems are equipped with priority override speed calling and two independent speech paths. The systems will be interrupted temporarily by a page or an alarm from a tone generator. Another system, Vingtor, links the rig pump room, radio room, and control room to the rig pump room, control room, and stairwell, and operates independently of all other systems. This is a hands-free, talk back system.

Intercom System, *Kulluk*

Barkway intercom system units are located in mud utility, bulk, mechanical and electrical areas, drill floor, and manager's office. The systems are equipped with priority override speed calling and two independent speech paths. The systems will be interrupted temporarily by a page or an alarm from a tone generator. Another system, Vingtor, links the rig pump room, radio room, and control room to the rig pump room, control room, and stairwell, and operates independently of all other systems. This is a hands-free, talk back system.

Page and Alarm System, *Frontier Discoverer*

This system consists of camp and alarm system. The camp page has high- and low- level volumes (low for sleeping areas); however, in the event of an alarm or emergency page, the volume is increased to full. Tone generators in the control unit of the page system will provide three distinct tones for:

- General – Vibrato – percussive 816 Hz tone
- Combustible Gas – Yeow – 1260-600 HX – downward sweep in 1.6 seconds, and
- H_2S Gas – Hi-Lo – 780-600 Hz, alternately – 0.52 seconds each.

A console in the radio room is interfaced to the control unit with push-button control of appropriate page, alarm, and cancel functions. This console is also interfaced to fire panel and remote sensors with lamps to indicate fault conditions, as well as an auto/manual switch to allow for automatic gas alarms should the radio room be unstaffed.

All alarm tones, standard pages, and emergency pages are transmitted to the rig, camp, and rig via mixer-amplifiers installed in the equipment room in a rack with the page control unit. The rig mixer/amplifiers are installed in the stores room.

Page and Alarm System, *Kulluk*

This system consists of camp, MAT, and alarm system. The camp page has high- and low- level volumes (low for sleeping areas), however, in the event of an alarm or emergency page, the volume is increased to full. Tone generators in the control unit of the page system will provide three distinct tones for:

- General – Vibrato – percussive 816 Hz tone
- Combustible Gas – Yeow – 1260-600 HX – downward sweep in 1.6 seconds, and

- H_2S Gas – Hi-Lo – 780-600 Hz, alternately – 0.52 seconds each.

A console in the radio room is interfaced to the control unit with push-button control of appropriate page, alarm, and cancel functions. This console is also interfaced to fire panel and remote sensors with lamps to indicate fault conditions, as well as an auto/manual switch to allow for automatic gas alarms should the radio room be unstaffed.

All alarm tones, standard pages, and emergency pages are transmitted to the rig, camp, and rig via mixer-amplifiers installed in the equipment room in a rack with the page control unit. The rig mixer/amplifiers are installed in the stores room.

Communication and Navigation Equipment, *Frontier Discoverer*

The *Frontier Discoverer* has the following communication and navigation equipment installed:

- Mitel SX-20 telephone exchange with seven outgoing trucks and associated locals
- Four each, VHF, FM radio telephone, Raytheon Ray-55
- VHF air-to-ground radio, WCS300
- Nondirectional beacon, Wilcox 485
- Two each, high frequency Single Sideband (SSB) – Motorola Triton
- Radar transponder – Vega 367X
- Rapifax machine
- Satellite dish for TV c/w modulator, amplifier, intercamp wiring, VCR
- Walkie-talkies (15)
- 2182 Marine Emergency Watch receiver
- Class 1 and Class 2 EPIRB
- Lifeboat radio and VHR crash boat radio
- Weatherfax receiver – Furuno
- Telecommunications currently supplied by Alaska Telecommunications
- Two each, 25 kilowatt (kW) Decca radars; one mounted on top of the camp, the other mounted on top of the derrick
- Satellite navigator – Magnavox 4102
- Three VHF radiotelephones – Raytheon Ray-78; one installed in each crane
- One Sperry SR120 gyro compass
- Pantenna/amplifier entertainment system

The *Frontier Discoverer* will have the following communication equipment installed:

- Three independent paging systems for all three cranes

Communication and Navigation Equipment, *Kulluk*

- ITT 3100 PBX
- Four each, very high frequency, FM radio telephone, Raytheon Ray-55
- VHF air-to-ground radio, WCS300
- Nondirectional beacon, Wilcox 485
- Two each, high frequency SSB – Motorola Triton
- Radar transponder – Vega 367X
- Rapifax machine
- Satellite dish for TV c/w modulator, amplifier, intercamp wiring, VCR
- Walkie-talkies (15)
- 2182 Marine Emergency Watch receiver
- Class 1 and Class 2 EPIRB
- Lifeboat radio and VHR crash boat radio
- Weatherfax receiver – Furuno
- Telecommunications currently supplied by Alaska Telecommunications with dual Ku Band stabilized systems as primary unit for phones, data, and fax
- Two each, 25 kW Decca radars; one mounted on top of the camp, the other mounted on top of the derrick
- Satellite navigator – Magnavox 4102
- Three VHF radiotelephones – Raytheon Ray-78; one installed in each crane
- One Sperry SR120 gyro compass
- Pantenna/amplifier entertainment system

The *Kulluk* will have the following communication equipment installed:

- Three independent paging systems for all three cranes

Patch Number 1 and Patch Number 2

HF radio can be patched to any world-wide telephone. When using these systems, explain to the other party that they have to wait for sender to stop transmitting before they try to talk or their conversation will be blocked.

1.4.3 Equipment Maintenance

Communications equipment will be periodically tested and maintained according to the following schedule:

- Monthly:
  - All rechargeable batteries will be tested and recharged.
  - All radio and electronic equipment will receive an operational test to ensure that the equipment is working.

- After Use:
  - All communications equipment used in actual spill response operations will be inspected, cleaned, and tested before being returned to storage.

1.5 DEPLOYMENT STRATEGIES [18 AAC 75.425(e)(1)(E)]

The first twelve hours of the response will be manned by the AES and response vessel oil spill personnel on-site. Both the Oil Spill Response Vessel (OSRV) and Oil Spill Recovery Barge (OSRB) have sufficient trained personnel to provide containment and recovery for the initial operation period. The succeeding operation period may be manned by response personnel from the response vessel located at the other site or by transporting trained AES or ACS personnel via helicopter or small vessel from a land or vessel based staging area.

The AES oil spill personnel designated to the OSRB will be accommodated on either the drilling vessel, or its support fleet in the immediate surrounding area. In the event of an incident at the other drilling location, response personnel will be available for prompt and immediate transfer to that site in order to provide crew relief within the first twelve hours of the spill response. These personnel may be transported via helicopter from the heli-decks located on the rig or its supporting vessels or may utilize small vessels or workboats for transport.

The AES oil spill personnel designated for the OSRV will reside onboard the OSRV. These personnel are available to respond rapidly to an on-site emergency. The OSRV personnel are also available to transfer to the icebreaker in the area and may be transported via helicopter to the other drilling location to provide crew relief to the OSRB combination within twelve hours. Should certain conditions exist that limit helicopter operations, the OSRV crew may remain onboard and continue the transit to the other drilling location. These personnel may also be transported via helicopter from the heli-decks located onboard either of the supporting vessels or may utilize other small vessels or workboats for transport.

The remaining mobilization of staff to support the oil spill response effort (as indicated in Table 1-17), will be progressively mobilized as follows:

- From existing call-out arrangements under ACS, for North Slope Spill Response Teams (72 hr duration), from ACS Auxiliary Contract Response Teams, and from the North Slope Village Response Team (with members from Barrow, Atkasuk, Nuiqsut, and Kaktovik),
- AES staff off-rotation outside the North Slope operating area (subject to 70% availability for planning purposes),
- Other AES staff and contractors,
- Other qualified staff mobilized from within the Royal/Dutch Shell Group in the US and abroad.

1.5.1 Transport Procedures [18 AAC 75.425(e)(1)(E)(i)]

Actual response and mobilization times will vary depending on a variety of factors, such as weather, personnel safety, and wildlife considerations. During adverse weather conditions that prohibit the transport of equipment, personnel, and other resources to the spill site, spill response will be conducted solely by on-site personnel and equipment.

The estimated response time from discovery of a spill at the drill site to the deployment of equipment varies depending on the incident causing the spill, the size of the spill, time of year, logistical support, and available information.

TABLE 1-8
TRANSPORTATION OPTIONS

MODES OF TRANSPORTATION	SEASON		
	OPEN WATER	BREAK-UP/FREEZE-UP	WINTER
Helicopters	X[1]	X[1]	X[1]
Fixed-Wing Aircraft	X[1]	X[1]	X[1]
Vessels	X	Conditional[2]	--
Vehicles/Heavy Equipment	--	--	Conditional[2]
Heavy ATV	--	--	Conditional[2]

[1] Weather dependent
[2] Dependent upon ice conditions

Pre-staged Equipment

Access to pre-staged equipment and supplies to handle minor operational spills will be kept in a state of readiness on each of the drill ships. Each drilling vessel will also have one of Shell's primary OSRVs on standby, on location, and ready to assist with any overboard release.

Shell and ACS will determine whether additional equipment should be pre-staged along the shoreline to support shoreline response as described in Section 1.6.12. If necessary, connexes packed with containment and recovery equipment will be pre-staged at strategic locations along the shoreline between Prudhoe Bay and Barter Island, and would be routinely inspected throughout the drilling season to ensure they are secure and ready for deployment in the event of an emergency.

Access to shoreline protection and nearshore response equipment is provided by ACS vessels.

Air Access

The drilling vessels can accommodate helicopter operations. Air operations can be limited by weather conditions, as discussed in Section 3.4.

Fixed-wing aircraft can transport personnel and equipment to gravel airstrips located at Badami (5,100 ft), Bullen Point (5,100 ft), Kavik River (5,000 ft) or Kaktovik (4,800 ft). Special permits are required to access the Bullen Point airstrip that will be coordinated with the U.S. Air Force as needed. These airstrips provide coastal access and can serve as logistical hubs for shoreline protection or cleanup efforts. Some upgrades such as lighting provisions may be required. The Badami and Bullen Point airstrip locations can be viewed on ACS Map Sheets 91 and 101 respectively.

1.5.2 Notification and Mobilization of Response Action Contractor [18 AAC 75.425(e)(1)(E)(ii)]

Section 1.1 of this C-Plan describes immediate response and notification actions, including notification of AES and ACS. While ACS is mobilizing personnel and equipment to provide spill response support, Shell personnel will determine safety procedures, notify government agencies and other Shell personnel, and proceed with source control measures. In addition, if safe to do so, AES response personnel will deploy on-site spill containment equipment.

1.6 RESPONSE STRATEGIES [18 AAC 75.425(e)(1)(F)]

The following subsections provide information about response to potential oil spill and related incidents arising from Shell's exploratory drilling program.

The narratives provided in these sections complement the information found in Section 1.6.13, Spill Response Scenarios. Where practicable, project-specific details, including oil trajectories, have been incorporated based on the actual prospects to be drilled during the 2007 season.

1.6.1 Procedures to Stop Discharge [18 AAC 75.425(e)(1)(F)(i)]

Procedures to stop the discharge are discussed in Section 1.6.3 Blowout Control/Relief Well Plan; Section 2.1.7, Blowout Prevention and Emergency Shutdown; Section 4.2, Source Control; Table 4-1, Best Available Technology (BAT) Analysis Well Blowout Source Control; and in the Spill Response Scenarios listed in Section 1.6.13.

1.6.2 Fire Prevention and Control [18 AAC 75.425(e)(1)(F)(ii)]

In the event of a spill, all sources of ignition will be eliminated, if safe to do so. A standard Site Safety Plan will be used in the event of a major oil spill. This includes assessing and establishing exposure control zones into which appropriately trained and equipped personnel may enter.

If a fire occurs, it will be controlled as much as possible with fire monitors on rig and supporting vessels.

The *Frontier Discoverer* contains fire and lifeboat alarms, fire fighting and wash down systems:

- Alarm systems include vessel mounted gas detectors located on the rig floor, upper shale shaker, mud pit room and mud pump room, with a monitoring panel mounted in the radio room.
- An emergency shut down system for the ship is located on the rig floor. The main engine emergency shutdowns are located on the bridge and in the Emergency Response Room.
- Fire and wash down systems include two centrifugal, 300 gpm fire pumps, one centrifugal 300 gpm emergency fire pump, and a number of fire hydrants located throughout the rig.
- The vessel is equipped with fixed CO2 fire extinguishing systems to cover the propulsion room, generator room, control room, paint locker and emergency generator room.
- Fire fighting foam systems comprise two monitors, foam tank and separate pump for Heli-Port protection.

1.6.3 Blowout Control/Relief Well Plan

Shell has taken significant precautions to minimize the potential for a loss of well control. Section 2.1.8 describes the four layers of preventive and recovery measures used to minimize spill potential during drilling operations.

In the unlikely event that well control is lost despite these precautions, Shell will immediately mobilize emergency response personnel and equipment. Shell will also consult a well control specialist such as Wild Well Control for the intervention and resolution of a well control emergency.

Surface Control Options

If well control is lost, every effort will be made to regain well control using dynamic surface control measures. Historically, these measures of regaining control have been rapid and effective.

However, uncontrolled flow at the surface presents a safety hazard. Safety procedures are employed to protect personnel, the environment, and equipment. A site assessment is conducted, safe access and work plans are created, and uncontrolled fluids are diverted for collection to create a safe working environment and to minimize pollution.

Although the specific surface control methods used will depend on the situation, potential mechanical surface control methods include the following:

- Natural bridging;
- Pumping mud, plugging material, and/or cement down the well to kill it;
- Replacing the failed equipment if control was lost due to equipment failure.

Relief Well

As described in Section 2.1.8, Shell does not rely on relief well drilling as the primary method of surface well control, but rather applies a rigorous multi-layer well control management system that has proven successful in preventing escalation of a well control incident to a blowout situation. These layers include planning and risk identification, early kick detection and kick response procedures, and installing mechanical barriers. These measures result in an extremely low probability of an uncontrolled well release, but in the event this did occur, the drilling of a relief well is the final tool for regaining well control.

In the scenario developed for this contingency plan, the drilling vessel originally on site attempts to stop (or slow) the blowout by pumping mud and/or concrete downhole. Should these efforts fail, the drilling vessel pulls away from the blowout location in order to support safe recovery operations from a relief well site. As a precautionary measure, relief well preparation operations are initiated in parallel with the implementation of surface control methods. Unless it is damaged, this same drilling vessel will then commence relief well drilling. Where the original on site rig is damaged, Shell's second rig will be used to drill the relief well.

The general strategy for drilling a relief well is to drill a well to intersect the blowout well. Then, drilling fluid or cement is circulated from the relief well to the original wellbore at sufficient rates and weight to stop formation fluid from flowing into the original wellbore, bringing the well under control. Finally, both wells are properly plugged and abandoned.

A relief well in this situation would have the following general characteristics:

- No mud line cellar
- No formation evaluation at the casing points
- Kill fluid as well as an additional wellhead and additional surface casing and other casing, drill pipe, mud materials, and cement would be in place onboard both Shell-operated rigs
- A detailed Relief Well Design is submitted to MMS as part of the Application for Permit to Drill.

Relief Well Locations

The optimum location for a relief well depends on several factors, including the depth and direction of the wellbore, personnel safety, and weather conditions. The location of the relief well is selected so that it can be drilled in the most efficient manner practicable.

Relief Well Drilling Rig and Equipment

As mentioned above, the relief well could be drilled by the on-site rig, or if necessary, by the second Shell-operated drilling vessel in the Beaufort Sea, which could be mobilized to drill the relief well from its position on an adjacent prospect (see Section 1.6.13). Given the relatively benign anticipated well conditions and subsurface well control at the Beaufort Sea locations covered by this plan, and given the risk reduction actions in place (See Section 2.1.8), Shell believes that a prudent operator could conduct a Beaufort drilling campaign using a single drilling rig. However, based on its prospect portfolio in the Arctic, Shell has committed to a two-rig drilling campaign, which provides an additional mitigation effort in the form of a backup rig to drill a relief well, if required. As stated in the Response Scenario Table 1-12, it is Shell's expectation that this second rig will be operating offshore in the Alaskan Arctic while exploratory drilling is underway in previously un-penetrated hydrocarbon formations below the surface casing point.

In the event of a blowout, the second drilling vessel would immediately cease its then current operations and begin redeploying to the blowout site to be available if required. It is important to note when considering potential relief well operations, that based on past seasonal ice conditions and active ice management experience, it is very likely that the drilling season could be extended into November. This is particularly relevant in the case of relief well operations and when considering the use of the proven ice-tolerant Kulluk drilling vessel.

While each drilling vessel will carry surface casing and wellhead equipment for a relief well, contingency plans have been established to augment existing drilling equipment (drill pipe, additional casing, cement, and mud materials) and services, which will be drawn from Shell's operations support base in Deadhorse, greater Prudhoe Bay, or Tuktoyaktuk, Canada.

Relief Well Timing

The estimated total duration from the start of a blowout to well killing by drilling a relief well would be approximately 16 days for a relief well for the 8,000 foot TVD well and would be approximately 34 days for a relief well for the 14,000 foot TVD well.

Blowout Well Ignition

The decision to ignite a blowout will be made only after assessing the probability of implementing successful surface control, reviewing potential safety hazards, addressing pertinent environmental considerations, and obtaining necessary agency approvals. In order to save time a risk/benefit analysis will be completed by Shell, considering the full range of conditions where deliberate ignition could take place. Placing human safety as the highest priority, Shell will consider the feasibility and benefits of igniting the blowout after all personnel, equipment, and vessels have been located at a safe distance from the surfacing oil and gas. Ignition equipment and procedures such as Heli-torch, hand-held igniters, and flares, will be located on-scene and ready for use. The Shell risk/benefit analysis will provide a checklist to facilitate a rapid assessment of the potential risks of exposure for personnel, equipment, and wildlife to the initial flash of combustible vapors, as well as the heat and combustion products from a sustained burn. Ignition and sustained combustion of vapors from the surfacing gas and oil could potentially result in a safer working environment for relief well operators and for responders attempting to contain and recover oil downstream of the blowout. A controlled burn would help eliminate dangerous vapors in the working vicinity.

Permits

In the event of a discharge due to the loss of well control, a series of federal, state, and local permits would be required to support the response effort. Permits will be needed to authorize construction of onshore support facilities if necessary (e.g., staging pads, temporary storage areas, and temporary water uses).

Federal approval would be required in the form of a Section 404/10 permit from the U.S. Army Corps of Engineers (COE) for placement of gravel in nearshore coastal waters. The COE has issued a Nationwide Permit No. 20, which authorizes placement of fill needed for cleanup of spilled oil. A request for this authorization would require approval from the Alaska Regional Response Team, and would typically be approved very rapidly, assuming the team is in agreement with the overall cleanup strategy for the spill event.

In addition to this federal permit, State of Alaska and North Slope Borough permits would also be required. If all other surface control measures fail and it becomes necessary to drill a relief well, Shell will obtain the proper State of Alaska Permit to Drill (APD) prior to drilling, as per 20 AAC 25.005. As part of the overall North Slope oil spill preparedness program, ACS holds a series of permits authorizing a variety of cleanup-related activities, including bird and mammal hazing and mammal stabilization.

1.6.4 Discharge Tracking [18 AAC 75.425(e)(1)(F)(iv)]

Discharge tracking is discussed in the response scenarios in Section 1.6.13.

Oil movement is tracked using a combination of visual observations and remote sensing techniques. Upon initial notification of the blowout, the Kuparuk twin Otter with forwa4rd looking infrared radar (FLIR) o alternative aircraft with Synthetic Aperture Radar (SAR) would be deployed (depending on availability and weather conditions). See ACS *Technical Manual,* Tactics T-4 through T-7.

Response vessels also deploy buoys with transmitters. Both systems are capable of real-time tracking of the leading edge of the oil. The tracking buoys are equipped with a transmitter that can be monitored by a receiver located either on a boat or aircraft. Oil location information is digitized and transferred to the Incident Management Team for response planning and trajectory modeling.

In the event of a spill, trajectory models will be based on observed and modeled currents, wind speed, and direction. Vector addition and trajectory modeling are used to forecast oil movement.

1.6.5 Protection of Sensitive Areas [18 AAC 75.425(e)(1)(F)(v)]

Environmentally sensitive areas and areas of public concern include cultural resource sites, public use areas, Native allotments, and bird nesting areas. See Section 3.2 for discussion of the local environment.

The NOAA Environmental Sensitivity Index Maps, ACS Atlas Maps, and the North Slope Subarea Contingency Plan are used to identify areas of major concern. See ACS Map Atlas sheets 86, 89, 98, 99, 100, and 105. A shoreline cleanup plan is prepared for approval by the Unified Command and the State Historic Preservation Officer.

Based on trajectory calculations and oil tracking, barrier islands are identified as the first landforms that may be impacted by oil, followed by the salt marshes and inlets adjacent to the Kadleroshilik River. Protection sites identified in these areas are provided protection with exclusion or deflection booming when little or no ice is present. If drifting ice is present, and the use of booms is not feasible, oil collecting naturally among the ice will be monitored. Recovery efforts for these natural collection sites include the use of small skimming systems, using shallow-draft boats. Accumulations may also present an opportunity for limited burns at or near the shore. In the case where land-fast ice conditions are present, sensitive shoreline resources may be afforded protection from the natural ice barrier.

As oil spill response progresses, priorities for protection may change based as weather, sea state, oil condition, hours of daylight, and other factors.

A new Shoreline Clean-up Plan will be developed and submitted to the Unified Command. Oil and oiled ice will be monitored to the extent possible throughout the spill, and for as long as oil is believed to be present. Should oil persist near the shoreline, after winter recovery operations are complete, these areas will be marked and monitored as the ice begins to melt during breakup. Shoreline specialists and clean-up teams will use the monitoring data to plan and implement removal (and possibly, combustion) tactics within those regions with oil.

1.6.6 Containment and Control Strategies [18 AAC 75.425(e)(1)(F)(vi)]

Containment and control strategies are discussed in the scenarios. AES is responsible for initial on-site personnel and equipment described in the scenarios. An OSRV/OSRB is staged with each of the Shell drilling vessels employed for the exploration program. Each OSRVs is outfitted with sufficient work boats, boom, skimmers, and other necessary response equipment to respond to an uncontrolled well blowout. Containment boom and equipment can be deployed from each OSRV. The OSRV collocated with the drill ship operating in the Sivulliq lease site shuts down drilling and departs that site as quickly as possible upon notification of the blowout. The backup OSRV arrives at the blow out within 24 hours to support containment and recovery operations. Specific tactics are described in the scenario in Section 1.6.13. See ACS *Technical Manual,* Tactics B-1, B1A, B-2 through B-7, C-12 through C-14, and L-2.

ACS has the capabilities to mount an effective, immediate response for the containment and recovery of oil in threatened nearshore waters and to prepare for the protection and cleanup of impacted shorelines. ACS will also provide personnel and equipment to supplement the primary offshore response operations. AES will be responsible for all offshore response and will use personnel and equipment identified in the AES *Response Tactics Manual*. ACS will lead the containment and control efforts in the nearshore and shoreline environments. They will use personnel and equipment identified in the ACS *Technical Manual,* as well as oil spill equipment possibly stored at pre-staged shoreline locations.

As described in the scenario, ACS Shoreline Protection Task Forces mobilize to deploy exclusion booms, if needed, at protection sites on Flaxman Island, at protection sites south of Tigvariak Island, and at protection sites adjacent to the Kadleroshilik River. These sites are prioritized and boomed in order of proximity to the spill. ACS dispatches additional Shoreline Protection Task Forces to Barter Island to assist Village Response Team personnel in deploying vessels, boom, and other equipment. The protection sites, located in Camden Bay, are prioritized by aerial observers on site, and through trajectory analyses performed by NOAA and The Response Group.

Four teams, traveling by workboats and/or airboats from the Prudhoe Bay area, each place boom in the quantities described in the ACS *Technical Manual* Map Atlas.

The summer scenario described in Section 1.6.13 addresses Shell's plans to respond to a blowout during open-water conditions (August 1–30). It is recognized that ice incursions can occur at any time during the open-water season, and that a period of unexpected cold-air temperatures can result in the formation of new ice (typically grease ice and the formation of thin continuous layers of ice). Any continuous layers of ice, and even low concentrations of individual ice cakes or floes (such as, 1/10 to 2/10 concentrations), can fill containment or deflection booms, prevent oil from accumulating in large pools, and block the flow of oil toward a recovery device. As these conditions develop, the efficiency of physical containment and recovery tactics will be reduced.

As indicated in Response Strategy 1 in Section 1.6.13 (with varying ice conditions), response strategies and specific tactics will be modified to accommodate the challenges of working with a variety of potential ice conditions. If ice concentrations threaten the structural integrity of equipment or prevent oil from being deflected or effectively contained, the offshore response teams will use shorter outrigger/boom extensions in conjunction with skimmers in order to maneuver around large ice cakes while attempting to access smaller pockets of oil.

As ice conditions persist, recovery operations will continue with rope mop skimmers and other small over-the-side skimmers to access oil trapped next to or within heavier ice concentrations, until the conditions threaten the safe and effective use of vessels. At this point, all physical removal tactics will cease, and clean-up operations will turn to the elimination of oil pockets through the use of controlled burning, as feasible. ACS Tactics B-3 through B-7 for open water and solid surface burning will be considered and modified as appropriate to allow for the controlled burning of oil herded against large ice floes, trapped within heavy concentrations of ice, or accumulated in thick layers against shorelines or land-fast ice. Burning can be accomplished without placing personnel and vessels at risk with the use of Heli-Torches suspended from helicopters.

At the blowout site, the potential for oil elimination using combustion may continue into periods of light to moderate ice concentrations (including new, solid ice layers) as the oil and gas released from the blowout lift and crack ice layers and leave oil exposed on or between ice cakes/floes. A Heli-torch can be flown, day or night, and used to ignite the oil and vapors directly over the blowout. During early freeze up, ice-breaking vessels or barges upstream of the blowout can enhance the efficiency of this operation by keeping large ice floes from moving in over the surfacing oil and gas where they could potentially extinguish the flames. These vessels or barges may also be positioned at a safe distance upstream of the blowout to deflect ice and create a temporary, relatively ice-free path and potentially enhancing the combustion process. Oil that escapes the burn at the surfacing plume will likely be herded by wind to one side or the other of the cleared path, allowing oil to accumulate for additional burning downstream.

Any oil that avoids containment, recovery, and/or combustion during freeze-up conditions will quickly be locked up beneath and on the ice, and eventually incorporated within ice and snow. Proven techniques for the removal (or mining) of oil from within or below ice (See ACS Tactics C-11 and C-12) may be feasible where it is safe to access and work on a stable ice layer. In other ice regions, particularly in the shear zone (typically 10- to 20-meter depths), it may be impractical and unsafe to access the oiled zone because of its movement and extensive ridging and rafting of the ice.

Shell, its Alaska and International Response Teams, and its contracted support from AES and ACS, are all prepared to conduct extensive monitoring and tracking of any oil that is released to the Beaufort Sea and which is unrecoverable until spring. Such tracking of oiled ice may involve the release of 5 Metocean buoys (stored on each rig) and Arctic drift buoys with extended transmission capabilities, to be released at or near the spill source. Other markers may involve passive systems such as radar reflectors and brightly colored floats and flags. Together with daily weather recordings, satellite images and ice-movement modeling activities, the continued release and tracking of buoys will enable oceanographers and surveillance specialists to monitor changes in the location, speed and direction of oiled ice. While the nature and location of stable, land-fast ice can vary substantially from year to year, the seasonal pack ice zone, although mobile, can also experience long periods of little or no ice motion. During these periods oiled ice would remain relatively close to the spill source and be easier to track.

Oil released beneath a stable ice cover would soon be encapsulated as new ice forms around and beneath the oil. Depending on the concentration of the oil and the thickness of ice and snow, the monitoring of oiled ice could include Shell's Global Solutions Light Touch system (developed for methane detection from oil in or under ice), the use of Ground Penetrating Radar (showing great promise in recent tests by MMS, Statoil AS and Alaska Clean Seas), and the use of laser fluorosensors (showing considerable potential for detecting and mapping oil).

As longer periods of light occur and the ice begins to melt and weaken, the heavier deposits of oil beneath and within the ice will begin to move through brine channels and accumulate in melt pools at the surface. These pools will be easy to detect, they will contain oil that is nearly as fresh as when the pools were encapsulated, and they will likely remain concentrated enough to support combustion. Any oil released as fine droplets and widely dispersed will remain within the ice until the ice melts down to expose it. These droplets will eventually surface and be herded by wind into pockets of oil that can potentially be ignited. Aerial ignition will continue well into the breakup period, as conditions allow, until it is safe to operate small skimmers in and around ice cakes and floes. As the ice rots and breaks into smaller pieces, regions of open water will appear, allowing larger containment and recovery operations to begin. Every opportunity will be used to contain and recover oil and burn residue before it can reach shorelines and other sensitive habitats.

1.6.7 Recovery Strategies [18 AAC 75.425(e)(1)(F)(vii)]

Recovery strategies are discussed in the scenarios and reference the ACS *Technical Manual* (Refer to Tactics R-16, R-20, R-32A, and R-32B).

Due to safety concerns, operations will be restricted or limited to appropriate distances from the blowout source. This statement does not indicate or imply a complete prohibition of activities such as containment and recovery close to the blowout. Personnel safety is Shell's primary concern. The On-scene Safety Officer provides access zone information and determines personal protective equipment (PPE) requirements. Access to the blowout site is carefully controlled. Monitoring protocol is established by the On-scene Safety Officer to ensure personnel protection. Recent spill recovery events and information provided to ADEC show that containment, control, and recovery operations can take place in areas near a blowout, as long as conditions are safe for workers.

Primary response is provided by equipment stationed in the vicinity of each drill rig. This equipment includes an OSRV or OSRB with a minimum 12,000-bbl storage capacity, equipped with two brush skimmers; two 34-foot work boats; mini-barges, and open-ocean containment boom and fire boom. The tactics used for the positioning of oil recovery vessels at the blowout site are described in the scenarios. The on scene OSRV/OSRB recovers oil throughout Day 1 until the second OSRV/OSRB (e.g., *Arctic Endeavor* or NAS 235) arrives on site within 24 hours. The *Arctic Endeavor* is equipped with storage tanks that can hold greater than 16,000 bbl of recovered fluids. In order to set up a consistent 24-hour rotation cycle with the other OSRV (one skimming while the other transits and lighters recovered oil), a conservative daily storage use of 12,000 bbl is used for the *Arctic Endeavor* for planning purposes. The *Endeavor* will also hold two brush-skimmers, four 34-foot work boats, one 47-foot skimming vessel (with built-in brush skimmers), mini-barges, and open-ocean containment boom and fire boom. When the *Endeavor* is on location recovering oil the other OSRV proceeds to the backup bulk storage tanker to transfer its recovered fluids. The total transport and set-up time of about 2 to 3 hours before and after lightering, together with the offload time of approximately 6 to 8 hours, allows either of the primary response vessels to complete their lightering and transit activities and return to support the other OSRV/OSRB before it fills its onboard storage tanks.

The time to fill each OSRV (using 12,000 bbl as a nominal storage capacity) is estimated by assuming that all of the oil released can be recovered; it is emulsified through the recovery and pumping process to 35 percent water-in-oil (using an emulsification factor of 1.54 as discussed with ADEC in October 2006), with an additional 20 percent of the blowout flow rate retained (after decanting) as free water, then all fluids (emulsion and free water) will fill the OSRV at a rate of nearly 400 bbl/hour. The 12,000-bbl storage capacity would therefore be reached in approximately 30 hours. It is recognized that no recovery operation would collect "all of the oil released; however, for planning purposes, the "Time-to-Fill" is based on the largest volume flow rate of oil/emulsion/water that could conceivably reach the skimming vessel.

A 513,000-bbl tanker will be centrally located not more than 60 nm from each drilling location to begin mobilizing immediately in the event of a spill. The tanker arrives at the blowout and is ready to accept recovered liquids in 14 hours.

For planning purposes, the scenario assumes that 10 percent of the 5,500-bopd discharge escapes the primary offshore recovery efforts at the blowout. The remaining 550 bopd continues to drift to the west, driven by prevailing winds and currents. ACS skimming vessels with mini-barges, dispatched from Prudhoe Bay, intercept the oil as described in the scenario. For the purposes of the scenario, it is assumed that half of the oil encountered in the nearshore environment is not recovered, leaving about 275 bopd to migrate to the shoreline.

Shoreline recovery operations are staffed by ACS. The scenario describes the mechanics of the recovery tactics. ACS task forces set up and maintain multiple teams along the shoreline to recover oil. For planning purposes, each task force maintains five teams that deploy boom to intercept oil moving along the shoreline, a small skimmer, and fast tanks or bladders set up on the beach to hold the recovered liquids or oily waste and debris. The tactical units will have two 59-bbl fast tanks allowing for up to 1,180 bbls of total fluid or oily waste storage along the shoreline before the waste is ready to be transported to Prudhoe Bay infrastructure for disposal.

Shell will negotiate a procedural agreement with either the Greater Prudhoe Bay Unit or Kuparuk River Unit for the processing and disposal of oil spill recovered fluids transported to Prudhoe Bay by ACS mini-barges. Recovered oil received in Prudhoe Bay will be handled in accordance with ACS disposal tactics D-1 through D-5.

1.6.8 Lightering, Transfer, and Storage of Oil from Tanks [18 AAC 75.425(e)(1)(F)(viii)]

Lightering, transfer, and storage of oil from tanks are discussed in the ACS *Technical Manual*, Volume 1 and in the AES *Response Tactics Manual*.

Liquids from the nearshore skimmer vessels are stored in mini-barges. Liquids and oily waste and debris recovered by the shoreline recovery task forces are stored in fast tanks or bladder tanks. Decanting follows Federal On-scene Coordinator (FOSC) plan approval. Stored liquids on mini-barges are off-loaded to the OSRV/OSRB or transported to Prudhoe Bay for processing.

AES will primarily use GT-A heavy oil transfer pumps to pump product from the mini-barges to the OSRV/OSRB. These pumps are modified, positive displacement pumps that are hydraulically driven, and have been specially developed for the pumping of extremely viscous products. The mini-barges are fitted with two suction lines (one each per tank) or the pumps can be submerged in the product via hold access hatches.

Recovered liquids received by the OSRV/OSRB will be retained on board until transferred to the Arctic storage tanker (refer to Section 1.6.9 below).

1.6.9 Transfer and Storage Procedures [18 AAC 75.425(e)(1)(F)(ix)]

Transfer and storage procedures are discussed in the ACS *Technical Manual,* Tactic R-22

Oil transfer from the OSRV/OSRB will be via permanently installed, hydraulically driven GT-A Heavy Oil Transfer Pumps. Each of the eight tanks (total 12,000 bbls capacity for all eight) on the OSRV are fitted with discharge pumps with each pump having a maximum pumping capacity of 115 cubic meters (m^3) per hour (718 bbls/hour) or a total of 920 m^3/hour (5,744 bbls/hour) total maximum pumping capacity. From the OSRV, recovered oil will be transferred from the manifold on the OSRV to the storage tanker.

As each OSRV nears capacity, the recovered oily liquids are transferred to the recovered oil tanker. Stored liquids are gauged and manifested.

1.6.10 Temporary Storage and Disposal [18 AAC 75.425(e)(1)(F)(x)]

Temporary storage of oil, oily waste, and debris recovered during a spill clean up may be provided by tanks located at the facility or on the OSRV/OSRB. The spill location or other logistical concerns may also require storage of oil, oily waste, and debris in smaller, more portable containers that can be brought to the scene via helicopter, or small boats and mini-barges. See ACS *Technical Manual* Tactics D-1 through D-3.

Non-liquid oily wastes are classified and disposed of according to classification. Non-oily wastes are classified and disposed of accordingly.

At the time of the spill, the Operations Section Chief, in consultation with the Environment Unit Leader, determines the reuse, recycling, or disposal method best suited to the state of the oil, the degree of contamination, and the logistics involved in these operations. Application for agency approvals are completed before the determined method of disposal is implemented.

Disposal and processing of recovered fluids transported to Prudhoe Bay will be in accordance with ACS *Technical Manual* disposal tactics D1 – D5. Recovered fluids will be disposed of as per Ballot Agreements.

Recovered fluids stored onboard the Arctic tanker will be disposed of either at Shell Group refineries or other 3rd party processors, in accordance with Shell environmental policy, and relevant local laws and regulations.

Shell's waste management procedures are further described in Appendix D, Oil and Debris Disposal Procedures.

1.6.11 Wildlife Protection [18 AAC 75.425(e)(1)(F)(xi)]

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

- Containment and controls to limit the spread of oil, and the area influenced by the spill and response options
- The drill rig has a marine mammal observer (MMO) on board at all times, which is considered the BAT for wildlife monitoring.
- Hazing of birds and mammals
- Capture and relocation of wildlife in direct threat
- Aircraft monitoring

Refer to Appendix E, "Wildlife Capture, Treatment and Release Programs, Beaufort Sea Oil Spill Response Planning" for further details.

Shell has developed a Bear (Polar and Grizzly) and Pacific Walrus Encounter and Interaction Plan to support its request for a Letter of Authorization from the U.S. Fish and Wildlife Service for Shell's proposed operations. As part of the Encounter and Interaction Plan, individual addenda have been developed for each project including drilling programs. The Letter of Authorization request is under review and a copy of the Letter of Authorization and the approved Encounter Plan will be available on all Shell Operations Facilities. Bear awareness training will be provided to all operations staff. Trained and certified bear guards will be deployed to support activities at risk of an encounter with Polar Bears. In the event of an accidental release that may impact shoreline resources, including Cross Island and Kaktovik, additional certified bear guards and security staff would be deployed to protect workers and Polar Bears. U.S. Fish and Wildlife Service staff may also be deployed to provide additional oversight and consultation in the event of a major response.

Hazing equipment will be stored at the Deadhorse warehouse and office building.

1.6.12 Shoreline Cleanup [18 AAC 75.425(e)(1)(F)(xii)]

Nearshore and Shoreline Response Plan

Tactics in the shallow and nearshore environments of the Beaufort Sea are best carried out using relatively small response boats (typically 20 feet to 40 feet). These shallow-draft fast-response boats are flexible platforms for conducting response activities in the changing conditions of the Beaufort Sea. The nearshore/shoreline response concept is to use smaller, more maneuverable vessels to conduct shoreline protection and cleanup operations, even in light concentrations of broken ice. The smaller vessels are better able to access pools of collected oil against an ice edge, move between ice cakes and floes, and respond more quickly to changing weather and ice conditions.

Experience has shown that small response boats also work well with relatively small, shallow-draft barges. ACS's fleet of mini-barges includes 249-bbl and two 225-bbl capacity barges. Barges of this size are ideal for easy maneuvering by small boats in thin ice and around ice cakes. Another advantage of the mini-barges is that, on their return to the recovery and cleanup area, they can be used as cargo platforms to carry equipment and supplies for the ongoing nearshore and shoreline operations.

Shell's offshore spill response program involves large OSRVs/OSRBs with high-volume recovery and storage capabilities. In addition, ACS has oil-spill-response vessels at Prudhoe Bay that can be deployed during open-water and limited broken or new-ice conditions over the broad region between Prudhoe Bay and Barter Island. Together with the mini-barges, these vessels can mount a significant response at those environmentally sensitive sites believed to be in the path of the oil's leading edge. Evaluations have been made of the likely spill trajectories that could result for a number of hypothetical spills from Shell's offshore operations. The oil spread and transport calculations suggest that shoreline exposures would not normally involve more than 3 or 4 high-priority-protection sites at a time during the first 24 to 48 hours of a spill. Because ACS vessels could travel from Prudhoe Bay all the way to Kaktovik in under 24 hours, there would be time to deploy boom at sensitive sites, and to intercept the leading edge of the oil before it reaches the shoreline.

Small boats can also be pre-staged and personnel heli-transported out to deploy boom. In most cases the water along the shoreline is so shallow that boom can be deployed by wading, and boats would not be needed.

Most of the tactics planned for nearshore and shoreline response are described and illustrated in the ACS *Technical Manual* shoreline Tactics SH-2, SH-3, SH-5, SH-6, SH-10, and SH-12; containment tactics C-

13 through C-16; and recovery tactics R-15 through R-18 and R-20. Some of these tactics, including slight variations to meet changing conditions along the shoreline, are detailed in Figures 1-3 through 1-8.

Sensitive Environmental Sites

In addition to the consideration of appropriate shoreline tactics and equipment, Shell has also undertaken a preliminary assessment of coastal areas that could be impacted from a major spill at Shell's drilling locations. These areas have been identified using a series of trajectory analyses and related timelines to ensure Shell's ability to protect the areas in a timely and effective manner.

The coastal area assessments consider the following factors:

- The potential for oil impact, and the nature and magnitude of possible oil retention (substrate, grain size, beach slope, and wave and tidal energy);
- The sensitivity of biological and cultural resources at risk;
- The type and amount of resources (personnel, boats, skimmers, and booms) required for shoreline protection and cleanup; and
- The weather and environmental conditions (prevailing and extreme events) that would most influence the performance of personnel and equipment.

An important step in this assessment process is the ranking of shoreline sensitivity. Ranking involves a careful evaluation of the relationships between physical processes, the nature and amount of oil that could reach a given shoreline, the shoreline type and substrate, oil fate and effects, and sediment-transport patterns. The intensity of energy expended on a shoreline by wave action, tidal currents (though small in the Beaufort Sea), and river currents directly affects the persistence of stranded oil. The need for shoreline-cleanup activities is determined, in part, by the speed with which natural processes might remove oil that is stranded on the shoreline, and the prioritization of areas where natural forces are relatively weak or absent (e.g., tidal flats and marshes). All of these processes and oil/shoreline interactions are used in the development and use of Environmental Sensitivity Index (ESI) values.

One of the best sources of environmental sensitivity ranking for the region of interest is the *Sensitivity of Coastal Environments and Wildlife to Spilled Oil, North Slope, Alaska, Atlas* (North Slope Atlas), supported by NOAA, Oil Spill Recovery Institute in Cordova, Alaska, CHADUX Corporation, ACS, and the MMS. The ESI rankings reflect the fact that areas exposed to high levels of physical energy generally have low biological activity and rank low on a scale of 1 to 10. Sheltered areas, however, commonly have high biological activity and rank the highest. The following list (extracted from the above referenced document) provides the ranking of shoreline habitats for the North Slope of Alaska, ordered by increasing sensitivity to spilled oil, with 1 being the lowest and 10 being the highest:

1A	Exposed Rocky Shores
1B	Exposed, Solid Man-made Structures
3A	Fine- to Medium-grained Sand Beaches
3C	Tundra Cliffs
4	Coarse-grained Sand Beaches
5	Mixed Sand and Gravel Beaches
6A	Gravel Beaches
6B	Riprap
7	Exposed Tidal Flats

- 8A Sheltered Rocky Shores and Sheltered Scarps in Mud and Clay
- 8E Peat Shorelines
- 9A Sheltered Tidal Flats
- 9B Sheltered, Vegetated Low Banks
- 10A Salt- and Brackish-water Marsh
- 10E Inundated Low-lying Tundra

Biological information about animal and plant species that are at risk from exposure to spilled oil or the cleanup process is also provided in the atlas. The species are divided into the following groups and subgroups:

- Birds (diving birds, gulls and terns, seabirds, shorebirds, and waterfowl);
- Fish;
- Marine Mammals (pinnipeds, polar bears and whales);
- Terrestrial Mammals (bears, caribou and musk ox), and
- Benthic Habitats (kelp).

The environmental sensitivity rankings, together with information about biological resources, sea ice, and human-use resources provided in the atlas, are important to the selection of areas identified as Priority Protection Sites. The North Slope Sensitive Areas Work Group, consisting of representatives from several federal, state and local government agencies and industry organizations, has worked with a wide range of experts to evaluate the environmental sensitivity rankings, and identify specific areas along the North Slope that should be recognized as Priority Protection Sites.

Figure 1-3 and Figure 1-4 present graphics of shoreline containment and protection and shoreline containment and recovery operations, respectively. Figure 1-5 shows shoreline cleanup and backwater protection.

Working closely with the North Slope Sensitive Areas Work Group, ACS has developed a Map Atlas, Volume 2 of their Technical Manual, which includes a comprehensive set of shoreline maps where Priority Protection Sites are identified (Figure 1-9). Shell has used the ESI rankings provided in the environmental atlas, along with the Priority Protection Sites indicated in the ACS *Technical Manual*, Volume 2, to consider the nature and extent of resources (vessels, barges, booms, skimmers, response equipment, and personnel) to provide a timely and effective nearshore and shoreline response.

For decades, ACS has carried out planning efforts, field trials, and training exercises involving the islands, mainland beaches, river deltas, and inland waterways and marshes over a broad region of the North Slope area. Most of these activities, and the Priority Protection Site analyses, have focused on the shoreline between Harrison Bay and Brownlow Point. Shell's assessment of possible spill trajectories from its planned drill sites reveal that shoreline impacts could occur east of the Priority Protection Sites currently identified in the ACS *Technical Manual*, Volume 2 (Figure 1-10). Using the ESI rankings in the North Slope Atlas, Shell has identified 23 additional sites that could be candidate Priority Protection Sites. Shell will work with ACS and other members of the North Slope Sensitive Areas Work Group to consider the selection of those sites (and possibly others) as official Priority Protection Sites for future updates of the ACS and other publications.

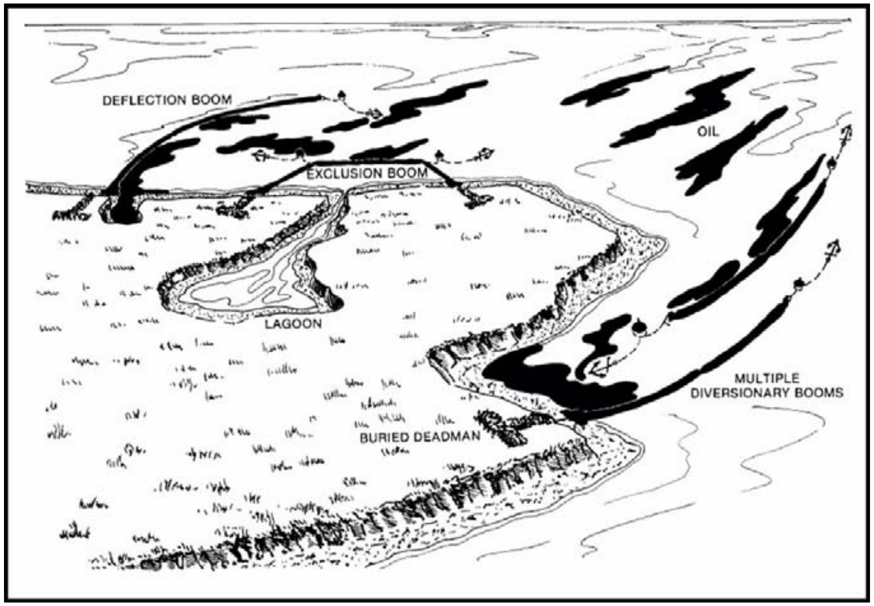
For planning purposes, Shell is using the proposed 23 candidate sites between Brownlow Point and Barter Island to ensure that all environmentally sensitive shorelines that could be exposed to spilled oil from Shell's operations are recognized and included in the current planning of nearshore and shoreline protection activities. See Table 1-9 for a list of the proposed priority protection sites. Plans are underway with ACS, NOAA, MMS, and others to participate in aerial surveys and site visits in the summer of 2007 to survey appropriate sites in this eastern portion of the Beaufort Sea. The goal is to designate official Priority Protection Sites and establish tactics, equipment, and personnel requirements for each site.

TABLE 1-9
SHORELINE PROTECTION ASSESSMENT FOR FLAXMAN ISLAND TO BARTER ISLAND

PROPOSED PRIORITY PROTECTION SITES	LATITUDE / LONGITUDE	LOCATION DESRCIPTION	PROPOSED TACTICS (AS PER ACS MANUAL)	ESTIMATED SHORELINE BOOM (IN FEET)
177	145 55' 0" 70 07' 0"	Covey	PS-46 C-13/14	800
178	145 40' 0" 70 05' 0"	Shoreline	PS-49 C-13/14	300
179	145 30' 0" 70 04' 0"	Shoreline	PS-49 C-13/14	300
180	145 28' 0" 70 03' 0"	Shoreline Covey	PS-46/49 C-13/14	600
181	145 20' 0" 70 02' 0"	Shoreline Point	PS-49 C-13/14	300
182	145 18' 0" 70 02' 0"	Shoreline Point	PS-49 C-13/14	300
183	145 18' 0" 69 59' 0"	Covey	PS-46 C-13/14	800
184	145 15' 0" 69 59' 0"	Shoreline and House	PS-49 C-13/14	300
185	145 0' 0" 69 58' 0"	Shoreline River Delta	PS-49 C-13/14	800
186	144 58' 0" 69 58' 0"	Shoreline River Delta	PS-49 C-13/14	1300
187	144 65' 0" 69 57' 0"	Shoreline River Delta	PS-49 C-13/14	800
188	144 40' 0" 69 57' 0"	Shoreline River Delta	PS-49 C-13/14	800
189	144 30' 0" 70 01' 0"	Shoreline	PS-49 C-13/14	300
190	144 28' 0" 70 02' 0"	Shoreline	PS-49 C-13/14	300
191	144 15' 0" 70 02' 0"	Shoreline	PS-49 C-13/14	800
192	144 10' 0" 70 02' 0"	Shoreline	PS-49 C-13/14	300
193	144 09' 0" 70 03' 0"	River Delta	PS-49 C-13/14	1300
194	144 07' 0" 70 03' 0"	River Delta	PS-49 C-13/14	1300
195	144 04' 0" 70 05' 0"	River Delta	PS-49 C-13/14	800
196	144 0' 0" 70 06' 0"	River Delta	PS-49 C-13/14	800
197	143 50' 0" 70 05' 0"	Covey	PS-46 C-13/14	800
198	143 49' 0" 70 05' 0"	Shoreline	PS-49 C-13/14	300
199	143 45' 0" 70 08' 0"	Shoreline Covey	PS-46/49 C-13/14	1300

While Shell's highest priorities will remain the prevention of oil discharge, and the safety of all personnel associated with the drilling program, the second highest priority will be the protection of the environment which will be achieved by containment, recovery, and/or elimination of as much oil as possible offshore before it can reach any of the sensitive resources and shorelines of the Beaufort Sea. Though unlikely, should a spill occur, Shell will have planned and implemented a nearshore and shoreline protection program with ACS, an Oil Spill Response Organization with a proven record of performance involving dedicated personnel and best available technology. The activities of ACS will involve multiple, high-volume elimination skimmers, ice-class vessels and barges, in a constant state of readiness to support each of Shell's offshore drill sites. The offshore and nearshore response teams will work closely with the North Slope Village Response Team to ensure that local knowledge of the environment is employed, including the possible staging of response equipment at key locations along the shoreline.

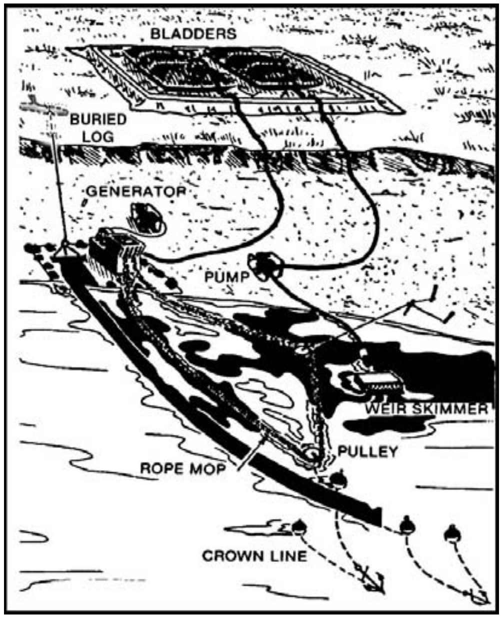
FIGURE 1-3
SHORELINE CONTAINMENT AND PROTECTION



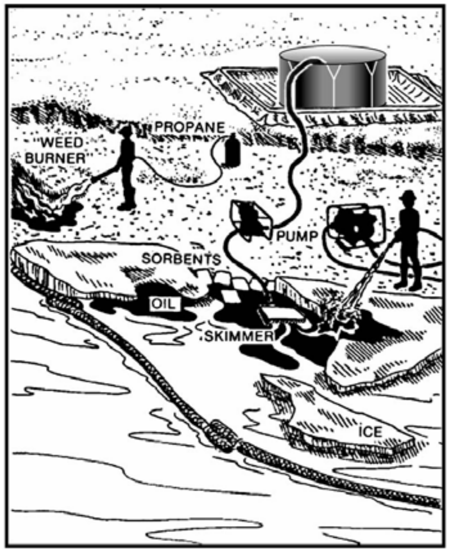
Concentration of oil at natural and/or man-made collection sites and diversion of oil away from Priority Protection Sites.

FIGURE 1-4
SHORELINE CONTAINMENT AND RECOVERY OPERATIONS

Open Water

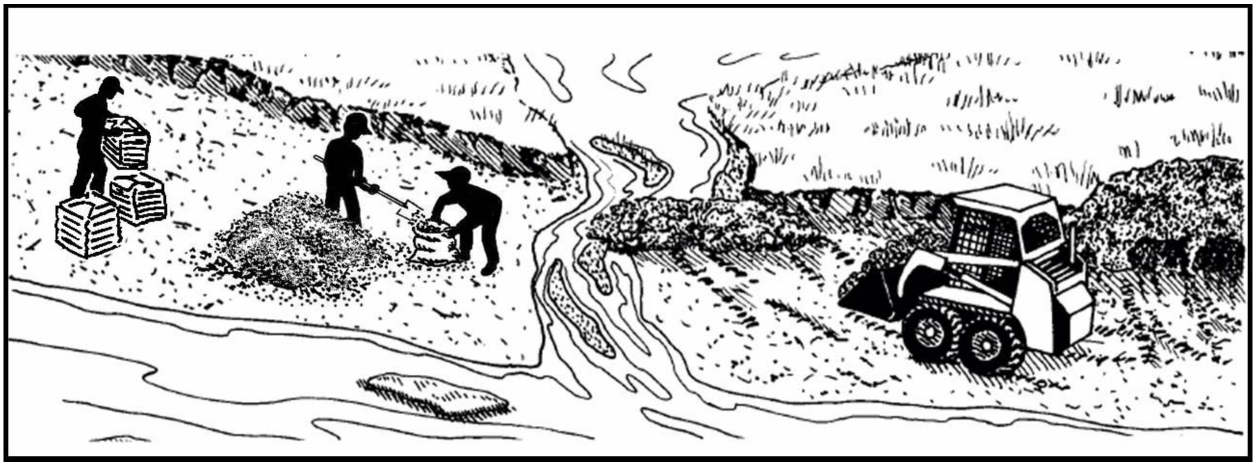


Broken Ice



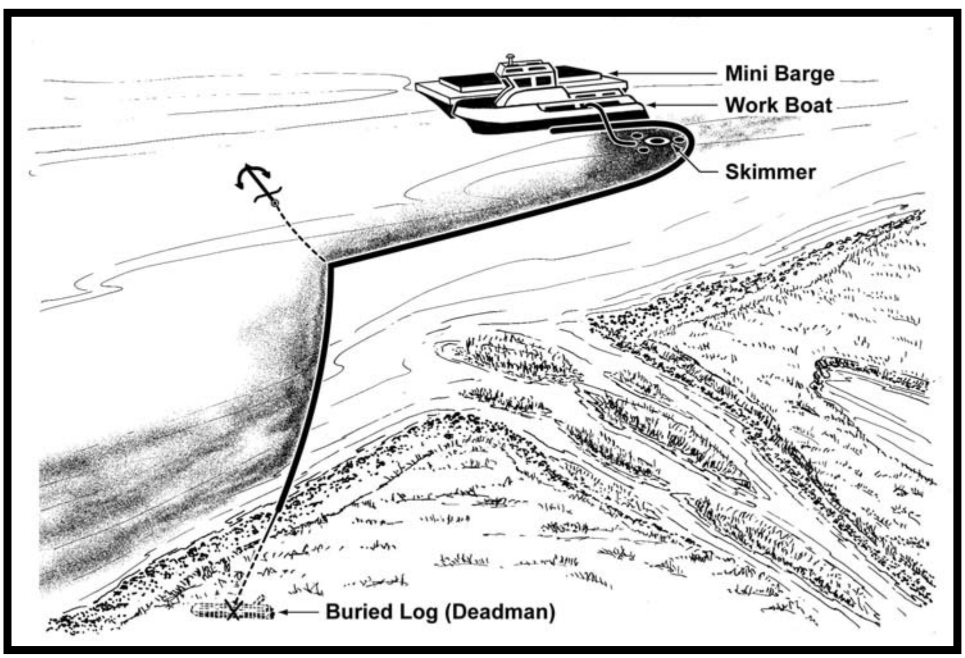
Deflection of oil toward shore for recovery with portable skimmers. Temporary storage of recovered oil in bladders or Fast-Tanks, and burning of isolated pools of oil.

FIGURE 1-5
SHORELINE CLEANUP AND BACKWATER PROTECTION



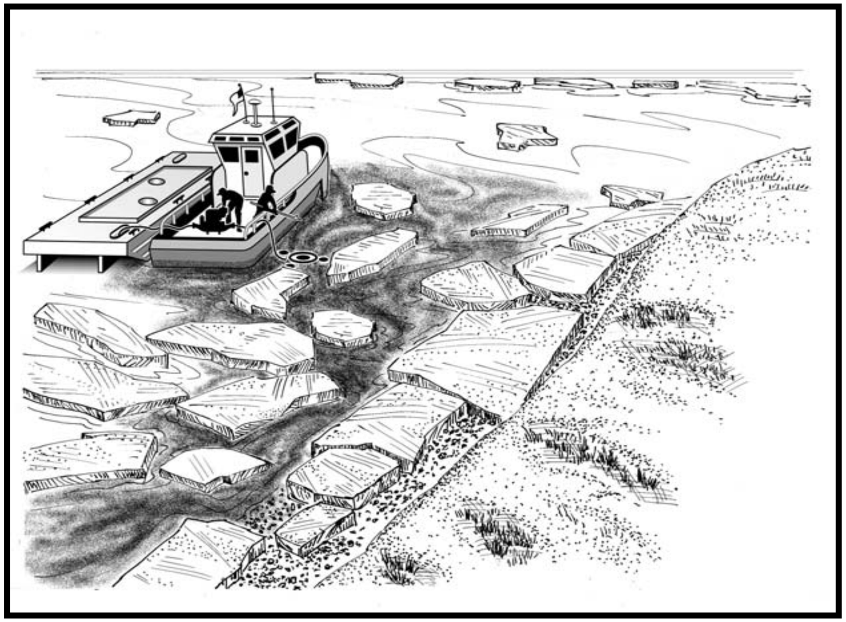
Physical removal of oil and oiled debris on beaches. Temporary blockage of marshes and other wetland areas.

FIGURE 1-6
NEARSHORE DIVERSION AND RECOVERY OF OIL



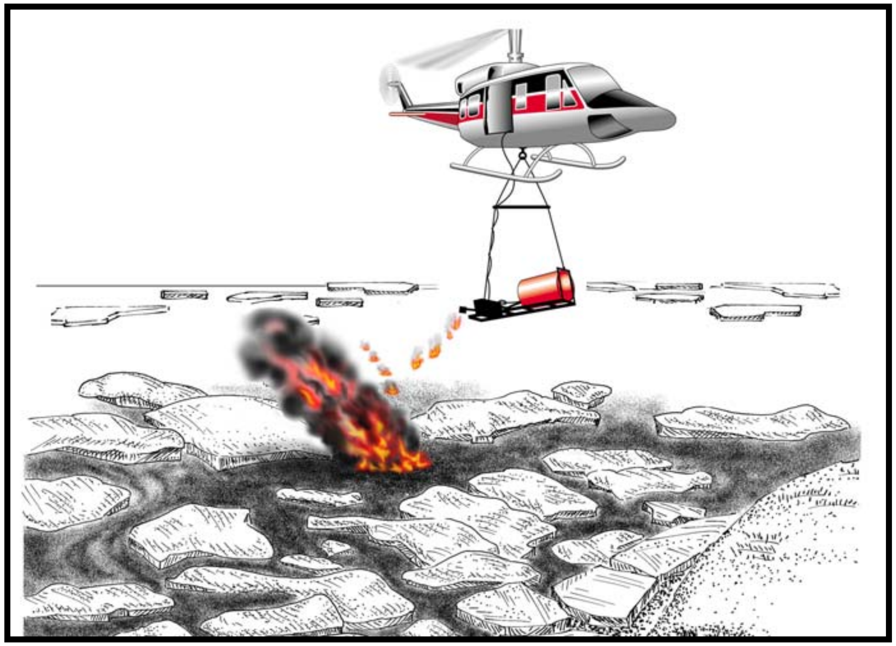
Protection of environmentally sensitive shoreline areas with recovery away from the shoreline

FIGURE 1-7
NEARSHORE RECOVERY IN BROKEN ICE



Recovery of oil that is wind-herded and trapped within ice cakes nearshore. Transfer of the recovered oil directly to a mini-barge.

FIGURE 1-8
NEARSHORE IGNITION OF OIL IN ICE



Heli-Torch ignition of oil that is wind-herded and trapped within ice cakes. Burning with gelled fuel igniters released upstream and allowed to drift into the oil.

FIGURE 1-9
ACS *TECHNICAL MANUAL*, VOLUME 2

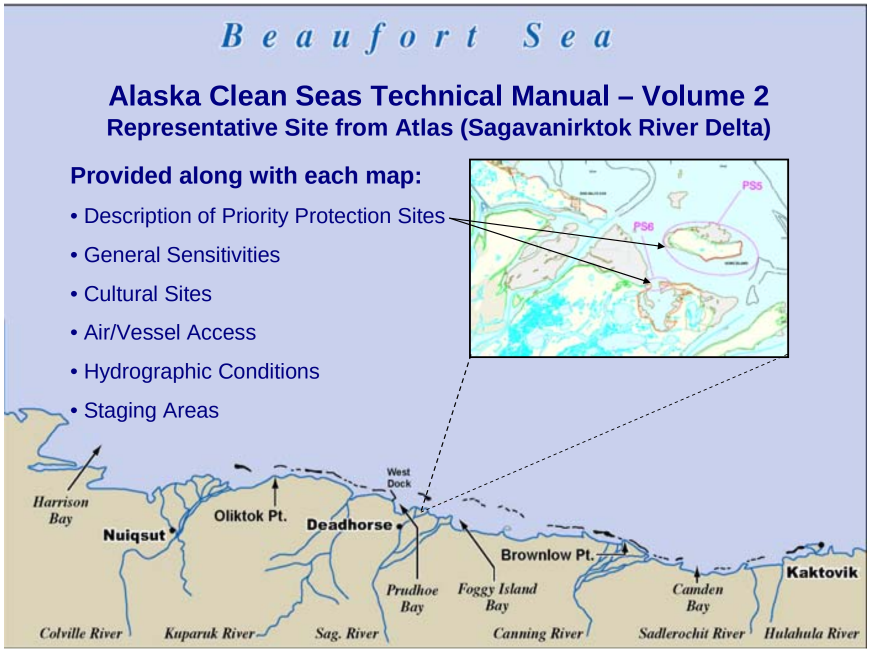
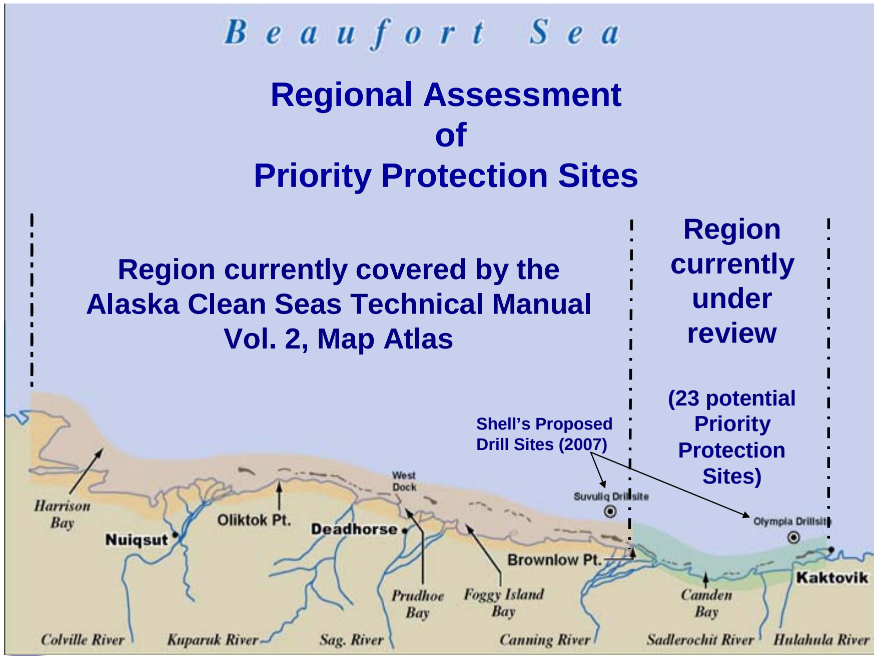


FIGURE 1-10
REGIONAL ASSESSMENT OF PRIORITY PROTECTION SITES



1.6.13 Spill Response Scenarios

Introduction

The ADEC Response Scenario/MMS Worst Case Discharge (WCD) Scenario contained herein was prepared to comply with both MMS regulations found in 30 CFR 254.26 for the discussion of the WCD scenario, and ADEC regulations found in 18 Alaska Administrative Code (AAC) 75.425(e)(1)(F) and (I) for the response scenario that demonstrates a plan holder's ability to respond to a discharge of the response planning standard (RPS) volume.

The scenario is provided to show spill response capabilities for employing an effective cleanup response for a “blowout lasting 30 days,” as required under MMS regulations in 30 CFR 254.26 and 30 CFR 254.44. ADEC requires the blowout to last 15 days, but to comply with the MMS requirement, Shell has extended the blowout duration to 30 days.

A response strategy is provided in this plan following the Response Scenario/WCD Scenario to meet both the WCD scenario requirements of the MMS “in adverse weather conditions,” with equipment that is “suitable, within the limits of current technology, for the range of environmental conditions” anticipated, and the ADEC requirements for a response strategy accounting for variations in receiving environments and seasonal conditions. The response strategy also illustrates additional spill response capabilities for employing an effective clean up response using non-mechanical response options.

This section contains the following:

- Scenario 1, Response Scenario/WCD Scenario, Offshore Sub-Sea Well Blowout During Summer Months
- Response Strategy 1, Offshore Sub-Sea Well Blowout in Varying Ice Conditions
- Response Strategy 2, Offshore Fuel Transfer Release During Summer Months

The following were developed in accordance with MMS regulations in 30 CFR 254.26, ADEC 18 AAC 75.425(e)(1)(F), and 18 AAC 75.445(d). They describe equipment, personnel, and strategies that could be used to respond to an oil spill. The scenarios are for illustration only and are not performance standards or guarantees of performance. The scenarios assume conditions of the spills and responses only to display general procedures, strategies, tactics, and selected operational capabilities. See ACS *Technical Manual,* Volume 1.

In situ burning could be used in a spill response to reduce the quantity of oil, regardless of whether a scenario hypothesizes in situ burning to help meet the RPS.

The scenarios were developed in accordance with the guidelines established by the North Slope Spill Response Project Team. These guidelines can be found in the front portion of Volume 1 of the ACS *Technical Manual*.

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SCENARIO 1

ADEC RESPONSE SCENARIO
MINERALS MANAGEMENT SERVICE
WORST CASE DISCHARGE SCENARIO

WELL BLOWOUT DURING
OFFSHORE SUB-SEA SUMMER MONTHS

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SCENARIO 1 QUALIFICATION STATEMENT

This worst case discharge scenario was prepared to comply with both Minerals Management Service regulations in 30 CFR 254.26, and Alaska Department of Environmental Conservation (ADEC) regulations in 18 AAC 75.425. The scenario is not a guarantee of performance. It is prepared as an illustration of the spill and response conditions that could be expected in the event of a worst case discharge. The scenario makes certain assumptions about spill conditions and describes equipment, personnel, and strategies that would be used to respond to a worst case discharge.

The response timelines are for illustration only. Spill response decisions depend on safety considerations, weather, and other environmental conditions. It is the discretion of the Incident Commander and persons in charge of the spill response to select any sequence or take as much time as necessary to employ an effective response without jeopardizing personnel safety. In any incident, personnel safety is considered the highest priority.

Depending on conditions, some equipment named in the scenario may be replaced by functionally similar equipment. The scenario assumes that agency permits are immediately granted by on-scene coordinators and other agency officials.

Greater responses than illustrated in the scenario can be mounted with additional in-region resources and the mobilization of out-of-region resources as needed.

How the Scenario Complies with the Minerals Management Service Requirement

The scenario provides a simulation of a worst case discharge with the type of responses that could be employed, to the maximum extent practicable.

Table 1-10 details how the scenario meets the MMS regulatory requirements (30 CFR 254.26) for a worst case discharge. Many assumptions are made about environmental conditions, oil distribution, and response capabilities. References to documents that support these assumptions are provided in the table. These documents are publicly available at MMS and ADEC, along with the Alaska Clean Seas (ACS) *Technical Manual*.

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TABLE 1-10
SUMMARY OF HOW THE WORST CASE DISCHARGE SCENARIO COMPLIES WITH MMS REGULATIONS

MMS REGULATION	SUMMARY	REFERENCE
30 CFR 254.26(a) and 254.47(b) Worst Case Discharge Volume for Exploratory or Development Drilling Operations	The worst case discharge volume of oil for this regional exploration plan is based on the ADEC response planning standard daily volume for an exploration well blowout of 5,500 barrels of oil per day (bopd).	See the OPA 90 MMS cross reference section at the front of this plan for descriptions of the basis for the worst case discharge estimate. The estimates follow 30 CFR 254.47(b) regarding worst case discharges for exploratory drilling operations. The total capacity of the oil storage tanks is the sum of permanent oil storage containers on the drill rig. Because there are no relevant well data or other supporting technical documentation to estimate the simulated blowout rate of the exploration well, the daily rate is based on the ADEC response planning standard of 5,500 bopd.
30 CFR 254.26(b) Oil Trajectory	The simulation of the oil plume on water is based on a well blowout at the sea floor (or mud line) in approximately 100 feet of water. The oil rises to the surface and spreads as a function of ocean currents and wind. The oil's viscosity and emulsification tendency affects its distribution on the sea. The scenario simulates the oil footprint by trajectory modeling performed by estimating the prevailing winds and local ocean currents during a 30-day blowout. The modeling was performed by The Response Group of Houston, Texas. The speed and direction of wind and currents determine the oil trajectory on the sea. Oil on open water, unaffected by ice, is assumed to move with surface currents and at 3 percent of the wind speed (see ACS *Technical Manual*, Tactic T-5). Tactic T-4 from the ACS *Technical Manual* is used to track the oil plume on open water throughout the spill response.	Modeling of the oil plume migration was conducted by The Response Group using local wind data and ocean currents. Trajectory calculations are presented in Tactic T-5 from the ACS *Technical Manual*. Portions of the ACS *Technical Manual* cited in the scenario are incorporated by reference. Wind direction is simulated as prescribed by 18 AAC 75.425(e)(1). Wind direction and velocity data were retrieved from the Alaska Climate Research Center website for Barter Island from 1971 through 1988 for the months of August through October. The average wind velocity in August is ~10 miles per hour (mph). The website URL is: http://climate.gi.alaska.edu/climate/Wind/Direction/BarterIsland/Data_table.html
30 CFR 254.26(c) Important Resources	Resources of environmental or special economic importance that might be impacted are the marine bird and mammal populations that occupy the sea between the open water and the shoreline and the shorelines of the barrier islands that lie in the oil trajectory. The trajectory is described in the body of the scenario. The resources are described more fully in the references.	Resources of special economic or environmental importance that potentially could be impacted in the areas in the trajectory are described in the Alaska Regional Response Team's "North Slope Sub-area Plan," Areas of Concern, which is also printed in the ACS *Technical Manual*, Volume 2, Map Atlas, and from Environmental Sensitivity Index Maps published by NOAA.

TABLE 1-10 (CONTINUED)
SUMMARY OF HOW THE WORST CASE DISCHARGE SCENARIO COMPLIES WITH MMS REGULATION

MMS REGULATION	SUMMARY	REFERENCE
30 CFR 254.26(d)(1) Response Equipment	The scenario identifies the types, numbers, and usage of the equipment capable of containing and removing the oil.	The equipment descriptions, locations, owners, inventory, quantity and capabilities are described in the AES *Response Tactics Manual* and ACS *Technical Manual,* Volume 1.
30 CFR 254.44(a) Effective Daily Recovery Capacities	The effective daily recovery capacities of the four Lamor brush skimmers (205 m^3/hour (1,289 bbl/hour) are determined using 20 percent of the manufacturer's nameplate capacity. Each brush skimmer is therefore derated to 258 bbl/hour. While twin pumps (each with 115 m^3/hour pump rate) in the skimmer's hopper actually exceed the skimmer's rate of recovery, the smaller value of 205 m^3/hour is used times 24 hours per day, as specified in the regulation. 1,289 bbl/hr x 0.20 = 258 bbl/hr (per skimmer)	ADEC rates most skimmers at 80 percent of the manufacturer's nameplate capacity, and assumes an oil emulsification factor of 1.54 and that skimmer operation occurs for 20 hours of each 24-hour period. Federal pump de-rating regulations are more conservative than the corresponding ADEC regulations. Consequently, Shell uses federal de-rating regulations (see Table 1-13).
30 CFR 254.44(b) Other Efficiency Factors	A smaller skimmer, the LORI LSC (similar to Lamor brushes) is derated to 80 percent of the effective nameplate capacity of the pumps. The resulting derated oil recovery rate is 217 bbl/hr per skimmer. 271 bbl/hr x 0.80 = 217 bbl/hr (per skimmer) The effective manufacturer's nameplate pumping capacity of other skimmers are listed in the ACS *Technical Manual*.	See the ACS *Technical Manual*, Volume I, Tactic L-6, for other pump rates.
30 CFR 254.26(d)(2) Deployment and Operation	The deployment of field personnel, vessels, and supplies needed to operate the oil removal and storage equipment are described in Tables 1-13 through 1-18 of the scenario.	An OSRV/OSRB is assigned to each drill rig during all drilling operations. A description of the OSRV/OSRB and the associated oil spill response equipment, vessels, and supplies contained on each vessel is described in Section 3.6. Equipment lists, locations, and owners of the equipment, as well as key oil spill response staffing lists, are described in the AES *Response Tactics Manual* and the ACS *Technical Manual*, Volume 1.
30 CFR 254.26(d)(3) Oil Storage, Transfer, and Disposal	The oil storage, transfer equipment, and disposal options, including barges, mini-barges, and fast tanks, and transport to oil processing facilities, are described in the scenario.	The types, locations, owner, quantity, and capacity of the scenario's equipment are described in the AES *Response Tactics Manual*, the ACS *Technical Manual*, Volume 1, and Section 1.6.10, Temporary Storage and Disposal.

TABLE 1-10 (CONTINUED)
SUMMARY OF HOW THE WORST CASE DISCHARGE SCENARIO COMPLIES WITH MMS REGULATION

MMS REGULATION	SUMMARY	REFERENCE
30 CFR 254.26(d)(4)(i) Time for Procurement of Oil Containment, Recovery, and Storage Equipment	Time for procurement, mobilization, and transit time is reflected in the scenario.	Mobilization and deployment time for offshore response equipment is specified in Tables 1-13 through 1-18. Nearshore and shoreline response equipment mobilization from ACS is specified in equipment tables in the ACS *Technical Manual* tactics that the scenario incorporates by reference. In addition, Shell has the capability to mobilize out-of-region resources within 24 hours if needed. See Tactics L-8, L-9, and L-10.
30 CFR 254.26(d)(4)(iii) Time for Procurement of Personnel	Procurement, mobilization, and transit time for personnel is reflected in the scenario.	Mobilization time for staff operating vessels and other equipment contained on the OSRV/OSRB is less than 1 hour. Mobilization time for other oil spill staff is specified in the AES *Response Tactics Manual* and the ACS *Technical Manual*. Equipment operators and crews mobilize with their equipment from North Slope origins through ACS contracts and mutual aid agreements; See Tactics L-8, L-9, and L-10 for mutual aid agreements, master agreements, and other agreements for accessing equipment.
30 CFR 254.26(d)(4)(iv) Equipment Loadout Time	Initial response vessels and equipment are contained on the OSRV/OSRB. An OSRV is stationed with each operating drill rig and the loadout times are reflected in the scenario. The loadout times for nearshore and shoreline response equipment are included in the mobilization times listed in the ACS *Technical Manual* tactics equipment tables and are incorporated here by reference.	Equipment loadout time is included in the mobilization times specified for equipment and vessels listed in the ACS *Technical Manual* tactics that the scenario incorporates by reference.
30 CFR 254.26(d)(4)(v) Travel Time	Times to travel to the deployment site for the offshore, nearshore, and shoreline tactical units (personnel and equipment) are described in the narrative of the scenario.	Travel times to the deployment sites are included in attached tables and the ACS *Technical Manual*, Tactic L-3, lists travel rates for ACS support equipment.
30 CFR 254.26(d)(4)(vi) Deployment Time	Times to deploy equipment are described in the scenario narrative and incorporated by reference to particular ACS *Technical Manual* tactics that list deployment times.	Deployment times are specified in the attached tables. The ACS *Technical Manual* contains tactics equipment tables that list equipment deployment times. The current Shell leases are a maximum of 160 air miles from Deadhorse. Assuming a helicopter travel speed of 100 miles per hour, the maximum travel time to a Shell lease is 1.6 hours.

TABLE 1-10 (CONTINUED)
SUMMARY OF HOW THE WORST CASE DISCHARGE SCENARIO COMPLIES WITH MMS REGULATION

MMS REGULATION	SUMMARY	REFERENCE
30 CFR 254.26(e)(1) Equipment and Strategies are Suitable for Conditions	Response equipment illustrated in the scenario is designed to operate within the range of environmental conditions projected to be encountered at the exploration leases. The equipment available on the two OSRV/OSRB and on the North Slope, and selected for the simulated deployments in this scenario, is the “best available technology” for responding to oil well blowouts in the offshore and nearshore Beaufort Sea. Equipment in the scenario has been tested and selected as the most suitable for mechanical oil recovery in broken ice and open water conditions associated with the regional exploration plan. Response strategies illustrated in the scenario are also suitable, within the limits of current technology, for the range of environmental conditions anticipated. The strategy of mechanical recovery illustrated in the scenario reflects best available technology for the environmental conditions. The strategy has been tested, exercised, and selected as most suitable for the conditions.	See the following analyses and reports that indicate the scenario’s equipment and strategies are most suitable: Blowout response plans, in Section 1.6 of this plan. Alaska Clean Seas *Technical Manual*, Volumes 1, 2, and 3.
30 CFR 254.26(e)(2) Standard Terms for Conditions and Equipment Capabilities	The scenario employs standardized, defined terms to define environmental conditions and response equipment. The terms in the scenarios are consistent with terms used in spill response planning in general and for North Slope responses in particular.	For definitions of terms, see the following document: Alaska Clean Seas *Technical Manual*, Volumes 1, 2 and Alaska Climate Research Center website containing Barter Island data from 1971 through 1988: http://climate.gi.alaska.edu/

Simulated Weather and Sea Conditions at Spill Scene

The scenario reflects historical sea and weather conditions that are described in references cited in the last column of Table 1-10.

On August 1, the sea is ice-free at the drilling location with daylight lasting 21 hours per day and decreasing to 16 hours per day by August 30. The average daily maximum and minimum air temperatures are 44°F and 34°F. The average wind speed is 10 mph or 8 to 9 knots.

Characteristics of the Simulated Discharged Oil [30 CFR 254.26(a)]

Oil reaches the surface from the exploration well several hours after a kick is detected. Oil flows at the rate of 5,500 bopd. Gas and oil reach the sea floor through a 6-inch orifice at the mud line. Gas releases at 5 million standard cubic feet per day (mmscf/d). The blowout discharges a total of 165,000 bbl of crude oil over 30 days.

For the purposes of the C-Plan, the properties of the crude oil from the proposed drilling locations are expected to be broadly comparable to the analysis of samples obtained previously from the Hammerhead prospect (now called Sivulliq) in 1985:

API gravity (60 deg. F):	20.2
Viscosity (60 deg. F):	468 cp
Water content in oil/water Emulsion (wt %):	12
Asphaltene content (wt %):	0.5
Pour point (deg. F):	-10

Assay comments[1]: "…Both crudes are of intermediate gravity, have low wax, asphaltene, and sulphur content, but an intermediate resins content, are acidic and fairly viscous. The crudes are unusual in that they are devoid of light ends…"

Aerial Deposition

The well blowout occurs at the mud line and the crude oil migrates to the water surface. No aerial deposition occurs.

Oil Spill Trajectory [30 CFR 254.26(b)]

August 1 through August 30

Oil on open water is assumed to move with surface currents and at 3 percent of the speed. If left uncontained and uncollected, the oil plume migration is driven by ocean currents and prevailing winds for the 30-day duration of this scenario. The regional ocean current used for the trajectory modeling was 0.75 knots to the west-northwest. Wind data used for the trajectory modeling were collected from the nearest National Weather Service weather station. Wind data observations from the Barter Island station,

[1] As reported by V.R. Kruka, SWEPI, Jan. 1986.

tabulated from August 1 through August 30 between 1971 and 1988, were used to simulate the prevailing winds. The predominant wind directions were determined as the 16 cardinal compass directions with a frequency greater than 10 percent of the time. These four wind directions were then normalized to 100 percent resulting in the following set of prevailing winds:

- East wind = 34.3% frequency
- West Northwest (WNW) wind = 22.4% frequency
- West wind = 21.9% frequency
- East Southeast (ESE) wind = 21.3% frequency

The trajectory simulation uses these winds in two 15-day cycles for the 30-day simulation with the duration calculated from the frequency percent of each wind direction. For purposes of the scenario, the model employs an East wind at the time of the blowout. This is the most conservative trajectory model, as the wind and the ocean current are both from the East, resulting in the quickest movement of the leading edge of the oil plume from the well site. The wind pattern for the scenario is:

- Day 1 through Day 5, Hour 4: wind from the east
- Day 5, Hour 4 through Day 8, Hour 13: wind from the WNW (292.5^{o})
- Day 8, Hour 13 through Day 11 Hour 20: wind from the west
- Day 11, Hour 20 through Day 15: wind from the ESE (112.5^{o})
- Day 16 through Day 21, Hour 4: wind from the east
- Day 21, Hour 4 through Day 24, Hour 13: wind from the WNW (292.5^{o})
- Day 24, Hour 13 through Day 27 Hour 20: wind from the west
- Day 27, Hour 20 through Day 30: wind from the ESE (112.5^{o})

The Response Group trajectory (Figure 1-11) shows a majority of the discharged oil moving offshore with lesser amounts impacting the mainland and barrier islands between Cross Island and Barrow. From Day 1 through Day 5, Hour 4, oil movement is controlled by a 0.75-knot WNW current and a 10-knot wind from the east. Left unrecovered, the oil plume travels almost due west in open water and first impacts land at Cross Island after 67 hours. By Day 19, the oil would have reached the shorelines of Barrow and would then move to open water north of land.

The final Environmental Impact Statement for the Beaufort Sea Planning Area Oil and Gas Lease Sales, prepared by the MMS (OCS EIS/ES MMS 2003-001), includes an analysis of how and where offshore spills move using a computer model called the Oil-Spill-Risk Analysis Model of the U.S. Geological Survey, developed in 1982. Working with both summer and winter conditions, thousands of trajectories were run for spill source locations that closely represent Shell's proposed drill sites in the Beaufort Sea. The trajectories were run using offshore and nearshore environmental conditions collected by governmental organizations and universities between 1982 and 1996.

The Response Group trajectories are consistent with the results presented in the MMS EIS. The MMS report reveals probabilities of impact to be typically 0.5% to 3% within the region between Point Brower, Prudhoe Bay, Arey Island, and Barter Island (Land Segments 39 through 46). These probabilities are based on oil left in the environment (i.e., no cleanup response) for 30 days, from source locations (Hypothetical Launch Areas #15 and #17) that include Shell's proposed drill sites at Olympia and Sivulliq.

While the trajectory modeling of hypothetical oil spills for the region of concern is valuable as an indication of probable shoreline impact, Shell recognizes the need to plan for those wind and sea conditions that could conceivably drive oil directly toward shore and other sensitive resources. BAT has been used wherever possible, along with the expertise of ACS and AES, to ensure that a timely and effective response is mobilized by the end of Day 1 to protect priority sites in the event that oil reaches the shore earlier than forecasted by the trajectory simulation (see Table 1-12).

Resources of Importance [30 CFR 254.26(c)]

Resources of special economic or environmental importance could be impacted by the spilled oil. The marine and coastal bird and mammal populations and shoreline cultural resources occupying the path of the spilled oil described in the trajectory section potentially could be affected by oiling. Many of the birds and mammals are important both ecologically and economically. Two primary documents list the marine mammal groups and the marine bird groups that may be potentially exposed to the scenario's oil. The ACS *Technical Manual*, Volume 2, contains information from Brownlow Point westward. NOAA ESI Maps contained in the *Sensitivity of Coastal Environments and Wildlife to Spilled Oil, North Slope, Alaska, Atlas* were used to identify marine mammals and marine bird groups from Brownlow Point eastward to Barter Island. The ACS *Technical Manual* and the ESI Maps also describes the seasonal distribution of marine mammals and birds in the spill vicinity and simulated trajectory path. Endangered and threatened species are also identified with notes describing protection strategies. Shoreline habitats exposed to the oil are listed by level of concern and depicted on maps of the spill area. Known cultural resource sites are listed on the ACS *Technical Manual* maps. The ACS *Technical Manual* lists are adapted from the Alaska Regional Response Team's "North Slope Subarea Plan."

There are two primary strategies necessary to protect resources of importance. The primary strategy is to contain and recover, and remove oil as quickly as possible while it is encountered in a thick layer at the blowout site. Focusing on the release site will most effectively reduce the quantity of oil available to move away from the blowout into sensitive areas later.

The second important strategy is to contain and recover oil that has escaped the primary recovery operations near the spill site. This secondary recovery will involve the self-propelled skimming boat operated by AES and the skimming boats operated by ACS closer to shore. ACS will also deploy exclusion and deflection boom at selected shoreline sites. All of these priority protection sites are identified in the ACS *Technical Manual*, Volume 2, or in the NOAA ESI maps.

To protect shoreline sites from oncoming oil that escapes the offshore oil removal task forces, teams of workboats tow boom from Prudhoe Bay and anchor it in shallow water as far east as Brownlow Point. Exclusion booming and deflection booming tactics, including equipment lists, personnel numbers, procedures, and mobilization and deployment times, are described in ACS *Technical Manual* Tactics C-13, C-14, and C-15. The features of the vessels and boom are outlined in Tactic L-6. Response teams may also fly from Prudhoe Bay to shoreline staging areas, then use work boats to travel westward to protect environmental sensitivity sites along the shoreline between Kaktovik and Brownlow Point. To protect birds and mammals, the main strategy is removing oil from the environment. The secondary strategy for wildlife protection is hazing. By hour 24, ACS equipment and trained personnel are working near the barrier islands and shoreline. Oiled carcasses are collected to remove them as sources of injury to predators. Oiled animals are captured, stabilized, and treated by specialists using ACS equipment, including the wildlife stabilization facility at Prudhoe Bay. Animals requiring further treatment are transported to the Alaska Wildlife Rehabilitation Center in Anchorage. See ACS *Technical Manual* Tactics W-1 to W-6 for decision-making and field procedures.

Discussion of Equipment, Personnel, and Times [30 CFR 254(d)]

The following discussion illustrates a response to a worst case discharge scenario described in conditions stated above. Descriptions of conditions are provided in the Simulated Conditions section of the scenario and in ACS *Technical Manual,* Tactic L-7, Realistic Maximum Response Operating Limitations for Mechanical Response Equipment. In addition, skimmer capacities are derated to reflect the effects of adverse weather, among other factors. Adverse weather conditions involving low temperatures and varying ice conditions are demonstrated in the ADEC Response Strategy following this Response Scenario/Worst Case Discharge Scenario.

The locations, owner, and capacities of response equipment, personnel, materials, OSR support vessels, oil storage, transfer, and disposal equipment referenced in the scenario are listed in the AES *Response Tactics Manual* and the ACS *Technical Manual*. ACS *Technical Manual* tactics are incorporated into the scenario by reference.

Mobilization and deployment times of the scenario's containment and recovery, storage equipment, equipment transportation vessels, and personnel to load and operate the equipment are listed in the AES *Response Tactics Manual*, the ACS *Technical Manual* tactics equipment tables, and Table 1-14 of the scenario. Equipment loadout times to transfer equipment to vessels are incorporated into the mobilization times.

TABLE 1-11
WELL BLOWOUT IN SUMMER
SCENARIO CONDITIONS

INITIAL CONDITIONS	
Spill Location	Shell Olympia Exploration Well, drilled by drill ship *Frontier Discoverer*
Date	August 1
Duration	30 Days
Type of Spill	North Slope Crude Oil
Source of Spill	Uncontrolled well blowout at the mud line through an open orifice in 100 feet of water
Quantity of Oil Spilled	RPS Volume = 5,500 bopd x 30 days = 165,000 bbl
Emulsification Factor and free water pickup	1.54 x 165,000 bbl = 254,100 bbl. This is the oil emulsion volume created by skimming/pumping operations. Assuming that approximately 20% of the original oil volume recovered is added to this mix as free water (~33,000 bbl), the total volume of fluids (emulsion + free water) could conceivably require approximately 287,100 bbl.
Wind Speed	10 knots
Wind Direction	Wind direction is simulated as prescribed by 18 AAC 75.425(e)(1). Wind direction data were retrieved from the Alaska Climate Research Center for Barter Island from 1971 through 1988 for the months of August through October. The website URL is: http://climate.gi.alaska.edu/climate/Wind/Direction/BarterIsland/Data_table.html. All wind directions with a daily persistence greater than 10 percent were selected and normalized to 100 percent. The 4 primary wind directions and their relative percent frequency were applied in two wind cycles of 15 days each. The wind directions and durations for the 30-day scenario are: Day 1 through Day 5, Hour 4: wind from East Day 5, Hour 4 through Day 8, hour 13: wind from WNW (292.5°) Day 8, Hour 13 through Day 11 Hour 20: wind from West Day 11, Hour 20 through Day 15: wind from ESE (112.5°) Day 16 through Day 21, Hour 4: wind from East Day 21, Hour 4 through Day 24, Hour 13: wind from WNW (292.5°) Day 24, Hour 13 through Day 27 Hour 20: wind from West Day 27, Hour 20 through Day 30: wind from ESE (112.5°)
Air Temperature	Average daily maximum and minimum temperatures were obtained from the Western Regional Climate Center website: http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?ak0558 The average daily maximum and minimum air temperatures for August are 44°F and 34°F, respectively.
Surface Current	0.75 knots to the WNW
Visibility	Variable
Surface	The well location is a Shell offshore mobile drilling platform located 120 nautical miles or less from the second Shell offshore mobile drilling platform and corresponding OSRV. The prospect is located in federal waters in the Beaufort Sea, approximately 10 nautical miles northwest of Kaktovik and not further than 120 nautical miles from the second Shell drilling platform. Wave heights are typically 1½ to 2 feet with no ice present.
Trajectory	Modeling of the oil plume migration was conducted by The Response Group using local wind data and ocean currents. Portions of trajectory calculations presented in Tactics T-4 and T-5 from ACS *Technical Manual* are incorporated by reference. The trajectory model developed by The Response Group uses Applied Science Associates, Inc.'s OilMap software. Based on environmental conditions such as predominant winds and currents, the output from this model shows estimated oil concentrations and predicted shoreline impact of a potential blowout. The oil trajectory model includes algorithms for spreading, evaporation, emulsification, and entrainment, all of which are input parameters based on the properties of the crude oil. The results identify potential shoreline impact and provide graphical representation for instantaneous or continuous release spills (Figure 1-11). Input parameters include a spill volume of 5,500 bopd of North Slope crude oil with 28 API. Local wind data and ocean currents used for the model includes 10 knots wind from the East and a

TABLE 1-11 (CONTINUED)
WELL BLOWOUT IN SUMMER
SCENARIO CONDITIONS

INITIAL CONDITIONS	
	current of 0.75 knots to the WNW. The figure shows the model at 72 hours into the spill and identifies the amount of evaporation and oil thickness at this time. The simulated oil discharge of 5,500 bopd is ejected through a 6-inch ID well at the mud line, in water approximately 100 feet deep. Within minutes of the blowout, oil rises to the surface of the sea. The oil plume migrates to the west as a function of water currents and the direction of the prevailing wind. Within 67 hours, <u>if the oil remained uncontained and unrecovered</u>, the leading edge of the plume could reach Cross Island, approximately 145 nautical miles west of the blowout.

TABLE 1-12
WELL BLOWOUT IN SUMMER SCENARIO
RESPONSE STRATEGY

ADEC REQUIREMENT	RESPONSE STRATEGY	ACS *TECHNICAL MANUAL* TACTIC
(i) Stopping Discharge at Source	As soon as the well kicks, subsurface well control is initiated (increasing mud weight, blowout preventer activation). Initial attempts fail and the Olympia exploration well is now classified as an "unobstructed" blowout well (T+00 hours). The well has a continuous flow rate that will deposit at the surface a total of 5,500 bopd. The On-Site Shell Drill Foreman notifies ACS and AES personnel on the OSRV collocated with the drilling ship. Notifications to appropriate state and federal agencies are performed. The National Response Center (1–800–424–8802) is notified, and the IMT is activated. The second Shell drill ship and associated OSRB located at a maximum distance of 120 nautical miles is notified. The second drill ship stops drilling operations and releases their oil response resources to the blowout site. An oil storage tanker, centrally located between the two drilling sites is also notified and immediately deployed to within a few miles of the blowout. Safety analyzed the situation and initiates equipment and personnel mobilization in order to stop the blowout. Well Control is discussed in Section 1.6.3 of this plan. Anchors are pulled and the drill ship is moved away from the sea floor blowout when control is lost and safety is a concern.	Volume 3 ICS Table 1-1, Section 1 of this plan A-1, A-2
(ii) Preventing or Controlling Fire Hazards	Throughout the first few hours of the spill, the Site Safety Officer verifies that all sources of ignition are shut down or removed from the area. The Site Safety Officer provides access zone information and determines PPE requirements. Monitoring protocol is established for all work areas to ensure personnel protection. The monitoring protocol establishes safety zones according to applicable OSHA and fire hazard standards. Consideration is given to pull anchors and move the drill ship from the well blowout.	S-1 through S-6
(iii) Well Control Plan	Well Control is detailed in Section 1.6.3 of this plan. The following briefly describes well control measures at the simulated blowout at the Olympia exploration site: In the event of a blowout a well control specialist would be consulted for the intervention and resolution of a well control emergency. **T+12 Hours**, the relief well plan is implemented in the event the surface control measures fail. Personnel and equipment are mobilized. Initially, the Olympia drill ship attempts to plug stop (or slow) the blowout by pumping mud and/or concrete downhole. After initial efforts fail, the drill ship pulls away from the well blowout location in order to support safe recovery operations. Repairs are initiated in order to facilitate potential relief well drilling. The second drill ship, at the Sivulliq site, has ceased drilling operations and begun preparations to deploy to the blowout site. The rig is located not further than 120 nautical miles and will arrive in 1.5 to 3 days, depending on conditions. Equipment needed for potential oil recovery and well control support is placed on standby. Helicopters in Prudhoe Bay are put on standby. **T+4 Days**. Equipment and personnel required for well control arrive at the drill rig. Potential subsurface control measures are evaluated. Damage to the drill site and the ability to access the actual rig and controls are determined. All options are considered (see Section 1.6.3). **T= 15 Days**. Well begins to bridge and flow rate decreases linearly.	Section 1.6.3
	T= 30 Days. Surface control of the blowout is achieved and relief well installation is suspended	

TABLE 1-12 (CONTINUED)
WELL BLOWOUT IN SUMMER SCENARIO
RESPONSE STRATEGY

ADEC REQUIREMENT	RESPONSE STRATEGY	ACS *TECHNICAL MANUAL* TACTIC
(iv) Surveillance and Tracking of Oil	Oil movement is tracked using a combination of visual observations and remote sensing techniques. Within the first 4 hours of initial notification of the blowout, the Kuparuk Twin Otter with forward looking infrared radar (FLIR) is deployed. Response vessels also deploy buoys with transmitters. Both systems are capable of real-time tracking of the leading edge of the oil. Oil location information is digitized and transferred to the IMT and On-scene Commander for response planning and trajectory modeling. NOAA and The Response Group are requested to provide trajectories based on wind speed and direction. Vector addition and trajectory modeling are used to forecast oil and movement.	T-4 T-5 T-5
(v) Exclusion Procedures; Protection of Sensitive Resources	The Environmental Unit's Cultural Resource Specialist and State Historic Preservation Officer issue an advisory. The NOAA Environmental Sensitivity Index Maps, ACS Atlas Maps, and the North Slope Subarea Contingency Plan are used to identify areas of major concern. A shoreline cleanup plan is approved by the Unified Command and the State Historic Preservation Officer. Based on trajectory calculations and oil tracking, barrier islands are identified as the first area to be impacted by oil, followed by the salt marshes and inlets adjacent to the Kadleroshilik River. Protection sites identified in these areas are identified for exclusion or deflection booming. **T+1 Day.** There are no priority protection sites on Cross Island. ACS Shoreline Protection Task Forces will be mobilized and prepared to deploy exclusion booms at **PS-56** and **PS-57** on Flaxman Island, if needed. Two teams, traveling by small workboats and airboats from Prudhoe Bay, each place boom in the quantities described in ACS *Technical Manual* Map Atlas. **T+2 Days.** ACS Shoreline Protection Task Forces deploy exclusion booms at **PS3** and **PS3A** south of Tigvariak Island, and **PS-3D, PS-4, PS-4A**, and **PS-4B** adjacent to the Kadleroshilik River. ACS dispatches additional Shoreline Protection Task Forces to Barter Island to deploy exclusion boom. The protection sites located in Camden Bay are identified by trajectory models performed by NOAA and The Response Group identified above.	NOAA Environmental Sensitivity Index Maps ESI 3-5 Map Atlas Sheets 80, 83-86, 88-89, 98-100 http://www.asgdc.state.ak.us/maps/cplans/subareas.html#northslope C-14
(vi and vii) Spill Containment, Control, and Recovery Procedures	ACS has the capabilities of mounting an effective response within several days to supplement the primary response operations. **<u>Task Force (TF) Descriptions:</u>** **TF-1:** Primary response is provided by equipment stationed with the drill rig. This equipment includes an OSRV with 12,000 bbl storage capacity and two Lamor brush skimmers; two 34-foot workboats; and containment and fire boom. **TF-2:** The second response team is mobilized from an alternate drill site located within 120 nautical miles of the Olympia lease site. Equipment includes an OSRB with more than 16,000 bbl storage capacity and two skimmers; four 34-foot workboats; one 47-foot skimming vessel; and containment and fire boom. The OSRB *Endeavor* is pushed to the site by an attending tug. Task Force 2 arrives at the spill site within 24 hours. **TF-3:** A 513,000 bbl tanker between the two drill sites is deployed immediately. It arrives in 16 hours. Decanting (if required) follows FOSC plan and USCG approval. **TF-4:** ACS Shoreline Protection Task Forces mobilize from Prudhoe Bay and deploy exclusion booms at priority sites by the end of Day 1. The primary objective of TF-4 is to prevent oil from entering priority sites. TF-4 does not recover discharged oil.	R-20 R-20 R-32B R-28 C-14

TABLE 1-12 (CONTINUED)
WELL BLOWOUT IN SUMMER SCENARIO
RESPONSE STRATEGY

ADEC REQUIREMENT	RESPONSE STRATEGY	ACS *TECHNICAL MANUAL* TACTIC
	TF-5: ACS nearshore recovery teams mobilize from Prudhoe Bay to recover oil that has escaped containment from Task Forces TF-1 and TF-2. Teams utilize skimmer boats with LORI LSC skimmers and mini-barges for storage.	R-32A, R-32B
	TF-6: ACS shoreline recovery teams to install boom in a hook configuration on shoreline to recover oil. Boom is anchored to the shoreline and offshore, and oil is collected with a skimmer and stored in a fast tank. One team works 10 locations within a 5-mile area. Two crews can manage shoreline operations for 10 miles.	R-17 modified, R-28
	<u>Recovery Timeline:</u>	
	T= 1 Hour. TF-1 is deployed immediately from the drill rig and moves a safe distance from the blowout. A vessel-based boom-skimmer system deploys downwind/down current of the blowout, ahead of the leading edge of the oil plume. The objective of TF-1 is to recover oil shortly after it surfaces and begins to move from the blowout location. While the burning of the well would likely eliminate some of the surfacing oil, it is assumed here (for planning purposes) that the full WCD of 5,500 bopd (229 bbl/hr) continues to flow from the blowout.	
	TF-1 deploys two workboats that tow boom in a U-shape, open-apex formation that allows oil to filter through to the OSRV at the apex of the boom. The U-shaped formation remains in a static location situated a safe operating distance from the blowout at the thickest portion of the oil plume. The two brush skimmers on the OSRV have a combined total derated recovery of 516 bbl/hour (see Table 1-13).	R-20
	T= 16 Hours. TF-3 consists of the storage tanker. The primary objective for TF-3 is to provide oil storage for the OSRV/OSRB that have reached full storage capacity. The two on-water task forces have the skimmer and barge capacity to handle over 24 hours of oil recovery operations; however, lightering to TF-3 occurs before the recovery vessels reach full capacity. Lightering procedures are detailed in Section 1.6.8.	
	T= 24 Hours. TF-2 has arrived from the second drilling rig located not further than 120 nautical miles away. The primary objective of TF-2 is to assist TF-1 in open water oil recovery. Vessels in TF-2 are capable of establishing two additional “U”-configuration recovery teams, if necessary. In this case, the three “U”-shaped recovery teams target the thickest portion of the oil plume without hindering each other’s operations. A single U-configuration can be deployed with the OSRB *Endeavor* configured with 2 LAMOR brush skimmers at the apex. The second U-configuration would have a 47-foot oil-skimming workboat equipped with two LAMOR brush pack skimmers (Figure 1-12).	R-17 modified
	J-Boom skimmer deployment is considered by TF-2 if sea conditions prevent U-Boom deployment.	
	Recovery rates of TF-1 and TF-2 are detailed in Table 1-13. The recovery rates exceed the rate that oil is released from the blowout location.	
	Oil that is not contained and recovered by TF-1 and TF-2 is transported westward by the ocean currents and prevailing winds. TF-5 is deployed from Prudhoe Bay to recover oil that is often encountered in windrows and linear slicks. TF-5 consists of two skimming vessels, one vessel is configured with two side booms and two LORI skimmers, the other vessel is configured with a single side boom and LORI skimmer. Mini-barges and shuttle boats are used to transport recovered oil to Prudhoe Bay for processing.	
	T = 2 Days. Currents and prevailing winds continue to move the oil that is not contained and recovered to the west. TF-6 is mobilized from Prudhoe Bay to install boom in a hook configuration with a Vikoma skimmer in the recover area of the boom. Each task force can deploy and maintain one team at up to 10 locations for this configuration.	R-16

TABLE 1-12 (CONTINUED)
WELL BLOWOUT IN SUMMER SCENARIO
RESPONSE STRATEGY

ADEC REQUIREMENT	RESPONSE STRATEGY	ACS *TECHNICAL MANUAL* TACTIC
	T+5 Days. Oil trajectory modeling predicts WSW movement of oil. Oil recovery vessels adjust positioning accordingly. **T+11 Days.** Oil trajectory modeling predicts WSW movement of oil. Oil recovery vessels adjust positioning accordingly.	
(viii) Lightering Procedures	Decanting (if required) follows FOSC plan approval. Stored liquids are offloaded from the OSRV/OSRB to the tanker. The TF-1 OSRV has a fluid storage capacity of 12,000 bbl, while TF-2 has a holding capacity greater than 16,000 bbl. Based on a maximum oil exposure rate of 5,500 bbl/day (or 229 bbl/hour), an emulsification factor of 1.54, and free water retained in storage (20%), each skimming vessel could be filled at a rate of approximately 400 bbl/hour. The 12,000-bbl storage capacity could therefore be filled in about 30 hours. With one of the two OSRV/OSRB recovering oil at the blowout location, the other OSRV could be traveling to the tanker and lightering its recovered fluids. The estimated time for transit and lightering is approximately 12 hours, making a 24-hour rotation cycle reasonable.	R-28
(ix) Transfer and Storage of Recovered Oil/Water; Volume Estimating Procedure	Stored liquids are offloaded from the OSRV/OSRB to the tanker. Liquids from the nearshore skimmer vessels are stored in mini-barges to be transported back to Prudhoe Bay and disposed of accordingly. Liquids recovered by the shoreline recovery task forces are stored in fast tanks or bladder tanks. See Section 1.6.10. The volumes of stored oil emulsion and free water are gauged with ullage tape and recorded on waste manifests	R-28
(x) Plans, Procedures, and Locations for Temporary Storage and Disposal	A Waste Management Plan is developed in order to (1) fill out and sign manifests; (2) measure liquid and other waste; and (3) submit a plan to ADEC for waste management. Non-liquid oily wastes are classified and disposed of according to classification. Non-oily wastes are classified and disposed of accordingly. Recovered fluids stored onboard the Arctic tanker will be disposed of outside the US, either at Shell Group refineries or other 3rd party processors, in accordance with Shell environmental policy, and relevant local laws and regulations (see Section 1.6.10).	D-1 D-2 D-3
(xi) Wildlife Protection Plan	Wildlife monitoring and deterrents to protect animals are put in place at the spill scene and impacted areas during recovery operations. The International Bird Research and Rescue Center is put on standby in the event the wildlife treatment facility is required. Building U-8 is made available to agency biologists and veterinarians standing by to respond to potential reports of oiled wildlife. An aircraft monitors wildlife twice daily at the spill scene.	W-1 W-2, W-2B, L-6 W-3 W-4 W-5
(xii) Shoreline Cleanup Plan	Depending on the location, shoreline impact is expected to occur no sooner than Hour T+43. Shoreline cleanup operations are based on a plan approved by the Unified Command. A shoreline assessment is conducted to understand the nature and extent of oiling. Based on the shoreline assessment, priorities are established for cleanup. Cleanup techniques chosen are based on shoreline type and degree of oiling. Access to the Canning River delta and shoreline with large equipment is limited.	SH-1

TABLE 1-12 (CONTINUED)
WELL BLOWOUT IN SUMMER SCENARIO
RESPONSE STRATEGY

ADEC REQUIREMENT	RESPONSE STRATEGY	ACS *TECHNICAL MANUAL* TACTIC
	Primary delta and shoreline cleanup techniques include: Burning of oily vegetation, Deluge of minor to moderately oiled shoreline in the river, including those areas where heavier concentrations were manually removed, and Natural recovery for those areas where residual staining may remain, but further recovery would cause more harm than good.	B-2 SH-3 SH-2

TABLE 1-13
WELL BLOWOUT IN SUMMER
DERATED POTENTIAL RECOVERY CAPABILITY

A	B	C	D	E	F	G	H	I	J	K
ACS SPILL RECOVERY TACTIC	**NUMBER OF SYSTEMS**	**RECOVERY SYSTEM**	**DERATED RECOVERY RATE PER SKIMMER [BBL/HR]**	**MOBILIZATION AND TRANSIT TIME TO SITE [TIME]**	**OPERATING TIME ON DAY 1 [HR/DAY]**	**RECOVERY CAPACITY ON DAY 1 [BBLS/DAY] (B X D X F)**	**OPERATING TIME ON DAY 2 [HR/DAY]**	**RECOVERY CAPACITY ON DAY 2 [BBLS/DAY] (B X D X H)**	**OPERATING TIME AFTER DAY 2 [HR/DAY]**	**RECOVERY CAPACITY AFTER DAY 2 [BBLS/DAY] (B X D X J)**
AES OPEN WATER RECOVERY										
TF-1: R-20	2	Lamor 205m^3 brush skimmers Derated to 20% of the nameplate pump rate (20% x 1,289 = 258)	258	<1 Hour	24	12,384	12	6,192	12	6,192
TF-2: R-20	2	Lamor 205m^3 brush skimmers Derated to 20% of the nameplate pump rate (20% x 1,289 = 258)	258	24 Hours	0	0	12	6,192	12	6,192
TF-2: R-32B	2	Lamor 82m^3 brush skimmers (47 ft workboat) Derated to 20% of the nameplate pump rate (20% x 516 bbl/hr = 103 bbl/hr)	103	24 Hours	0	0	18	3,708	18	3,708
ACS NEAR SHORE RECOVERY										
TF-5: R32A	1	LORI LSC skimmers Derated to 80% of the nameplate pump rate (80% x 271 = 217)	217	48 Hours	0	0	0	0	10	2,170
TF-5: R32B	2	LORI LSC skimmers Derated to 80% of the nameplate pump rate (80% x 271 = 217)	217	48 Hours	0	0	0	0	10	4,340
TF-6: R-16	10	Hook Boom configuration with Vikoma or Morris skimmer	10	48 Hours	0	0	0	0	10	1,000
TOTAL BBLS OF RECOVERED LIQUIDS PER DAY						12,384		16,092		23,602

[1] Lamor pumps are derated to 20 percent per 30 CFR 254.44 (a) and (b). Federal de-rating regulations are more conservative than ADEC regulations; consequently, Federal regulations are used to estimate recovery capacity. Lori LSC-3 skimmers are an exception: a de-rating of 80% is applied to the nameplate pumping rate per MMS and ADEC guidelines.

[2] Once both Lamor systems are on location, each is capable of skimming more than 24 hours without filling. Recovery calculations assume that they go into a 24-hour rotation with only one OSRV skimming at a time, while the other transits to the tanker and offloads. For the purposes of calculating total recovery, 12 hours of recovery per day is used for the Lamor systems.

[3] Pump performance calculations assume 1 cubic meter equals 6.29 bbls (US, oil).

TABLE 1-14
MAJOR EQUIPMENT TO CONTAIN AND RECOVER OIL IN OPEN WATER

ITEM		EQUIPMENT INFORMATION	QUANTITY
TASK FORCE 1			
	Vessels		
	OSRV	300-foot Response Vessel with 12,000 bbl Storage	1
	Workboats	Kvichak 34-ft Workboat	2
	Oil Recovery Equipment		
	Large Brush Skimmer	Lamor 205m^3 Skimming Packages	2
	Vertical Rope Mop	Portable Skimming Package	1
	Mini-Brush Skimmer	Portable Skimming Package	1
	Storage Bladder	100-bbl Bladder	1
	Off Shore Boom	200-m Containment Boom Sections	4
	Fire Boom System	In Situ Burning Containment	1
TASK FORCE 2			
	Vessels		
	Barge *Arctic Endeavor*	16,800-bbl Storage Barge with Support Tug	1
	Workboats	Kvichak 34-ft Workboat	4
	Skimming Boat	Kvichak 47-ft Brush Skimming Vessel	1
	Oil Recovery Equipment		
	Large Brush Skimmer	Lamor 205-m^3 Skimming Packages	2
	Vertical Rope Mop	Portable Skimming Package	1
	Mini-Brush Skimmer	Portable Skimming Package	1
	Storage Bladder	100-bbl Bladders	2
	Kvichak Mini-Barges	249-bbl storage	4
	Off Shore Boom	200-m Containment Boom Sections	4
	Fire Boom System	In Situ Burning Containment	1
TASK FORCE 3			
	Vessels		
	Mass Storage	513,000-bbl tanker	1
	Other		
	Offloading Pumps	Mini-barge Offloading Pumps	1
		Spare Pump w/Hoses	1

TABLE 1-15
MAJOR EQUIPMENT FOR SHORELINE AND NEARSHORE OPERATIONS

TASK FORCE	EQUIPMENT	QUANTITY
TF-4, Shoreline Containment	Workboat Type C (2 teams, 2 boats each)	4
	Anchor Containment Boom	Varies among sites, >2,000 feet
TF-5, Nearshore Recovery	Skimming Vessel (Type D)	2
	Workboat (Shuttle)	2
	LORI Skimmer	3
	Boom	21 feet (R-32A), 42 feet (R-32B)
TF-6, Shoreline Recovery	Workboat Type C	2
	Vikoma or Morris Skimmer	20
	Anchor Boom	Varies, <6,000 feet (total)

TABLE 1-16
STORAGE EQUIPMENT FOR RECOVERY OPERATIONS

SUM OF CAPACITY OF OIL STORAGE TANKS		
ELEMENT	**DERATED CAPACITY (BBL)**	**REFERENCE**
OFFSHORE STORAGE		
OSRV	11,400	AES Equipment
Endeavor Barge	15,960	AES Equipment
Arctic Tanker	513,000	AES Equipment
AES Mini-barges	946 (4 x 236 bbl)	AES Equipment (comparable to ACS Mini-barges below)
NEARSHORE STORAGE		
ACS Mini-barges	1,888 (8 x 236)	ACS *Technical Manual*
SHORELINE STORAGE		
Fast Tanks	1,080 (20 x 54)	ACS *Technical Manual*
TOTAL STORAGE	**594,274**	

TABLE 1-17
STAFF TO OPERATE OIL RECOVERY AND TRANSFER EQUIPMENT

LABOR CATEGORY	TASK FORCE	DESCRIPTION	NO. STAFF PER SHIFT DAY 1	NO. STAFF PER SHIFT AFTER DAY 1
Team Leader/Field Supervisors	TF-1	OSRV Supervisor	1	1
	TF-2	OSRB Supervisor	1	1
	TF-3	Tanker Deck PIC	1	1
	TF-4	ACS	1	1
	TF-5	ACS	1	1
	TF-6	ACS	1	1
Large Vessel Response Equipment Operators, >30 feet	TF-1	OSRV Skimmer Operators	4	4
		(2) 34-ft Workboats	4	4
	TF-2	OSRB Skimmer Operators	4	4
		Skimmer Boat	0	3
		(4) 34-ft Workboats	4	8
	TF-3	Tanker	PIC	PIC
	TF-5	Workboat Type D (2 skimmer boats, 2 work boats)	4	4
Small Vessel Response Equipment Operator, <30 feet	TF-4	Workboat Type C (2 teams, 2 boats each)	4	4
	TF-6	Workboat Type C	2	2
Skilled Technicians*	TF-1	OSRV Deck Support Techs	2	2
	TF-2	OSRB Deck Support Techs	2	2
	TF-3	Tanker	PIC	PIC
	TF-4	2 Teams	8	2
	TF-5	Tactic R-32A, 1 Team	2	2
		Tactic R-32B, 1 Team	2	2
	TF-6	Tactic R-16, 2 Teams	4	2
Total Operators and Technicians	-	-	52	51

* Total is sum of vessel operators and technicians. Team leaders are vessel operators.

PIC – Person in charge, indicating that this aspect will be performed by a member of the tanker crew who is assigned to this duty; no additional response staff from Shell, AES or ACS included.

FIGURE 1-11
ESTIMATED OIL TRAJECTORY - DAY 3 (IF UNCONTAINED AND UNRECOVERED)

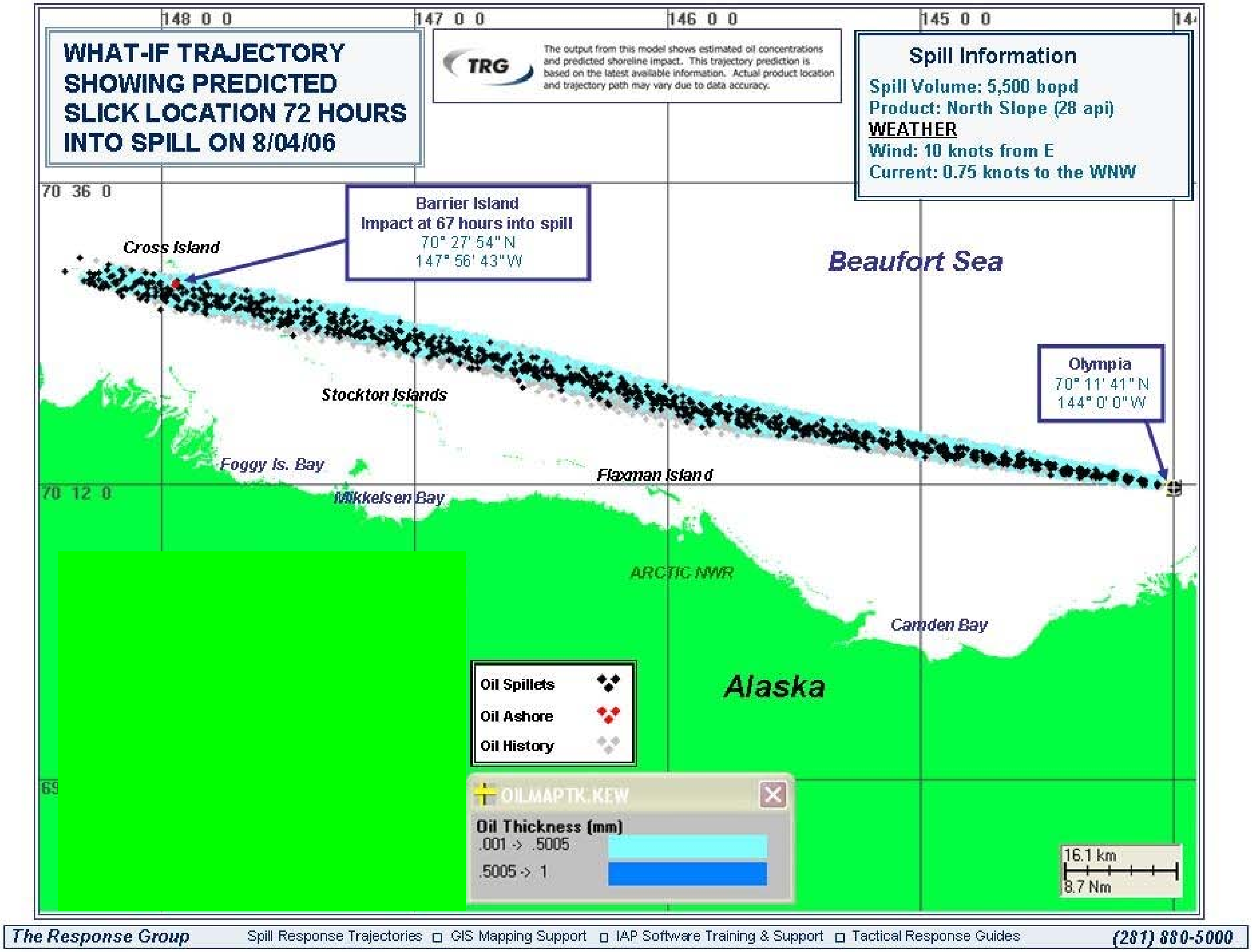
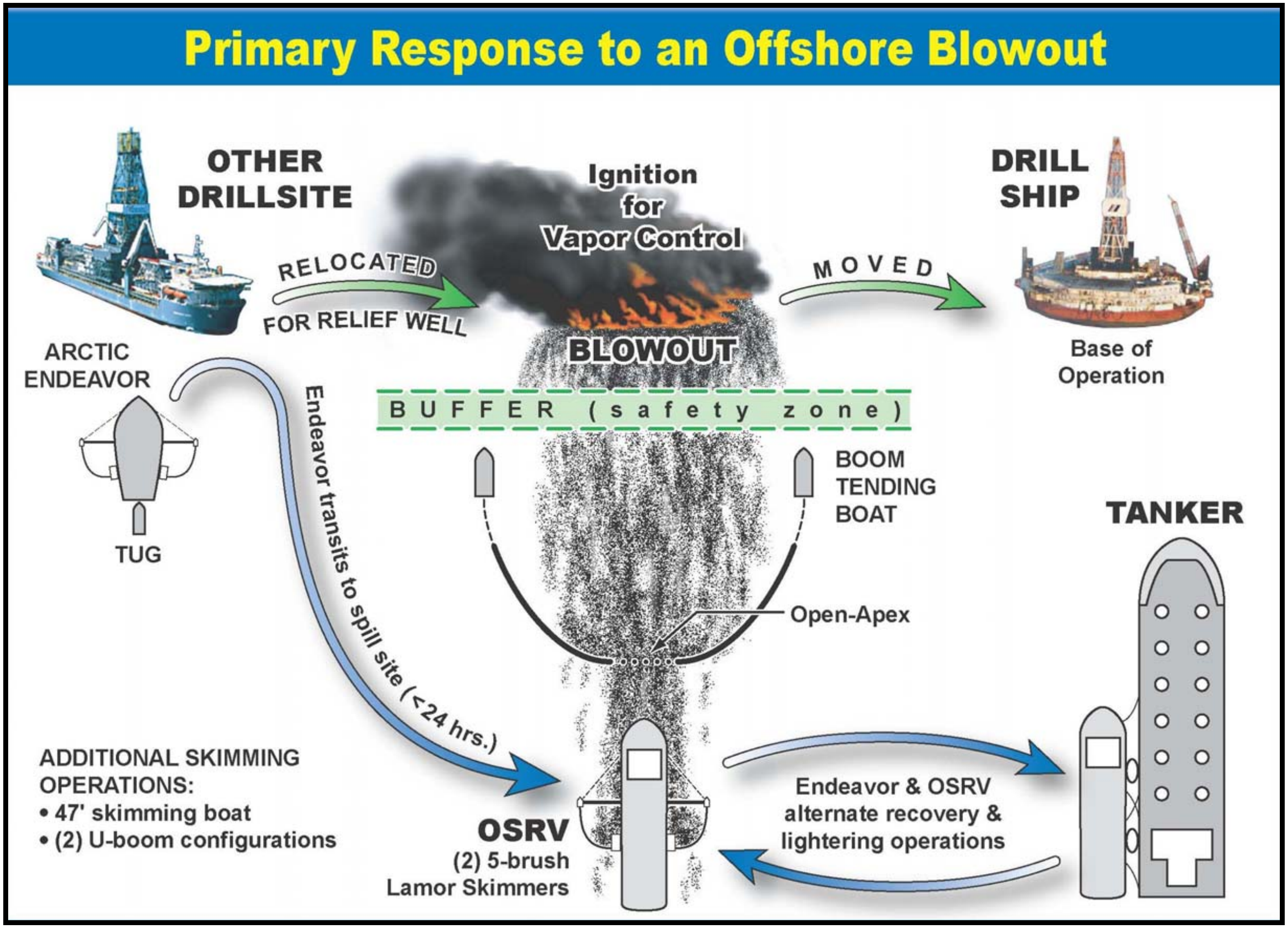


FIGURE 1-12
PRIMARY RESPONSE TO AN OFFSHORE BLOWOUT



RESPONSE STRATEGY 1

SUB-SEA BLOWOUT IN VARYING ICE CONDITIONS

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RESPONSE STRATEGY PARAMETERS

The following response strategy describes methods and equipment that could be used in response to a hypothetical oil spill from a sub-sea well blowout at one of Shell's exploratory drilling locations during varying ice conditions.

For the purposes of the strategy, a Shell exploration well on the Olympia prospect blows out at sub-sea on October 1, nine days before freeze-up. While open water at the Olympia location can (and often does) extend well into mid-October, the formation of new ice by Day 9 provides ample time for the description of response techniques during freeze-up. In this simulation, oil and gas travels from the sub-sea release at the mud line to an open region at the water's surface.

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TABLE 1-18
RESPONSE STRATEGY
SUB-SEA WELL BLOWOUT IN VARYING ICE CONDITIONS

ADEC REQUIREMENT	RESPONSE STRATEGY	APPLICABLE ACS *TECHNICAL MANUAL* TACTIC
(i) Stopping Discharge at Source	The On-site Shell Drill Foreman notifies ACS and AES personnel on the OSRV collocated with the drilling ship. All notifications to appropriate state and federal agencies are performed. The National Response Center (1–800–424–8802) is notified, and the Incident Management Team is activated. The second Shell drill ship and associated OSRB located at a maximum distance of 120 nautical miles is notified. The second drill ship stops drilling operations and deploys their OSRV. An oil storage tanker centrally located between the two drilling locations (not more than 60 nautical miles from the blowout) is also notified and immediately begins mobilizing to the spill location.	A-1, A-2
(ii) Preventing or Controlling Fire Hazards	Throughout the first few hours of the spill, the Site Safety Officer verifies that all sources of ignition are shut down or removed from the area. The Site Safety Officer provides access zone information and determines PPE requirements. Monitoring protocol is established for all work areas to ensure personnel protection from fire hazards and other blowout conditions. All anchors are pulled, and the drill ship is moved from the well blowout. As in the open-water scenario, the FOSC approves the ignition of the blowout for safety reasons.	S-1 through S-6
(iii) Well Control Plan	Well Control is discussed in Section 1.6.3 of this C-Plan.	Not applicable
(iv) Surveillance and Tracking of Oil; Forecasting Shoreline Contact Points	Oil movement is tracked using a combination of visual observations and remote sensing techniques. Within the first 4 hours of initial notification of the blowout, the Kuparuk Twin Otter with forward looking infrared radar (FLIR) is deployed. Response vessels also deploy buoys with transmitters. Both systems are capable of real-time tracking of the leading edge of the oil. By Day 9 of the spill, discharge tracking in ice is performed by helicopter, which deploys beacons capable of transmitting the leading edge of the oil. NOAA is requested to provide trajectories based on wind speed, direction, and currents.	T-4, T4A T-5
(v) Protection of Environmentally Sensitive Areas and Areas of Public Concern	Land-fast ice may exist in early October. When present, land-fast ice provides an effective natural barrier against oil reaching the shoreline. If land-fast ice has not formed, nearshore skimming operations (R-15 through R-18) will be used to intercept any oil that may approach the shoreline. In this scenario, containment booming and recovery with ACS skimmers and mini-barges is used to prevent oil from reaching the Canning River Delta and other sensitive river outlets nearby. Oil that has not been recovered by primary response methods is expected to reach the first barrier island (Cross Island) by the end of Day 3. If land-fast ice has not formed in these areas, nearshore and shoreline containment and recovery operations will be mobilized to prevent oil from reaching sensitive sites. The Environmental Unit's cultural resource specialist and State Historic Preservation Officer issue an advisory. The NOAA Environmental Sensitivity Index Maps, ACS Atlas Maps, and the North Slope Sub-area Contingency Plan are used to identify areas of major concern. A shoreline cleanup plan is approved by the Unified Command; however, it is recognized that shoreline access will be limited as land-fast ice begins to form throughout the region. Should oil move into these nearshore waters and become entrained within the growing ice, the locations of the oiled regions will be recorded and monitored for ice movement. As ice thickness increases at	NOAA Environmental Sensitivity Index Maps ESI 3-5 ACS Atlas Maps 80, 89, 100 http://www.asgdc.state.ak.us/maps/cplans/subareas.html#northslope T-2

TABLE 1-18 (CONTINUED)
RESPONSE STRATEGY
SUB-SEA WELL BLOWOUT IN VARYING ICE CONDITIONS

ADEC REQUIREMENT	RESPONSE STRATEGY	APPLICABLE ACS *TECHNICAL MANUAL* TACTIC
	these sites, stakes will be positioned to identify areas for on/in-ice recovery techniques.	
(vi) Spill Containment and Control Actions	From Day 1 and throughout the month of October, land-fast ice continues to grow out from the mainland and from long stretches of shoreline along the barrier islands. This land-fast ice becomes increasingly stable, resisting the forces of wind, current, and tidal changes. Due to the scale of the initial response to the oil farther offshore, relatively small quantities of oil are expected to reach the beaches. The land-fast ice continues to grow seaward out to depths of typically 5 to 10 meters (32 feet). Beyond the land-fast ice, operations continue with conventional containment and recovery operations involving large swath, open apex U-boom configurations, funneling oil immediately downstream of the blowout into narrow, thick bands. The concentrated bands of oil are intercepted by the OSRV/OSRB, which work in a rotation cycle, filling only a portion of their onboard storage capacity with each recovery cycle (approximately 24 hours). While some oil would undoubtedly be removed by the burning gas at the blowout, it is assumed (for planning purposes only) that a substantial amount of oil continues to be released from the burning blowout. As offshore operations move into the second week of response, the hours of daylight and average air temperatures continue to drop, making oil surveillance and tracking more difficult, along with the location, containment, and recovery of oil. Intentional ignition of the blowout at the start of the spill helps keep dangerous vapors from accumulating and interfering with recovery operations; the fire helps responders to see the source from which oil is being released; and, depending upon the nature of the oil and the degree of emulsification, it is likely that some of the oil would be consumed through combustion at the spill site. During the second week of response (Day 8 to Day 14), the formation of grease ice and nilas (e.g., a thin elastic crust of ice up to 10 cm thick that bends easily under pressure) make it increasingly difficult to work with booms as they begin to fill with ice, preventing the effective collection of oil. During this period, recovery continues with the more narrow-swath capabilities of the outriggers on the OSRV/OSRB. Oil encounter rates are substantially reduced, and the large OSRV/OSRB, together with the smaller skimming vessels (the 47-foot boat with built-in Lamor brushes and the ACS skimming workboats), are limited to spot-removal techniques in the heaviest of concentrations. As oil accumulates in pockets, recovery continues with the OSRV/OSRB operating rope-mop and direct suction skimmers along with the over-the-side Lamor brush skimmers. Beyond Day 14, the on-scene drilling support vessels with ice-breaking capabilities begin to break through the formation of pancake ice and large continuous layers of thin ice. These ice breakers patrol and move ice that can hamper normal drilling operations, and they are able to break and help deflect ice away from a blowout situation. By keeping the open water upstream of the blowout relatively free of heavy ice incursions, oil is exposed and made available for combustion and for limited recovery with spot-removal techniques further downstream. As freeze-up continues and blowing snow begins to accumulate on young ice, it becomes impossible to operate the physical containment and recovery systems safely and effectively. Small work boats and barges and the 47-ft skimmer are loaded onto the larger OSRV/OSRB. ACS boats return to	B-3 L-2, S-6 C-12, B-5, B-6 B-5, B-6 B-3, B-5 R-31

TABLE 1-18 (CONTINUED)
RESPONSE STRATEGY
SUB-SEA WELL BLOWOUT IN VARYING ICE CONDITIONS

ADEC REQUIREMENT	RESPONSE STRATEGY	APPLICABLE ACS *TECHNICAL MANUAL* TACTIC
	Prudhoe Bay. At this point, the response shifts to a concentrated effort to break and deflect ice forward of the blowout to keep oil and gas exposed as it surfaces, in order to support combustion. A Heli-torch and/or hand-held igniters will be used to re-ignite vapors if flames become extinguished. Further downstream, there will be a concentration of oil and burn residue that escapes the blowout. It is expected that this oil will be confined to a relatively narrow swath created by the natural containment of the surrounding ice. To the extent that the oil accumulates within the broken ice, every effort will be made to ignite the oil with aerial ignition techniques. It may be necessary to rely upon burning as weather, ice, and visibility permit. During the final days of the blowout, darkness and snow coverage will continue to make tracking and recovery techniques difficult, if not impossible. After the blowout stops, and all vessels have been removed from the area, the movement of the ice in the region of the blowout is monitored and recorded until it is safe to move personnel to potential areas of contamination by helicopter, all terrain vehicles (ATVs), and Rolligons (depending upon ridging, rafting, and ice stability). When safe to do so, activities on ice will focus on the detection, delineation, and marking of oiled ice and snow, as responders attempt to expose and remove oil on top of or contained within and beneath the ice. Tracking devices such as radar reflectors, stakes, and other marking systems will be left in place to guide personnel as the spring melt approaches, and when oil begins to migrate to the surface and accumulate in melt pools. Again, as with freeze-up conditions, when the ice becomes unsafe to work on during break-up, response techniques will shift to aerial ignition of oil in melt pools, and accumulations in open leads and polynyas. Throughout the first two weeks of October, personnel, work boats, equipment, and supplies are moved to shoreline cleanup sites and nearshore recovery areas possibly from Kaktovik and from other staging sites set up at key locations along the shoreline. These sites will also serve as decontamination facilities until all nearshore and shoreline response operations are shut down. Decontamination for all offshore personnel is staged on the OSRV/OSRB.	
(vii) Spill Recovery Procedures	ACS has the capabilities of mounting an effective nearshore and shoreline response program within the first 24 hours of a call-out. ACS, together with the Village Response Team personnel, will also be available to supplement the primary offshore response operations, as needed. Task Force 1: Primary response is provided by personnel and equipment located on the OSRV. This equipment includes an OSRV with a 12,000-bbl storage capacity, two large brush skimmers; two 34-foot work boats; and containment and fire boom. Task Force 2: The second oil spill response platform and its response team are mobilized from an alternate drill site located within 120 nm. The equipment with the second oil spill response platform includes the OSRB with greater than 16,000-bbl storage capacity, two large brush skimmers, four 34-foot work boats, one 47-foot skimming vessel, and containment and fire boom. Task Force 2 arrives at the location of the blowout in not more than 24 hours. Task Force 3: An Arctic tanker is centrally located between the two drilling locations (not more than 60 nm from either drilling vessel during critical drilling operations) and begins to deploy immediately, arriving in the immediate vicinity of the blowout within 16 hours. Within 1 hour, Task Force 1 initiates recovery of oil in the open water west of	R-20

TABLE 1-18 (CONTINUED)
RESPONSE STRATEGY
SUB-SEA WELL BLOWOUT IN VARYING ICE CONDITIONS

ADEC REQUIREMENT	RESPONSE STRATEGY	APPLICABLE ACS *TECHNICAL MANUAL* TACTIC
	the drilling vessel, which is located northwest of Barter Island. Two work boats tow boom in a large, U-shaped configuration with an open apex that allows oil to filter through to an OSRV immediately downstream of the apex of the boom. The open-apex booming allows for the deflection of small amounts of ice that begin to form during the early states of freeze-up. By Day 2, Task Forces 2 and 3 assist Task Force 1 in open water recovery operations. Decanting follows FOSC plan approval. Clean-up in open water continues through Day 8. Open water conditions persist through the first week of October. Depending on wind and sea conditions, young ice begins to form offshore and develops into thin layers and/or pancake ice, gradually becoming isolated from the effects of wind and wind-generated currents. Heavier ice incursions are possible with the presence of northerly winds. Through the second week, open-water recovery is hampered by increasing ice and slush, forcing the cessation of large-swath, open-apex booming. Increasing ice concentrations, together with increasing darkness, soon reduce all skimming to the spot-removal of oil pockets in broken ice. Ice breakers and burning at the spill site enhance the elimination of oil at the source, and limited physical removal continues until the end of the second week. Shortly after that, nearly all offshore response is conducted without support from skimming vessels, leaving aerial ignition of isolated patches downstream of the blowout and combustion of oil and gas at the source as the only response mode, until it is safe to operate on stable ice with the onset of winter.	
(viii) Lightering Procedures	Lightering crews offload oily waste from the OSRV/OSRB to the tanker. With the tanker in close proximity (within a mile or two) of the recovery operations, transit times to the tanker are minimal. With the use of best-available technology for transfer operations (annular injection of water at the suction of the Archimedes-type screw pumps) aboard each oil spill response platform, the lightering of viscous oil emulsions can be accomplished in approximately 6 to 8 hours. Decanting from the oil spill response platforms is accomplished with all discharge forward of the skimmers. All decanting (including from the tanker) is performed in strict compliance with all relevant state and federal regulations.	R-28
(ix) Transfer and Storage of Recovered Oil/Water; Volume Estimating Procedure	As each OSRV nears capacity, the oil spill response platform transits to the Arctic tanker for offload, and the recovered emulsions and free water are transferred to the tanker. Stored liquids are gauged with ullage tape, manifested, and logged with the assistance of the Waste Management Team.	D-1
(x) Plans, Procedures, and Locations for Temporary Storage and Disposal	A Waste Management Plan is developed in order to (1) fill out and sign manifests, (2) measure liquid and other waste, and (3) submit a plan to ADEC for waste management. Non-liquid oily wastes are classified and disposed of according to classification. Non-oily wastes are classified and disposed of accordingly. Recovered fluids stored onboard the Arctic tanker will be disposed of outside the U.S., either at Shell Group refineries or other third party processors, in accordance with Shell environmental policy and relevant local laws and regulations (see Section 1.6.10).	D-1 through D-3
(xi) Wildlife Protection Plan	Priority areas are protected by containment booming or by land-fast ice, which creates an effective natural barrier to exclude oil from sensitive habitats. A strategy is implemented to deal with any birds and mammals that may become oiled at sea, and the ACS Wildlife Stabilization Center is made operational. Polar bear guards, security staff trained by government biologists,	C-13, C-14 W-1 W-2A, W-2B

TABLE 1-18 (CONTINUED)
RESPONSE STRATEGY
SUB-SEA WELL BLOWOUT IN VARYING ICE CONDITIONS

ADEC REQUIREMENT	RESPONSE STRATEGY	APPLICABLE ACS *TECHNICAL MANUAL* TACTIC
	are assigned to protect bears and workers.	W-5, W-6
(xii) Shoreline Cleanup Equipment	Shoreline cleanup operations are based on a plan approved by the Unified Command. A shoreline assessment is conducted to understand the nature and extent of oiling. Shoreline operations are conducted if land-fast ice is not yet present. Land-fast ice provides an effective natural barrier against the shoreline. Surface access is temporarily limited by forming ice. As freeze up continues and ice becomes more stable, oil is burned in situ and/or trenched to direct entrapped oil to containment areas where it can be burned. A shoreline cleanup plan is submitted to Unified Command before break-up in the event that oiled shorelines are discovered after break up. At break up, Shoreline Cleanup Assessment Teams (SCATs) monitor the tundra and adjacent shorelines for oiling, according to the plan. Based on the shoreline assessment, priorities are established for cleanup. Cleanup techniques chosen are based on shoreline type and degree of oiling. Access to the Canning River Delta and shoreline with large equipment is limited. Primary delta and shoreline cleanup techniques include: Burning of oily vegetation, Deluge of minor to moderately oiled shoreline in the river, including those areas where heavier concentrations were manually removed, and Natural recovery for those areas where residual staining may remain, but further recovery would cause more harm than good.	SH-1 B-5, B-6 C-12 SH-1 B-2 SH-3 SH-2

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RESPONSE STRATEGY 2

FUEL TRANSFER RELEASE DURING SUMMER MONTHS

RESPONSE STRATEGY PARAMETERS

The following response strategy describes methods and equipment that could be used in response to a hypothetical diesel spill during a fuel transfer from a fuel barge to one of Shell's exploratory drilling locations during summer months.

For the purposes of the strategy, the release occurs during a fuel transfer from a barge or supply boat to the drill ship, *Frontier Discoverer*. Assumptions for the discharge are based on 33 CFR 154.1029(b). The diesel release is assumed to occur due to transfer hose failure. The spill duration is assumed to be 5.5 minutes, resulting in the release of 2,000 gallons (48 bbls) of diesel. Approximately 10% of the spill is contained on the deck of the drill ship, and 90 percent of the spilled diesel enters the water. The maximum targeted recovery volume is 3,132 gallons (75 bbls). This volume includes a 1.54% emulsion rate and a free water recovery of 20% of the original spill volume.

The direction of the wind and ocean current will have limited effect to the recovery of diesel because containment boom will be pre-deployed prior to the fuel transfer. The current is assumed to be 0.75 knots to the west-northwest. The sea conditions are assumed to be typical 1½ to 2 feet wave height.

TABLE 1-19
FUEL TRANSFER RELEASE DURING SUMMER
RESPONSE STRATEGY

ADEC REQUIREMENT	RESPONSE STRATEGY	ACS *TECHNICAL MANUAL* TACTIC
(i) Stopping Discharge at Source	The fuel barge is positioned adjacent to the drill ship to conduct a fuel transfer. The fuel transfer is monitored by a dedicated response team equipped with an OSRV and two Kvichak workboats. A pre-transfer conference is conducted between the fuel vessel, the drill ship, and response team personnel. During the transfer, the fuel vessel operator, an officer in the wheelhouse of the fuel barge tug, and the hosewatch from the drill ship remain in both visual and radio contact. Additionally, the response team pre-deploys containment boom down current of the fueling operation. During the fuel transfer, the fuel hose close to the deck rail of the drill ship fails. The failure is assumed to be a complete rupture of the hose. For the purposes of the strategy, the hosewatch discovers the hose failure after 5 minutes. The hosewatch activates the emergency shutdown, stopping the pump on the fuel barge. At T=5.5 minutes, fuel transfer has stopped. The On-Site Shell Drill Foreman assumes role of Incident Commander. He activates the drill ship response team. The response team from the drill ship lifts a section of hose onto the deck, attempting to prevent any further draining of fuel. The end of the hose is sealed. Notifications to appropriate state and federal agencies are performed. ACS (in Prudhoe Bay) is put on stand-by.	Appendix C of this plan Table 1-1, Section 1 of this plan A-1, A-2
(ii) Preventing or Controlling Fire Hazards	Throughout the first few minutes of the spill, the Site Safety Officer verifies that all sources of ignition are shut down or removed from the area. The Site Safety Officer also reminds personnel that the vessel diagram has the location of all fire suppression equipment. The Site Safety Officer then provides access zone information and determines PPE requirements. Monitoring protocol is established for all work areas to ensure personnel protection. The monitoring protocol establishes safety zones according to applicable OSHA and fire hazard standards.	S-1 through S-6
(iii) Well Control Plan	Not applicable.	
(iv) Surveillance and Tracking of Oil	Diesel movement is tracked using visual observations from the drill ship, fuel barge, and support vessels. After recovery operations, one of the two Kvichak workboats performs reconnaissance of the area downcurrent of the release. If necessary, the Kuparuk Twin Otter with forward looking infrared radar (FLIR) or alternative aircraft with Synthetic Aperture Radar (SAR) is put on stand-by.	
(v) Protection of Environmentally Sensitive Areas and Areas of Public Concern	A shoreline assessment/recovery plan is not activated, because reconnaissance indicates the diesel is recovered in open water. If necessary, NOAA Environmental Sensitivity Index Maps, ACS Atlas Maps, and the North Slope Subarea Contingency Plan are used to identify areas of major concern. Nearby priority protection sites are identified. ACS is put on standby to deploy exclusion booms at the nearest shoreline.	NOAA Environmental Sensitivity Index Maps ESI 3-5 Map Atlas Sheets 80, 83-86, 88-89, 98-100 http://www.asgdc.state.ak.us/maps/cplans/subareas.html#northslope
(vi and vii) Spill Containment,	**Task Force (TF) Descriptions:** **TF-1:** Primary response is provided by personnel and equipment stationed with the	

TABLE 1-19 (CONTINUED)
FUEL TRANSFER RELEASE DURING SUMMER
RESPONSE STRATEGY

ADEC REQUIREMENT	RESPONSE STRATEGY	ACS *TECHNICAL MANUAL* TACTIC
Control, and Recovery Procedures	drill rig. This equipment includes an OSRV with 12,000 bbl storage capacity and two Lamor brush skimmers; two 34-foot Kvichak workboats; a vertical rope mop skimmer; a mini-brush skimmer; a 100-bbl storage bladder; and containment and fire boom. **TF-2:** The second response team is put on standby and is provided by personnel and equipment stationed with the drill rig. This equipment includes an OSRB with over 16,000 bbl storage capacity; two skimmers; four 34-foot workboats; one 47-foot skimming vessel; and containment and fire boom. **TF-3:** ACS Shoreline Protection Task Forces from Prudhoe Bay is put on standby to deploy exclusion booms at priority sites. TF-3 is not mobilized because the diesel is contained at sea. The Incident Commander, Barge Captain, and Site Safety Officer communicate throughout the recovery operations. **<u>Recovery Timeline:</u>** **T= 0 Minutes.** Transfer hose ruptures. TF-1 has pre-deployed two Kvichak workboats towing boom in a U-shape formation downcurrent of the fuel transfer operations. **T= 5.5 Minutes.** Fuel transfer operations have stopped. Site Safety Officer assesses access and PPE requirements. The drill ship and fuel barge detach and separate. Recovery operations begin. Sorbants are used to clean the deck of the drill ship. **T= 20 Minutes.** The workboats position the boom to contain the spilled fuel, and then proceed to the OSRV for recovery. The OSRV utilizes either a mini-brush skimmer or rope mop to collect the contained diesel. Recovered fuel/water mixture is stored in the OSRV. **End of Day 1.** Recovery operations have stopped. Approximately 75 bbl of liquid (fuel/water) is collected and stored in the OSRV.	Section 1.6.6 and 1.6.7 of this plan
(viii) Lightering Procedures	On a non-emergency basis the recovered diesel is lightered to either a 249-bbl barge mobilized from Deadhorse by ACS or a 513,000-bbl tanker located within 60 nautical miles.	R-28
(ix) Transfer and Storage of Recovered Oil/Water; Volume Estimating Procedure	The volumes of stored oil emulsion and free water are gauged with ullage tape and recorded on waste manifests	R-28
(x) Plans, Procedures, and Locations for Temporary Storage and Disposal	A Waste Management Plan is developed in order to (1) fill out and sign manifests; (2) measure liquid and other waste; and (3) submit a plan to ADEC for waste management. Non-liquid oily wastes are classified and disposed of according to classification. Non-oily wastes are classified and disposed of accordingly. Recovered fluids potentially transferred to West Dock by ACS will be disposed of in injection wells or processing and placement into a production pipeline. In the event that recovered fluids are stored onboard the Arctic tanker, they will be disposed of outside the US, either at Shell Group refineries or other 3rd party processors, in accordance with Shell environmental policy, and relevant local laws	D-1 D-2 D-3 Section 1.6.10 of this plan

TABLE 1-19 (CONTINUED)
FUEL TRANSFER RELEASE DURING SUMMER
RESPONSE STRATEGY

ADEC REQUIREMENT	RESPONSE STRATEGY	ACS *TECHNICAL MANUAL* TACTIC
	and regulations.	
(xi) Wildlife Protection Plan	Wildlife monitoring is conducted immediately. If necessary, deterrents to protect animals are put in place at the spill scene during recovery operations. The International Bird Research and Rescue Center is put on standby in the event the wildlife treatment facility is required.	W-1 W-2, W-2B, L-6
(xii) Shoreline Cleanup Plan	Not Applicable. Fuel dissipates prior to encountering any shoreline.	

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1.7 NON-MECHANICAL RESPONSE OPTIONS [18 AAC 75.425(e)(1)(G)]

Shell will mechanically contain and clean up oil spills to the maximum extent possible. When mechanical response methods are no longer effective in situ burning will be used to augment mechanical response.

1.7.1 Obtaining Permits and Approvals

Burning will not occur without approval of federal, state, and local agencies. The Shell Incident Commander will discuss the option of in situ burning with the FOSCs and SOSCs, and an "RRT In-Situ Burn Application Form" will be prepared. This form is provided in the ACS *Technical Manual*, Tactics B-1 and B-1A. Deliberate ignition of the blowout for safety reasons, however, may be approved by the FOSC without delay if it is felt that an accidental ignition of vapors from the blowout could result in serious harm to on-site personnel and responders.

1.7.2 Decision Criteria for Use

As covered in ACS Tactic B-1, burning may be used as a spill control measure once regulatory approval has been obtained. Should burning be needed, Shell will complete the Alaska Regional Response Team Application for In-Situ Burning, and submit the application to the Unified Command (see ARRT Unified Plan, Appendix 2, Annex F, In-Situ Burning Guidelines for Alaska).

When mechanical recovery is unfeasible or ineffective, removing oil from the water by in situ burning may provide significant protection for fish, wildlife, and sensitive environments, as well as commercial, subsistence, historic, archaeological, and recreational resources.

In situ burning may:

- Prevent the resources from coming into contact with spilled oil;
- Reduce the size of the spill and thus the amount of spilled oil affecting natural resources;
- Allow the environment to recover to the pre-spill state sooner; and
- Provide the most effective means to remove oil from water prior to shoreline impacts in broken ice conditions, in remote or inaccessible areas, or when containment and storage facilities are overwhelmed.

1.7.3 Implementation Procedures

If the Shell Incident Commander decides to use in situ burning and obtains the necessary authorization, ACS and AES will carry out the response (see ACS Tactics B-1, B-1A, B-3, B-5, and B-6).

Once approved, in-situ burning will normally involve the following steps:

1. Collect and concentrate the oil using a fire-resistant boom, ice cakes/floes, ice pits, or other natural features as gathering places for the burn;

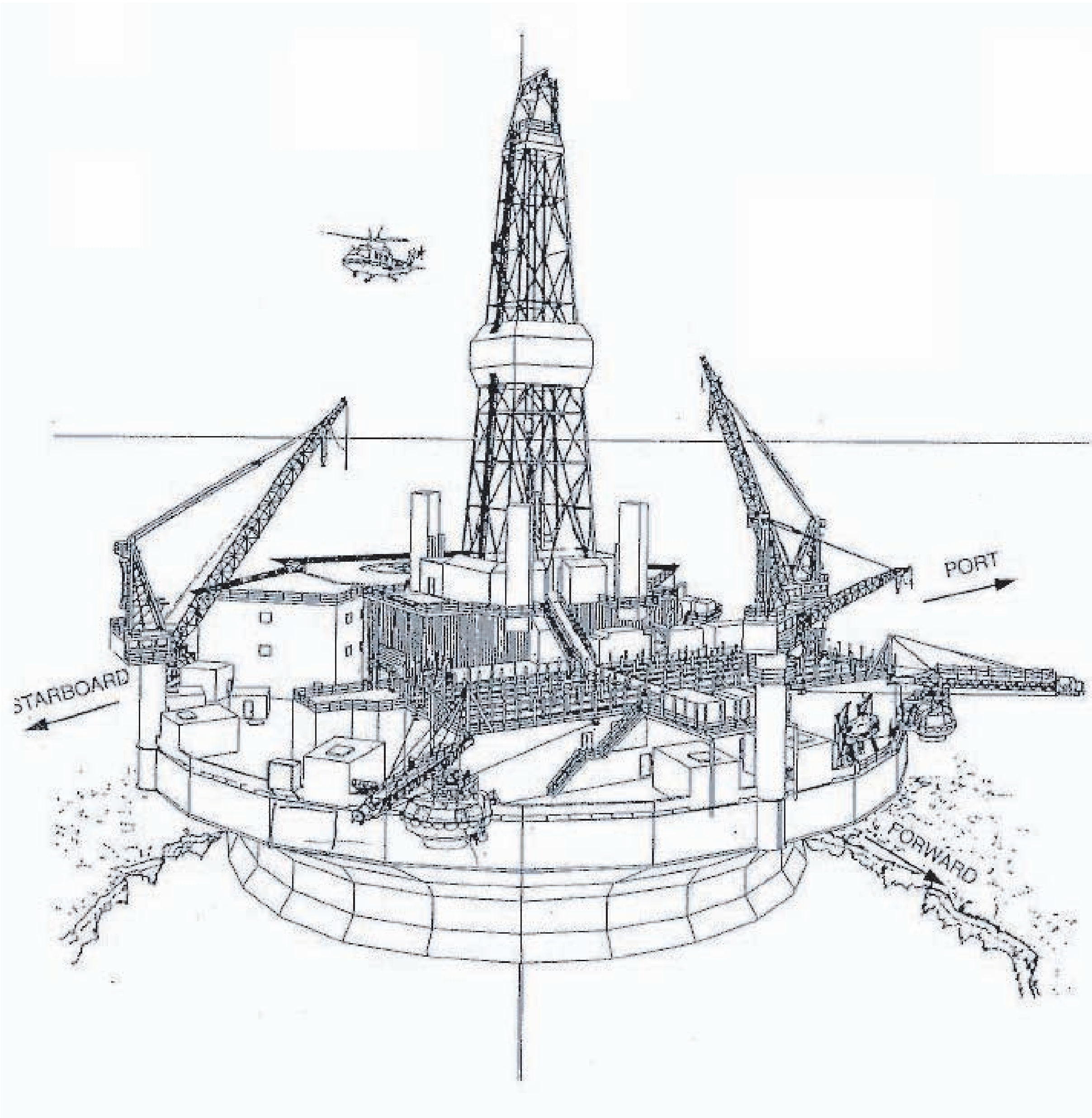
2. Ignite the oil using the Heli-Torch or hand-held igniters, making sure to avoid flashback and ignition of the spill source;

3. Monitor the burn, maintaining constant watch on the fire and smoke plume, condition of containment boom, speed and position of boom-towing vessels, and other safety hazards and issues; and

4. To the extent possible, recover and dispose of the burn residue.

1.8 FACILITY DIAGRAMS [18 AAC 75.425(e)(1)(H)]

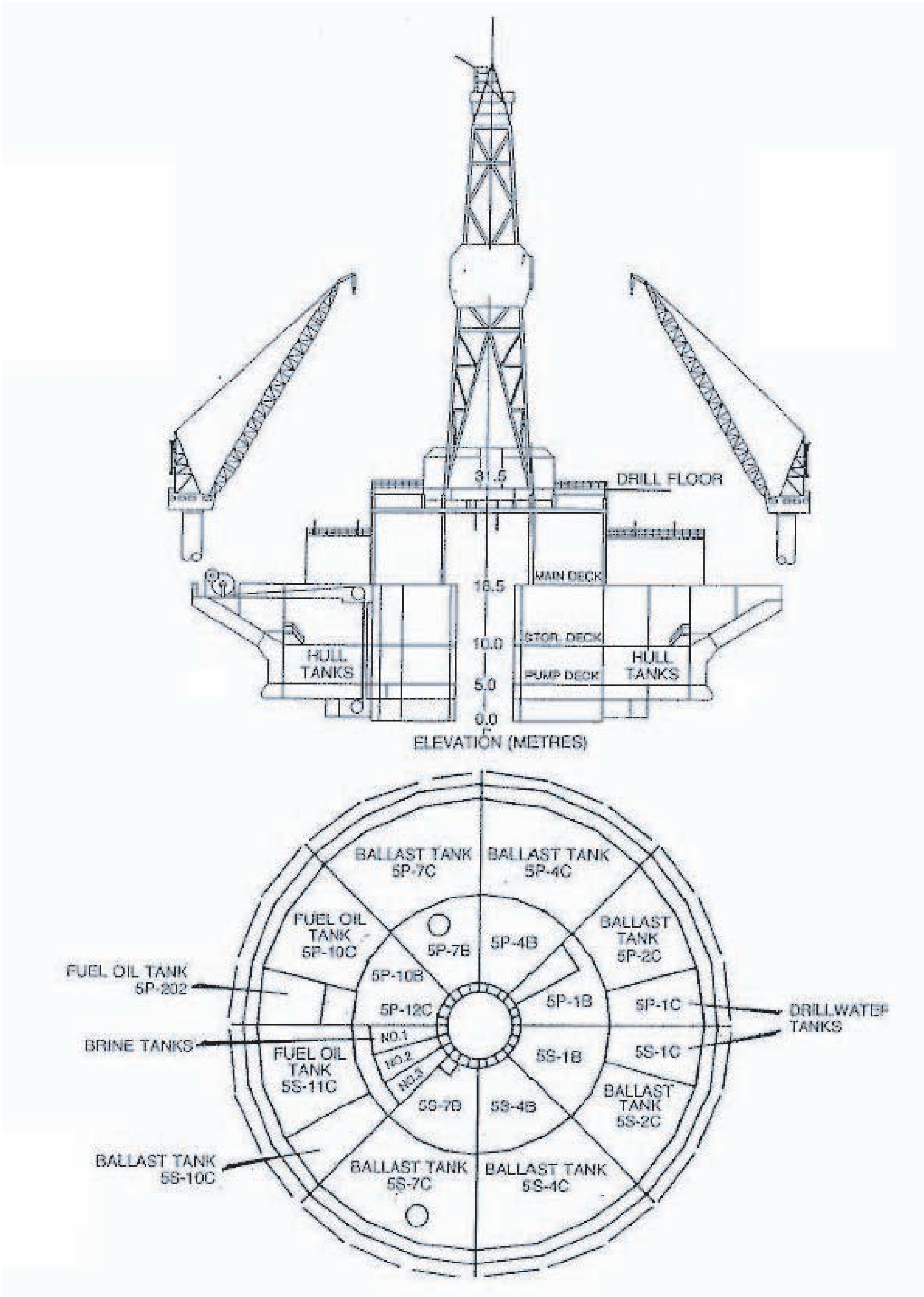
Diagrams for the drilling vessels are presented in Figures 1-13 through 1-17.



SHELL OFFSHORE, INC.

KULLUK DRILL RIG

December 2006	Figure - 1-13



SHELL OFFSHORE, INC.

KULLUK DRILL RIG SCHEMATIC

December 2006	Figure 1-14

PRINCIPLE DIMENSIONS

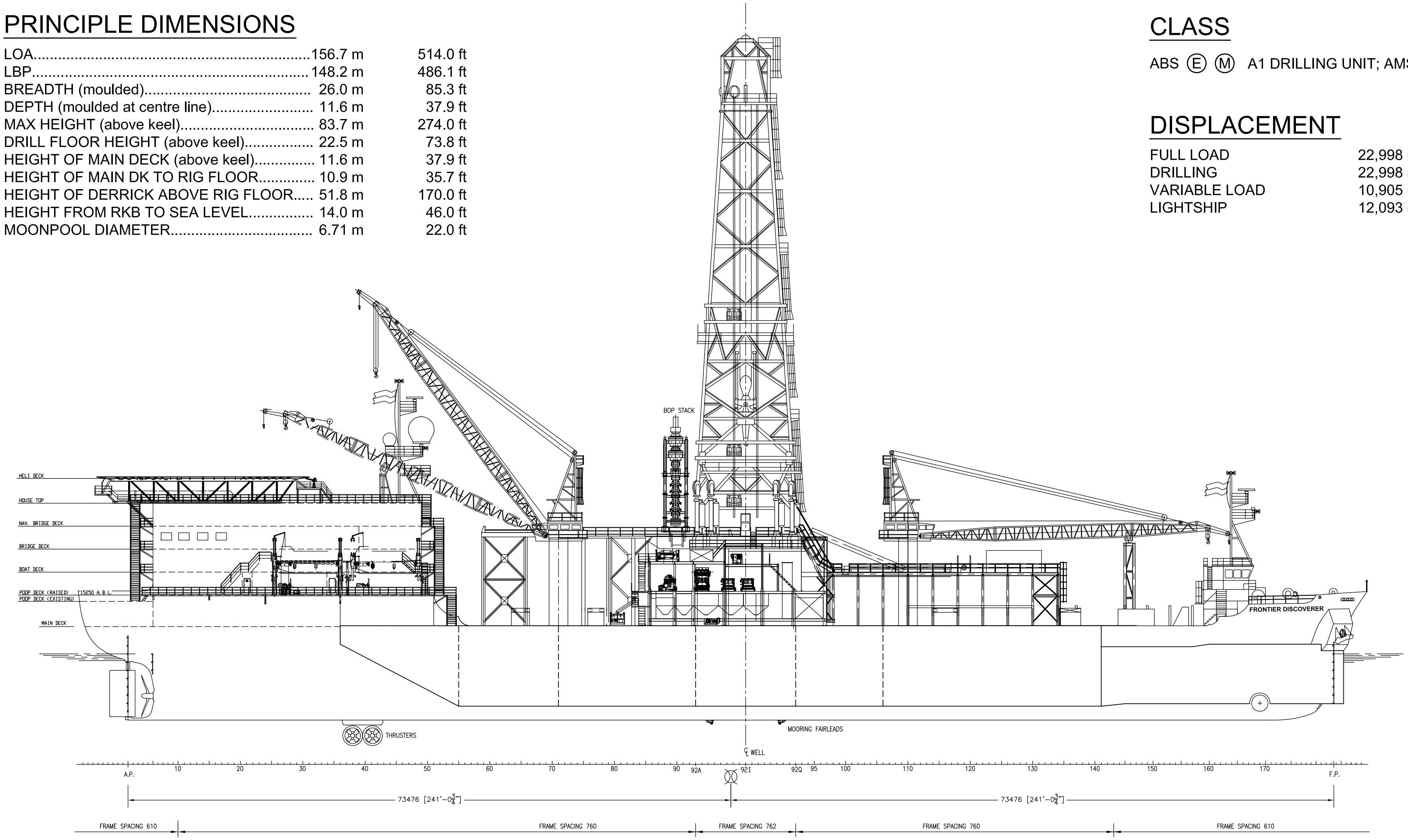
LOA	156.7 m	514.0 ft
LBP	148.2 m	486.1 ft
BREADTH (moulded)	26.0 m	85.3 ft
DEPTH (moulded at centre line)	11.6 m	37.9 ft
MAX HEIGHT (above keel)	83.7 m	274.0 ft
DRILL FLOOR HEIGHT (above keel)	22.5 m	73.8 ft
HEIGHT OF MAIN DECK (above keel)	11.6 m	37.9 ft
HEIGHT OF MAIN DK TO RIG FLOOR	10.9 m	35.7 ft
HEIGHT OF DERRICK ABOVE RIG FLOOR	51.8 m	170.0 ft
HEIGHT FROM RKB TO SEA LEVEL	14.0 m	46.0 ft
MOONPOOL DIAMETER	6.71 m	22.0 ft

CLASS

ABS Ⓔ Ⓜ A1 DRILLING UNIT; AMS

DISPLACEMENT

FULL LOAD	22,998 mt
DRILLING	22,998 mt
VARIABLE LOAD	10,905 mt
LIGHTSHIP	12,093 mt



OUTBOARD PROFILE

TONNAGES

GROSS (International)	12,230 tons
NET (International)	3,669 tons

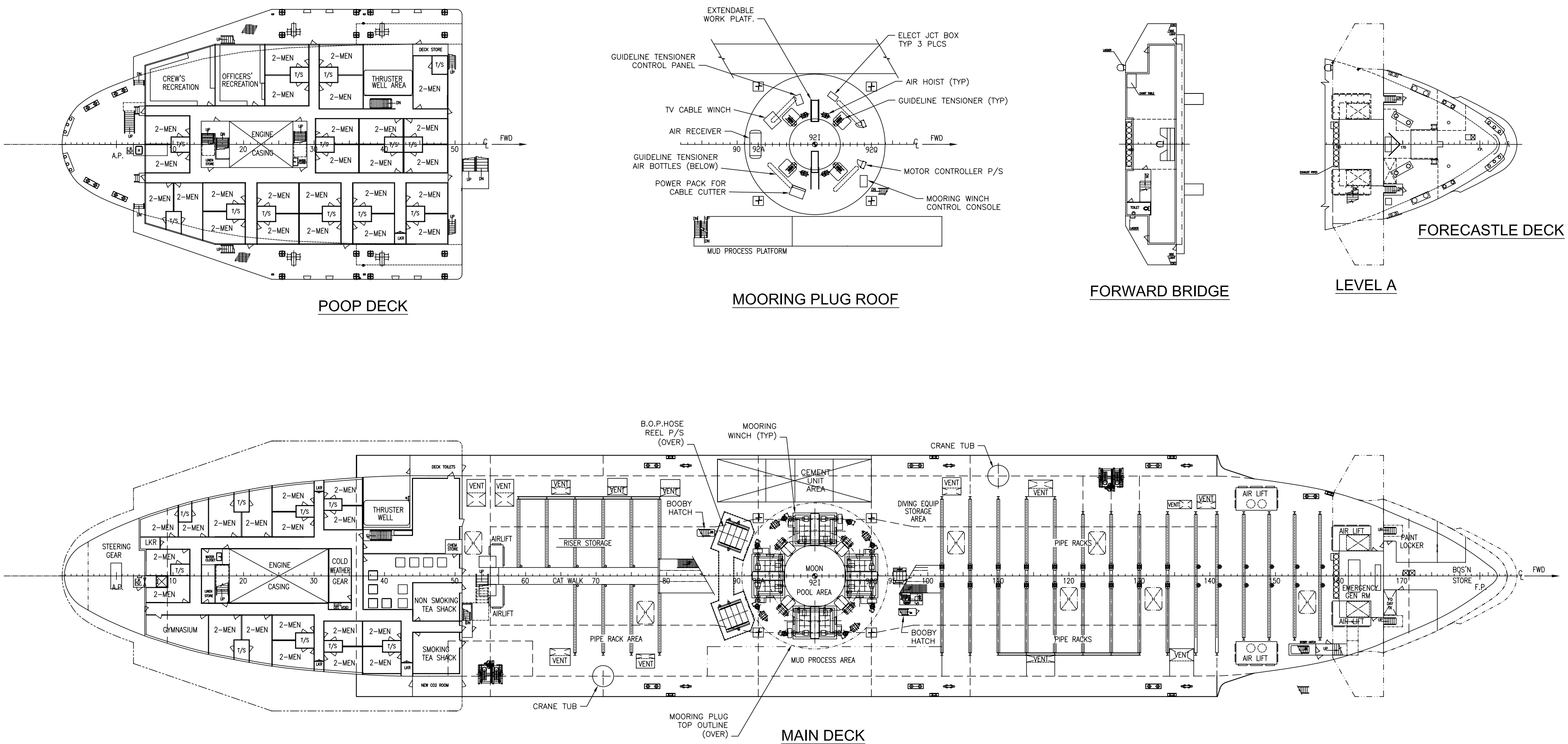
DRAUGHT

DRAFT AT LOAD LINE	8.20 m	27 ft
TRANSIT	8.20 m	
DRILLING	8.20 m	
LIGHTSHIP DRAFT (Mean)	4.75 m (Lightship incl. perm ballast, mean)	

SHELL OFFSHORE, INC.

FRONTIER DISCOVERER
GENERAL ARRANGEMENT OF
OUTBOARD PROFILE

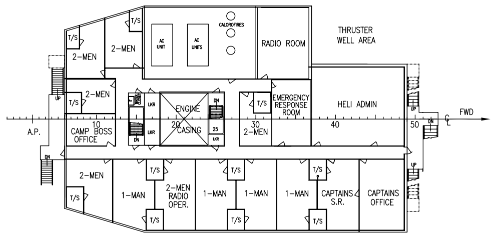
December 2006 | Figure 1-15



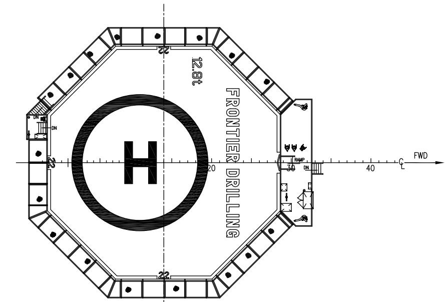
SHELL OFFSHORE, INC.

FRONTIER DISCOVERER GENERAL ARRANGEMENT OF MAIN DECK AND ABOVE

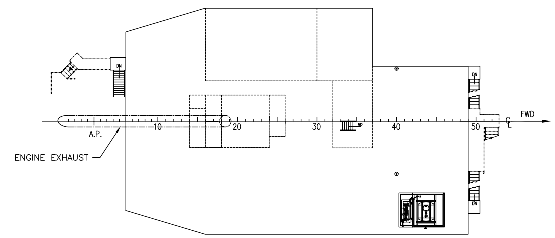
December 2006	Figure 1-16



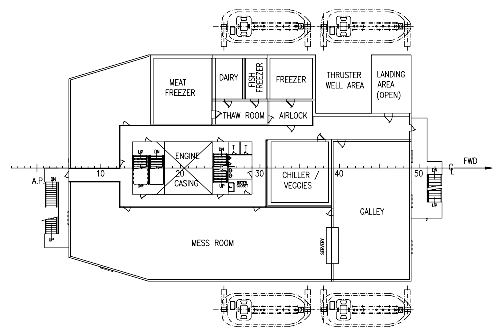
NAV. BRIDGE DECK



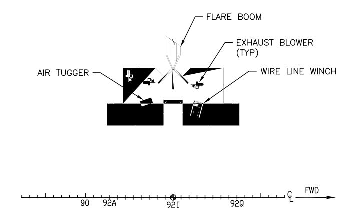
HELI DECK



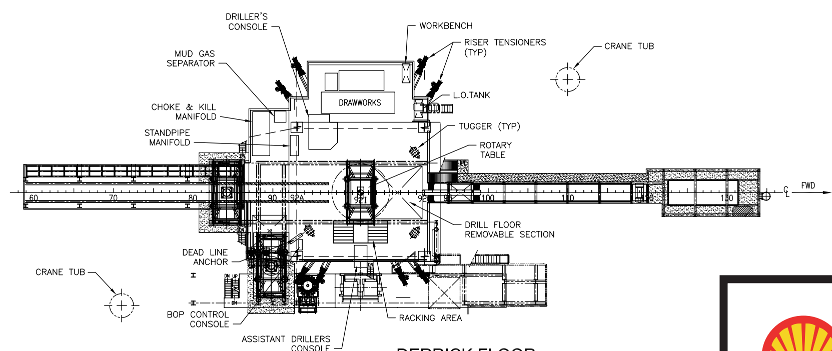
HOUSE TOP



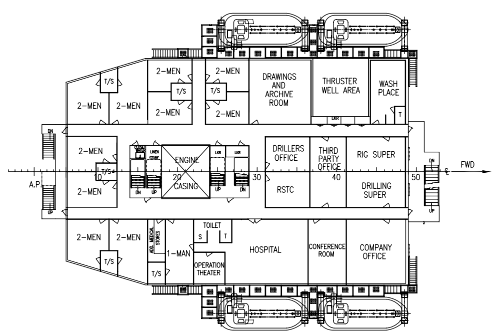
BRIDGE DECK



DRAWWORKS HOUSE ROOF



DERRICK FLOOR

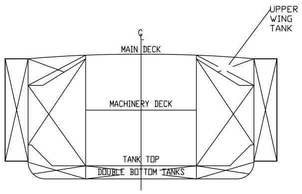


BOAT DECK

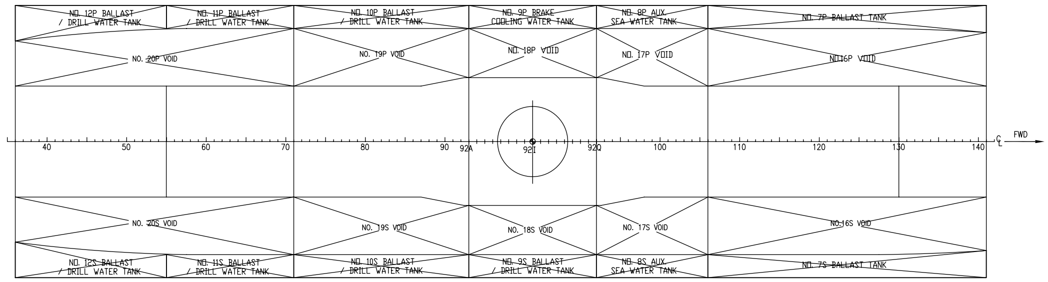
SHELL OFFSHORE, INC.

FRONTIER DISCOVERER
MAIN DECK VIEW 2

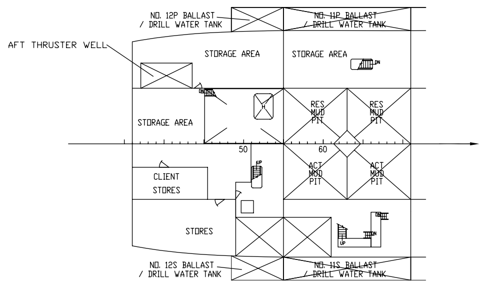
December 2006	Figure 1-17



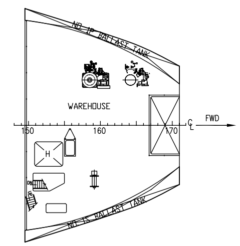
TYPICAL SECTION
TANK LAYOUT



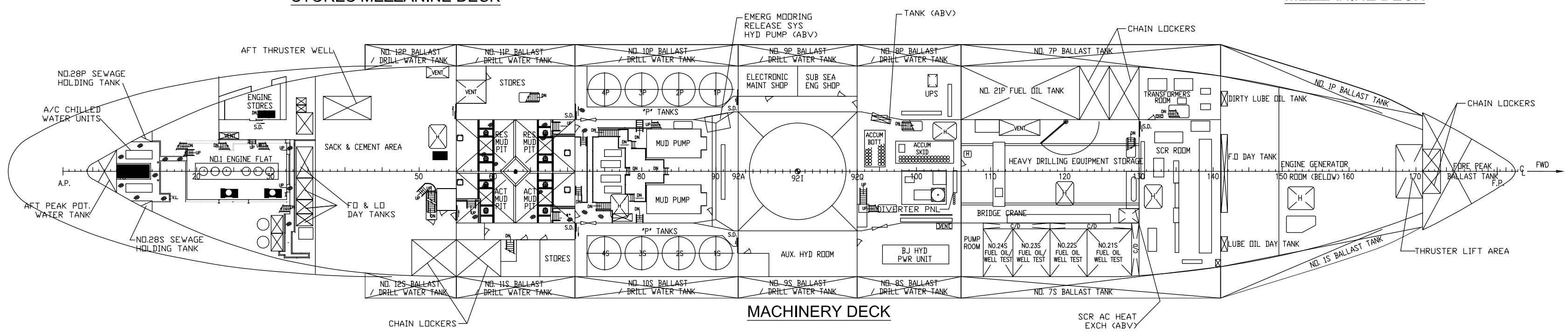
UPPER WING TANK LAYOUT



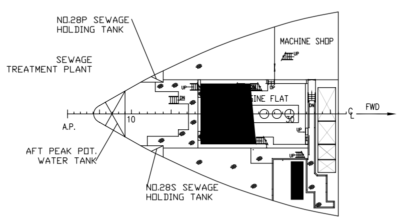
STORES MEZZANINE DECK



ENGINE GEN. ROOM
MEZZANINE DECK



MACHINERY DECK

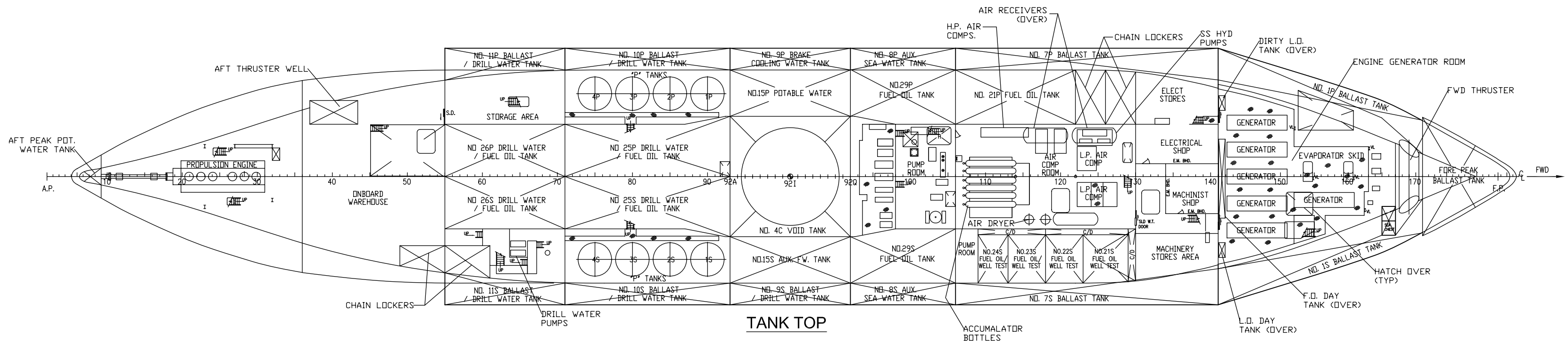


NO. 2 ENGINE FLAT

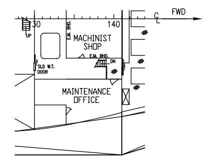
SHELL OFFSHORE, INC.

FRONTIER DISCOVERER
GENERAL ARRANGEMENT
OF LOWER DECKS

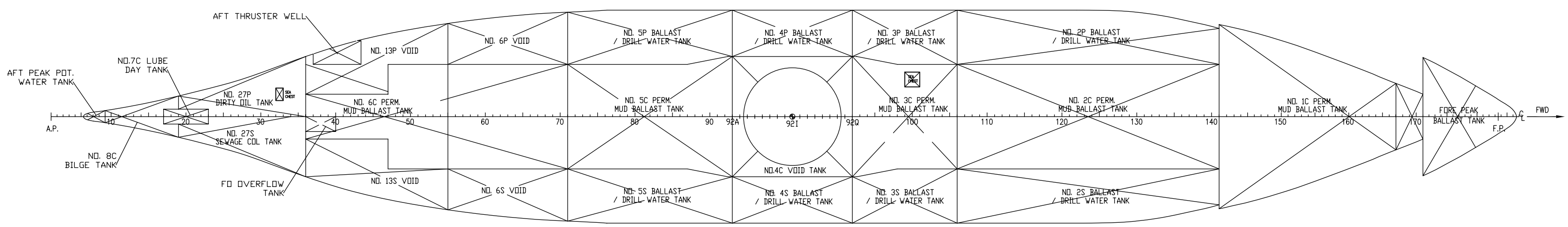
December 2006	Figure 1-18



TANK TOP



MAINTENANCE OFFICE FLAT



DOUBLE BOTTOM

SHELL OFFSHORE, INC.

FRONTIER DISCOVERER
LOWER DECKS VIEW 2

December 2006	Figure 1-19

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PART 2 PREVENTION PLAN [18 AAC 75.425(e)(2)]

2.1 PREVENTION, INSPECTION, AND MAINTENANCE PROGRAMS [18 AAC 75.425(e)(2)(A)]

2.1.1 Prevention Training Programs [18 AAC 75.007(d)]

Personnel involved in spill response or cleanup activities are thoroughly trained and are expected to be knowledgeable of safety, health, and environmental requirements, so that they fully understand the safety and health risks associated with their job, as well as the practices and procedures required to control their exposure to potential safety and health hazards. The level of training is based upon the duties and functions of each responder in the emergency response, and complies with the regulatory requirements for employee training. See Section 3.9 for additional training information.

All drilling personnel will be required to take additional training in key subjects, such as:

- Safety Orientation/Personal Protective Equipment (PPE)
- Environmental Handbook/Spill Prevention Guidelines
- Confined Space Entry
- Lockout/Tagout of Hazardous Energy Sources
- Safety and Health Accident Prevention
- Incident Command System (ICS) Basic Overview
- Hazardous Waste Operations and Emergency Response (HAZWOPER 8-Hour)
- First Aid/CPR Training

In addition, selected site personnel shall be fully aware of waste issues involving on-site generation, storage, segregation, manifesting, and transportation. They must be knowledgeable of exempt vs. nonexempt, and hazardous vs. non-hazardous materials, and the associated practices in managing the material in accordance with standard operating procedures.

Site personnel who are expected to participate in oil spill response activities will require training in a number of other subjects, including:

- HAZWOPER 24-Hour
- Fate and Transport of Oil Under Arctic Conditions
- Shell C-Plan Overview
- Oil Spill Response Equipment Overview and Oil Spill Response System Performance
- Specialized training as needed for oil spill response boat operations, lightering, spill containment and recovery, and in-situ burning operations

Shell Offshore Inc. (Shell) Drill Foreman and Contractor Toolpushers, Drillers, and Assistant Drillers are required to have formal well control training in accordance with Minerals Management Service (MMS) Code of Federal Regulations (CFR) requirements. In addition, MMS requires weekly pit and trip drill exercises designed to keep drill crew personnel alert to well control contingencies. Blowout prevention equipment is regularly pressure- and function-tested, again under MMS CFR requirements, and flow chart response plans are kept visible on the drill floor as decision aids to the driller should a well flow event occur.

2.1.2 Substance Abuse Programs [18 AAC 75.007(e)]

The Shell drug policy was established to ensure a safe working environment at all operations. Shell's company-wide policy covers all employees. All contractors and non-employees who work at Shell facilities must also obey this policy. Shell requires joint venture partners under its operational control to apply this policy, and uses its influence to promote it in other ventures.

The use, possession, distribution, or being under the influence of illegal drugs or alcohol is strictly prohibited on Shell-controlled premises. Entry onto Shell-controlled premises constitutes consent to and recognition of the right of the Company to random drug testing, as well as drug testing for cause.

Beyond these requirements, operators of designated critical equipment (such as company drivers, crane operators, work boat operators) are subject to daily alcohol testing.

Failure to cooperate, or repeated positive test results will result in termination for Shell personnel, and removal from Company premises for all others.

2.1.3 Medical Monitoring [18 AAC 75.007(e)]

Shell has a systematic approach to medical management designed to assure compliance with the law as well as achieve continuous performance improvement. All Shell and contract employees must meet the minimum physical requirements for their job classifications as determined by the Medical Department. For example, crane operators must undergo periodic vision examinations. These tests allow for a safe working environment and pursue Shell's international goal of safe working conditions.

At the onset of employment, personnel receive a physical examination, at which time they can voluntarily declare pre-existing medical conditions and current medications. This procedure allows for the accurate monitoring of all employees' health.

Subsequent physical examinations are available to employees, with frequency based on age.

2.1.4 Security Program [18 AAC 75.007(f)]

The primary safety and security concern relates to the transportation of Shell and contractor personnel via the Shell facility in Deadhorse.

Access to the two drill rigs is either by helicopter or by vessel. Personnel are primarily transferred to the platform by helicopter, which is strictly controlled at Shell's Deadhorse, Alaska warehouse and office facility, located along the airport runway at the Deadhorse Airport.

Purcell Security will provide security services for the Deadhorse facility. In 2006 Purcell also provided security for a series of communications centers, which were located in Barrow and Deadhorse under the terms of a Conflict Avoidance Agreement (CAA) with the Alaska Eskimo Whaling Commission, which governed the 2006 season. (Note: The CAA for 2007 activities is still pending as of the date of submission of this C-Plan, and the location of communication centers is premised to continue as per the 2006 program.)

Supplies will be loaded onto the drilling vessels prior to mobilization, and all oil spill response equipment will be mobilized directly to the Beaufort Sea onboard the oil spill response vessel and the *Arctic Endeavor*. A mid-season resupply consisting primarily of drilling water and fuel is expected to occur in September from Prudhoe Bay. Transport of any remaining supplies during the drilling season is expected to be minimal, mainly related to transfers of spare parts, drilling tools, and other unforeseen items which can be transported from the Deadhorse area to the drilling location by helicopter (or boat, if weather conditions preclude helicopter operations).

In the event of an actual spill, Rolligons may be used for supplemental transportation of equipment, personnel, and supplies in support of the Alaska Clean Seas shoreline recovery effort and, in all likelihood, temporary camps would be mobilized to available gravel pads and communities adjacent to the shoreline recovery effort.

Access to the drilling sites themselves will be very limited, given that they are in remote, offshore locations and subject to authorization by the on-site Drill Foreman who strictly controls transit and access to the drilling site. For safety reasons, access to the drilling vessels will be limited to authorized personnel only.

For further information regarding on-site security and regulations, see the Shell Security Plans on the respective drilling vessels.

2.1.5 Fuel Transfer Procedures [18 AAC 75.025]

At exploration sites, the following types of fuel transfers take place:

- Fuel transfers to or from either of the drilling vessels, including transfers from these vessels to other supporting vessels (e.g., anchor handler) or helicopters.
- Fuel transfers to or from either of the two oil spill response platforms (OSRV/OSRB) including transfers from these vessels to other supporting vessels such as work boats.

Fuel Transfer Procedures for the OSRV/OSRB, and for the *Kulluk* and *Frontier Discoverer* are in Appendix C.

The mobile offshore drilling drill rig transfers, and unit, the *Kulluk*, and the *Frontier Discoverer*, incorporate fuel transfer facilities for heli-support, fuel barge to fuel barge to support vessels.

Fuel transfers will be done in accordance with:

- Lease specific requirements including the pre-deployment of booming and OSR personnel.
- USCG regulations [33 CFR 154.1035(b)(2)(i)] and vessel response plans
- Alaska Department of Environmental Conservation (ADEC) regulations 18 AAC 75.025.

Manuals governing fuel transfers, including emergency shutdown, are strictly followed by maintenance personnel and can be found onboard the drill rigs. If a spill of any size is detected, immediate action will be taken to stop the source. Both drill rigs have shipboard oil pollution emergency plans that personnel adhere to, including immediate contact of the supervisor.

Fuel Transfers Within a Drilling Vessel

Internal fuel transfers include flow of fuel from the onboard storage tanks to settling tanks or to loading stations on deck. Onboard storage tanks include:

- Boiler day tank,
- Cold start compressor,
- Emergency generator day tank,
- Incinerator day tank,
- Deck cranes,
- Crude oil tank,
- Survival anchor windlass diesel, and
- Mud pits

The boiler day tank, emergency generator day tank, and the incinerator day tank are fitted with overflow pipes that return excess fuel back to the hull storage tanks. These transfers generally take place twice daily, once per shift, and are handled by maintenance personnel. Safety procedures include adherence to an internal fuel transfer checklist, direct communication among personnel, and visual inspection of the transfers. No internal fuel transfers take place during high-risk situations such as bad weather or alarm status.

If an alarm occurs, an emergency shutdown system at the pumps closes any valve in use and stops the transfer to avoid spill overflow.

Helicopter Fuel Transfer

Helicopter fuel transfers include storage, filtering, and transfer of fuel from the fuel pods located on drill rig decks through pumps and filters to the delivery skid on the heli-deck. An emergency shutdown valve at the control room is both manually and pneumatically operated. Preventive measures for fuel transfer to the helicopters include:

- Ensuring no helicopters are inbound/outbound,
- Discontinuing hot work on the heli-deck and starboard decks,
- Verifying operative firefighting system including extinguisher on the heli-pad, and
- Proper alignment of fueling facilities (including valves, motor, pump, and coalescing filter)

Only authorized personnel (either the Helicopter Landing Officer or one of three heli-deck crew members) will activate this system.

Fuel Oil Transfer from Fuel Barge to MODUs *Kulluk* and *Frontier Discoverer*

No fuel transfers will occur during emergency weather conditions or alarms without the direct approval of the Maintenance Superintendent. Safety of fuel transfer procedures for the transfer of diesel fuel to the drill rigs is reliant on the direct communication between rig and fuel supply vessel personnel responsible for the transfer procedures. Preventive measures for ensuring a safe transfer will be reliant on pre-transfer procedures. Prior to transfer, these persons will identify:

- The product, rate of transfer, and sequence of operations;

- Critical stages of the transfer operation;
- Applicable federal, state, and local regulations; and
- Emergency procedures including shutdown operations.

Refer to Appendix C for the fuel transfer procedures for the *Kulluk* and *Frontier Discoverer*.

Fuel transfers will include the use of pre-deployed boom, visual inspection and open communication between the fueling facility and the drill rig personnel is the best preventive measure for avoiding an emergency situation. If radios are used for communication, they will be tested and ensured to be safe as required by 46 CFR 110.15-100 and 46 CFR 11.80.

Once the fuel transfer is complete, fill valves are closed and visual inspection of valves, flanges, pumps, and connection facilities ensures that no discharge is detected.

Fuel Oil Transfer to/from the OSRV/OSRB

In normal operation, the OSRV/OSRB will receive diesel fuel delivered from bunkers on the *Arctic Endeavor* storage tanker, or from either of the two drilling vessels. In both cases, the fuel transfer procedures will be based on the more stringent of either the vessel's own procedures (as part of the U.S. Coast Guard-approved Vessel Response Plan submitted by each vessel owner) or the similar procedures in place at either of the two drilling vessels.

Refer to Appendix C for the fuel transfer procedures for the OSRV/OSRB.

The OSRV/OSRB may also at times be used to provide diesel bunkering for OSR-related work boats (either 34-foot or 47-foot craft), in which case the transfer would always be conducted under the fuel transfer procedure of the respective OSRV/OSRB.

In the event that any oil spill response related work boats or support vessels have fuel delivered to them by a third-party fuel barge, the transfer would be conducted in accordance with the fueling procedure established by the owner of the fueling barge.

Where required as part of the approved Vessel Response Plan, fuel transfers will include the use of pre-deployed boom, visual inspection, and communication among the vessel personnel as the best preventative measures.

2.1.6 Maintenance Programs

The MODU *Kulluk* and *Frontier Discoverer* drill rigs have routine internal inspections and maintenance. Maintenance is an important tool for spill prevention because it monitors mechanical integrity and is documented daily by written reports. During the refurbishment phase, maintenance records are kept in log books. Under the operating phase, maintenance is performed according to a computerized maintenance program with records kept in the electronic maintenance database. The mechanical integrity of the drill rigs is upheld through the planned maintenance program initiated following rig refurbishment.

For malfunctioning or corroded materials, the maintenance department is notified and personnel are assigned the repair task by either the Chief Engineer or the Maintenance Supervisor. Equipment is inspected based on frequency intervals indicated in the maintenance program and in accordance with manufacturer and industry recommendations. For example, cranes are inspected daily per regulatory requirement, while the blowout preventer (BOP) gantry crane hydraulic system, which receives only sporadic use, is inspected weekly.

2.1.7 Operating Requirements for Exploration [18 AAC 75.045]

Flow Tests

Oil produced during a formation flow test or other drilling operations must be collected and stored in a manner that prevents the oil from entering state or federal land or waters. Oil produced for flow tests will be stored in internal tanks on the drilling vessel. Visual surveillance will be the primary means of overfill protection, as described in Section 2.5.1.

Drill Rig Integrity Inspections

During drilling, a visual inspection of major tanks and lines will be conducted daily. Shift inspections are conducted by personnel to detect leakage, damage, or serious deterioration of the storage tanks, fuel lines, piping, and associated facilities. Potential leaks will be properly reported in the daily tour report and the Toolpusher will be notified.

Piping between the storage tanks and boilers or engines is attached to the structure with brackets or double plates that protect the piping from damage. These brackets are visible for regular inspections. Much of the piping is routed by design to be out of the way and protected from impact or the environment.

Preventive measures include the installation of floor drains around the drill rigs to stop minor spills from flowing off the deck. Supplemental 1-inch drain lips at individual doorways are provided to contain potential spills to a single room. On the *Kulluk*, the drains flow to the disposal caisson from which oil or pollutants are subsequently skimmed and sent to the sludge tank. From the sludge tank, skimmed containment is sent through the oily water separator. After separation, water is routed overboard and contaminants are shipped ashore for proper disposal. Each sump is equipped with a level-sensing alarm.

2.1.8 Blowout Prevention and Emergency Shutdown [18 AAC 75.425(e)(1)(F)(III)]

Drilling Assurance

Well control is the process of maintaining positive pressures in the drilled wellbore in a manner that pressures in the geologic formations do not cause gas or fluids from the formations to escape from the it in an uncontrolled manner. This section provides information on the measures taken to maintain well control, preventing a blowout from occurring during drilling and testing operations. Recovery measures used to regain well control in the event of lost control are discussed in Section 1.6.3. The potential for discharge is discussed in Section 2.3.

Shell believes that no failure of a single barrier or a barrier element, whether caused by operational error or equipment failure, should lead to loss of well control. Therefore, Shell applies the following series of layers of prevention and response to well control issues:

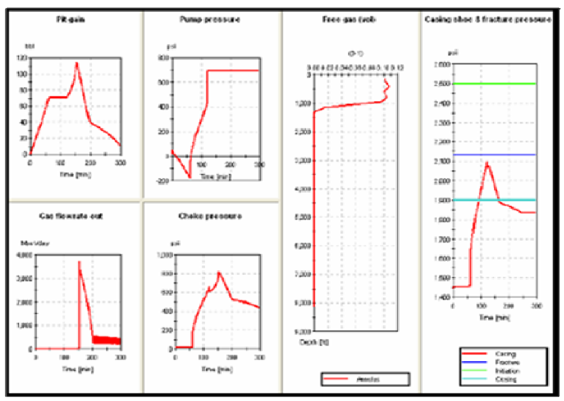
- Layer I includes proper well planning, risk identification, training, routine tests and drills on the rig (e.g., blowout prevention equipment [BOPE] tests, pit drills, and trip drills), which build a strong foundation.
- Layer II includes early kick detection and timely implementation of kick response procedures. Continuous monitoring including the use of Shell's Real Time Operations Center (see subsections below on Well Control During Drilling) provides early kick detection. When a kick is detected, the general response is to immediately shut down the pumps, perform a flow check, shut in the well, and kill the well.

- Layer III involves the use of mechanical barriers, including, but not limited to, blowout preventers, casing, and cement. Testing and inspections are performed to ensure competency.
- Layer IV represents relief well drilling, which would be implemented if a blowout were to occur, despite the first three layers of protection. Contingency plans include dynamic surface control measures and the methods of drilling a relief well.

Well Control During Planning and Preparation

The primary method of well control is properly designed casing/cementing programs to isolate and structurally support downhole formations and maintenance of drilling fluids of sufficient volume and density in the wellbore to counteract any experienced geologic pressures. Data from previous wells in the area have been used to anticipate formation pressures that might be experienced when drilling the proposed wells and the wells have been designed to handle the expected pressures. See Figure 2-1 for an example of this process.

FIGURE 2-1
MODELS FOR SITE-SPECIFIC WELL CONTROL



The primary causes of loss of well control are insufficient fluid density, fluid losses to the formation, swabbing, not keeping the wellbore full of drilling mud, charged formations, rapidly drilling a gas sand, dissolution of shallow gas hydrates. Loss of well control, an uncontrolled influx of formation fluids into the wellbore, is primarily prevented by properly designed casing strings and drilling fluid systems.

Shell's approach to reducing the risk of a well control incident includes proactive measures to maintain well control. This starts with the following key safeguards during well planning and preparation:

- Training key rig site personnel;
- Risk identification and mitigation, including writing Shell's Drill the Well on Paper (DWOP) exercise;
- Contingency planning, including operation-specific plans to mitigate all of the potential causes of loss of well control; and
- Flexible well design to accommodate a range of uncertainty in subsurface data.

The following training and drills support the proactive approach to well control in the well preparation phase.

- Onsite Shell and contractor supervisors maintain current well control certification.
- Prospect-specific well control scenarios and kill techniques are modeled and simulated using Shell's proprietary software and well control simulators at the Robert Training and Conference Center.
- Shell foreman, Shell engineers, contractor supervisors, and contracted rig skilled positions (e.g., drills and assistant drillers) are trained for prospect-specific well control situations.
- Pit drills and trip drills performed weekly.
- Secure well drills performed when applicable.
- Training on the Critical Operations Curtailment Plan and the associated daily status reporting conducted for appropriate personnel.
- Blowout prevention drills performed on a frequent basis ensure the well can be shut in properly and quickly. BOP service and inspection are performed throughout the drilling and off seasons.

Available data from seismic operations and neighboring exploration wells, such as rock types and subsurface pressure profiles, are interpreted to ensure a design that permits effective control of the well. Drilling engineers predict downhole pressures and interpret existing datasets to design a safe and productive drilling program.

Shell performs a site-specific hazardous operations analysis for each prospect. In addition, Shell's DWOP exercise is performed for each prospect. DWOP is a systematic method to 1) identify and prioritize a set of actions to optimize the drilling program, considering all areas of activity; 2) identify and prioritize key operational and Health, Safety, and Environment (HSE) risks and associated mitigation opportunities; and then 3) use this information to develop the optimum drilling program. Shallow hazard surveys have also been conducted to assess the shallow areas of the planned wellbore for potential pockets of shallow gas that could result in loss of control.

In addition to site-specific hazardous operations analyses and the DWOP exercise for each prospect, the following additional risk identification and mitigation measures are taken:

- Site-specific well control modeling for anticipated hydrocarbon intervals
- Site-specific dynamic well control modeling for any prospects with possible shallow gas or hydrae accumulations
- Virtual ice management using shipboard marine radar combined with satellite RADARSAT ice imagery to permit advanced and accurate warning of ice hazards.

Well Control During Drilling

General

The primary means of controlling well pressure utilizes hydrostatic pressure exerted by drilling fluid of sufficient density to prevent flow from the formation into the wellbore. The condition of the drilling fluid is continuously monitored using both manual and automated means, and adjusted as necessary to meet the actual wellbore requirements. Monitored parameters include mud weight into and out of the well, mud flow rate into and out of the well, and presence and analysis of any gases in the return mud flow. The majority of those monitoring duties are performed by the staff of the drilling crew. A mud logging unit, staffed by experienced personnel, will be in continuous use during drilling operations.

Should a kick occur, kick identification and detection, and timely kick management are the primary tools used to prevent a blowout. Latest generation Measurement-While-Drilling (MWD) and Pressure-While-Drilling (PWD) tools are used, allowing real-time monitoring of downhole pressures and drilling parameters. This allows rapid identification of the onset of abnormal pore pressures, swabbing, or the influx of hydrocarbons near the drilling bit.

The drilling operations are supported by Shell's Real Time Operations Center (RTOC), where technical experts in Houston or New Orleans can assist by monitoring on-going operations, analyzing penetrated formations, and analyzing pressure trends. Data can be transferred from the rig to the RTOC in real-time. See Figure 2-2. This service augments the mud logging capabilities at the drilling rig and allows Shell to easily make the people with the right skills available to support the drilling operation.

FIGURE 2-2
REAL TIME OPERATIONS CENTER

Early kick detection is critical to maintaining well control. The drillers, drill crews, mud engineers, mud loggers, and logging engineers are all trained on kick detection and rapid response procedures. In addition, all drilling breaks are treated as potential kick situations, taking all necessary precautions until the situation has been determined to be stable.

Well Control While Drilling at the Mudline

There is risk for a shallow gas blowout while drilling a hole at the mudline, before the subsea BOPs or surface casing have been installed. Large volumes of high-pressure gas can escape from shallow formations, into the wellbore, and then into the water. It should be noted that shallow gas blowouts do not contain oil and, therefore, no spill of oil would be expected at the surface. However, such an incident would be critical from a worker safety standpoint.

Should a shallow gas blowout occur, no attempt would be made to shut in the well to contain the gas because the shallow formations exposed at these depths generally would not have enough strength to control the gas. Instead, the gas would be directed away from the rig floor using a diverter valve and diverter line.

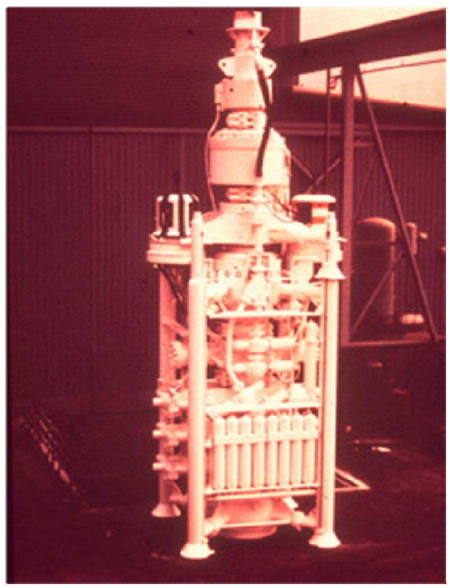
Free gas accumulations in shallow permafrost have been encountered in the course of drilling permafrost intervals. To avoid liberation of this gas and the potential loss of structural integrity of the wellbore, the drilling fluid is cooled to ensure that the wellbore remains frozen, with the gas trapped, and the integrity of the hole is intact.

Well Control While Drilling Below the Conductor Casing

Each well is drilled according to a detailed location-specific well plan, based on expected downhole conditions at that location. Such plans are part of the first layer of protection, proper planning and risk identification. Isolating formations with casing and appropriately maintaining the drilling fluid properties, including density, are critical to preventing loss of well control during drilling.

Once the conductor casing has been set across the shallowest formations, blowout prevention equipment (BOPE) provides a mechanical barrier to loss of well control, key to the third layer of protection. See Figure 2-3 for an example of a blowout preventer. Although rarely needed, this equipment is available as a back-up means (secondary to the mud system) to secure well pressure. In the unlikely event that primary well control is lost; the BOPE can be used to safely halt an uncontrolled flow from the wellbore.

FIGURE 2-3
EXAMPLE OF A BLOWOUT PREVENTER



In the event the well kicks, the BOPE will be used immediately to shut-in the well and confine the pressure within a closed system. The casing program will be designed so that any anticipated formation pressure can be shut-in at the subsea BOPE without rupturing the casing. Shell representatives assigned to the drilling unit have MMS-approved blowout prevention training and actual experience in controlling and killing kicks. Training of this nature is a continual program with Shell. Drilling crews will be trained to a standard sufficient to satisfy both the MMS and Shell.

All surface-mounted BOPE meets the MMS standards as defined in 30 CFR 250.440 through 30 CFR 250.451.

The BOPE is installed after the conductor casing is run and cemented. The BOPE for the *Kulluk* consists of:

- Four 18 ¾-inch 10,000 pounds per square inch (psi) WP ram-type preventers,

- Two 18 ¾-inch 10,000 psi annular preventers,
- 3 -inch 10,000 psi choke and kill lines,
- Hydraulic control system with accumulator back-up closing capability

For a diagram of the *Kulluk* BOPE, refer to Figure 2-4.

The BOPE for the *Frontier Discoverer* consists of:

- Four 18 ¾-inch 10,000 pounds per square inch (psi) WP, ram-type preventers (Cameron).
- Two 18 ¾-inch 5,000 pounds per square inch (psi) annular preventers (Hydril).
- 2 ¾-inch 10,000 psi choke and kill lines.

For a diagram of the BOPE for the Frontier Discoverer, refer to Figure 2-5

After installation, the BOPE will be tested in accordance with MMS and Shell specifications. Tests will be conducted at least weekly and prior to drilling out casing.

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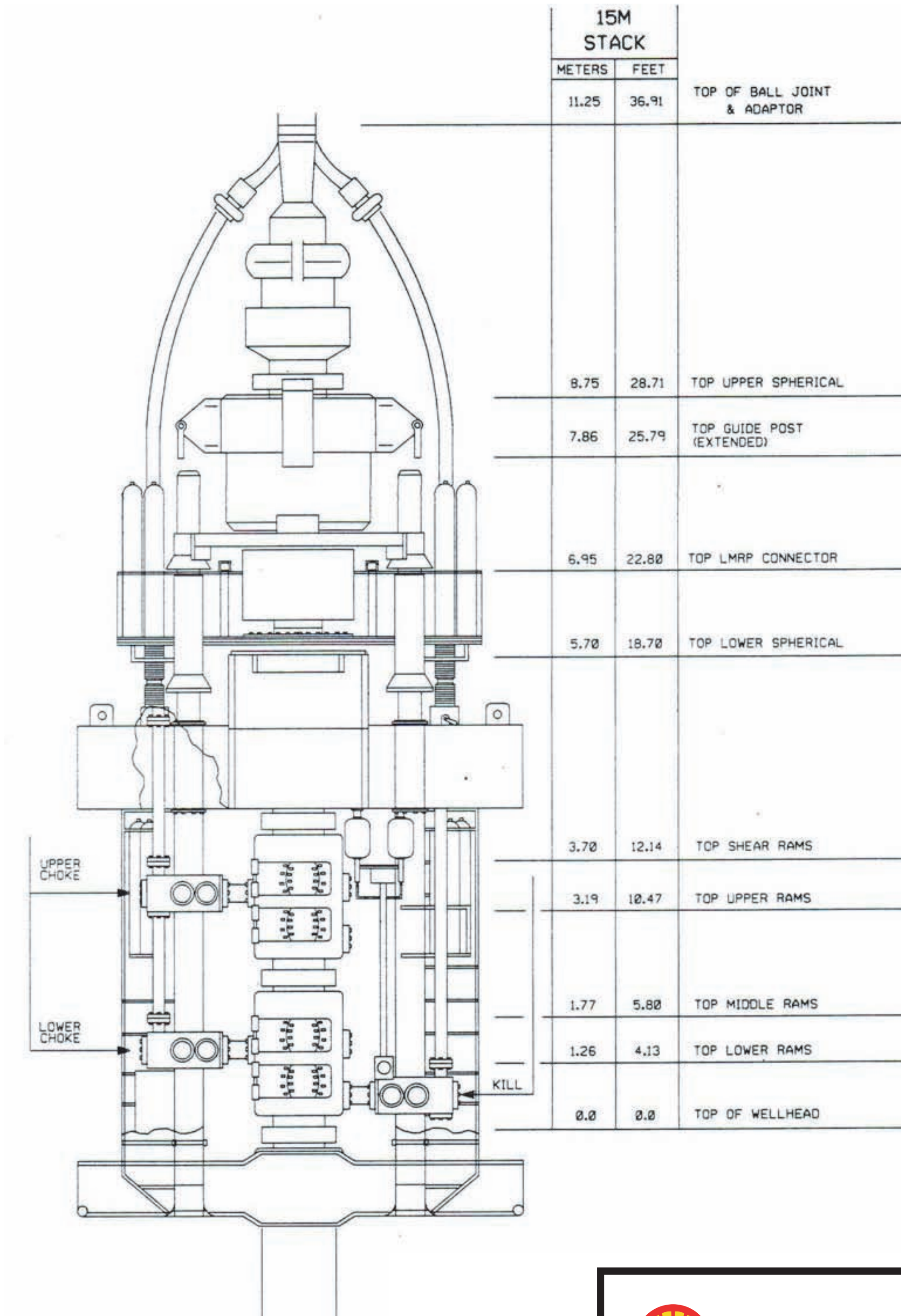
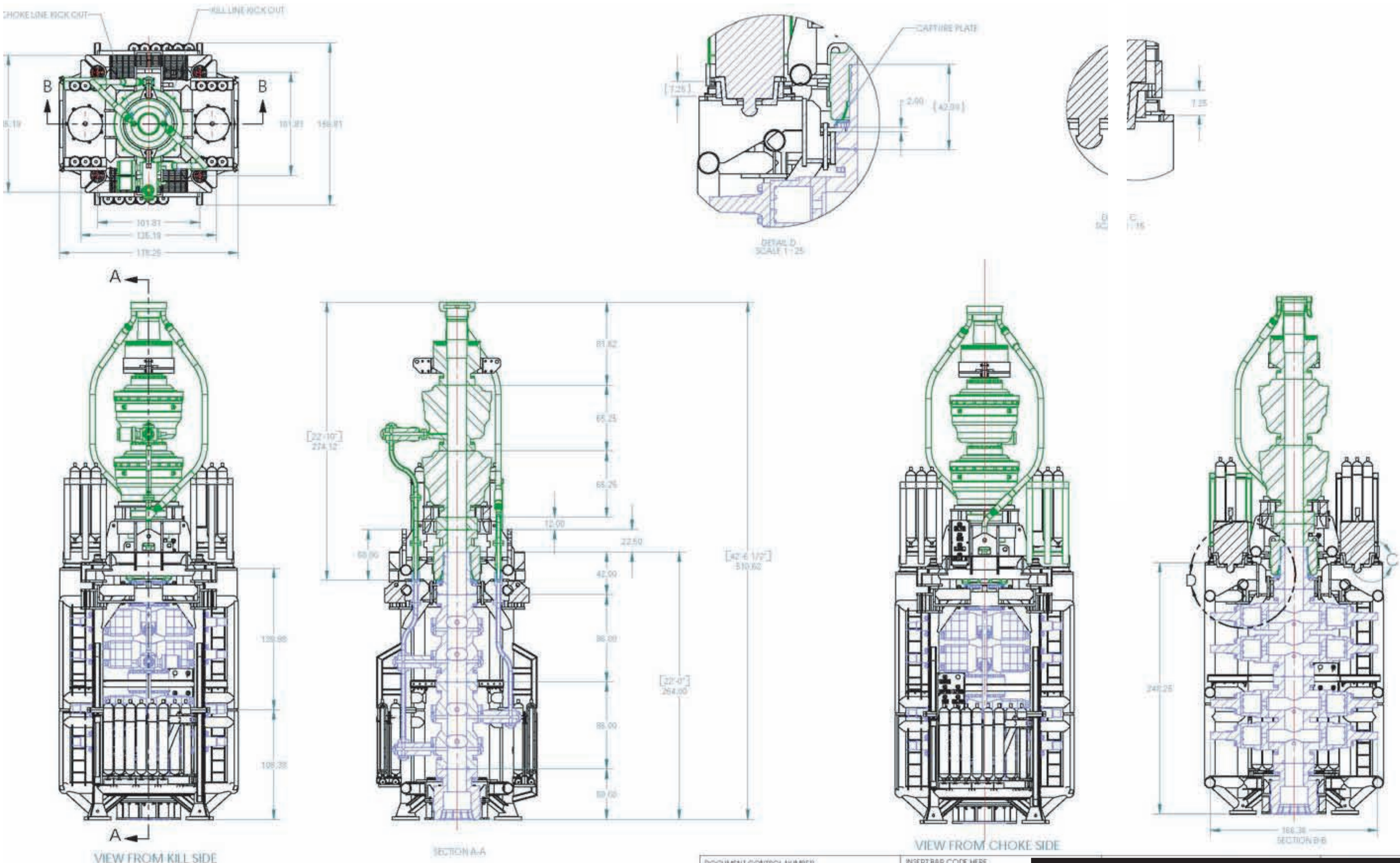


SHELL OFFSHORE, INC.

KULLUK BOPE

December 2006

Figure 2-4



SHELL OFFSHORE, INC.

FRONTIER DISCOVERER
BOPE

December 2006 | Figure 2-5

Well Suspension or Abandonment

Upon completion of drilling operations, the well will be properly plugged and abandoned following MMS requirements. Procedures include setting cement across hydrocarbon intervals. All plug and abandonment operations will be conducted per 30 CFR 250 Subpart D and with prior approval from MMS.

Spill Prevention Practices and Training

Blowout prevention drills are performed on a frequent basis to ensure the well is shut in properly and quickly. Blowout prevention testing intervals are within the standard of MMS regulations. Blowout preventers will be pressure-tested every 14 days and function-tested every 7 days. In addition, drilling personnel are MMS-certified in well control, and weekly pit/trip drills will be conducted.

2.1.9 Oil Storage Tanks [18 AAC 75.065]

Section 3.1 contains information about the major tank facilities on the two drill rigs. During drilling, a visual inspection and soundings of the major tanks will be conducted twice daily during shift inspections to allow leak or damage detection, or to identify questionable mechanical integrity of the storage tanks and their associated fuel lines, piping, and valves. Leak detection will be recorded in a daily tour report and the Offshore Installation Manager (OIM) in charge of each drilling vessel will be notified in order to ensure that repairs are completed safely and in a timely manner.

Inspections of Elevated and Portable Tanks [18 AAC 75.065(a)]

The storage tanks to be used in Shell exploration are integral parts of the respective Mobile Drilling Units (*Kulluk* and *Frontier Discoverer*) which will undertake the drilling program. Neither the *Frontier Discoverer* nor the *Kulluk* MODU contain non-integral bulk storage oil tanks equal to or greater than 10,000 gallons, which are regulated under 18 AAC 75.065.

The largest non-integral tanks on the *Frontier Discoverer* are less than 5,000 gallons and are used for well testing purposes. The largest elevated tanks (on deck or in containment) on the *Kulluk* are two aviation fuel bowsers that are 600 gallons each.

Inspection Records [18 AAC 75.065(d)]

Inspection records are maintained by the drilling rig or well testing contractor.

Repair or Alteration [18 AAC 75.065(e)]

Shell will notify MMS of any major repair or alteration.

Leak Detection [18 AAC 75.065(h)(1)]

See Section 2.5.

Overfill Prevention [18 AAC 75.065(j), (k)]

Overfill protection is primarily through high-level alarm enunciations where incorporated (fueling), in conjunction with visual observation and mechanical and remote soundings during transfer operations. Containment coaming is in place around the fuel tank vent outlet.

The on-board tanks are equipped with high- and low-level alarms for overfill protection. There are 19 tank level indicators on the central control console on the *Kulluk* drill rig. There are 11 temperature indicators on 11 of the 19 tanks, and there are 11 high- or low-alarm lights associated with nine of the tank levels. The alarms and indicators on the tanks are listed below.

The 19 tank level indicators on the central control console are located on:

- Fuel Oil Tanks (3)
- Ballast Water Tanks (7)
- Drill Water Tanks (2)
- Portable Water Tanks (2)
- Brine Storage Tanks (3)
- Waste Oil Tank, (1)
- Water Glycol Storage Tank (1)

The 11 temperature indicators associated with 11 of the 19 tanks with level indicators are located on:

- Ballast Water Tanks (7)
- Drill Water Tanks (2)
- Potable Water Tanks (1)

Eleven high- or low-alarm lights are associated with nine of the tank levels. They are located on:

- Fuel Oil Tanks (2)
- Potable Water Tanks (2)
- Drill Water Tanks (2)
- Water Glycol Tank (low-level alarm) (1)
- Waste Oil Tank (high-level alarm) (1)

The four draft gauges are located on the *Kulluk* in the Forward, Aft, Port, and Starboard locations.

The Frontier Discoverer's fuel tanks are integral to the vessels hull. Therefore all loading stations and vents are provided with save-alls or high coamings as per the requirements of SOLAS, MARPOL and DNV requirements.

Bulk oil storage tanks located on the drill rigs will be lined with appropriate impermeable liners. Tanks will be visually inspected daily for the presence of oil leaks or spills.

Debris Removal [18 AAC 75.075 (c)]

The tank areas will be maintained free of debris and other material that might interfere with the effectiveness of the system.

Drainage [18 AAC 75.075(d)]

Deck drains including coamed drainage will be routed to a facility designed for oily water separation. This drainage system and the separation process will be inspected to ensure that separated oily water may safely be disposed of.

2.1.10 Emergency Tow and Escort Vessels Program

Each of the two drilling vessels will have two dedicated ice-class vessels assigned to support them for the purpose of anchor handling and ice management (see Appendix A). These two vessels are the primary escort and emergency vessels for each rig.

2.2 DISCHARGE HISTORY (>55 GAL) [18 AAC 75.425(e)(2)(B)]

Not applicable.

2.3 ANALYSIS OF POTENTIAL DISCHARGES [18 AAC 75.425(e)(2)(C)

This section contains a summary of potential discharges and their impact. Based on a spill history of the Beaufort Sea, there is a low probability of an event causing oil to enter into an open-water environment. However, there is a chance that a blowout could occur.

A response scenario addresses the potential immediate release of crude oil to the environment by a loss of well control during drilling operations in open water conditions. The probability of a major oil spill occurring during drilling operations is extremely low. Comprehensive flow histories are generally not available for exploration areas. For planning purposes, the flow rate from a blowout is 5,500 barrels of oil per day (bopd) for the duration of the event.

2.3.1 Potential Areas for Discharge

Table 2-1 contains a summary of potential discharges.

TABLE 2-1
SUMMARY OF POTENTIAL DISCHARGES

TYPE	CAUSE	PRODUCT	SIZE	DURATION	ACTIONS TAKEN TO PREVENT POTENTIAL DISCHARGE
Transfer from fuel barge to drill rig	Hose rupture	Diesel	Approximately 2,000 gallons (Section 1.6)	5.5 minutes (Section 1.6)	Transfer procedures in place; Note: This scenario will be addressed as part of USCG approval of Vessel Response Plans by individual vessel owners.
Diesel	Tank rupture	Diesel	1,555 bbl	Minutes to hours	Note: The diesel tanks are internal to each drilling vessel rather than deck-mounted, where the potential for marine spills is much greater. As a result, a scenario involving tank rupture has not been included in the oil spill response plan, but will be monitored as part of an ongoing tank inspection program.
Blowout	Uncontrolled flow at the mudline	Crude oil	287,100 bbl including emulsion and free water	30 days (Section 1.0)	Blowout prevention equipment and related procedures for well control.

Fuel Transfers

A potential source of discharge occurs during fuel transfers of any kind. This discharge is minimized by the weather restrictions of transfer procedures, which prevent transfers during unfavorable wind or sea conditions. Transfers are announced in advance and verbal communication, in combination with visual inspection, is the best method of discharge detection.

If discharge is detected, the fuel would most likely be contained immediately on deck. If fuel overflow of the containment dikes occurs, edge coaming would prevent flow of fuel off the vessel into open water.

Blowouts

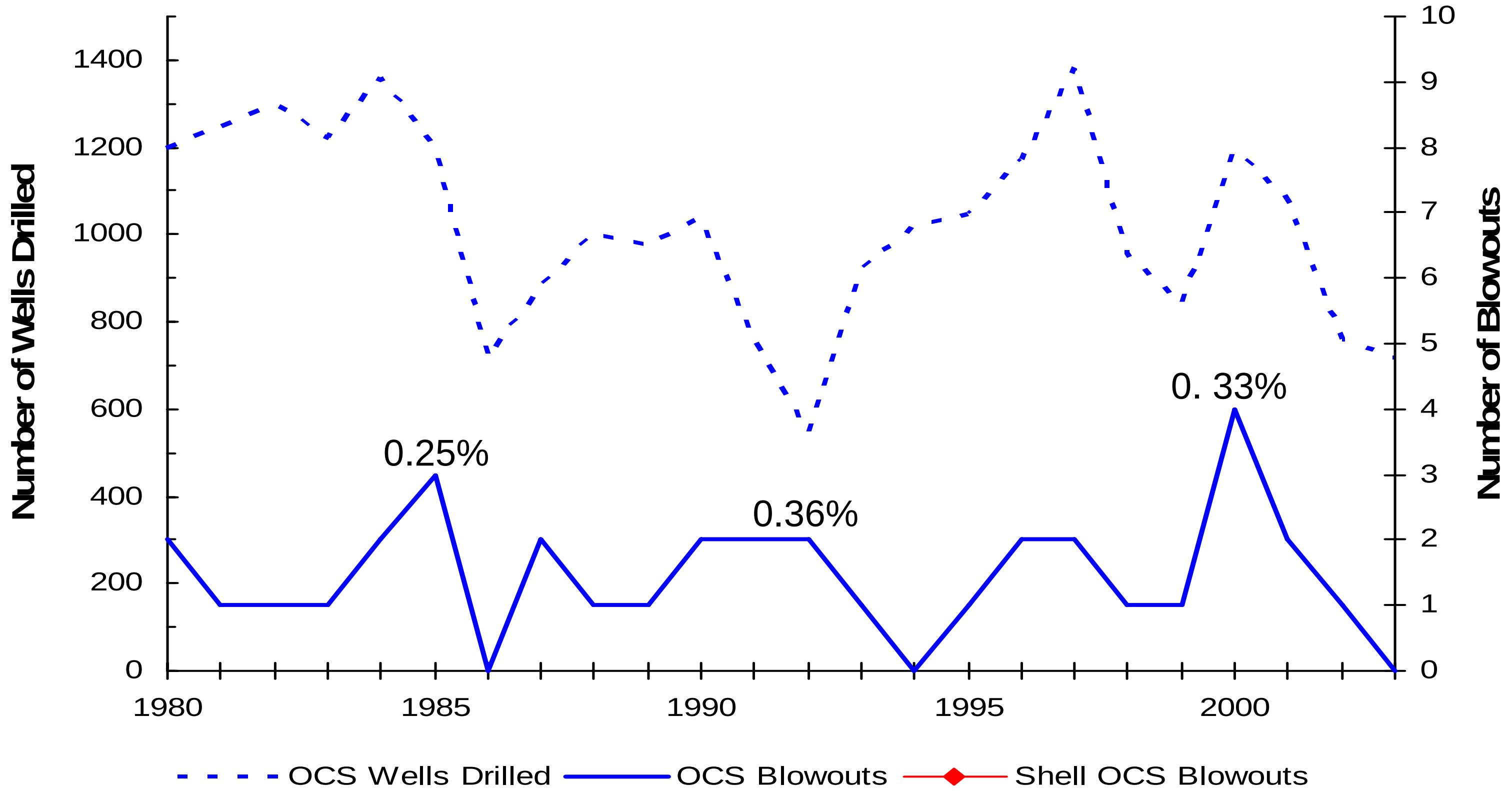
The uncontrolled release of oil during a blowout is discussed in Section 1.6. Table 2-2 provides a summary of potential discharge volumes for wells drilled in the outer continental shelf and in Alaska state water since 1997.

Given the use of modern prevention and control techniques, actual blowouts are extremely rare and of relatively short duration. See Figures 2-6 through 2-8.

TABLE 2-2
POTENTIAL DISCHARGE FOR ALASKA OFFSHORE DRILLING (1997-2003)

PLAN NAME	PRODUCTION OR EXPLORATION	OPERATOR	18 AAC 75.425(e)(1)(f) SCENARIO WELL BLOWOUT WORST CASE DISCHARGE VOLUME (bbl/day)	18 AAC 75.425(e)(2)(C) POTENTIAL DISCHARGE ANALYSIS BLOWOUT VOLUME (bbl/day)	MMS WORST CASE DISCHARGE VOLUME (bbl/day)
McCovey Exploration	Exploration	AEC Oil & Gas, Inc.	5,500 (March 2002)	5,500 (March 2002)	5,500 (March (2002)
Warthog #1	Exploration	ARCO	5,500 (August 1997)	5,500 (August 1997)	5,500 (August 1997)
Northstar Operations	Production	BPXA BP Exploration (Alaska) Inc. (BPXA)	7,220 (May 2003)	10,000 (July 2005)	8,872 (January 2005)
Milne Point Unit (F Pad)	Production	BPXA	2,000 (June 2002)	142,800 gpd = 3,400 bbl/day (March 2003)	N/A
Greater Prudhoe Bay	Exploration	BPXA	3,000 (September 2006)	6,005 (September 2003)	2,000 (September 2003)
Endicott	Production	BPXA	2,000 (December 2003)	2,250 (December 2003)	2,000 (December 2003)
Badami	Production	BXAP	1,100 (May 2005)	1,045 (May 2005)	N/A
Alpine Dev. Participating Area	Production	CPA	7,500 (January 2004)	7,500 (August 2004)	N/A
Thomson Gas Cycling	Exploration	Exxon Mobil	517 (May 2003)	517 bbl/day (May 2003)	N/A
Kuparuk Field	Production	Phillips 66	1,000 (March 2003)	N/A	N/A
Cook Inlet Area Exploration Program	Exploration	Phillips 66	1,500 (July 2001)	5,500 (February 2001)	N/A
Tyonek Platform	Exploration	Phillips 66	5,500 (September 1998)	5,500 (September 1998)	5,500 (April 1998)
North Slope Exploration Program	Exploration	Pioneer Natural Resources	5,500 (September 2005)	5,500 (September 2005)	N/A
Kitchen Prospect	Exploration	Escopeta Oil	4,675 (June 2006)	4,353 (June 2006)	4,675 (June 2006)
Cook Inlet Production Facilities	Production/Exploration	Unocal 76	300 (December 2006)	1,200 (December 2006)	300 (December 2006)
Oil & Gas Production Operations	Production	Kerr-McGee	1,000 (September 2005)	N/A	1,000 (April 2006)
Northwest Milne Point Exploration Operations	Exploration	Kerr-McGee	5,500 (January 2004)	5,500 (January 2004)	5,500 (January 2004)
Oogurik Development Project	Exploration	Pioneer Natural Resources Alaska Inc.	2,500 (April 2006)	2,500 (April 2006)	2,500 (April 2006)
Cook Inlet Area Production Operations	Production/Exploration	Forest Oil Corporation	1,500 (February 2002)	1,500 (August 2004)	1,500 (January 2002)

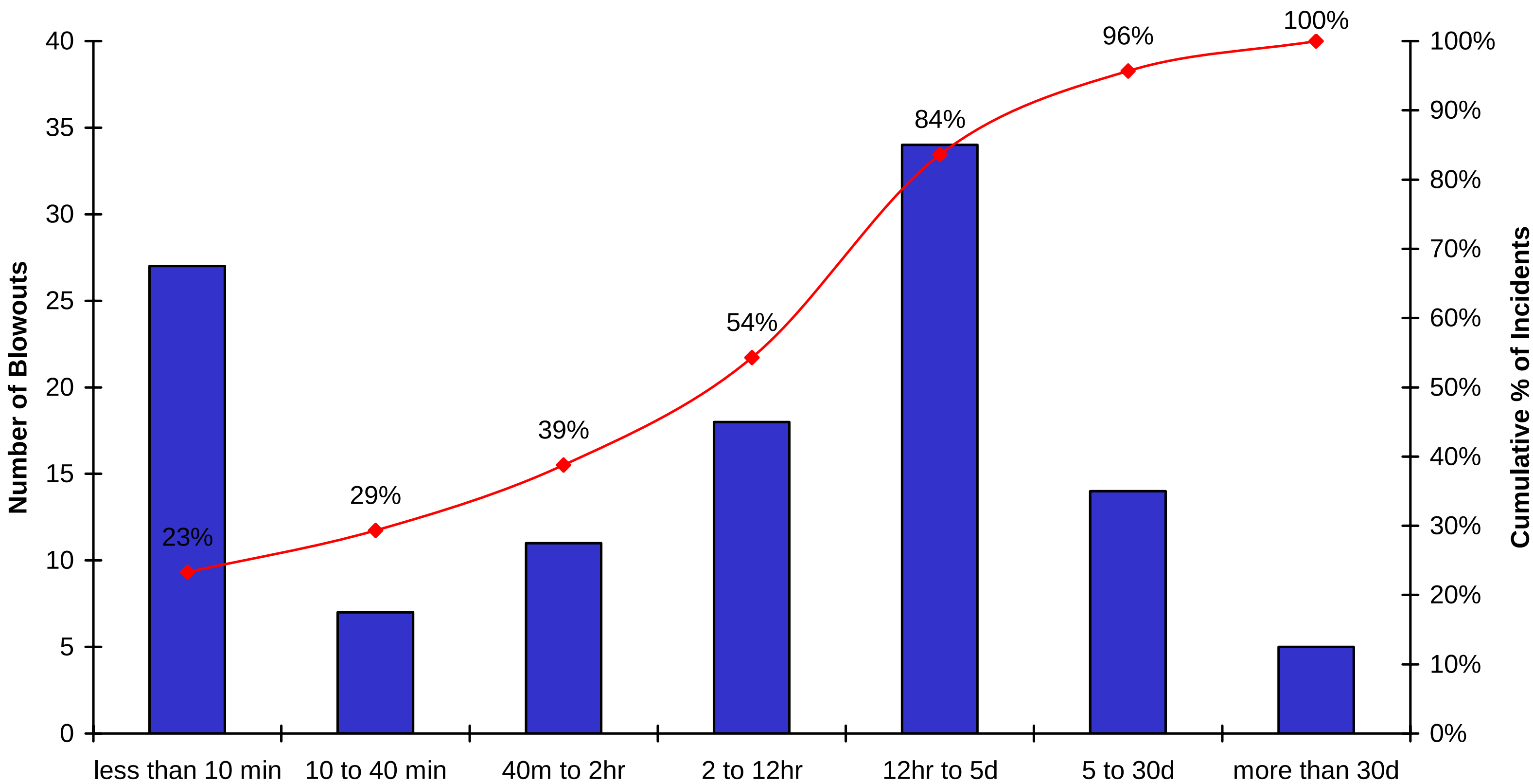
FIGURE 2-6
HISTORICAL INFORMATION ON OFFSHORE BLOWOUTS IN THE US OCS (1980 – 2003)



Key Points:

- **Across the period, only 0.14 percent of wells drilled have blown out.**
- **No Shell blowouts have occurred in the OCS during the period (Troll in UK 1983**)

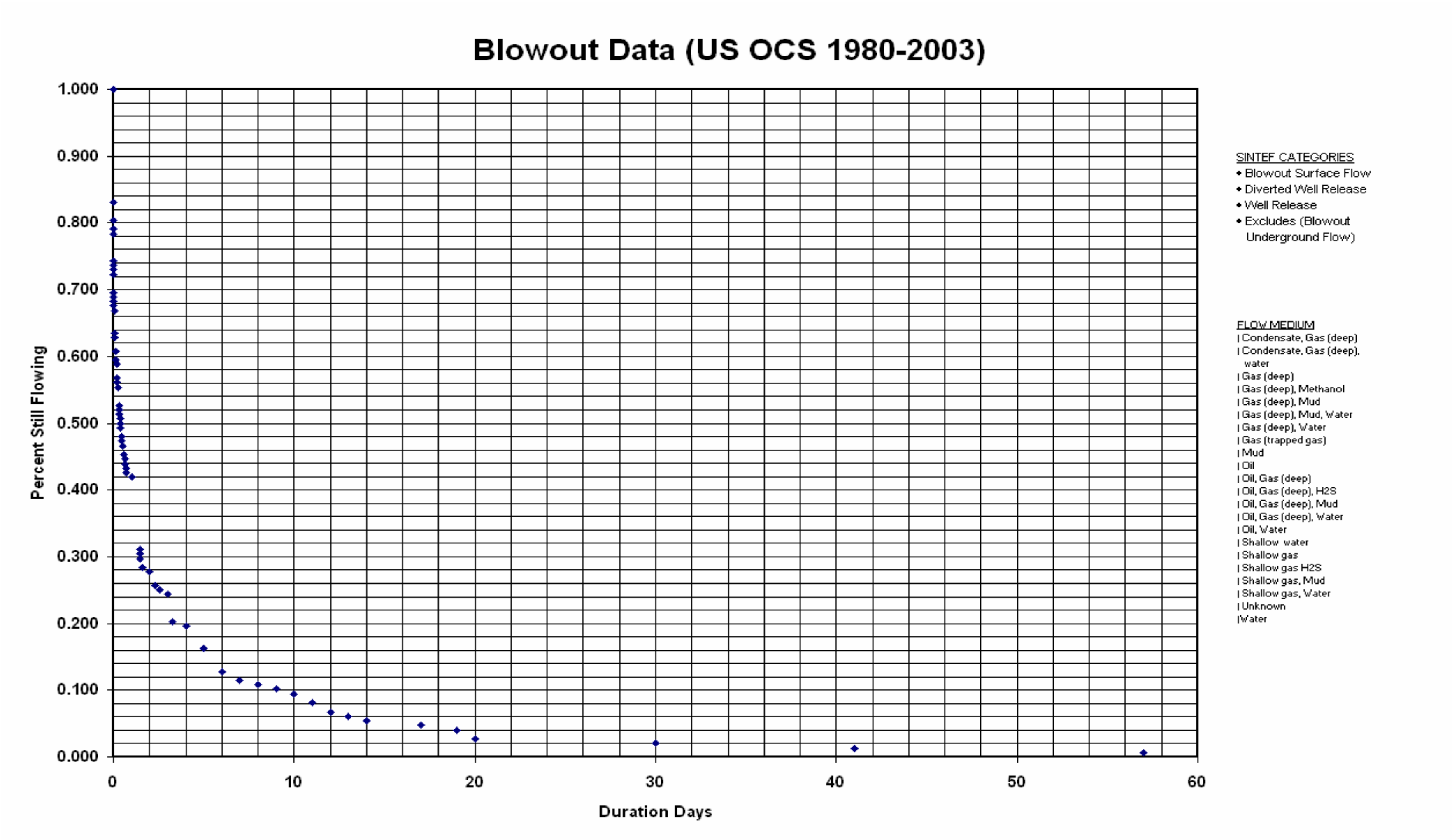
FIGURE 2-7
DURATION OF OFFSHORE BLOWOUTS IN THE U.S. AND NORWAY (1980-2003)



Notes:

- 116 Blowout events between 1980 – 2003
- Surface and Underground Blowouts in US and Norway (1980 – 2003)

FIGURE 2-8
DURATION OF BLOWOUTS IN THE U.S. OCS (1980 – 2003)



2.4 OPERATIONAL CONDITIONS INCREASING RISK OF DISCHARGE [18 AAC 75.425(e)(2)(D)]

Severe weather and ice conditions are the primary factors most likely to curtail operations and increase the potential for accidental discharge. The key measure that has been taken to reduce the risk of a discharge attributable to these conditions is the Critical Operations Curtailment Plan (COCP) for the drilling operations. Conditions specific to Shell's Beaufort Sea operations that potentially increase the risk of discharge, and actions taken to eliminate or minimize identified risks, are summarized below:

- Temperature: Cold temperatures pose a threat to personnel and equipment. Heat may cause gases to expand and increase the likelihood of discharge. The drill rigs are near the Alaska Arctic coastline, which is marked by arctic air masses with relatively harsh temperatures throughout the year.
- Weather Conditions: The operation most likely to be affected by adverse weather conditions is the drilling support operation, such as transportation activities between the drill site and Prudhoe Bay or other staging areas. Strict adherence to air safety will be enforced.
- Sabotage or Vandalism: Potential for any sabotage or vandalism is minimal. Security and special-interest training by Shell and its contractors should deter any damage from these acts at any of the drill sites. Air safety is essential.

These characteristics can affect the movement of discharge as well as deployment of equipment and efforts to contain and recover the oil.

2.4.1 Severe Weather

In general, meteorological and oceanographic conditions at the project site during the summer season are relatively mild. Intensity and frequency of storms increase as the open water season progresses into the late September-October time frame. Generally, storms follow a northeast-southwest track, moving fairly rapidly, and influence the area for a relatively short period of time.

Environmental parameters such as wind speed and wave height do not directly influence drilling operations. Rather it is the drilling unit’s response to environmental conditions, coupled with the drill crew’s ability to handle equipment safely, that affects curtailment of critical operations. Conditions of curtailment due to heavy weather are therefore determined in accordance with the drilling vessel’s responses to heave, pitch, roll, horizontal displacement, and anchor tension as a function of the corresponding environmental parameters.

Since heavy weather will clearly influence vessel response, environmental conditions will be regularly monitored at the drill units and regional wind and wave forecasts will be received on each drilling unit two times a day with two updates between each forecast. Meteorologists with the weather forecasting service will provide weather consultation services on a 24-hour basis.

Shell has developed a COCP (see Section 2.4.4 for more information on the plan), which has procedures to aid operations personnel in determining the correct procedures to follow when storm conditions are anticipated. Implementing the procedures will ensure the safety of any personnel on board, minimize the risk of damage to equipment, and minimize the chance of a discharge attributable to the severe weather conditions.

On an ongoing basis once on location, the drilling vessel and key personnel will monitor weather conditions using a variety of data, including aerial ice reconnaissance, third party forecasts from weather services, and on-board weather surveillance and motion monitoring. Critical operations will be managed in accordance with the Critical Operations Curtailment Plan, which sets forth allowable operating parameters based on the use of T-time. T-time is the time required to trip or recover the drill pipe and associated equipment and complete the operations required to leave the well in a secured state. In heavy weather conditions, when vessel heave and horizontal displacement exceed pre-set levels, drilling operations cease, the drill string is pulled into the protective casing of the well, the drill pipe is hung-off the drilling unit, and the drilling unit prepares to recover its anchor equipment. If conditions continue to deteriorate, the lower marine riser package is disconnected and anchor equipment is recovered (or released if necessary). If weather severity reaches specified levels, the drilling unit moves off location and is positioned to ride out the storm.

2.4.2 Ice Conditions

The start of on-site project activities will coincide with the northward retreat of the ice edge possibly as early as July. At any time during the drilling season, occasional incursions of ice floes are expected, and so a mitigation plan is in place. On-site activities will conclude prior to freeze-up, which is not anticipated until the latter half of October, based on the average historic freeze-up dates.

Shell’s ice management system is a combination of ice monitoring and forecasting techniques, along with icebreaking operations. Ice monitoring techniques include satellite-based Synthetic Aperture Radar (SAR), airborne and icebreaker reconnaissance, ice forecasting, and weather forecasting. Forecasting incorporates data from the federal services of Canadian Ice Service and National Oceanographic and Atmospheric Administration. Shell also intends to use specialized software to integrate ice speed and direction data from vessels’ radar, aerial reconnaissance, and satellite imagery in order to predict individual ice floe movement, allowing modification of icebreaking operations on a real-time basis. Shell’s ice management team at Shell's Bellaire Technical Center will be fully engaged to support the collection and use of ice-related information.

Two icebreakers will be used for each drilling unit. Typically, one icebreaker will deflect or break up large ice floes farther away by circling updrift or upwind (“upstream”) in the flowing sea ice, while another icebreaker protects the drilling unit by further breaking nearer ice floes into smaller and smaller pieces so that the drilling unit is able to hold station.

Shell has developed two sets of protocols for responding to potentially hazardous ice conditions, one for typical summer drilling when ice can move in with wind and currents, and another in anticipation of winter freeze-up. These two sets of procedures utilize T-time estimates for establishing alert stages and associated operational and communication protocols.

In general, drilling operations will cease and preparations will be made to disconnect drill pipe when hazardous ice conditions are anticipated within the T-time plus 4 hours. If the ice management strategy is not capable of preventing a large ice floe from impacting the drilling unit or reducing ice buildup, then the drilling unit begins preparing in stages to disconnect from the lower marine riser package, recover anchor equipment, and vacate the drilling location.

The Ice Alert Procedures spell out specific responsibilities for personnel aboard the drilling vessels and aboard their support vessels. The conditions necessary to achieve a given alert level are described, along with the corresponding tasks for each of the key individuals assigned to Drilling Operations, Marine Operations, and Helicopter Support Base Operations. The conditions for each alert level relates to a time value “T” which is defined as “the time required to stop the current operations safely and efficiently so that the riser can be disconnected and the anchors retrieved or disconnected to move off location.” All estimates of operations closure time include safety margins that guarantee that the well will be completely secured in the best possible way by the end of the period, “T.”

2.4.3 Structural Icing

Meteorological data for the project area indicate that structural icing is most prevalent in September, when open water, subfreezing air temperatures, and wind are all present. The severity of icing conditions is a function of surface water temperature, air temperature, and wind speed. Structural icing can be enhanced by the occurrence of atmospheric icing due to freezing fogs and by snow.

Accumulations of ice on the drilling vessel’s superstructure will be thickest on windward surfaces between 10 and 50 meters above sea level. Heavy structural icing will raise the vessel's vertical center of gravity and affect its heeling and righting moments.

The *Kulluk* was designed for Arctic conditions and the *Frontier Discoverer* has been Arctic strengthened. Both vessels have pre-established ice load limits. If icing for either rig approaches the allowable amount and raises the allowed vertical center of gravity, critical operations will be curtailed until sufficient ice has been removed and the loading is acceptable.

The *Kulluk* has been designed to minimize the accumulation of spray ice. All work areas are enclosed and heated, piping is enclosed or heat traced and wrapped with insulation. In addition, on-deck equipment, such as anchor windlasses, is wrapped with tarps and blower-heated to minimize spray ice accumulations. Heating and wrapping greatly reduces icing and facilitates ice removal when spray ice conditions are present. The *Frontier Discoverer* will, upon conversion, incorporate features to minimize the accumulation of spray ice, such as enclosed work spaces and enclosed or heat-traced piping.

When icing conditions exist, crew vigilance will be essential to preventive accumulation. At the start of each tour, crewmembers will inspect their work areas for icing. Roustabouts will remove ice, snow, and standing water from decks, equipment, railings, and the superstructure to prevent ice accumulation in any of these areas. If ice builds up on the derrick, steps will be taken to see that it is removed. Removal onboard the vessel will be accomplished by means of portable heaters, steam hoses, steam lances, wooden ice bats, and picks.

2.4.4 Critical Operations and Curtailment Plan

MMS requires that offshore operators in the Alaska OCS Region develop procedures and maintain an MMS-approved COPC. The plan deals largely with potential problems associated with severe weather and unexpected levels of ice. The procedures identify ice conditions, weather, and other constraints under which the exploration activities will either be curtailed or stopped. Shell’s COCP provides a series of procedures for monitoring and responding to various ice conditions and weather/wave conditions at the drilling sites. The focus of the COCP is to prevent personnel injury, equipment damage, and any accidental discharges to the environment. The main objective is to secure the well in an orderly manner when facing adverse environmental conditions.

A prerequisite to safe and efficient Arctic offshore operations is an environmental monitoring and forecasting system. A comprehensive system has been established to support Shell’s drilling activities in the Beaufort Sea. Components of the monitoring and forecasting system include meteorological observations, onsite weather forecasts, oceanographic observations, sea state forecasts, ice monitoring, and ice forecasting. In addition to the environmental monitoring and forecasting system, real time measurements of the drill ships performance in ambient conditions is obtained from a performance monitoring system installed onboard. An alert status system has been established onboard each drill ship to anticipate hazardous ice and weather events and to assign pre-determined responses to all responsible personnel.

The COCP describes the comprehensive effort that Shell and the drill ship contractors are providing to ensure that drilling operations are conducted in a safe and prudent manner in the unique environment of the Beaufort Sea. The COCP is a component of the Applications for Permit to Drill submitted for approval to the MMS. The COCP is also readily available onboard the drill ships and in Shell's offices.

The COCP defines standards and guidelines for the conduct of operations on the drill ships to minimize any hazard to personnel or the environment. In the Alaskan Beaufort Sea, the two primary factors that can cause curtailment of critical operations and that potentially increase the risk of discharge while drilling are sea ice and heavy weather. The objective of the COCP is to detail the critical drilling operations and the conditions under which such operations will be curtailed.

The COCP will be strictly followed to mitigate ice forcing the rig off location in an uncontrolled fashion.

2.4.5 Hours of Light at 70°N

In addition to severe weather and ice conditions described above, reduced hours of daylight during the end of the drilling operations could increase the risk of a discharge during some activities. The average number of daylight hours for the Beaufort Sea at 70°N are as follows:

- January 0.0
- February 4.9
- March 9.5
- April 14.0
- May 18.9
- June 24.0
- July 24.0
- August 21.2
- September 15.5
- October 11.2
- November 6.1
- December 0.0

Drilling operations will be aided by rig lights and portable lighting as necessary.

2.5 DISCHARGE DETECTION [18 AAC 75.425(e)(2)(E)]

2.5.1 Drilling Operations

Discharge detection will rely on visual surveillance. Visual inspections are an important component of leak and spill detection because automated systems may not detect small leaks and spills. The drill rigs and fuel transfer operations will be closely monitored at all times (see Section 2.1.6). The drill site will be staffed 24 hours a day by drilling personnel. Once a day, facility personnel will visually inspect tankage, sumps, and drains for indications of oil leaks. Piping, valves, pumps, and other machinery will also be visually inspected as part of the daily routine. Any oil leaks or spills will be noted, the source of the spill will be located and corrected, and the oil spill will be cleaned up. During drilling, drillers are continually monitoring the drilling equipment and will stop drilling if unsafe conditions are observed.

2.5.2 Automated Methods

In the drill rigs' ballast control rooms, automated control systems and visual monitoring of instrumentation are used to control flow rates, pressures, and distribution. Various systems in exploration operations are continuously monitored with a microprocessor-based control system. Rounds are documented daily. Incidents are recorded using the incident reporting and investigation process recognized and approved by the company.

Several independent emergency shutdown systems limit the scope of any single failure. An emergency shutdown can be initiated by process conditions outside set limits or manually initiated by operators at the instrument/control panels and by personnel at strategic emergency shutdown punch-button locations on the facility.

The *Kulluk* Drill Rig Discharge Detection

On the *Kulluk* drill rig, service alarms are tied to the unit service master alarm panel of the Central Control Console. This allows the operator the ability to notify personnel when an equipment alarm occurs. There is also a section on the Central Control Console for emergency shutoff valves on storage tanks.

Located on the bottom left side of the Central Control Console is a graphic display showing water lines, pumps, and valves to the ballast tanks. The ballast pumps (4) can be stopped or started by the stop/start switches located in the graphics. The ballast valves may be opened or closed from the graphics, by pushing the desired open or closed push buttons. Each push button has an indicator light displaying the valve status. By opening the appropriate valves and starting the appropriate pump, each ballast tank level may be raised or lowered. Located on both sides of the graphics are six meters. There are four pumps and three meters for each pump. The meters read suction pressure, discharge pressure, and flow for each pump.

The unit service master alarm panel includes an audible alarm buzzer, flicker stop, and buzzer stop for the unit service alarms located on the console.

To activate an alarm, devices of pressure switches, float switches, and electrical relays are engaged. Some equipment has local alarm panels that contain more than one alarm condition (e.g., high temperature, low oil pressure).

Emergency Equipment Stops are located on the console. A common plastic door protects these push buttons so they cannot be accidentally pushed. When a switch is depressed, it will illuminate and shut down the equipment in the room corresponding to the switch nameplate. There are also emergency shutdown push buttons on the console for saltwater service pump, winch cooling water pump, and open/close push buttons for the saltwater inlet supply valve.

Emergency shut off valve indicators are illuminated when storage tanks are shut.

The console contains an inclination detector that signals a calculation unit. The calculation unit determines the angle of inclination and the X-Y coordinates (0-360°) of the drill rig. If the rig is level, the inclination detector is lit. If the rig is off-center, an indicator light will be lit in the direction in which the rig is tilted.

The Frontier Discoverer Drill Rig Discharge Detection

The *Frontier Discoverer* drilling rig has a system of controls, monitors, and procedures to assist in the early detection of potential discharges. For both downhole and surface operations, these detection systems include standard operating procedures governing the monitoring, handling, and containment of fluids. Specifically, visual and manual detection in combination with drilling policies and procedures allow for ample discharge detection.

Further discharge detection is allowed by the continuous monitoring of the ship's bilge systems. Potential discharge collects in system where it eventually travels to the pump room. Visual surveillance of this bilge system's piping, valves, and pumps allows for early detection of a spill.

2.6 RATIONALE FOR CLAIMED PREVENTION CREDITS 18 AAC 75.425(e)(2)(F)]

Although Shell considers its well prevention and control measures "best in class," it will not be claiming any prevention credits to offset oil spill response planning requirements, based on exploration well operations as specified in 18 AAC 75.430 through 18 AAC 75.434.

The recovery equipment provided in support of this plan (see Tables 1-8 and 1-9) substantially exceed the mechanical recovery capability needed to contain the worst case discharge (see Section 1.0).

2.7 COMPLIANCE SCHEDULE 18 AAC 75.425(e)(2)(G)]

Compliance schedule and waivers have not been requested at this time.

PART 3 SUPPLEMENTAL INFORMATION [18 AAC 75.425(e)(3)], [30 CFR 254.22(a)], [30 CFR 254.23(e)], AND [30 CFR 254.26]

3.1 FACILITY DESCRIPTION AND OPERATIONAL OVERVIEW [18 AAC 75.425(e)(3)(A)]

3.1.1 Facility Description

Exploratory drilling will occur from two drill rigs, the *Kulluk* and the *Frontier Discoverer*. Adjacent to each of these drilling vessels will be dedicated oil spill response platforms one of which will be a purpose-built oil spill response vessel (OSRV) and the other an oil spill response tug/barge combination using the *Arctic Endeavor*. Shell's response capability is ensured by on-the-water OSRV/OSRBs allowing timely and immediate response in the event of an oil spill. In addition to the OSRVs, Shell will charter an Arctic-class tanker as a storage vessel for recovered fluids. The oil containment, recovery, and storage capacity is more than sufficient to cover the amount of oil potentially released from the worst case discharge (WCD) arising from a well blowout.

The *Kulluk* Drill Rig

The *Kulluk* drill rig is a mobile offshore drilling unit (MODU) designed for drilling in harsh offshore arctic environments in water depths ranging from 24 meters (m) to 55 m. The mobile drill rig is towed to and ballasted down at the drill site. When drilling operations at a location are complete, the unit can be deballasted, refloated, and towed to another drill site. Its drilling depth reaches a maximum of 6,100 meters and its flow testing capability is up to 10,000 barrels of oil per day (bopd). It can house up to 108 people. A facility diagram is provided in Section 1.8, Figure 1-13, and the schematics are provided in Section 1.8, Figure 1-14.

The *Kulluk* was constructed in 1982 by Mitsui Engineering and Shipbuilding Company, Ltd. The floating semi-submersible vessel incorporates a 24-faceted conical shaped hull which has been ice strengthened to meet Arctic Class IV classification. The double hull is shaped in the form of an inverted cone which causes the ice to break downward and away from the vessel, thus protecting its anchor lines and drilling riser system from ice movement.

The bottom of the hull is equipped with a skirt system. The skirt is designed to protect the mooring lines whose fairleads depart from the center of the unit below this skirt. Ice is deflected away from the lines allowing the unit to remain on location during conditions when ice is present.

In previous drilling exploration programs, the *Kulluk* has operated in three characteristic ice scenarios: spring break-up with thick moving first-year ice and some old ice; summer open water with first and multi-year ice intrusions; and freeze-up early winter with a growing first-year ice cover and some old ice. The Kulluk has experienced very little down time in these conditions and has commenced drilling operations as early as June 1 and continued working as late as December 11th. The Kulluk has also operated through a number of Beaufort Sea storms with maximum wave heights in the 20 foot range, performing in accordance with design expectations.

The *Frontier Discoverer* Drill Rig

The *Frontier Discoverer* drill rig is also a MODU designed for drilling in the same environment as the *Kulluk* and is designed for water depths ranging from 38 m to 305 m. Its drilling depth reaches a maximum of 6,096 m. It can house up to 120 people. A facility diagram is provided in Section 1.8, Figure 1-15, and the schematics are provided in Section 1, Figures 1-16 and 1-19.

The service facilities on the two drill rigs are described in Table 3-1.

TABLE 3-1
SERVICE FACILITIES ON THE MODUS

	KULLUK	***FRONTIER DISCOVERER***
Length	81.0 meters (diameter)	156.7 meters
Capacities		
Bulk Mud and Cement	608 m^3	386m^3
Sack Storage	500 m^3	3,200 kilograms per square meter (kg/m^2)
Total Liquid Mud	416 m^3	368 m^3
Drilling Water	672 m^3	1272 m^3
Potable Water	295 m^3	266 m^3
Fuel Oil	1589 m^3	1346 m^3
Drilling Equipment		
Draw Works	Ideco E-3000	Ideco E-2100
Pumps	2 Ideco T-1600 Triplex	Two Continental Emsco FA1600
Rotary	Ideco LR-495	National C-495
Derrick	Dreco 50 m; 6227 kN hook load	Pyramid 170' x 40' x 40'
Blowout Prevention Equipment		
WP RAM-Type Presenters	Four 18 ¾ -inch 10,000 psi	Four 18 ¾ -inch 10,000 psi
Annular Presenters	Two 18 ¾ -inch 10,000 psi	Two 18 ¾ -inch 5,000 psi
Choke and Kill Lines	YES	YES
Hydraulic Control Systems with Accumulator Back-up Closing	YES	YES

Drilling Support Vessels

The two drilling vessels will be accompanied by support vessels for anchor handling, ice management, and general logistical support for the movement of supplies and personnel. Vessels for the 2007 season are identified in Appendix A. It is Shell's intent to update this information in the event that changes occur prior to each drilling season.

Oil Spill Response Support Vessels

In the event of an oil spill, it is Shell's intent that the primary response for the purposes of the C-Plan be conducted by the following vessels:

- OSRV;
- *Arctic Endeavor*;
- Six 34-foot oil spill response work boats;
- One 47-foot work boat equipped with over-the-side brush skimmer; and
- Oil spill response storage using the Arctic tanker *Marilee* or comparable (70,000 gross metric tons, with a de-rated storage capacity of 513,000 barrels). The oil spill response storage tanker will be positioned in an area approximately equidistant from either drilling vessel, and its position will be not more than 60 nautical miles from either drilling vessel while critical drilling activity is underway.

Fuel Systems

There are four fuel systems on both the *Kulluk* and the *Frontier Discoverer*. They include the main bunker and fuel transfer, camp and rig utilities, emergency generator, and helicopter fuel systems. Individual characteristics for the separate drill rigs are included where necessary, but the following provides information for both MODUs.

On the *Kulluk*, the main bunker and fuel transfer system consists of three large storage tanks and pumps that allow fuel to be received into primary storage and then delivered to secondary storage (Figure 1-14). This system has been fitted with a full recirculation system that will return fuel overflow from the camp and rig utilities fuel system back to the main storage.

The camp and rig utilities fuel system include 10 day tanks (2 to 90 bbl) and one settling tank (91 bbl) for secondary storage as well as pumps and centrifuges to deliver fuel to end-use locations.

The emergency generator fuel system is 9.6 bbl and is filled by the centrifuge from the camp utilities settling tank and overflow returns to that settling tank.

The helicopter fuel system on the *Kulluk* consists of two fuel tanks located below deck and a pump with filter used to transfer fuel to the helicopter on the port side of the heli-deck. Both the Jet Fuel #1 and the Jet Fuel #2 tanks have a capacity of 14 bbl. On the *Frontier Discoverer*, there are two fuel tanks for the helicopter; both with 17 bbl holding capacity.

The entire fuel system of the *Frontier Discoverer* consists of a 6,500 bbl holding capacity, including main bunker, fuel transfer, and helicopter fuel systems.

Bilge Systems

There are three bilge system on the *Kulluk* located in the fuel pump room, which is isolated from the rest of the fuel tanks by a hatch combing. Bilge sumps for the below deck fuel compartments make up the bilge system, which normally pumps directly into the oily water surge tank.

The pump room is fitted with a main bilge, emergency bilge, and oily bilge systems. The main system is an extension of the ballast stripping system. An eductor, powered by the sea water supply pumps, draws from a single suction in the pump room. The emergency system is made up of a horizontally-mounted submersible pump that discharges directly overboard.

The oily bilge system allows bilge water in the pump room to be processed to an oily water surge tank with 75 bbl capacity. After the bilge water is run through the oily water separator, the treated water (below 15 ppm oil in water) is discharged overboard and the oil and emulsion is contained in the tank.

The primary containment method of oil discharge is the installation of a drain surrounding the entire deck of each vessel. Drainage from the rig floor goes to an observation tank and then through an oily water separator. A maintenance record of the deck drainage is maintained by drilling personnel.

On the *Frontier Discoverer*, the bilge system consists of a network of piping, a valves strainer, and mud boxes which are connected to locations where water is likely to collect from environmental or natural leakage from equipment and other systems under normal operations. The bilge system is connected to two electrically driven bilge pumps located in the ship's service pump room.

The oily water separator on the *Frontier Discoverer* functions similarly to that of the *Kulluk*'s and is located in the propulsion room, to treat effluent propulsion room bilges.

3.1.2 Bulk Storage Containers

Neither the *Frontier Discoverer* nor the *Kulluk* MODU contain non-integral bulk storage oil tanks equal to or greater than 10,000 gallons.

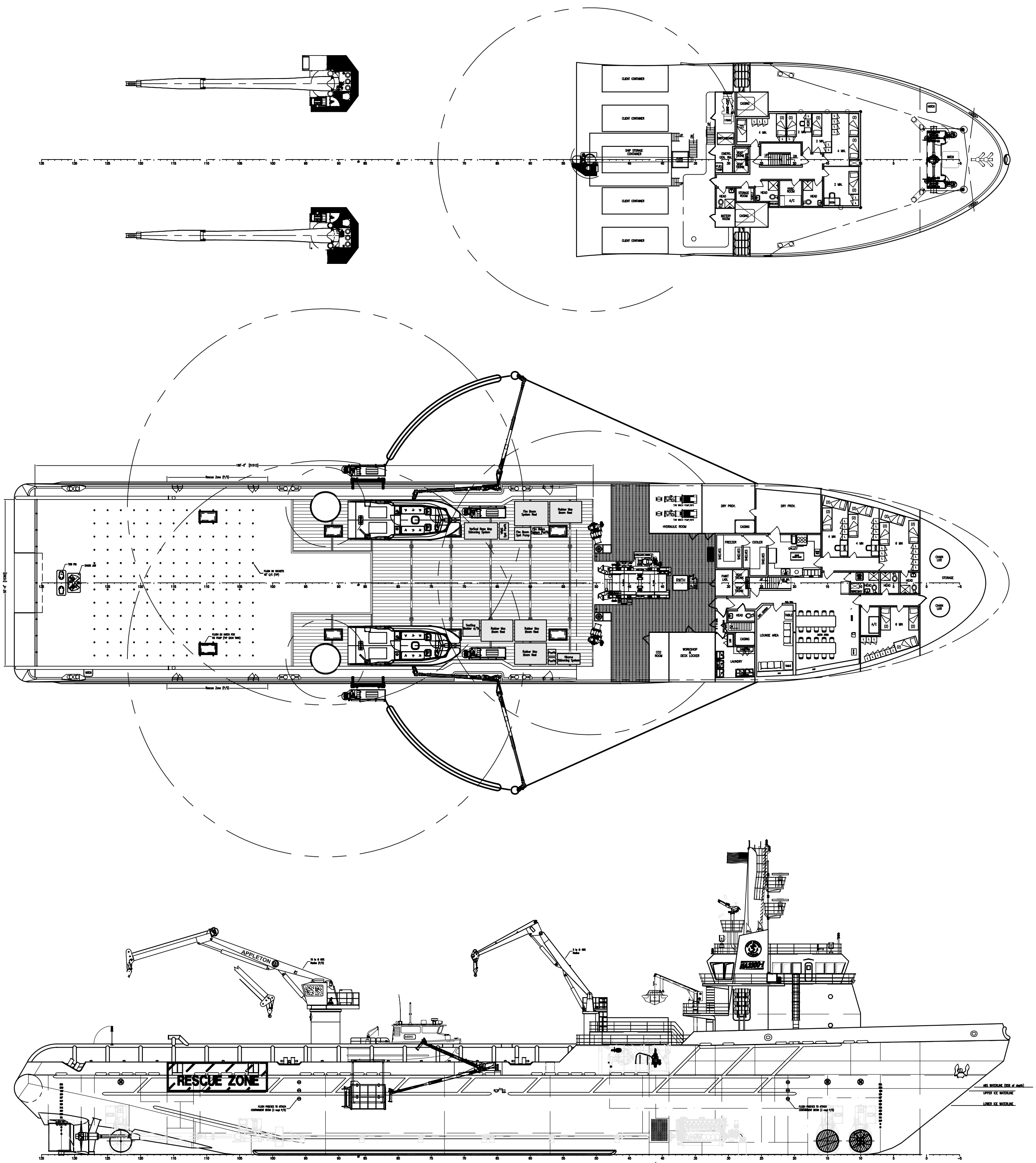
The largest oil storage facility in the exploration vessel fleet is the 513,000 bbl capacity Arctic tanker that will be located not more than 60 nautical miles away from a drill rig while critical drilling activity is underway, and will be used for emergency oil spill response.

3.1.3 Transfer Procedures

Fuel transfer procedures are discussed in detail in Section 2.1.5 and Appendix C.

3.1.3 Vessel Plans and Diagrams

See Figures 3-1 and 3-2 for diagrams of the vessels.

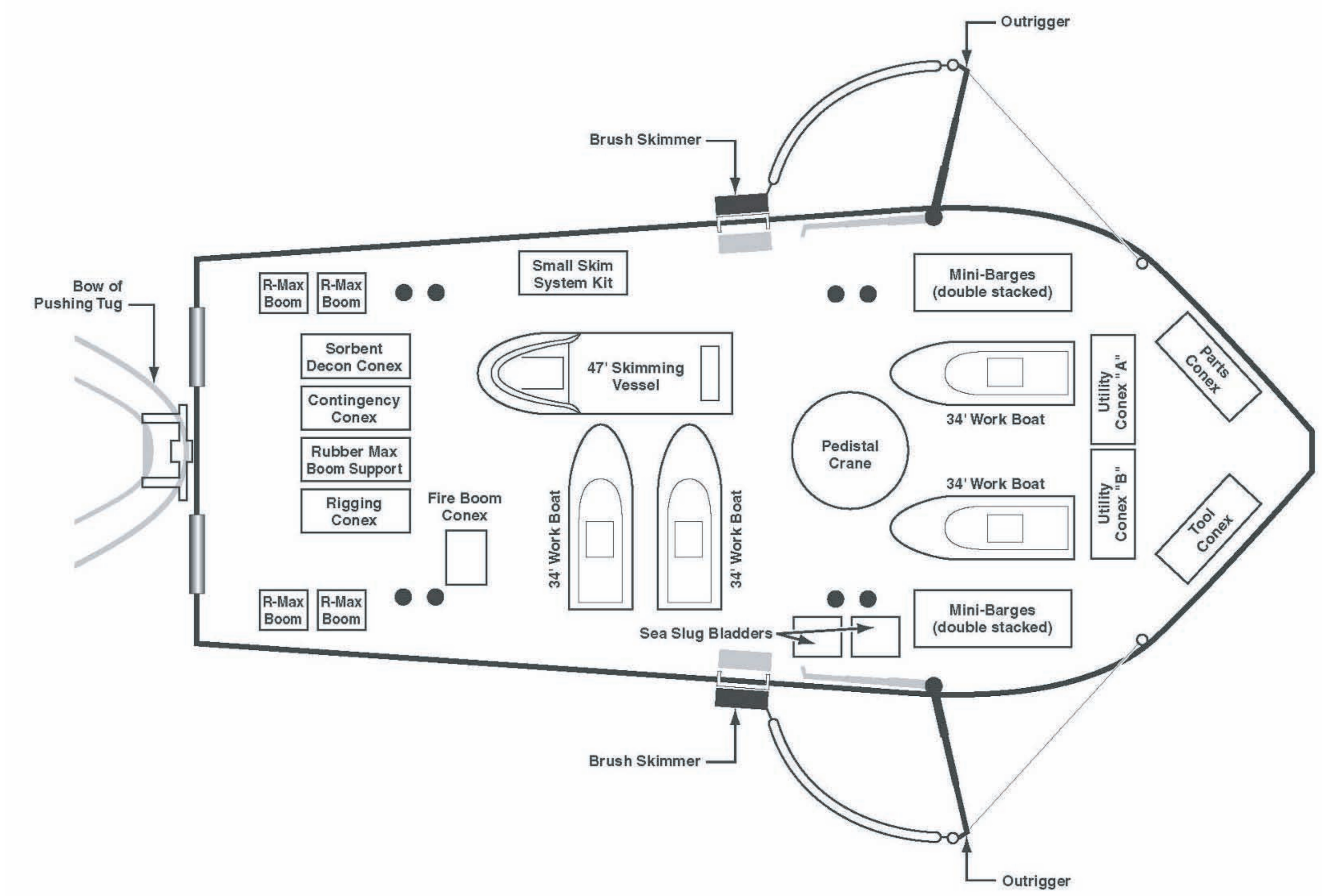


SHELL OFFSHORE, INC.

OSRV

December 2006

Figure 3-1



SHELL OFFSHORE, INC.

ARCTIC ENDEAVOR

December 2006	Figure 3-2

3.2 RECEIVING ENVIRONMENT [18 AAC 75.425(e)(3)(B)]

Offshore seasonal exploration well activity in the Beaufort Sea occurs in a few key environments. The *Kulluk* and *Frontier Discoverer* will travel to the Beaufort Sea in early spring with a fleet of support vessels and their accompanying OSRV/OSRBs. They may arrive at their exploration sites by late June or early July. The movement and positioning of the fleet is dependent on the breakup of the Arctic sea ice. Ice deterioration begins along the shoreline, initially concentrated in areas affected by local ice overflood at the mouths of major rivers. The flooded ice floats free of the bottom and melts first. An open water pathway opens along the shore while the still-thick pack ice offshore continues to melt into an irregular pattern of hummocks and open holes. It is through this window of open water that the vessels and barges move to the exploration area.

Peak exploration activities will commence in July and August and continue into freezeup in September and October. During the freezeup period, exploration will occur between the fast ice (contiguous with the shoreline) and the pack ice. When drilling in water depths of 25 m or more, the environment will be dominated by open water throughout the drilling season, with common areas of calved pack ice and rare invasions from the permanent pack. Pack ice beyond the transition zone is subject to unpredictable fracturing and movement and may interfere with drilling in the late season. Although the permanent pack ice usually remains well north of the proposed operational area in the summer months, storm events can rapidly drive multi-year floes south at rates exceeding 12 kilometers per day (km/day). The movement of both fast ice and pack ice will be the predominant control over the success of exploration activities.

The Beaufort Sea is primarily free of sea ice from mid-August to early October. The fleet of drill rigs and support vessels will exit the exploration sites through the open water pathway before winter ensues and the pack ice encroaches on the shoreline.

Wildlife expected in the Beaufort Sea offshore exploration area includes polar bears (protected species), bowhead whales, and marine birds.

3.3 COMMAND SYSTEM [18 AAC 75.425(e)(3)(C)]

The oil spill response command system is compatible with the Alaska Regional Response Team (ARRT) *Unified Plan*. The organizational structure is based on the National Incident Management System and the Alaska Incident Management System. It provides clear definition of roles and lines of command, together with the flexibility for expansion or contraction of the organization. In addition, Shell's Incident Management Handbook is followed for the process, organization and language for incident response management.

In the event that a spill reaches jurisdiction of the North Slope Borough, Shell will abide by the regulatory North Slope Subarea Contingency Plan to ensure compliance. This procedure would include emergency response notification of the necessary and afflicted parties, including federal, state and local agencies. When more than one regulatory agency has jurisdiction, the Unified Command System of this plan will be properly implemented (see Section 3.3.2).

All emergency response situations will use the Incident Command System (ICS). The ICS defines roles and lines of command, together with the flexibility for expansion of the organization as necessary. The first person discovering or responding to any emergency situation becomes the on-scene Incident Commander (person in charge) until that individual relinquishes authority to another person better able to assess the situation.

The Alaska Clean Seas (ACS) *Technical Manual*, Volume 3, Appendix B contains a description of ICS position responsibilities and checklists. Appendix D of Volume 3 contains many common ICS forms for documenting response decisions and activities. This is consistent with the *Shell Oil Company Incident Management Handbook* and IAP development process.

In most Tier I incidents, the on-site spill technicians possess the capabilities to effectively control the incident. The On-site Shell Company Representative will fulfill the role of Incident Commander. ASRC Energy Services (AES) and ACS personnel will be activated to stand by until an assessment is performed. Once the assessment is complete, AES and ACS personnel are either released or mobilized.

For Tier I incidents, rig personnel will report to a designated secure area until completion of an incident assessment by the on-site representative. Following that assessment, the rig personnel will be assigned cleanup duties based on their level of training. The on-site spill technician will assist in this effort.

Tier II/III responses are initiated by the Drilling Superintendent who initiates the appropriate Incident Management Teams (IMTs). Once the response level is ascertained, the appropriate IMT begins to provide support to the field responders (Operations Section) and to coordinate the collection and distribution of information. AES provides manpower and equipment resources from on site OSRV/OSRBs, and the North Slope. ACS provides additional manpower and equipment resources from Deadhorse to assist in spill containment and recovery. The drill operators coordinate with ACS to ensure that a reserve of trained manpower is available for an extended spill response.

For Tier II/III incidents, the Drill Foreman is the initial On-scene Incident Commander. The rig personnel will be directed to a secure area to await the arrival of emergency response personnel. Depending on the incident, rig personnel may be incorporated into the IMT, when applicable.

The Qualified Individual (QI) would be notified during callout of the IMT (Tier II or III response). During Tier II events, the mutual aid agreements cover resource issues associated with personnel and equipment. During Tier III events, the QI acts as the company representative for commitment of additional resources. The QI can be either the Incident Commander, or the Deputy Incident Commander.

Through the mutual aid agreements with ACS, response personnel are available to respond to a Tier II or Tier III incident at a drill site. Shell would arrange for equipment and manpower from contractors beyond the mutual aid agreement limits, if necessary, to complete a spill response. Contracts for additional trained response personnel are in place through ACS and AES (See ACS *Technical Manual* Tactics L-8 and L-9). For significant oil spills of Tier II and III magnitude, there may be federal, state, and local government On-scene Coordinators (FOSC, SOSC, LOSC), Shell, and the Responsible Party if it is not Shell. These individuals will become part of the Unified Command, representing their organization. Each contributes to the process of:

- Determining and establishing overall incident objectives and priorities,
- Selecting strategies,
- Planning for tactical activities,
- Conducting integrated tactical operations, and
- Using resources effectively and efficiently.

The Incident Commander will represent the Responsible Party in the unified structure unless the SOSC or FOSC determines the response is inadequate. At that time, either the SOSC or FOSC will assume the Incident Commander role.

3.3.1 Incident Management Team

The IMT determines strategic objectives and priorities to deal with an emergency incident. They approve spill response tactics and provide overall support to the Spill Response Technicians. Activation of an IMT is dependent on the severity of the incident; if the emergency is serious enough to trigger the direct involvement of several response organizations, an IMT will be activated. Upon activation, a Unified Command Structure may be established.

An organization chart showing the ICS structure is presented in Figure 3-3. Command Staff contact information is presented in Table 3-2, and an IMT checklist is presented in Table 3-3.

FIGURE 3-3
INCIDENT COMMAND SYSTEM

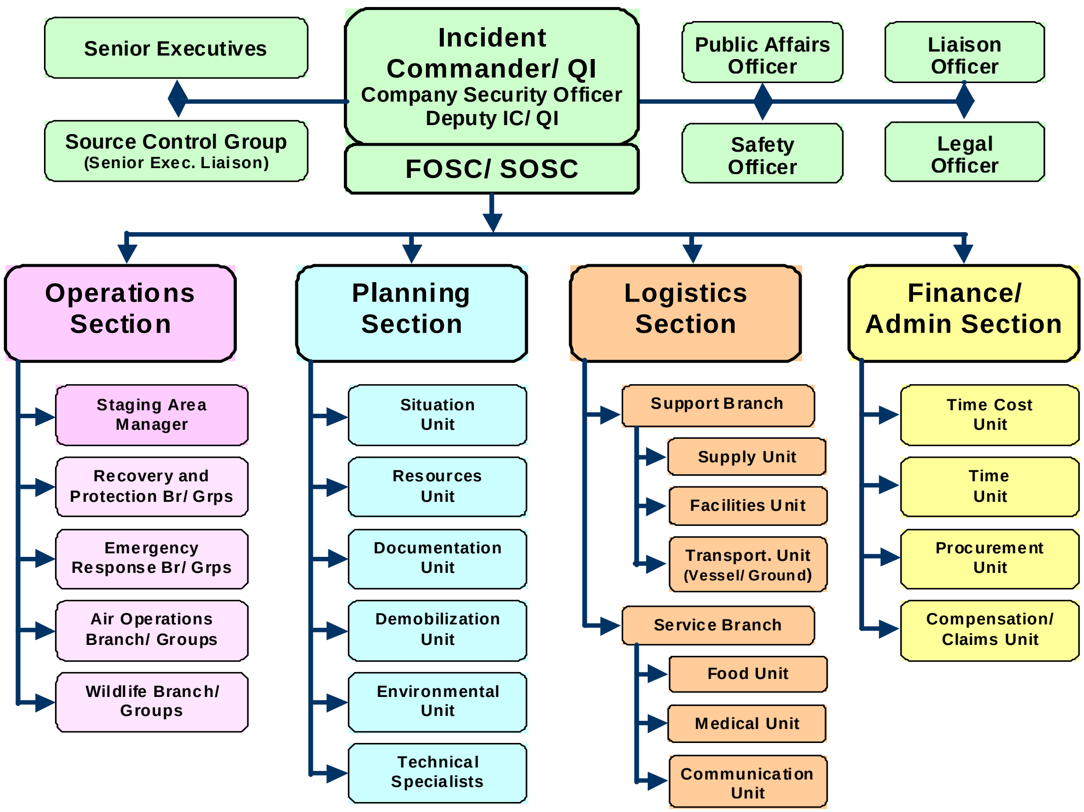


TABLE 3-2
COMMAND STAFF CONTACT INFORMATION

NAME	OFFICE #	PAGER #	CELL #
COMMAND STAFF			
Incident Commander/QI			
Rick Fox	907-646-7109		907-360-4813
Susan Childs	907-646-7112		907-301-5792
Deputy Incident Commander/QI			
Susan Moore	907-770-3700		
Jon Edmondson	907-646-7110		907-952-7769
Public Affairs/Information Officer			
Cam Toohey	907-646-7108		907-301-3966
Terzah Poe	907-646-7103		907-360-5718
Liaison Officer			
Susan Childs	907-646-7112		907-301-5792
George Ahmaogak	907-646-7106		907-367-3932
Safety Officer			
Brad Boschetto	907-770-3700		907-854-0073
Steve McCasland	504-728-4789		504-220-0943
Legal Officer			
Marc Stone	281-544-2596		713-269-8054
Company Security Officer (IC Support)			
Phil Smith	504-728-4252	888-265- 8113	504-606-4252
Tommy Hutto	504-728-4369	888-264-0024	504-884-1665
Senior Executive (IC Support)			
Frank Glaviano	504-72-6711		281-857-1888
Annell Bay	713-546-6400		832-640-7543
Source Control Exec Liaison (IC Support)			
Paul Goodfellow	281-544-2151		281-857-4014
Chandler Wilhelm	713 546 6157		713-444-3811
GENERAL STAFF			
Operations Section Chief			
AES Staff	907-339-6200		
O'Brien's Oil Pollution Services Staff	800-910-3778		
Staging Area Manager			
AES Staff	907-339-6200		
Operations Section Branch Directors			
AES Staff	907-339-6200		
Planning Section Chief			
Jon Edmondson	907-646-7110		907-952-7769
Brad Boschetto	907-770-3700 ext 121		907-382-5050
Kent Satterlee	504-728-4143		713-992-9634

TABLE 3-2 (CONTINUED)
COMMAND STAFF CONTACT INFORMATION

NAME	OFFICE #	PAGER #	CELL #
Planning Section Unit Leaders			
Technical Specialists			
Michael Macrander	281-544-6166		713-907-8136
Al Allen (Spiltec)	425-869-0988		
Ian Voparil	281-544-6906		281-222-8472
Dave Dickens (Contractor)	858-453-8688		
ACS Planning and Development Manager (IMT Coach/facilitator)	907-659-3220		
Logistics Section Chief			
Kate Marstall	907-646-7111		907-382-2755
John Le Bas	504-728-6414		281-857-1289
Support Branch Director			
Travis Allen	504-728-4595		
Alan Power	504-728-6135		504-259-2218
Service Branch Director			
Finance Section Chief			
Betty Cook	281-544-2333		832-244-0772
Ellen Karisch	713 546 6026		832 398 3085
Finance Unit Leaders			
Lei Wang	713 546 6155		

TABLE 3-3
IMT CHECKLIST

POSITION	RESPONSIBILITIES	COMMENTS

INCIDENT COMMANDER	❑ Fill in Spill Report Form
	❑ Assist field personnel (medevac)
	❑ Assemble Spill Response Team
	    ❑ Brief team
	    ❑ Assign duties (org. chart)
	    ❑ Remind team to keep logs
	❑ Establish objectives (chart)
	❑ Name Incident
	❑ Determine response strategies
	❑ Conduct air surveillance
	❑ Establish meeting times (chart)
	❑ Notify agencies (chart)	

QUALIFIED INDIVIDUAL (IC or DIC)	❑ Status of incident, facility, and personnel ❑ Evaluate level of response required and activate SMT support as required ❑ Conduct internal/ external notifications as required ❑ Authorize the use of response resources ❑ Participate in Incident Command briefings	
LIAISON OFFICER	❑ National Response Center ❑ Notify appropriate state agencies ❑ Notify federal agencies ❑ Request safety zones air/ water (USCG) ❑ Request Notice to Mariners (USCG) ❑ Submit In-Situ Burn request to USCG ❑ Obtain approval to decant (USCG) ❑ Prepare written reports to agencies	
HUMAN RESOURCES	❑ Notify family of injured (if company employee) ❑ Follow up on injured ❑ Coordinate volunteer activities ❑ Notify corporate executives	
PUBLIC AFFAIRS OFFICER	❑ Notify partners ❑ Notify company personnel ❑ Prepare for media interest ❑ Keep the public informed ❑ Coordinate media efforts through the Joint Information Center ❑ Coordinate efforts with USCG ❑ Identify community concerns ❑ Evaluate/ monitor hazards	
SAFETY OFFICER	❑ Notify offset operators ❑ Obtain MSDS/ Prepare Site Safety Plan ❑ Establish first aid posts ❑ Coordinate search and rescue operations	

TABLE 3-3 (CONTINUED)
IMT CHECKLIST

POSITION	RESPONSIBILITIES	COMMENTS
	❑ Coordinate post-incident debriefing ❑ Conduct air monitoring as may be needed	
SAFETY OFFICER (CONTINUED)	❑ Establish initial site safety plan ❑ Ensure HAZWOPER compliance ❑ Investigate safety related accidents and report to Incident Commander ❑ Conduct safety inspections ❑ Commence source control operations	
SOURCE CONTROL	❑ Verify amount spilled ❑ Calculate total potential ❑ Mobilize source control specialist ❑ Develop/Obtain approval for repair plan ❑ Direct surveillance operations	

OPERATIONS	❑ Mobilize AES (and ACS if needed) and other available equipment that is deemed necessary to response efforts by the Unified Command.
	    ❑ Equipment/ operators/ supervisors
	    ❑ Take air monitoring equipment
	    ❑ Obtain samples of spilled material
	    ❑ Prepare shoreline for impact (pre-clean)
	    ❑ Contact Airborne Support, Inc. (ASI)
	    ❑ Spray/Spotter aircraft and personnel
	    ❑ Vessel for USCG SMART Team
	    ❑ For assistance contact OOPS
	    See Appendix B for equipment (potential services not under contract).	

WILDLIFE BRANCH/GROUPS	❑ Send company representative to site/ staging ❑ Consider night time spill tracking - RTTI ❑ Consider pre-cleaning the shoreline prior to impact ❑ Assist in SCAT process to determine shoreline response ❑ Contact wildlife specialist/ refuge mgrs. for info. ❑ Consider scare cannons (ACS) ❑ Call Wildlife Rehab ❑ Prepare Air Operations Plan ❑ Develop waste disposal plans ❑ Set up decontamination stations	
LOGISTICS	❑ Locate utility/ crew boats, helos ❑ Identify/ set up staging areas ❑ Ensure temporary storage-recovered oil capacity ❑ Request mechanics/ parts trailers ❑ Prepare medical plan, source EMTs ❑ Prepare communications plan (ICS 205) ❑ Obtain security at Incident Command Post (ICP) / staging areas	

TABLE 3-3 (CONTINUED)
IMT CHECKLIST

POSITION	RESPONSIBILITIES	COMMENTS
LOGISTICS, CONTINUED	❑ Establish services ❑ Housing ❑ Catering ❑ Parts trailers/ mechanics ❑ Fueling facilities	
PLANNING	❑ Call Response Group ❑ Request trajectories ❑ Show dispersant timeline ❑ Shoreline impact? Request sensitive areas ❑ Update w/ weather forecasts/ surveillance ❑ Prepare dispersants/in situ burning request form ❑ Post/Update charts in Incident Command Post ❑ Commence NRDA operations (sampling) ❑ Determine Sensitive Areas as Identified in the ACP ❑ Call out technical specialists as needed ❑ Prepare ICS 201 and Incident Action Plan (IAP) ❑ Set up secured filing system ❑ Obtain USCG approval for decanting	
FINANCE	❑ Issue WBS Element ❑ Prepare for claims ❑ Review contracts with Logistics/ vendors	

3.3.2 Unified Command

Unified Command is a structure that is created at the time of an incident to bring together the Incident Commanders of each major organization involved in response operations. In Alaska, the members of Unified Command are usually the FOSC, the SOSC, and the responsible party On-scene Coordinators. For this exploration, a LOSC from a neighboring area may join the Unified Command.

The priorities of the Unified Command are to select tactics and strategies and determine the operations for using all available resources effectively and efficiently. Further objectives come from state and federal government participation. Using the Unified Command, governments will coordinate the responsibilities specific to them, such as taking over containment, control and cleanup operations, when necessary. These regulatory operations are managed simultaneously throughout the incident.

When an incident occurs, the Unified Command structure may be established and superimposed at the top of the IMT. In this position, the On-scene Commanders are ideally situated to carry out the responsibilities cited above. They provide overall direction by establishing strategic objectives and response priorities addressed by the IMT through the planning process. Moreover, they review and approve the products of the planning process (e.g., Incident Action Plans) developed by the IMT to address the objectives and priorities.

The Unified Command position at the top of the IMT also facilitates the appropriate integration of response resources. For the agency representatives, it allows them to determine the appropriate role(s) for agency personnel and to position them optimally within the IMT structure. For the Responsible Party, it ensures members of the IMT have access to valuable expertise without diluting their ability to manage response operations.

3.4 REALISTIC MAXIMUM RESPONSE OPERATING LIMITATIONS [18 AAC 75.425(e)(3)(D)] [30 CFR 254.26(D)]

The realistic maximum response operating limitations are described in the ACS *Technical Manual,* Tactic L-7. The most probable factors that could result in the curtailment of critical operations and can sometimes limit response activities are heavy weather, sea ice, and structural icing. Some limitations are based on safety and equipment effectiveness. Tactic L-7 analyzes the frequency and duration, expressed as a percentage of time, of limitations that would render mechanical response methods ineffective, as required by 18 AAC 75.425(e)(3)(D) and 30 CFR 254.26(d). The analysis considers weather, sea conditions, ice, daylight hours, and other environmental conditions that might influence the efficiency of the oil spill response.

Several additional specific response measures may be taken to reduce the environmental consequences of a spill when environmental conditions exceed operating limits. In high wind-chill situations, more staff may be added to allow longer break times. In sea states that preclude oil containment and recovery, vessels, are still able to transit. When night hours otherwise restrict visibility, light plants can be used.

Importantly, the limitations for response operations are directly related to those of drilling operations. Shell will follow a curtailment plan for drilling operations. These adverse weather drilling restrictions will lessen the likelihood of a spill. Included in the Critical Operations Curtailment Plan are strict procedures for continuous weather surveillance and heavy weather policies designed to aid operations personnel in determining the correct procedures to follow when storm conditions are expected. Should it become necessary to cease critical operations, methods will be followed for securing the well and rig, ceasing drilling operations and hanging off the drill pipe. Terminating drilling operations will greatly reduce the need for response and is considered an important procedure for preventative discharge. Critical operations will not recommence until the Drill Foreman deems it safe. As part of that decision, the Drill Foreman will assess the risks associated with drilling, including:

- Evaluating the forecast for weather conditions.
- Fuel and water sustainability.
- Safety of operations: type of operation needed, hazards, and the risks involved.
- Availability of emergency equipment.

In addition, should response efforts become necessary, efforts could be accelerated with the use of in-situ burning in conjunction with manual recovery. See Section 1.7.3 for a list of the procedures for implementing this response tactic.

3.4.1 Adverse Weather Conditions

MMS regulations (30 CFR 254.23 and 30 CFR 254.26(d)) for a Facility Response Plan require consideration of how spill response will be managed during adverse weather conditions. The single most limiting factor of mechanical containment and response effectiveness at a drill site is extreme weather conditions. Activities at the drill site may be curtailed due to safety considerations. Temperatures below -35 º F may cause failures in hydraulic equipment. Winds above 15 knots with 30-knot gusts are strong enough to make hoists and lifts unsafe, and whiteouts restrict visibility to a few feet, 10 feet to 20 feet above ground. Drill site activity may also be curtailed if crucial materials or supplies cannot be delivered.

The oil spill response recovery equipment used in this exploration program can:

- Be deployed in seas in the 5- to 6-foot range,
- Continue to operate 8- to 10-foot seas, and
- Operate in 20-knot winds after deployment

If conditions should arise that effectively prohibit the recovery or containment of an oil spill as per the USCG Marine Safety Manual and 30 CFR 254.23, the Drill Foreman will lead a risk assessment with the participation of the Toolpusher, location personnel and Shell Management. The Drill Foreman is responsible for making the final decision as to the level of risk in accordance with Shell's Critical Operations Curtailment Plan.

Weather and ice conditions during the shoulder season are described in the Response Strategy in Section 1.6.13 and in Sections 2.4.2 and 2.4.3. Also see ACS *Technical Manual*, Tactic L-7.

3.4.2 Sea States, Tides and Currents

In general, winds in the area are considered gentle to moderate and generally from the east. Circulation conditions include nearshore currents, shelf currents, and subsurface currents. Nearshore circulation is heavily influence by the complexities along the Beaufort coastline. Continental shelf currents in the Beaufort Sea are wind driven. As a result, currents generally flow to the west.

Tides in the Beaufort Sea are mixed semidiurnal with a very small range, about 6 to 12 inches. The coastline in proximity to the exploration area is generally a low wave-energy environment. Waves are primarily from the east and northeast and are predominantly generated during the open water season.

In the event that a storm surge occurs, critical drilling operations would be curtailed and continuous monitoring of the weather forecast will ensue. For specific limitations on response equipment due to sea states, see ACS *Technical Manual*, Tactic L-7.

3.4.3 Snow, Ice, and Debris

One of the most important factors in the success of drilling activities is the movement and amount of sea ice in the Beaufort Sea. Sea ice poses a challenge for spill response operations. Shell will maximize spill prevention by following a curtailment plan for drilling operations which includes strict procedures for ice monitoring. These procedures include identifying the alert status and conditions of ice movement and they also identify the site-specific procedures for the support vessels. See Table 3-4, Ice Alert Procedures for Summer Conditions in the Beaufort Sea and Table 3-5, Ice Alert Procedures for Freezeup Conditions in the Beaufort Sea.

See ACS *Technical Manual*, Tactic L-7. Also see Tables 1-7 and 1-11, and Section 1.6.13 of this plan for further discussion on response equipment operating in varying ice conditions.

TABLE 3-4
ICE ALERT PROCEDURES FOR SUMMER CONDITIONS IN THE BEAUFORT SEA

ALERT	CONDITIONS	DRILLING	MARINE (DRILLSHIPS)	MARINE (SUPPLY VESSELS)
NO ICE ALERT	Ice Outside Limits Of Alert One	Continue Normal Operations And Update Every 12 Hours	Maintain A Good Ice Watch.	When Not Alongside The Drill ship, Maintain Station Updrift / Upwind At A Distance Dictated By The Drill ship Master. Support Vessel To Steam Over An Arc Of 45 Degrees Or As Directed By The Drill ship Master.
ONE	Hazardous Ice Within “T” + 24 Hours.	Continue Normal Operations And Update “T” Every 12 Hours.	Begin Continuous Monitoring If Ice And Update Alert Status Present And Fore- Casted Every 12 Hours. Update Support Vessel Master Every Hour Or More Frequently If Situation Dictates.	When Not Alongside The Drill ship Maintain Station Updrift / Upwind At A Distance Dictated By The. Drill ship Master. Support Vessels To Steam Over An Arc Of 45 Degrees Or As Indicated By The Drillsh1p Master.
TWO	Hazardous Ice Within “T” +12 Hours	Continue Normal Operations Send Update “T” Every 3 Hours.	Continue Plotting And In- Form Support Vessel Master Of Ice Prediction I Every 30 Minutes. Or More Frequently If Ice Dictates. Update Alert Status Every 3 Hours. Interrogate Ear.	Reconnoitrer And Test Ice As Directed. Inform The Drill ship Of Ice Conditions Every 30 Minutes. Or More Frequently If Ice Dictates.
THREE	Hazardous Ice Within “T” + 4 Hours.	Stop Normal Operations And Secure The Well In Preparation- To Disconnect.	Continuous Plotting. Communicate With Supply Vessel Master Every 30 Minutes. Or More Frequently If Ice Dig-I Tates. Clarify With Support Vessels And Anticipated Plans For Retrieving The First 4 Anchors. Two Ice Observers To Be Onboard. Update Alert Status Every 3 Hours.	Break And Clear Ice As Directed. Inform Drill ship Master Of Vessel Performance And Ice Movement Every 30 Minutes. Or More Frequently If Ice Dictates.
FOUR	Hazardous Within 4 Hours.	Disconnect LMRP And Pull To Moonpool. Leave Guide Wires Attached.	When LMRP Disconnected, Retrieve First 4 Anchors. Update Support Vessels Every 20 Minutes Or More Frequently If Ice Dictates, Position Seamen In Fwd & Aft. Winch Houses.	Break And Clear Ice As Directed. Update The Drill ship Every 20 Minutes. Regarding Vessel Performance And Ice Conditions. Retrieve Anchors As Required.

TABLE 3-5
ICE ALERT PROCEDURES FOR FREEZEUP CONDITIONS IN THE BEAUFORT SEA

ALERT	CONDITIONS	DRILLING	MARINE (DRILLSHIPS)	MARINE (SUPPLY VESSELS)
ONE	Up To 8 Cm (3") Thick New Ice. Hazard Could Develop Within "T" + 12 Hours.	Continue Normal Drilling Operations. Update "T" Every 3 Hours.	Continue Ice Monitoring On 24-Hour Watches. Update Present And Fore-Casted Status Every 3 Hours.	Reconnoiter Break And Test Potential Ice Hazards As Directed.
TWO	Over 8 Cm (3") Thick New Ice. No Significant Ridging Or Rubble. Support Vessels Can Break The Ice Faster Than It Approaches; Hazard Could Develop In "T" + 6 Hours.	Continue Operations. Be Prepared To Secure Well. Update "T" Every Hour.	Interrogate Rar Units. Continuous 24 Hour Plotting Of Ice. Communicate With Support Vessels Minimum Every 30 Minutes. Begin Continuous Monitoring Of Anchorline Tensions.	Reconnoiter Break And Clear Ice As Directed. Be Prepared For Possible Anchor Work. Exchange Information Every 30 Minutes. Or More Frequently If Ice Dictates.
THREE	Over 8 Cm (3") Thick New Ice. Significant Ridges And Rubble Fields. Support Vessels Can Only Keep Up. Adverse Changes Expected. Hazard Could Develop Within "T" + 4 Hours.	Stop Operations And Secure Well. Disconnect The LMRP Leaving Guide Wires Attached.	When LMRP Is Disconnected, Retrieve First Four Anchors.	Retrieve Anchors And Break Ice As Directed.
FOUR	Support Vessels Can No Longer Prevent Buildup Of Ice And Resulting Pressure On The Drilling Vessel	Marine Riser Is Clear. Shear. Guide Wires; Be Prepared For Relocating Over The Wellhead.	Retrieve Remaining Anchors And Vacate Site.	Retrieve Anchors. Break And Clear Ice As Directed.
FIVE	Hazardous Ice Imminent.	Disconnect Guide Wires. Riser Has Been Disconnected And Is Clear Of Seabed. Stand By To Relocate Over Wellhead. Assist Marine Crew If Required.	Retrieve Remaining Anchors And Vacate Site.	As Directed By The Master Of Drill ship.

3.4.4 Hours of Daylight and Visibility

In the event of adverse weather, poor visibility due to low hanging clouds may restrict offshore operations and response. However, hours of daylight are at their greatest extent and should not hinder operations. Strict adherence to the critical operations curtailment plan and continuous risk assessment allows for the safety of both equipment and personnel.

See ACS *Technical Manual*, Tactic L-7. Also see Section 2.4.5 for further discussion.

3.5 LOGISTICAL SUPPORT [18 AAC 75.425(e)(3)(E)]

The Logistics Section Chief is responsible for providing facilities, transportation, communications, services, and material in support of the incident. The Logistics Services Branch may include communications, information technology, medical, and food units. The Support Branch may include transportation, personnel, equipment, facilities, and supplies.

Logistical support for spill response is provided through response contractors. Table 3-6 contains a list of vendors in Alaska that may be called upon to support Shell's spill response operations.

Depending on the severity of a situation, federal and state logistics may also support the response. Examples of these functions include ordering, tracking and servicing government resources, arranging for transportation and lodging for government response staff, providing communications to government oversight staff, and performing other logistical functions specifically in support of the government oversight role. These governmental functions may become an integral part of the overall Logistics Section should Shell establish a mutual aid agreement with government agencies.

The equipment described in the logistics tactics of the ACS *Technical Manual* and the response equipment is discussed in Section 1.6. ACS *Technical Manual* Tactic L-9 provides technical information on aircraft.

Please refer to Appendix A for additional technical information regarding the helicopters to be used for offshore services**.**

TABLE 3-6
LOGISTICAL SUPPORT CONTRACTORS

COMPANY	SERVICES	CONTACT
TRANSPORTATION		
Era Helicopters 6160 Carl Brady Drive Anchorage, Alaska 99502	Rotary-wing Passenger Transport, Medevac, Small Cargo, Aerial Ignition	907-248-4422
Air Logistics Alaska, LLC 1915 Donald Avenue Fairbanks, Alaska	Rotary-wing Passenger Transport, Medevac, Small Cargo, Aerial Ignition	907-452-1197
Peninsula Airways, Inc. 6100 Boeing Avenue Anchorage, AK 99502	Fixed-wing Passenger Transport, Cargo Transport, Medevac	907-243-2485
Era Aviation, Inc. 6160 Carl Brady Drive Anchorage, AK 99502	Fixed-wing Passenger Transport, Cargo Transport, Medevac	800-478-1947 907-248-4422
Frontier Flying Service 5245 Airport Industrial Road Fairbanks, AK. 99709	Fixed-wing Passenger Transport, Cargo Transport, Medevac	907-450-7250
Carlile Transportation Systems 1800 East 1st Avenue Anchorage AK 99501	Ground Transportation	907-276-7797 1-800-478-1853
Lynden Transport 3027 Rampart Drive Anchorage, AK 99501	Ground Transportation	907-276-4800 1-800-326-5702
COMMUNICATIONS		
Alaska Telecom 6623 Brayton Drive Anchorage, AK 999507	Remote Site Systems, Microwave/Satellite Radio Systems, VHF/UHF hand held radios, Satellite and cellular telephones	(907) 344-1223
GCI 2550 Denali Street Anchorage, AK 99503	Cellular Services, Local and Long Distance phone service, WAN connectivity within AK and lower 48 states. Internet service (dial, DSL, T1)	(907) 868-7000
ASTAC 4300 B Street Anchorage, AK 99503	Local & Distance phone service, Internet service (DSL,Dial, wireless) Cellular Service	(907) 544-2663
AT&T Alascom 505 E. Bluff Drive Anchorage, AK 99501	Long Distance phone service, Internet service, and WAN connectivity within AK and lower 48.	(800) 478-9000
FACILITIES		
Marsh Creek LLC 2800 E. 88th Avenue, Suite 200 Anchorage, AK 99507	Housekeeping and Catering	907-258-0050

3.6 RESPONSE EQUIPMENT [18 AAC 75.425(e)(3)(F)]

This section is intended to provide additional information and lists of equipment to be used to conduct mechanical recovery of oil spill fluids and other response activities as discussed in Section 1.6.

A list of the mechanical response equipment is also provided in the AES *Response Tactics Manual* and in the ACS *Technical Manual*.

3.6.1 Equipment Lists

Spill response equipment is available through AES for offshore operations and ACS for nearshore and shoreline activities. A list of typical on-site response equipment pre-staged at a drill site is provided in Table 3-7.

As necessary, on-site equipment will be contained in heated storage units to ensure its operability during cooler temperatures which may be expected while drilling is underway. There are a number of conexes included in the vessel fleet. Conexes will include contingency materials, tools, Personal Protective Equipment (PPE), and spare parts.

TABLE 3-7
TYPICAL ON-SITE SPILL RESPONSE EQUIPMENT
DRILLING CONNEX AND OTHER CRITICAL SUPPLIES

DESCRIPTION	QUANTITY	UNIT
GENERAL SAFETY		
Small first aid kit	1	Each
PPE		
Rubber boots	3	Pair
Rain gear (top and bottom)	6	Set
Goggles, splash	6	Pair
Rubber gloves	6	Pair
Cotton gloves	6	Pair
Tyvek® suits, XXX-large	1	Box
SORBENT		
Sorbent roll (36-in. x 150-ft.)	3 LOTS	Each
Sorbent boom (8-in. x 40-ft.)	3 LOTS	Each
18-in. x 18-in. sorbent pads/bale	3 LOTS	Bale
18-in. x 18-in. glycol sorbent pads/bale	3 LOTS	Bale
RECOVERY		
Large Brush Skimmers	1	Each
Vertical Rope Mop	2	Each
Mini Brush Skimmers	2	Each
Rubber-Max Boom – 200m Boom Sections	8	Each
Rubber-Max Boom – Boom reels	8	Each
Rubber-Max Boom – Power Packs	4	Each
Rubber-Max Boom – Tow Gear Kits	9	Each
Fire Boom System – Insitu Burning	2	Each
Fire Boom System – Heli-torch (55 gal)	1	Each
Fire Boom System – Surfire Gelling Agent	1 Lot	Lot
MISCELLANEOUS (for the mini-barge system)		
Offloading pumps – Mini-barge Offloading Pump	1	Each
Offloading pumps – Annular Injection System	1	Each
Fendering and Lines	8	Each
Off-loading Hoses	4	Each
Transfer Hoses (8” x 50’ rigid-flanged)	4	Each

3.6.2 Maintenance and Inspection of Response Equipment

Response equipment will be stored and maintained in such a manner that it can be deployed rapidly and in a condition for immediate use. The on-site response equipment will be routinely inspected and tested.

AES conducts inspections and maintenance on all offshore oil spill response equipment. These inspections and maintenance procedures are contained in the AES *Response Tactics Manual*.

ACS performs routine inspection and maintenance of all ACS response and pre-staged land based equipment. ACS holds the following USCG Oil OSRO classifications:

- River/canal environments: Classes MM, W1, W2, and W3;
- Inland environments: Classes MM, W1, W2, and W3; and
- Nearshore environments: Classes MM, W1, and W2.

ACS has fulfilled the equipment maintenance and testing criteria that these classifications require.

3.7 NONMECHANICAL RESPONSE INFORMATION [18 AAC 75.425(e)(3)(G)]

Non-mechanical response information is detailed in Section 1.7.

3.8 RESPONSE CONTRACTOR INFORMATION [18 AAC 75.425(e)(3)(H)]

Shell will activate AES and ACS to provide the initial manpower and resources required to respond to a large or lengthy spill response. If additional resources are required, they will be accessed through master services agreements maintained by AES, ACS, and through other contracts, as needed, established by Shell during the spill.

AES will lead spill response operations as the primary response contractor for all offshore activities.

ACS will be activated and respond for all nearshore and shoreline spill response activities.

Contact information for AES and ACS can be found in Table 1-4.

3.8.1 Statement of Contractual Terms

Shell has developed Statement of Contractual Terms with primary response action contractors for the proposed exploration activity. Supporting documentation of the Statements of Contractual Terms is provided in Appendix B.

3.9 TRAINING PROGRAM [18 AAC 75.425(e)(3)(I)]

Shell, AES, and ACS provide training for Health, Safety, and Environmental programs for all employees.

ACS offers an ADEC-approved spill prevention and response training program available for Shell, AES and ACS oil spill response personnel. This training includes regulatory required training as well as training specific to aspects of spill response. As new training needs are identified, ACS will develop and incorporate these needs into the training program. At a minimum, all North Slope spill response personnel will receive the following required training: Initial Emergency Response (24-Hour Hazmat Technician), and Hydrogen Sulfide Training. ACS holds contracts with other response action contractors and oil spill response organizations (OSROs) that will be able to provide additional trained and qualified spill responders. Some examples of general training courses offered by ACS (ACS *Technical Manual* Tactic A-4) include:

- Arctic Cold Weather Survival
- Open Ocean Water Survival
- Summer Spill Operation
- ICS (all sections)
- Wildlife Hazing
- Helicopter Slinging Operations
- Shoreline Response Training Workshop
- Swift water First Responder

A complete list of available training courses can be found on the ACS website at www.alaskacleanseas.org.

3.9.1 NSSRT Spill Response Training

The North Slope Spill Response Team (NSSRT) consists of workers who volunteer as emergency spill responders and skilled technicians. Each team member is required to have initial emergency response training and annual refresher training, which meets or exceeds the requirements in the HAZWOPER regulations, 29 CFR 1910.120(q). All “qualified responders” must have a minimum of 24-Hour HAZWOPER training and annual requirements for HAZWOPER refreshers, medical clearance (physicals), and a valid respiratory fit test, in addition to required training within each individual labor category. The ACS Training Department tracks these requirements and distributes a monthly “Readiness Report” generated from the ACS database for responder status. The ACS Area Supervisor can generate a report at any time (see Section 3.9.4, Record Keeping).

General Laborer and Equipment Operators

The NSSRT training program is available to responders from all production units on the North Slope. Responders to an exploration spill are classified into the labor categories of General Technician, Skilled Technician, Team Leader, Nearshore Boat Operator, and Offshore Boat Operator, each with minimum training requirements as noted in the ACS *Technical Manual* Tactic A-4. The NSSRT maintains a minimum staffing level designed to ensure response capability and to maintain compliance with all North Slope C-Plan response scenarios.

Active Member Requirements

All NSSRT members must complete the following minimum annual training activities in order to be considered an active member of the NSSRT:

- 8-Hour HAZWOPER refresher certification
- C-Plan review, and
- Completion of five equipment proficiency checks.

The NSSRT training program offers weekly classes at each field. These classes emphasize hands-on experience, field exercises, and team building drills. Table 3-8 lists typical NSSRT training courses. Due to operational time constraints, many of the courses are divided by subject area and are taught in the 2- or 3-hour timeframe of an NSSRT meeting. The training and attendance is documented and available for review. The yearly training schedule is also available at the facility and at ACS. Current NSSRT training schedules are posted on the ACS web site.

TABLE 3-8
TYPICAL NORTH SLOPE SPILL RESPONSE TEAM
TRAINING PROGRAM COURSES

CATEGORY	COURSE TITLE
Communication	Incident Command System Basic Radio Procedures
Decontamination	Decontamination Procedures
Environmental	Environmental Awareness
	Wildlife Hazing
Equipment	Boom Construction and Design
	Fastanks and Bladders
	Skimmer Types and Application
	Snow Machines and All-Terrain Vehicle Operations
	90+ Spill Response Equipment Proficiency Checks
Management	Incident Command System
	Management and Leadership During An Oil Spill
	Quarterly Drill and Exercises
	Staging Area Management
Miscellaneous	Global Positioning System
	Tundra Cleanup Techniques
	Spill Volume Estimation
Response Tactics	In Situ Burning
	Oil Under Ice Detection
	Winter Oil Spill Operations
	Winter Response Tactics
Safety/Survival	Arctic Cold Weather Survival
	Arctic Safety
	HAZWOPER
	Spill Site Safety
	Weather Port and Survival Equipment
	Ice Safety Awareness
	Air Monitoring

3.9.2 Incident Management Team Member Training

Shell will provide Incident Management Team (IMT) training for required personnel. This training will follow the National Incident Management System (NIMS) required training guidelines. NIMS training that will be conducted for Shell and AES personnel includes on-line courses and classroom training. In addition, Shell will sponsor IMT workshops that focus on the planning cycle for oil spill response. Shell and AES will conduct equipment training in the field (e.g., boom deployment, skimmer and lightering equipment operation) and on-the-job training to ensure response personnel are trained and kept current in the specifics of plan implementation, equipment deployment, and mobilization of personnel and resources. Examples of ICS training courses include:

- ICS/100, ICS/200, and ICS/700 (on-line training),
- ICS/300 as a 2-day training event, and
- ICS/400 that will cover Command Staff and Section Chiefs' training.

Shell's training management system includes an in-house training database that is maintained for all personnel. Shell will also ensure and maintain documentation of training for AES personnel.

ACS provides IMT training for ACS IMT personnel. A description of this IMT training program is provided in Volume 3, Section 6.0, of the ACS Technical Manual.

3.9.3 Other Training

There may be specific departmental training requirements for Shell's exploration activities. Shell's Health, Safety, and Environment (HSE) Training Department maintains and conducts frequent training for health, environment, and safety awareness.

3.9.4 Record Keeping

Training records for Shell IMT training are kept at the Command Post. These records will be maintained for a minimum of five years. The Command Post is located in Shell's Deadhorse, Alaska warehouse and office facility, located along the airport runway at the Deadhorse Airport. Depending on the severity of the spill, additional support may be provided at secondary command posts located in Anchorage and at Shell Headquarters.

ACS and AES maintain a database as a record of the courses taken by each employee and contractor. The course description, date completed and the employee or contractor current status are available from the database. The ACS instructors' training records and qualifications are also maintained in the database. Records are kept for a minimum of 5 years or for the duration of time that the employee or contractor is assigned responsibilities in this Plan.

3.9.5 Spill Response Exercises

Shell intends to conduct internal oil spill response exercises to test the C-Plan and its interaction of the various Shell oil spill response vessels, equipment, and personnel. These exercises will be conducted to test the coordination between Shell, AES, and ACS, including the mobilization of ACS equipment or personnel on a call-out basis. See ACS *Technical Manual* Volume 2.

The current plan for internal Shell response exercises includes:

- Pre-mobilization training exercises using the oil spill response equipment and selected vessels prior to the mobilization of personnel and equipment to the Beaufort Sea.
- Pre-startup exercises prior to the commencement of critical drilling activity, to be conducted in the vicinity of the first drilling location.

- Regularly scheduled exercises to maintain response capability while drilling is underway.

Additional drills, both scheduled and un-scheduled, may be conducted at the request of MMS or other authorities.

As a member of Mutual Aid through ACS, Shell may be called upon to participate in a Mutual Aid Drill (MAD) to be conducted once a year as per National Preparedness for Response Exercise (NPREP) guidelines. The MAD exercise satisfies the NPREP requirements to exercise all aspects of the response plan at least every three years.

3.10 PROTECTION OF ENVIRONMENTALLY SENSITIVE AREAS AND AREAS OF PUBLIC CONCERN [18 AAC 75.425(e)(3)(J)]

For the protection of environmentally sensitive areas, the IMT will plan for mitigation of impacts of a spill, or to monitor over-season migration of oil in the ice.

Section 1.6 details these response strategies and how they pertain to the protection of environmentally sensitive areas.

A number of sites of archeological or cultural significance exist on the nearby shorelines. Because the proposed exploration activities will be offshore, these sites should not be impacted. If, at some point, onshore activities are required to support response actions, the Alaska Office of History and Archeology will be consulted in order to avoid archeological disturbances to these sites.

3.10.1 Sensitive Wildlife Areas

The environmental sensitivities for this exploration are summarized in both the ACS Technical Manual Volume 2, and in the North Slope coastal environmental sensitivities maps (Sheets 1-12) published by NOAA. Primary areas of sensitivity are the migration routes of polar bears, bowhead whales, and sea birds. In the event of a major spill, sensitive areas along the coastline will also be affected.

Forty-three marine species of fish, 18 species of terrestrial mammals, and at least 10 species of marine mammals have been identified in the Beaufort Sea and along the coastline. There are several million birds of approximately 150 species on and near the North Slope, although they tend to concentrate in the Arctic Coastal Plain and in nearshore waters of less than 20 meters depth. Section 1.6.12 provides detail on the identification and protection of sensitive sites during response efforts.

3.11 ADDITIONAL INFORMATION [18 AAC 75.425(e)(3)(K)]

Please refer to the following Appendices for additional information:

APPENDIX A: *General Specifications for Marine and Aerial Support Vessels*

APPENDIX B: *Contractual Terms with Primary Responders*

APPENDIX C: *Fuel Transfers Procedures*

APPENDIX D: *Oil and Debris Disposal Procedures*

APPENDIX E: *Wildlife Capture, Treatment and Release Programs*

APPENDIX F: *Production Specification for Low Sulfur Diesel Fuel Oil*

In addition, Shell acknowledges that MMS will review proposed Shell exploration well locations as part of the application package for individual well(s) and will determine whether the Shell C-Plan is applicable for each well. Additional information regarding reservoir modeling, well plans, and derivation of worst case discharge volumes are available from Shell upon request.

3.12 BIBLIOGRAPHY [18 AAC 75.425(e)(3)(L)]

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PART 4 BEST AVAILABLE TECHNOLOGY [18 AAC 75.425(e)(4)]

This section discusses the best available technology (BAT) requirements contained in 18 AAC 75.425(e)(4)(A), (B), and (C) to address technologies not subject to response planning standards or performance standards in 18 AAC 75.445(k)(1) and (2). The discussion of each technology covers the requirement to analyze applicable technologies and to provide a justification that the technology is BAT.

Additional information about BAT is also provided in the Alaska Clean Seas (ACS) *Technical Manual*, Volume I.

In addition, Shell has reviewed the ADEC Best Available Technology 2004 Conference Report issued in June 2006 and has adopted the following recommended technologies for the purposes of this C-Plan:

- Annular water injection - Annular water injection is considered a proven breakthrough technology. It can be used during a spill response to expedite the transfer of discharged oil from a temporary storage tank to a more permanent storage facility. The technology involves reducing the discharge line pressure of a discharge hose by injecting a sleeve of water through the hose as the oil is pumped. The reduced pressure results in faster transfer rates and therefore, faster recovery time.
- GT-A Pumps – GT-A Pumps are considered BAT and are used for lightering of viscous oil. During a spill response, the pumps significantly aid in the recovery efforts by accelerating the transfer rate for the discharge.

Shell has also selected response equipment for the containment and recovery of oil and the potential burning of oil that is considered to be the best available for conditions commonly found in the Beaufort Sea. Brief descriptions of these systems follow:

- LAMOR-LORI brush skimmers, each consisting of 5 parallel, stiff-brush chains, have proven Name Plate capacities of 41 m^3/hour. Each of Shell’s two Oil Spill Response Vessels (OSRVs) are equipped with two (2) of these over-the-side skimming packages, giving a total Name Plate recovery capacity of 410 m^3/hour (or approximately 2,580 bbl/hour) for each OSRV. The unique LAMOR-LORI Recovery Channel design recirculates surface water back into the recovery area, increasing the system’s overall throughput efficiency. The skimmer automatically separates oils, emulsions and oily debris/ice from sea water making efficient use of on-board storage. Recovered oil normally contains less than 5% free water.
- LAMOR-LORI brush skimmers were also selected as the primary recovery system for Shell’s 47-foot, self-propelled skimmer that will be stored on, and launched from one of the primary OSRVs (the Arctic Endeavor). This skimmer is capable of operating effectively at vessel speeds of 2 to 3 knots, which results in much higher oil encounter rates than other types of advancing skimmers. The built-in skimmers, one on each side of the vessel, with a Name Plate recovery capacity of 82 m^3/hour gives this system a total potential recovery of 164 m^3/hour (or approximately1,032 bbl/hour). This skimming system is ideally suited for a broad range of oil viscosities; it can operate in adverse weather and sea conditions; and, it is sufficiently maneuverable for the recovery of oil trapped or herded in pockets against ice.
- Vertical Rope Mop Skimmers by Crucial Inc. have been selected as part of Shell’s backup recovery system, each skimmer consisting of 8 continuous loops of oleophilic fiber mops with a combined Name Plate capacity of 80 m^3/hour. Stored aboard the OSRVs, two (2) of these skimmers provide an additional 160 m^3/hour (or approximately1,000 bbl/hour) recovery potential.

Operated from a crane over the side of a skimming vessel or barge, these skimmers allow for the placement of the mops directly into heavy pockets of oil contained within a boom or trapped by ice.

- Small Vikoma Brush skimmers (with a floating Lobe Pump) provide for the careful placement of a skimming device into smaller pockets of oil (within a boom or trapped among ice cakes). Two of these brush skimmers, each rated at 14 m^3/hour, will be located aboard the primary OSRVs, giving flexibility for the recovery of oil from isolated pools. Their combined recovery potential represents another 28 m^3/hour (or approximately176 bbl/hour).
- RuberMax boom is made of vulcanized neoprene and hypalon, and is a durable, inflatable boom for use in open water and light ice conditions. The boom is manufactured to ISO 9001-2000 standards; has a high buoyancy to weight ratio; and, comes with a high visibility orange color. A complete system consists of a reel, power pack and 200 meters of boom. The height of the boom is 170 centimeters (cm), (67 inches), with a freeboard of 60 cm (24 inches) and a draft of 110 cm (43 inches). Eight (8) of these systems will be available onsite for use as large open-apex deflection system; deflection booms secured to, and providing deflection for, an OSRV; and as independent U-boom configurations for the collection of oil.
- Two water-cooled, Hydro-Fireboom packages, each with 500 feet of inflatable boom (with 14-in. floatation and 18-in. skirt) are stored on Shell's OSRV/OSRB. Each package is supported by two water pumps, along with long tow lines and fire hose assemblies to provide each of the booms in a U-configuration with adequate cooling seawater to keep the boom from being damaged by the intense (approximately 1,000 ^{o}C) flames of a contained oil fire. The boom is towed in a U-configuration to capture and burn spilled oil, or it can be held (in a station-keeping mode) at a surfacing blowout, providing enough burn area to eliminate 10,000 to 15,000 barrels oil per day. This boom has undergone rigorous testing with pit burns and in large tanks (Ohmsett Facility in New Jersey).

4.1 COMMUNICATIONS [18 AAC 75.425(e)(4)(A)(i)]

The communications system for use in a spill response at drill sites is described in the ACS *Technical Manual*, Volume 1, and in Section 1.4 of this plan. As described in Section 1.4, satellite communications systems will be used to maintain compatibility with communication systems of ACS, all North Slope operators, and the worldwide telephone network. Specifically, both drill rigs will be equipped with Very Small Aperture Terminal (VSAT) communication systems.

On-site communications systems are believed to be adequate for most Tier 1 response efforts. In the event of a major or moderate Tier II/Level III spill response, the Global Maritime Distress and Safety System (GMDSS) will be used to communicate with authorities. In the event of a major blowout, the existing on-site systems might not be accessible for safety reasons. However, blowout conditions require that an operations center is established.

4.2 SOURCE CONTROL [18 AAC 75.425(e)(4)(A)(i)]

The following sections provide an analysis of BAT as it relates to source control for a well blowout, and the avoidance of piping and valve failures on the diesel tanks located on each drilling rig. In addition to the narrative contained in these sections, loss of well control (i.e., a blowout) is also addressed in Sections 1.6.3 and 2.1.8, which includes a discussion of preventive measures that may be taken, along with other possible methods of well control. Shell's Well Control Plan provides a detailed assessment of various methods of well control including surface control measures, relief well drilling, blowout ignition, and the services of a professional well control firm, if well control is not regained by conventional mechanical means or natural bridging.

4.2.1 Well Source Control

This BAT analysis (Table 4-1) reviews the techniques and methods to control a deep well blowout that has the potential to release liquid hydrocarbons to water surface. Inherent to this analysis are the assumptions that the first three layers of prevention (see Section 2.1.8) have failed or have not been sufficient to control the well:

- Even with the proper well planning and preparation, a kick occurred (Layer I);
- Early kick detection and timely implementation of kick response procedures were not sufficient to kill the well (Layer II);
- A mechanical barrier (e.g., the Blowout Prevention Equipment [BOPE], casing, or cement) failed (Layer III).

Operations are also monitored by Shell's Real Time Operations Center (RTOC), which assists in monitoring operations, analyzing penetrated formations, and analyzing pressure trends. The Houston RTOC supplements the mud- logging capabilities of the two drill rigs.

There are three methods of regaining well control once an incident has escalated to a blowout scenario; implementation of dynamic surface control measures, well capping, and relief well drilling. This analysis indicates that for the planned wells, regaining control via surface control measures is the preferred method whenever possible. Well capping is not feasible for offshore wells from moored vessels with BOPE sitting below the mud line in a well cellar (glory hole); and killing a well by relief well drilling can take significantly longer to implement, increasing the duration of discharge. Given the uncertainties of the success of implementing surface control measures in these situations, relief well drilling mobilization efforts will begin immediately upon the incident escalating to a blowout.

Surface Control Measures

Regaining primary control through the use of dynamic surface control measures consists of increasing the weight of the drilling fluid or reestablishing the column height in the wellbore. Depending on what caused the influx of formation fluids into the wellbore, the circulation of kill weight drilling fluid, formation plugging material (e.g., nut plug), and/or cement would be indicated.

Reestablishing an uncontaminated, full column of appropriately weighted mud usually requires the use of the choke to maintain a constant bottom hole pressure to prevent further formation fluids from entering the wellbore. The hydrostatic head of the column is increased by holding back pressure on the well using the choke. This may not be possible if BOPE has failed. If the cause of the well control incident was loss of fluid in an under-pressured formation, reducing the hydrostatic pressure, allowing an influx of formation fluid from a higher pressured formation, then circulation of plugging material or cement will be required to stop flow into the fluid loss zone.

The following factors could limit the effectiveness of surface control measures:

- BOPE element failure.
- Insufficient pump rate. In the event that the available pump capacity is insufficient to kill the well, other methods with lower rates can be applied to kill the well (e.g. weight and wait).

- Inability to divert the blowout fluid and ensure a safe environment for workers.

In the unlikely event of a blowout, Shell would attempt to kill the well via dynamic surface control methods while mobilizing to drill a relief well as a contingency. Factors that would make this method infeasible include:

- Any situation where the BOPE has failed and was not available to hold back pressure on the well,
- Efforts were implemented to divert the blowout fluids to create a safe work environment,
- The vessel or drilling equipment were damaged to an extent to make them ineffective, or
- The vessel had to move off the location for safety and/or vessel stability reasons.

Well Capping

Well capping techniques have improved, especially since its frequent application during the Iraq-Kuwait conflict in the early 1990s. Well capping techniques have been proven to be both efficient and effective in regaining control of damaged wells and reducing the associated environmental impacts for wells with accessible BOPE or wellheads. However, similar techniques for performing well capping in mud line cellars constructed on the sea floor from moored vessels have not been proven. Therefore, well capping would not be an effective option for regaining well control while operating from a moored vessel.

Relief Well Drilling

A relief well could be drilled either by the on-site rig, or the second Shell-operated vessel in the Beaufort Sea, which could be mobilized to drill the relief well (see Section 1.6.3, and the Blowout Scenario in Table 1-11 and Table 1-12). (Note: While the mobilization of the two drilling vessels may vary slightly, it is Shell's expectation that no critical drilling operations will be conducted until the second rig is in position (e.g. within 120 nm of the first rig), should it be needed to drill a relief well).

Relief well drilling in a blowout zone can be a time-consuming and costly process. The lead-time involved in relocating a rig and drilling a relief well necessitates early planning. Within Shell's exploration, it is reasonable to drill a relief well within 30 days for true vertical drilling depths up to 12,000 feet. The relief well plan may be initiated concurrently with the implementation of control methods. The total time to regain well control via a relief well would depend on the depth of well interception required, availability of a vessel capable of drilling the relief well, as well as ice and water conditions. Based on historical data for oil blowouts in the U.S. and Norway (see Figure 2-6, Figure 2-7, and Figure 2-8), 54 percent of blowouts were brought under control within 12 hours, and 84 percent within 5 days, within the timeframe a relief well drilling rig could be mobilized. Statistically, it is more than likely that the blowout well would kill itself before the need to mobilize the second rig.

Relief well drilling technology is compatible with Beaufort Sea drilling operations, although it may be sensitive to both the well location and well type. Down-hole and surface equipment (tubulars, wellheads, or similar equipment) to support relief well drilling operations are also available.

Relief well drilling has been attempted only once as a mitigation measure to control a blowout in a nearby environment on the North Slope. This was the ARCO Cirque blowout in 1992, where well control was regained by a combination of well capping techniques and an assist from natural bridging**.**

Since Shell's well plan does not include extended reach wells, the operations of drilling a relief well would not be relatively straightforward in comparison to the original well, apart from ensuring well intersection. The differences between the two wells would be:

- There is no mud-line cellar for the relief well;
- There is no open-hole logging on wireline at casing points for relief well; and
- The use of directional/honing services to specifically locate the original wellbore.

Relief well drilling in the Beaufort Sea is similar to current methods used to drill offshore wells elsewhere in the world. Advances in directional technology that allow for more precise wellbore placement increase the likelihood of success of drilling a relief well.

4.2.2 Tank Source Control

Drill rig tanks are inspected in accordance with American Petroleum Institute (API) 653 by the Minerals Management Service (MMS) and USCG as part of the drill rig inspection prior to exploration activities.

Fuel storage tanks are equipped with manual shutdown valves that remain closed except during fuel transfer operations. Remote temporary exploration sites will be staffed 24 hours a day. Best management practices (BMPs) indicate two operators present and in direct line of sight and in constant communication for the duration of the fuel transfer, with one person having the ability to shut down the fuel transfer in the event of an emergency.

4.3 TRAJECTORY ANALYSES [18 AAC 75.425(e)(4)(A)(i)]

As exploration is offshore, oil reaches the mud water interface immediately, under the blowout scenario. Various techniques for monitoring the spill trajectory include the use of the established oil spill trajectory models and use of aerial reconnaissance.

Computer-based trajectory analyses (see Section 1.6.13, Scenario 1) were performed using predominant wind directions (those that occur greater than 10 percent of the time indicated) as depicted by a wind rose polar coordinate plot, required under 18 AAC 75.425(e)(1)(I)(iv), for the purposes of overall response planning. Vector-based trajectory analyses as described in the ACS *Technical Manual*, Volume 1, Tactic L-11B, were used to calculate minimum response times to deploy shoreline protection at sensitive environmental sites between Barter Island and Prudhoe Bay (see Section 1.6.12).

4.4 WILDLIFE CAPTURE, TREATMENT, AND RELEASE PROGRAMS [18 AAC 75.425(e)(4)(A)(i)]

Wildlife capture, treatment, and release programs are described in the ACS *Technical Manual, Volume 1*, Tactic L-11C, and related Tactics W-1 through W-5, and the Alaska Regional Response Team (ARRT) *Wildlife Protection Guidelines for Alaska* (Annex G of the ARRT Unified Plan). These programs are considered BAT for this exploration program.

Additional information is provided in a report prepared by Shell, with the assistance of ASRC Energy Services (AES), *Wildlife Capture, Treatment and Release Programs* for their Beaufort Sea Oil Spill Response Planning program. This report is found in Appendix E of this plan.

Both the *Kulluk* and the *Frontier Discoverer* drill rigs will have marine mammal observers (MMOs) on board at all times. This is considered the BAT for wildlife monitoring.

4.5 CATHODIC PROTECTION [18 AAC 75.076(h)(4)(A)(II)

Not applicable.

4.6 LEAK DETECTION TANKS [18 AAC 75.425(e)(4)(A)(II)]

Visual inspection is BAT for newly installed tanks at exploration sites that are staffed 24 hours a day. Standard operating procedures and BMPs provide for daily inspections of fuel tanks. Because this is not a permanently fixed facility, daily visual inspections as outlined in Section 2.5, provide the most reliable, feasible, and cost effective means to determine leaks.

These inspections are evaluated in Table 4-2 in accordance with the criteria as set forth in 18 AAC 75.445(k)(3) and ACS *Technical Manual*, Tactic L-11.

4.7 TANK LIQUID LEVEL DETERMINATION [18 AAC 75.425(e)(4)(A)(ii)]

Tank liquid levels are manually measured to determine the required volume prior to any fuel transfer occurring. The levels are determined either by visual observation through the tank opening using sight glass readings or by manual soundings with an applicable sounding tape. Manual soundings are taken at any time that there is an uncertainty with other sounding methods. Fluid transfers follow the inspection and procedures noted in Sections 2.1.5 and Appendix C.

Tank liquid levels in temporary and deck-mounted equipment will be checked primarily by visual means prior to filling (e.g., by direct observation through the hatch or fill cap using a flashlight). Direct visual observation using a flashlight is highly reliable, as a functional check is performed on the flashlights prior to use and actual liquid levels are noted. Visual observation may be more accurate and reliable than other devices such as sight glasses, float gauges, or tank strapping, due to the tendency for these devices to fail under arctic conditions (Table 4-3). BMPs indicate two operators present, in direct line of sight of each other, or at least in constant communication via radio or hand signal, for the duration of the fuel transfer, with one person having the ability to shut down the fuel transfer in the event of an emergency. Tank liquid levels will be monitored visually (e.g., by direct observation through the hatch using a flashlight) throughout the duration of the filling process. Key times for visual observations include the refueling of both the Schlumberger wireline unit and the crane fuel tanks.

This method is as good as or better than, and provides the most reliable, feasible, and cost effective alternative to, the alternative methods presented in Table 4-3.

Although visual inspection is considered BAT for determining tank levels, other methods on board the *Kulluk* drill rig include level alarms and metritape. The tank level and temperature indicators consist of 23 metritape Level/Temperature (L/T) and Level Sensors (LS) for tank level, temperature and draft measurement. Tank level and temperature values are displayed on individual analog meters. Level meters are located on the deck (by tanks) and in the control console (readings are in meters). Temperature meters are located in the control console only and are in Celsius. Digital values for tank levels are selectively displayed on a digital panel located in the cover of the metric circuit enclosure (in data equipment room). Digital values for draft levels are displayed on individual digital meters located in the control console (readings are in meters). Level alarm contacts for specified tanks are located in the metric circuit enclosure. These contacts are used to illuminate alarm lights on the control console, near the associated tank level indicator.

The two drill rigs have strict procedures for fuel transfer and discharge prevention. Fuel transfers normally occur once or twice a day, depending on equipment and usage, and include manual opening of valves, filling the tanks, and manually closing the tanks. Visual inspection and proper communication between the pump operator and the person supervising the tank fueling is considered BAT for these transfers. High-level alarms are placed on most tanks (see Section 2.1). If alarms fail to sound, the overflow from the EMD day tank is directed through piping to the 5P-10C fuel storage tank. Overflow from the temporary or deck equipment fuel tanks is captured in drip pans and deck drains.

All fuel transfers to temporary or deck fuel tanks are executed under the Permit to Work system following an associated Job Safety Analysis. Preventative maintenance measures of control include careful planning of equipment placement for the storage tanks. For example, temporary and deck equipment are not positioned over open grating if they are equipped with fuel tanks or associated fueling facilities.

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TABLE 4-1
BEST AVAILABLE TECHNOLOGY (BAT) ANALYSIS
WELL BLOWOUT SOURCE CONTROL

BAT EVALUATION CRITERIA	PROPOSED METHOD: DYNAMIC SURFACE CONTROL	ALTERNATE METHOD: RELIEF WELL DRILLING	ALTERNATE METHOD: WELL CAPPING
AVAILABILITY: Whether technology is best in use in other similar situations or is available for use by applicant	Dynamic surface control is in use globally.	Relief well drilling equipment (rigs, downhole tools, etc.) are widely available aside from a few spatiality providers (e.g. honing services)..	Equipment not available for wells drilled from moored vessels.
TRANSFERABILITY: Whether each technology is transferable to applicant's operations	Technique is directly transferable, and equipment is the same as is used on the vessel during normal operations.	Relief well drilling is transferable as there will be two drilling vessels in use by Shell in the Beaufort Sea. Each vessel would be made available should the other need a relief well drilled.	Proven technology is not available.
EFFECTIVENESS: Whether there is a reasonable expectation each technology will provide increased spill prevention or other environmental benefits	In the majority of cases, the technique is highly effective. Application of dynamic surface control provides best opportunity for minimizing pollution impacts since most blowout wells are controlled with dynamic surface controls while other methods are being mobilized. Technique would not be effective if BOPE had failed, a safe work environment could not be ensured, extensive vessel or equipment damage, or if the vessel had to move from the location.	Technique is generally understood to be effective in a wide range of situations.	Proven effective technology is not available.
COST: The cost to the applicant of achieving BAT, including consideration of that cost relative to the remaining years of service of the technology in use by the applicant	The costs are relatively low, assuming that the vessel is available to kill the well and consumables such as drilling fluids and cement are readily available	The cost of permitting, mobilization, and executing relief wells is high. Costs include day rate of the vessel to drill the relief well, casing, drilling fluids and other consumables, as well as the cost of lost opportunity should the vessel have to prematurely end work on its intended prospect.	Not applicable, since proven technology is not available.
AGE AND CONDITION: The age and condition of technology in use by the applicant	The age and condition of the drilling equipment is appropriate for the operation. Equipment is the same as is used on the vessel during normal operations.	The age and condition of the drilling vessels and associated equipment available for a relief well are appropriate for the operation.	Not applicable, since proven technology is not available.
COMPATIBILITY: Whether each technology is compatible with existing operations and technologies in use by the applicant	Technology is compatible and equipment is the same as is used on the vessel during normal operations.	Technology is compatible. The relief well rig, whether the on-site rig or the other Shell vessel in the Beaufort Sea, has comparable equipment onboard.	Not applicable, since proven technology is not available.
FEASIBILITY: The practical feasibility of each technology in terms of engineering and other operational aspects	Method is feasible for all drilling operations. Would not be a feasible option if the BOPE had failed. Applied at the surface, the technology is not sensitive to well type. Demonstrated success in historical well control efforts.	Method feasibility is contingent upon geographical access near area of blowout. Lack of year round access to some locations (e.g., offshore Beaufort) limits application to the open water season.	Proven technology is not available.

TABLE 4-1 (CONTINUED)
BEST AVAILABLE TECHNOLOGY (BAT) ANALYSIS
WELL BLOWOUT SOURCE CONTROL

BAT EVALUATION CRITERIA	PROPOSED METHOD: DYNAMIC SURFACE CONTROL	ALTERNATE METHOD: RELIEF WELL DRILLING	ALTERNATE METHOD: WELL CAPPING
ENVIRONMENTAL IMPACTS: Whether other environmental impacts of each technology, such as air, land, water pollution, and energy requirements, offset any anticipated environmental benefits	Technology provides the best-proven opportunity to quickly reduce environmental impacts.	Technology provides additional exposure and environmental risks during application (additional well control problems). Additional environmental costs would include the resource consumption (e.g., fuel, casing, and drilling fluids), waste generated, and emissions associated with drilling the relief well. Technology application may be seasonally limited, leading to durations of 60-180 days. Drilling a relief well is accompanied by the additional risk of a second well control event.	Not applicable, since proven technology is not available.

TABLE 4-2
BEST AVAILABLE TECHNOLOGY (BAT) ANALYSIS
LEAK DETECTION FOR TANKS

BAT EVALUATION CRITERIA	CURRENT METHOD: VISUAL INSPECTIONS AND ALARMS
AVAILABILITY: Whether technology is best in use in other similar situations or is available for use by applicant	This approach has been extensively used for similar exploration rigs and is currently proposed by Shell.
TRANSFERABILITY: Whether each technology is transferable to applicant's operations	This approach is directly transferable for Shell operations.
EFFECTIVENESS: Whether there is a reasonable expectation each technology will provide increased spill prevention or other environmental benefits	Effective with strict adherence to BMPs and local 24-hour staffing at drill sites provides a reliable and effective method of leak detection.
COST: The cost to the applicant of achieving BAT, including consideration of that cost relative to the remaining years of service of the technology in use by the applicant	No cost.
AGE AND CONDITION: The age and condition of technology in use by the applicant	Not applicable.
COMPATIBILITY: Whether each technology is compatible with existing operations and technologies in use by the applicant	Compatible and widely used on remote drilling operations. Requires no change.
FEASIBILITY: The practical feasibility of each technology in terms of engineering and other operational aspects	Currently planned to be used and is feasible. With 24-hour operations on the rig, this provides a practical and reliable method of leak detection.
ENVIRONMENTAL IMPACTS: Whether other environmental impacts of each technology, such as air, land, water pollution, and energy requirements, offset any anticipated environmental benefits	None.

TABLE 4-3
BEST AVAILABLE TECHNOLOGY (BAT) ANALYSIS
TANK LIQUID LEVEL DETERMINATION SYSTEM

BAT EVALUATION CRITERIA	PROPOSED METHOD: VISUAL INSPECTION/ALARMS	ALTERNATIVE 1: SIGHT GLASS WITH BALL CHECK VALVE CONTROL SYSTEM	ALTERNATIVE 2: FLOAT LEVEL GAUGE (VAREC) CONTROL SYSTEM	ALTERNATIVE 3 MANUAL (TANK STRAPPING) CONTROL SYSTEMS
AVAILABILITY: Whether technology is best in use in other similar situations or is available for use by applicant	Proposed method.	Sight glass with ball check valve systems are used today, but less frequently than other devices.	Float-actuated level gauges, such as Varec devices, are widely used in the industry today	Tank strapping devices are used in the industry
TRANSFERABILITY: Whether each technology is transferable to applicant's operations	Transferable.	Undetermined.	Transferable.	Transferable.
EFFECTIVENESS: Whether there is a reasonable expectation each technology will provide increased spill prevention or other environmental benefits	Highly effective with strict adherence to BMPs and local procedure. Tank liquid levels will be determined from direct observation through the hatch using a flashlight, As good as or better than other "low tech" devices.	Not effective in this application. Sight glass systems are prone to breaking, becoming obstructed, and freezing if moisture buildup occurs in the tubing. In addition, the ball check valves are prone to freezing and sticking in either the open or closed position.	Effective in this application. However, condensation or freezing conditions may obscure the measurement reading window. In addition, this system will provide inaccurate measurements if there is uneven sedimentation build up in the tank.	Effective in this application. However, this system will provide inaccurate measurements if there is uneven sedimentation build-up in the tank.
COST: The cost to the applicant of achieving BAT, including consideration of that cost relative to the remaining years of service of the technology in use by the applicant	Not applicable.	Undetermined.	Undetermined.	Undetermined.
AGE AND CONDITION: The age and condition of technology in use by the applicant	Procedures have been in place since 1993 for fuel transfer operations.	Sight glass devices have been used in the industry for over 20 years, mostly on permanent tanks.	Float-actuated devices have been used in the industry for over 20 years.	Tank strapping devices have been used in the industry for over 50 years.
COMPATIBILITY: Whether each technology is compatible with existing operations and technologies in use by the applicant	Compatible and widely used. Requires no change.	Compatible but preferably not used on portable tanks and tanks on rigs due to breakage potential.	Compatible and used in the industry on tanks in Alaska.	Compatible and used in the industry.
FEASIBILITY: The practical feasibility of each technology in terms of engineering and other operational aspects	Feasible and preferred due to potential for electronic or pneumatic systems to experience damage from rough handling.	Rig tanks are frequently moved over rough roads. Rough handling has the potential to break the sight glass. Sight glass devices are typically not used in exposed areas as they can become a source for a leak if damaged.	Feasible, but would require some engineering modifications to install and operational modifications. There is concern over the use of float devices due to several failures of float devices within the state.	Feasible, but would require some operational modifications.

TABLE 4-3 (CONTINUED)
BEST AVAILABLE TECHNOLOGY (BAT) ANALYSIS
TANK LIQUID LEVEL DETERMINATION SYSTEM

BAT EVALUATION CRITERIA	PROPOSED METHOD: VISUAL INSPECTION/ALARMS	ALTERNATIVE 1: SIGHT GLASS WITH BALL CHECK VALVE CONTROL SYSTEM	ALTERNATIVE 2: FLOAT LEVEL GAUGE (VAREC) CONTROL SYSTEM	ALTERNATIVE 3 MANUAL (TANK STRAPPING) CONTROL SYSTEMS
ENVIRONMENTAL IMPACTS: Whether other environmental impacts of each technology, such as air, land or water pollution, and energy requirements offset any anticipated environmental benefits	None.	None.	None.	None.

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4.8 MAINTENANCE PROCEDURES FOR BURIED STEEL PIPING [18 AAC 75.425(e)(4)(A)(ii)]

Not Applicable.

4.9 PROTECTIVE WRAPPING OR COATING FOR TANKS AND PIPELINE [18 AAC 75.425(e)(4)(A)(ii)]

Not Applicable.

4.10 CORROSION SURVEYS FOR AN EXISTING INSTALLATION

Not Applicable.

4.11 PIPELINE LEAK DETECTION

Not Applicable.

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PART 5 RESPONSE PLANNING STANDARD [18 AAC 75.425(e)(5)]

This section discusses the applicable response planning standards (RPS) used in this plan, as set forth in 18 AAC 75.430 – 18 AAC 75.440 and 18 AAC 75.442.

Well Blowout (18 AAC 75.434)

The Alaska Department of Environmental Conservation (ADEC) regulations (18 AAC 75.434) require the default RPS volume for a well blowout at an exploration facility to be 5,500 barrels of oil per day (bopd), or best producing well data, for the duration of fifteen (15) days. Because this plan is under the jurisdiction of both ADEC and U.S. Department of the Interior, Minerals Management Service (MMS) regulations, it will include an RPS volume of 5,500 bopd for a total duration of 30 days.

The total release will involve 165,000 barrels (bbl) of oil during the entire 30 days (5,500 x 30 = 165,000). This value represents the Worst Case Discharge Scenario to meet ADEC regulations for the Oil Discharge Prevention and Contingency Plan (C-Plan) and the regulations of MMS. See Section 1.6.13, Scenario 1 for a discussion of reservoir characteristics.

For storage purposes, an emulsion factor of 1.54 and a percentage of free water (20 percent) has been added to the initial RPS of 165,000 bbl [(165,000 x 1.54 = 254,100) + (165,000 x 0.20 = 33,000) = 287,100] for a total storage volume of 287,100 bbl.

Fuel Transfer Strategy (18 AAC 75.025)

The worst case discharge (WCD) for the fuel transfer strategy prepared for this C-Plan is based on the definition contained in 33 CFR 154.1029(b)(2), using the following values:

- Maximum Time to Discover Release: 5 minutes
- Maximum Time to Shutdown Pumping: 0.5 minutes (30 seconds)
- Maximum Transfer Rate: 320 gallons per minute (gpm) (based on representative fuel transfer pumps on the oil spill response vessel [OSRV] = 7.6 bbl/min)
- Total Line Drainage Volume: 163 gallons (premising 4-inch by 250 meter [m] marine hose between the pump manifold on the barge and the delivery flange on the inlet piping at the drilling vessel) or 3.9 bbl

Rationale for Claimed Prevention Credits (18 AAC 75.425(e)(2)(F))

Although Shell considers its well prevention and control measures "best in class," it will not be claiming any prevention credits to offset oil spill response planning requirements, based on exploration well operations as specified in 18 AAC 75.434.

The recovery equipment provided in support of this plan (see Tables 1-8 and 1-9) substantially exceed the mechanical recovery capability needed to contain the worst case discharge (see Section 1.0).

APPENDIX A:
GENERAL SPECIFICATIONS FOR MARINE AND AERIAL SUPPORT VESSELS

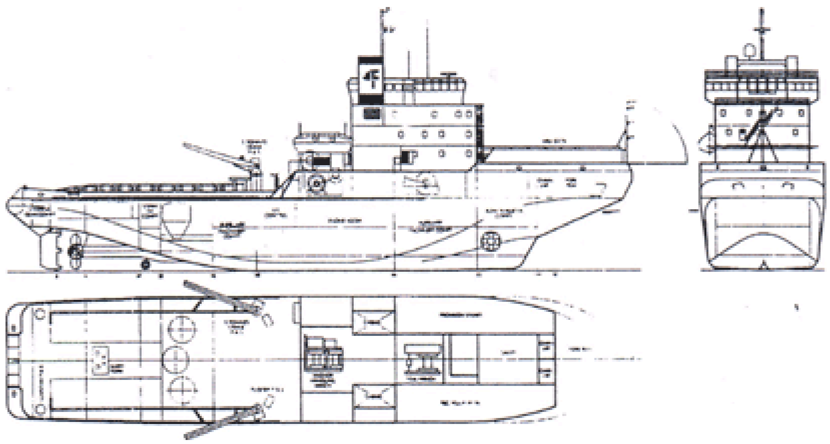
1. **MARINE VESSELS IN SUPPORT OF BEAUFORT EXPLORATORY DRILLING PROGRAM**
2. **AERIAL SUPPORT OF BEAUFORT EXPLORATORY DRILLING PROGRAM**

1. MARINE VESSELS IN SUPPORT OF BEAUFORT EXPLORATORY DRILLING PROGRAM

LIST OF MARINE VESSELS IN SUPPORT OF BEAUFORT EXPLORATORY DRILLING PROGRAM

	M.V. *KULLUK*	***FRONTIER DISCOVERER***
Anchor-handling	***Tor Viking***	Nordica
Ice-management	***Vladimir Ignatyuk***	Kapitan Dranitsyn
oil spill response Platform:		
	OSRV	Crowley Pt. Barrow Arctic Tug
		Barge *Arctic Endeavor*
Oil spill response work boats:		
	(2) 34-foot *Kvichak* workboats	**(4) 34-foot Kvichak workboats**
		(1) 47-foot Kvichak workboat w/ brush skimmer
Other:		
	Misc. short-term support Vessels (crew changes, supplies, etc.)	**Misc. short-term support Vessels (crew changes, supplies, etc.)**

The *Vladimir Ignatyuk* Diesel Icebreaker



Wharf - builder: Victoria Yard, Burrard Yarrrows Corporation, Canada
.

Purpose: Multifunctional icebreaker-tow

Class: Lloyd's Register of Shipping + 100 A1 Icebreaker Tug + LMC
Lloyd's Register of Shipping 100 A1 LMC, icebreaking tow, ice class - 1A Super

Max. length: 88.02 m

Width: 17.51 m

Draught: 8.3 m

Deadweight capacity: 2,113 t

Displacement: 7,077 t

Main engine: Two-shaft diesel-reduction gear engine with 4 main engines and variable-pitch propeller.
GD type - 8TM410, Stork Werkspoor Diesel

Capacity of engine: 4 x 5,800 h/p

Maximal speed in clear water: 15.5 knots

Navigation area: unlimited

Vessel Owner: Murmansk Shipping Company

The *Kapitan Dranitsyn* Diesel-Electric Icebreaker

Apart from her main activity – cargo ships piloting on the routes of the Northern Sea route, the *Kapitan Dranitsyn* icebreaker participates in tourist voyages in high polar latitudes. Since 1994, the voyages to Frants Joseph's Archipelago, Spitsbergen, New Land, and Chukotka, to Bering Strait and even to the North Pole were carried out. The *Captain Dranitsyn* made the first around-the-world voyage in 1996 and brought 665 passengers around the Earth. Also, in 1996, the icebreaker participated in a rescue operation. As a result of nautical fault, the German passenger *HANSIATIK* motor ship was in low water. There were 135 passengers aboard. The maximal number of passengers the *Captain Dranitsyn* could manage (128 people) were taken off the motor ship.

In 2000, the icebreaker made the Arctic around-the-world voyage on the following route Hammerfest (Norway), Keflavik (Iceland), Stromfiord (Greenland), Canadian Arctic regions, Alaska, Chukotka and Murmansk. In 2002, the icebreaker participated in the research expedition of the in the Laptev Sea with the University of Alaska (USA) and with the Ecoshelf company (St.-Petersburg), researching the sea bottom shelf.

In the summer of 2002, the *Captain Dranitsyn* participated in shooting an advertising film for the Ford company in the area of the Spitsbergen Archipelago.

For all voyages the vessel transported about 5,000 passengers from more than 40 countries.

The *Captain Dranitsyn* is the only icebreaker in the world certified as passenger carrier, according to the international standards.

Displacement	12,228 tons
Power	24,000 hp
Length	131.00 m
Width	26.50 m
Draft	8.50 m
Cruising Speed	15 knots
Crew	60
Passengers	102

MSV *Nordica* Multi-Purpose Icebreaker

The Fennica-class multipurpose icebreakers built by Aker Finnyards operate during the open water period as global offshore construction vessels.

DNV ID:	17933	IMO No:	9056985
Operational Status:	In Operation	Class Relation:	In DNV Class

Speed: 16 knots
Engine Output: 21,000 kW
Dimensions:

Loa:	116 m	GT (ITC 69):	9,088
Lbp:	96.7 m	NT (ITC 69):	2,727
Lload:		DWT:	1,650
Lwl:			
Bext:		GT (pre 69):	
B:	26 m	NT (pre 69):	
D:	12.5 m	Freeboard:	I
Draught:	8.415 m		

Flag:	Finland	Signal Letters:	OJAE
Port:	HELSINKI		
Owner:	Shipping Enterprise (120131)	GT (ITC 69):	9,088
		NT (ITC 69):	2,727
Manager:	Shipping Enterprise (120131)	DWT:	1,650
Yard:	Finnyards Ltd.(104590)	Year of Build:	1994
Type:	630 – Supply Vessel/Tug		
Class Notation:	✠1A1 POLAR Icebreaker Tug Supply Vessel SF HELDK EPR E0 DYNPOS-AUTR		
Register Information:	bp 227 dat(-30oC) dk(+) ern(99,99,99) ram		

MSV *Tor Viking II* Multi-purpose Icebreaker

DNV ID:	21779	IMO No:	9199622
Operational Status:	In Operation	Class Relation:	In DNV Class

Speed: 16 knots – Abt. 42.7 MT

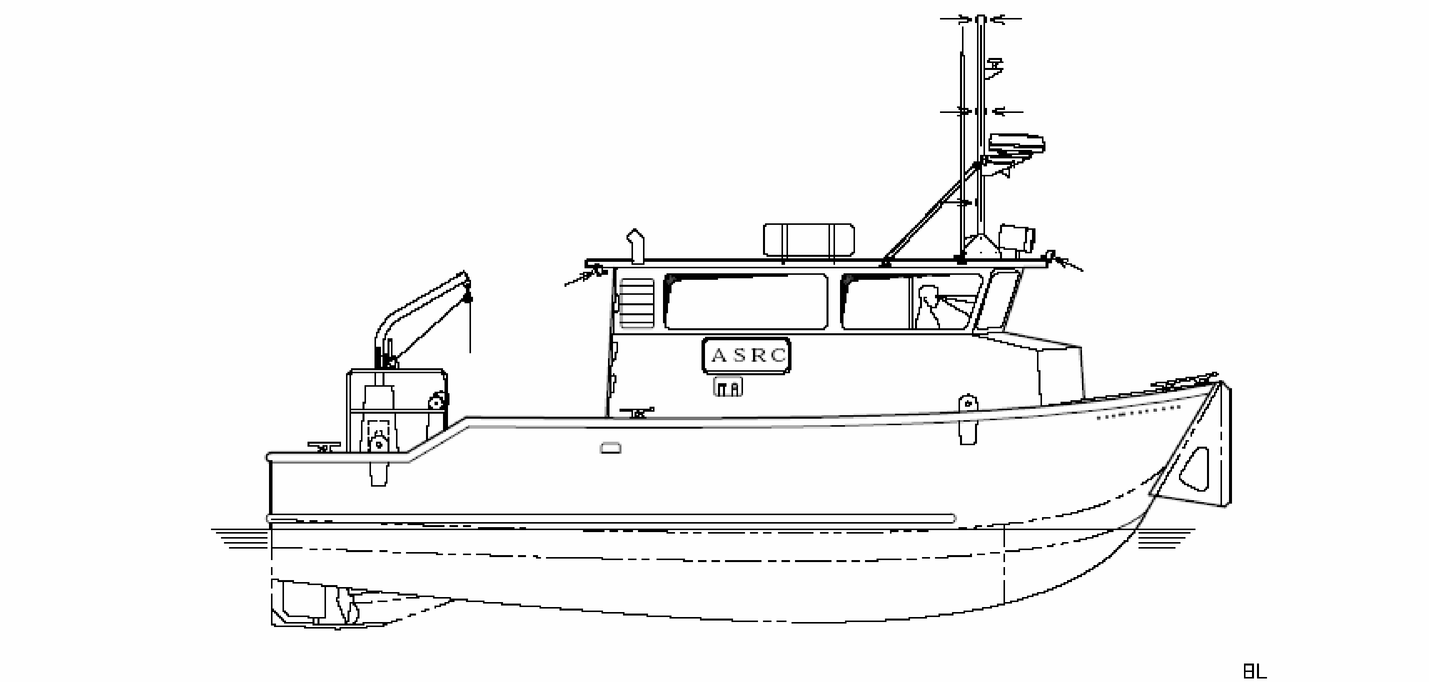
Engine Output: 13,440 kW

Dimensions:

Loa:	83.7 m	GT (ITC 69):	3,382
Lbp:	77.76 m	NT (ITC 69):	1,145
Lload:	75.1 m	DWT:	2,528
Bext:	18 m	GT (pre 69):	
B:	18 m	NT (pre 69):	
D:	8.52 m	Freeboard:	
Draught:	7.2 m		

Flag:	Sweden	Signal Letters:	SLJT
Port:	SKÄRHAMN		
Owner:	Transviking Icebreaking & Offshore AS	GT (ITC 69):	3,382
	(189468)	NT (ITC 69):	1,145
Manager:	Viking Supply Ships AS Kristiansand, Norway	DWT:	2,600
	(191173)		
Yard:	Havyard Leirvik A.S.(108910)	Year of Build:	2000
Type:	630 - Supply Vessel/Tug		
Class Notation:	✠1A1 ICE-05 Icebreaker Tug Supply Vessel SF HELDK-SH E0 DYNPOS-AUTR NAUT-OC DK(+) HL(2.8)		

Kvichak 34-foot Oil Spill Response Work Boat



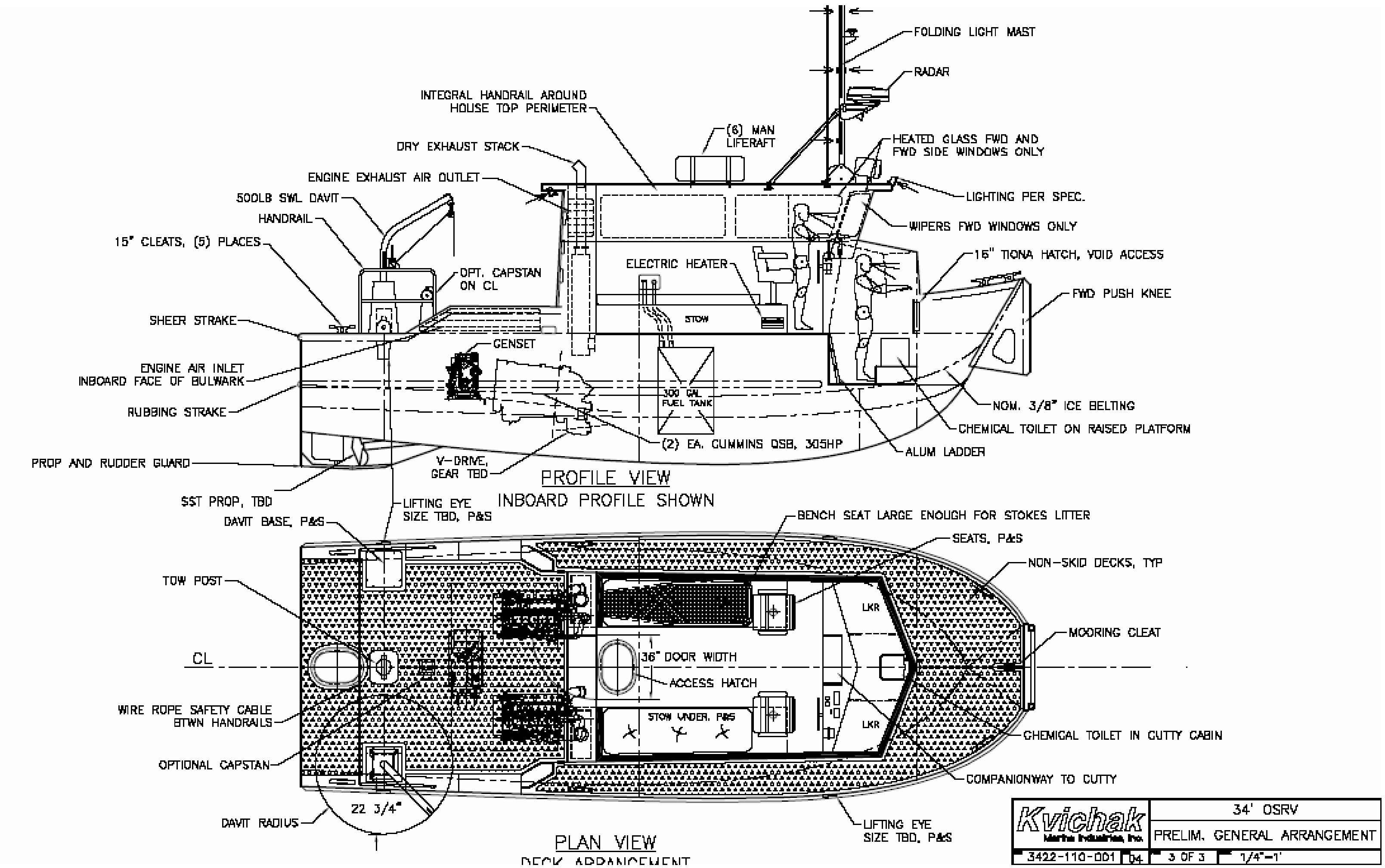
SPECIFICATIONS
LWL: ~31'-7"
LOA: ~34'-2"
BEAM: ~12'
DRAFT: ~55"
DISPLACEMENT: ~24,000LBS
FUEL: 300 GALLONS
MAX SPEED: 18KN
ENGINES: (2) CUMMINS QSB @ 305HP EA.
GEAR: TWIN-DISC V-DRIVE CONFIG. OR SIMILAR
GENSET: (1) ~8kW
EXHAUST: DRY W/ MUFFLER
COOLING: KEEL COOLED

OUTBOARD PROFILE
REFER TO DETAILS ON FOLLOWING PGS

ALL DIMENSIONS FOR REFERENCE ONLY

Kvichak Marine Industries, Inc.		34' OSRV	
		PRELIM. GENERAL ARRANGEMENT	
3422-110-001	04	2 OF 3	1/4"=1'

_Kvicha_k 34-foot Oil Spill Response Work Boat
General Deck Arrangement



***Kvichak* 47-foot oil spill response Work Boat**
(with Brush Skimmer)

Vessel use:

- Respond quickly to spill site. Recover oil via LAMOR system.
- Operate in shallow water with adequate protection to propellers and rudders.
- Capable of operating in 6- to 8-foot seas.
- Has an approximate 20,000 pounds of bollard pull.
- Able to tow vessels and barges with a maximum weight of 75 gross tons along side, astern, and pushing ahead.
- Capable of slow speed operation for skimming oil via the engine's MGX transmissions.

GENERAL SPECIFICATIONS

LOCATION	SIZE	ALLOY
Bottom	14", 3/8, 1/2"	5086-H116
Sides	3/8"	5086-H116
Transom	3/8"	5086-H116
Decks	3/16"	5052-H32
BHDs	3/16	5086-H116
CVK (Keel)	1/2"	5086-H116
Chine	1/2"	5086-H116
Engine Girders	1/2"	5086-H116
Fuel Tank	1/4", 3/8"	5086-H116
House	3/16"	5052-H32
Bottom Longs	2x2x1/4" Tee Bar	6061-T6
Side Longs	1.5x1.5x3/16" Tee Bar	6061-T6

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2. AERIAL SUPPORT OF BEAUFORT EXPLORATORY DRILLING PROGRAM

GENERAL SPECIFICATIONS
BELL 412 (IFR) TWIN TURBINE HELICOPTER

DIMENSIONS

Length	56' 2"
Width	9' 4"
Height	15' 1"
Main Rotor Diameter	46' 0"

CARGO/BAGGAGE

Tailboom cargo space - 28 cu. ft (400 lbs)
Internal cargo space - 220 cu. ft. with 49" x 92" Sliding doors

SPECIFICATIONS

Maximum gross weight	11,900 lbs.
Average basic weight	7,700 lbs.
External sling load	4,000 lbs.
Fuel capacity	214 gal / 1455 lbs (293 gal. (one aux tank))
Fuel consumption	110 gph/800 pph
Average cruise speed	117 kts/135 mph
Maximum range	252 nm/290 sm with 30 minute fuel reserve
Passenger seats	11 to 13 passengers depending on configuration
Crew	2 pilots

POWER PLANT

Two (2) Pratt & Whitney PT6T-3B engines developing 1,800 SHP derated to a total of 1,350 SHP.

LANDING GEAR

Fixed skid type landing gear with automatic and pilot activated emergency pop-out float system.

LOADING INFORMATION

Basic weight	7,700 lbs
Full fuel (one auxiliary tank)	1,992 lbs
Pilots (2)	400 lbs
Operating weight	10,092 lbs
Maximum gross weight	11,900 lbs
Minus operating weight	10,092 lbs
Total Payload 1,808 lbs	(full fuel)

PAYLOAD - **Includes 30 minute reserve.*

DISTANCE (roundtrip)	FUEL REQUIRED*	PAYLOAD OUTBOUND	FLIGHT TIME
252 nm/269 sm	1,992 lbs.	1,808 lbs.	2.2
200 nm/230 sm	1,657 lbs.	2,143 lbs.	1.7
150 nm/172 sm	1,337 lbs.	2,463 lbs.	1.3
100 nm/115 sm	1,016 lbs.	2,784 lbs.	0.9
50 nm/57 sm	696 lbs.	3,104 lbs.	0.4

APPENDIX B:
CONTRACTUAL TERMS WITH PRIMARY RESPONDERS

SHELL EXPLORATION AND PRODUCTION COMPANY

Oil Spill Response
ASRC Energy Services
AES-Response Operations, LLC
Outline Agreement No. 4610013302

ACCEPTANCE

By signing below, each party signifies that it has carefully examined and agrees to be bound by all terms and conditions that are contained in this Agreement.

Authorized Shell Representative

Signature: Mary Kelly

Name: Mary Kelly

Title: SCM Category Manager

Date: 12/14/2006

Signature: Chandler Anderson

Name: Chandler Anderson

Title: Manager SCM Production

Date: 12/14/2006

Authorized AES Representative

Signature: Bernard Nidowicz

Name: BERNARD NIDOWICZ

Title: President

Date: 1/15/07

MEMBER

RESPONSE ACTION CONTRACT

By and between

ALASKA CLEAN SEAS

AND

SHELL OFFSHORE INCORPORATED

This Response Action Contract is entered into this 30th day of November, by and between Alaska Clean Seas ("ACS"), a non-profit corporation organized and existing under the laws of the State of Alaska, and Shell Offshore Inc. ("MEMBER").

WHEREAS, MEMBER may request from time to time the use of the response services and equipment provided by ACS as a response action contractor in the event of a release or threatened release ("release") of crude oil, hazardous material or refined petroleum products ("liquid hydrocarbons"), or for a drill conducted by any authorized governmental agency ("drill");

NOW, THEREFORE, in consideration of the premises, and in further consideration of the promises below, the parties agree as follows:

1. **Term of Contract.** This Contract is effective the date first written above.

2. **Payment Due Dates.** All invoices submitted by ACS to MEMBER shall be due and payable not more than thirty (30) days after the date the invoice is transmitted to MEMBER, and amounts due shall bear interest at the rate of one percent (1%) per month or portion thereof from the due date until paid. At any time payments are past due, ACS may request and receive from MEMBER adequate security for payments, such as a cash deposit or an irrevocable letter of credit in amount equal to the anticipated costs for one or more months of services to be rendered, or other security satisfactory to ACS. In the event such security is not forthcoming within three (3) days upon request, ACS may decline to provide services for MEMBER under this Contract, and may cease services immediately upon notice to MEMBER.

   In the event ACS and MEMBER cannot agree on any charge or charges made by ACS to MEMBER under this Response Action Contract, MEMBER may withhold up to ten percent (10%) of the disputed charges, only, pending resolution of the dispute. In the event MEMBER withholds more than ten percent (10%) of any billing on account of disputed charges,

F. Amendment: This Response Action Contract may be amended only in writing signed by both parties to the Contract.

G. Entire Understanding. The terms set forth in this Response Action Contract supersede all previous discussions, understandings and agreements between the parties hereto with respect to the subject matter hereof, and are intended by the parties as a final, complete and exclusive expression of the terms of their agreement and may not be contradicted, explained or supplemented by evidence of any prior agreement, any contemporaneous oral agreement or any additional terms.

H. Conflicts. This Response Action Contract is to be interpreted in harmony with the ACS Bylaws. In the event of a conflict between the provisions of this Contract and the ACS Bylaws, the terms of the ACS Bylaws shall control.

IN WITNESS WHEREOF, the parties have signed this Response Action Contract, effective the date first written above.

ACS		MEMBER	
ALASKA CLEAN SEAS		Shell Offshore Inc.	
Signature:	L.D. [signature]	Signature	Mary Kelly
Name:	L.D. (Lindy) Theis	Name:	Mary Kelly
Title:	Secretary/Treas	Title:	SCM Category Manager
Date:	Dec 12, 2006	Date:	11/10/06

Phone: 504.728.6101
Fax: 504.728.0608
Email: mary.Kelly@shell.com

Susan M Moore
Susan M Moore
Alaska Operations Manager
11/30/06
mobile: 907-382-5472
Office: 907-770-3700
Email: Susan.S.m.moore @shell.com

STATEMENT OF CONTRACTUAL TERMS
OSRV

VESSEL REQUEST ORDER

This VESSEL REQUEST ORDER is entered into the 9th day of May, 2006, between Shell Offshore, Inc. ("SHELL") and EDISON CHOUEST OFFSHORE, LLC ("CONTRACTOR"), owner of the vessel described below ("VESSEL").

Pursuant to the terms of that Master Marine Transportation Services Agreement entered into as of the 6th day of December, 1995 between Shell Offshore, Inc. and Edison Chouest Offshore, Inc. to be modified to include special provisions for Arctic and oil spill recovery operations, the premises and covenants of which the parties hereto are familiar with and incorporate herein by reference, CONTRACTOR agrees to and does hereby time charter and SHELL agrees to and does hereby hire the VESSEL subject to the following.

CONTINGENT LIABILITY PERIOD

Contingent Liability Period	May 8, 2006 to June 1, 2006

CONTINGENT LIABILITIES

- The additional costs to be incurred by CONTRACTOR between Monday, May 8, 2006, and Thursday, June 1, 2006 is $1,110,000.00. This amount is represented below as follows:
  Gearboxes - $80,000.00
  Wheels and Hubs - $50,000.00
  Low Temp Steel - $900,000.00
  Engineering - $80,000.00
- If Shell does not commit to time charter the below described vessel for a primary term of three (3) years prior to Thursday, June 1, 2006, the above noted $1,110,000.00 will be for the account of Shell.
- ECO will use its best efforts to reduce contingent liabilities to a minimum.

VESSEL DESCRIPTION

Vessel Name	**Artic Oil Spill Recovery/PSV TBN** (Hull 240)
Official Number	TBA
Principal Dimensions	301'6" x 60' x 24'
Horsepower	7,200 BHP
Deck Space	203' x 50.5'
Main Engines	(2) 3608 Caterpillar

STATEMENT OF CONTRACTUAL TERMS
OSRV

Shell Offshore, Inc.	**Edison Chouest Offshore, L.L.C.**
By: Alan T. Power	By: Roger White
	Roger White
Its: Alan T. Power	Its: Senior Vice-President, as agent
Date: 5-16-06	Date: 5-17-06

STATEMENT OF CONTRACTUAL TERMS
ARCTIC ENDEAVOR

CONFIDENTIAL

Vessel Request Order

(Ref: SOI/SDDI/SDPI Service Agreements)

VRO Number: 406
Date of issue: 11/17/2006

Pursuant to the terms and conditions that certain Master Agreement 4610012929 as amended, entered into by and between Shell Offshore, Inc. (SOI), and other appropriate Shell entities and Crowley Marine Services , This VRO sets forth our understanding and agreement that the captioned vessel has been chartered by Crowley Marine Services to SOI

Charter Details

Vessel Name:	Arctic Endeavor	**Starting Fuel (Gals):**	0	☑ Term Vessel	
Type:	Barge	**Est. Hourly Fuel:**	0	**Year 1 Rate:**	$2,400.00
Day Rate:	$2,400.00	**Date Time On Charter:**	5/1/2007 0:01	**Year 2 Rate:**	$2,400.00
Riggers Included:	☐	**Expected Days Of Charter:**	3 yrs	**Year 3 Rate:**	$2,400.00
		Cancellation Terms:	Non Cancelable	**Bid Ref #:**	
Shell Focal Point:	Kate Marstall	**Terminal Hired:**		**Charge Code:**	

Reason Hired:
Oil Spill Response

Special Equipment:

Special Conditions:
Port of Delivery and Re-Delivery is Seattle, Washington.

The delivery date noted in this VRO is an estimated delivery date and will be firmed up as the project/upgrade timeline is confirmed.

Any reimbursables, including outside engineering charges, will be at cost plus 10% unless such reimbursables are charged in another mutually agreeable fashion.

Owner and Charterer have agreed that in addition to the initial 3-year term, Charterer is granted (3) 3-year contract extensions at Charterers option. The pricing for each option will be based on the cumulative increase in the Consumer Price Index, All Consumers, US – All Products, from year one to year three of the agreement. Each subsequent increase will be priced using the same methodology.

The term of the VRO is 3-years firm and non-cancelable by either party unless by mutual agreement. However, in the event Charterer deems that Owner's safety program is insufficient, Charterer retains the ability to cancel the agreement.

Misc:

Vessel Specifications

DP Type:		**Seats:**	0	**Water Cap (bbls):**	0	**Fire Monitors:**	0
Overall Length (ft):	205	**Min Draft (ft):**	10	**Fuel Cap (gals):**	0		
Overall Width (ft):	90	**Max Draft (ft):**	12	**Liquid Mud Cap (bbls):**	0		
Clear Deck Length (ft):	0	**Max Speed (kts):**	0	**Dry Bulk Cap (ft3):**	0		
Clear Deck Widt (ft):	0	**Cruise Speed (kts):**	0	**Methanol Cap (bbls):**	0		

FAX SIGNED ACCEPTANCE TO ATTENTION OF SHELL SUPPLY CHAIN MANAGEMENT AT 504-728-0637

STATEMENT OF CONTRACTUAL TERMS
ARCTIC ENDEAVOR

CONFIDENTIAL

Vessel Request Order

(Ref: SOI/SDDI/SDPI Service Agreements)

VRO Number: 406
Date of issue: 11/17/2006

Acceptance

Contractor		Shell	
Print Name:	Michael P. O'Shea	Print Name:	Alan T. Power
Signature:	Michael O'Shea	Signature:	Alan T. Power
Title:	Authorized agent	Title:	SEM Representative
Date:	12/13/06	Date:	12-12-06

STATEMENT OF CONTRACTUAL TERMS
CROWLEY POINT BARROW TUG

CONFIDENTIAL

Vessel Request Order

(Ref: SOI/SDDI/SDPI Service Agreements)

VRO Number: 407
Date of issue: 11/17/2006

Pursuant to the terms and conditions that certain Master Agreement 4610012929 as amended, entered into by and between Shell Offshore, Inc. (SOI), and other appropriate Shell entities and Crowley Marine Services , This VRO sets forth our understanding and agreement that the captioned vessel has been chartered by Crowley Marine Services to SOI

Charter Details

Vessel Name:	Point Barrow	**Starting Fuel (Gals):**	0	☑ Term Vessel	
Type:	Tug	**Est. Hourly Fuel:**	0	**Year 1 Rate:**	$5,600.00
Day Rate:	$5,600.00	**Date Time On Charter:**	5/1/2007 0:01	**Year 2 Rate:**	
Riggers Included:	☐	**Expected Days Of Charter:**	3 yrs	**Year 3 Rate:**	
		Cancellation Terms:	Non Cancelable	**Bid Ref #:**	
Shell Focal Point:	Kate Marstall	**Terminal Hired:**		**Charge Code:**	

Reason Hired:
Alaska Oil Spill Response

Special Equipment:

Special Conditions:
Port of Delivery and Re-Delivery is Seattle, Washington.

The delivery date noted in this VRO is an estimated delivery date and will be firmed up as the project timeline is confirmed.

Year 1 rate is fixed at the rate contained in this VRO. The Year 2 and Year 3 rates of the initial term will be adjusted for changes in the Consumer Price Index, US - All Consumers upon each anniversary date. The new rate shall be the product of the existing rate and the percentage change in index values between the month of the anniversary date and the same month of the prior year. Each subsequent increase (including option years) will be priced using the same methodology

During periods when the vessel crew is demobilized the day rate for the vessel shall be $2,500 per day.

If it so chooses, Charterer may return the vessel to Seattle, WA or some other mutually agreeable location during each off-season. In such an event Owner is encouraged to seek alternate employment for the vessel. If alternate employment can be secured, Charterer will not be responsible for any portion of its contracted day rate during the period of alternate employment (unless such employment is at a lower rate than the charter rate).

Owner and Charterer have agreed that in addition to the initial 3-year term, Charterer is granted (3) 3-year contract extensions at Charterers option.

The term of the VRO is 3-years firm and non-cancelable by either party unless by mutual agreement. However, in the event Charterer deems that Owner's safety program is insufficient, Charterer retains the ability to cancel the agreement.

Misc:

Vessel Specifications

DP Type:		**Seats:**	0	**Water Cap (bbls):**	4000	**Fire Monitors:**	0
Overall Length (ft):	90	**Min Draft (ft):**	6	**Fuel Cap (gals):**	60000		
Overall Width (ft):	32	**Max Draft (ft):**	8	**Liquid Mud Cap (bbls):**	0		
Clear Deck Length (ft):	0	**Max Speed (kts):**	0	**Dry Bulk Cap (ft3):**	0		

FAX SIGNED ACCEPTANCE TO ATTENTION OF SHELL SUPPLY CHAIN MANAGEMENT AT 504-728-0637

STATEMENT OF CONTRACTUAL TERMS
CROWLEY POINT BARROW TUG

CONFIDENTIAL

Vessel Request Order

(Ref: SOI/SDDI/SDPI Service Agreements)

VRO Number: 407
Date of issue: 11/17/2006

Clear Deck Widt (ft): 0 Cruise Speed (kts): 0 Methanol Cap (bbls): 0

Acceptance

	Contractor		Shell
Print Name:	Michael P. O'Shea	Print Name:	Alan T. Power
Signature:	Michael P. O'Shea	Signature:	Alan T. Power
Title:	Authorized Agent	Title:	SCM Representative
Date:	12/13/06	Date:	12-12-06

FAX SIGNED ACCEPTANCE TO ATTENTION OF SHELL SUPPLY CHAIN MANAGEMENT AT 504-728-0637

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APPENDIX C:
FUEL TRANSFER PROCEDURES

1. ***Kulluk* Fuel Transfer Procedures**
2. ***Frontier Discoverer* Fuel Transfer Procedures**
3. **Oil Spill Response Vessel and Barge Fuel Transfer Procedures**

1. *Kulluk* Fuel Transfer Procedures

DIESEL/HELI-FUEL

TRANSFER MANUAL

FOR THE MODU
KULLUK

INTRODUCTION

This section of the manual is to be used as a guide for the safe transfer of diesel oil between vessels (supply ships, fuel barges, etc.) and the MODU *Kulluk* and for fuel transfers that are internal to the *Kulluk*.

All practices comply with procedures set by the Canadian Coast Guard Arctic Ship Safety and the United States Coast Guard as interpreted from various publications.

CONTENTS FOR DRILL RIG FUEL TRANSFER SECTION

1.0 FUEL OIL SYSTEM OVERVIEW

The Fuel Oil System consists of:

-	Three Hull Storage Tanks	(1603.3 m^3 total)
-	Two Fuel Oil Transfer Pumps	(6.3 litres/sec.ea.)
-	Two Fuel Oil Booster Pumps	(3.15 litres/sec. ea.)
-	One Fuel Oil Settling Tank	(14 m^3)
-	One clean Oil Tank	(14 m^3)
-	Various Misc.Tanks	(13.1 m^3 total)
-	Two Fuel Oil Filters	
-	Two Fuel Oil Purifiers	
-	Associated Strainers, F.O. Meters, Piping	

The three hull storage tanks (5P-10C; 5P-12C2; 5S-11C) have a total capacity of 1603.3 m^3. These tanks are located in the 5m level and are each fitted with emergency shut off valves (air operated) on both the high and low suctions, high level alarms, low level alarms, remote level indicators, and armored-type gauge glasses which are fitted to the storage tanks via self closing valves (spring close/air open). In addition each tank is also fitted with manual sounding pipes which are accessed from the 10 m level.

These tanks can be filled, via a duplex strainer located on the 10 m level, from any one of three loading stations located on the main deck (port deck, fwd. deck, starboard deck). Each station is equipped with dry break fittings (5") and a permanent drip tray.

The two fuel oil transfer pumps are used to transfer fuel from the hull storage tanks to the fuel oil setting tank or to discharge fuel oil via the loading stations to one of the support vessels. (ice breaker/supply ship). As these pumps can also be used to off load fuel each loading station is equipped with a start/stop station for remote operation of the pumps. The two transfer pumps can also be operated from a remote stop/start station near the F.O. settling tank and from local stations at the pumps themselves.

In operation the pumps draw fuel from the storage tanks through one of the two suctions and discharge it via a duplex strainer and F.O. meter to either the deck stations or the settling tank.

Fuel in the settling tank is then drawn through the fuel oil purifier where solids and water are removed and the clean fuel discharged to the clean oil tank which is also used as the diesel engine day tank. Both the settling tank and the clean oil tank are fitted with high and low suctions, emergency shut off valves (air operated), low level alarms, flat type gauge glasses, self closing sludge valves and overflow pipes which return excess F.O. to the hull tank 5P - 10C .

The fuel oil booster pumps can be used to transfer fuel from the settling tank to the clean oil tank and from the clean oil tank through two sock type filters to the fuel oil tanks of;

- boiler
- cold start compressor
- emergency generator
- incinerator
- deck cranes
- crude oil tank
- Schlumberger unit
- survival anchor windlass diesel
- and to the mud pits.

The boiler day tank, emergency generator day tank and the incinerator day tank are all fitted with overflow pipes which return excess fuel back to the hull storage tanks.

1.1 PRE TRANSFER REQUIREMENTS

Before any fuel transfer operation can take place that involves either the taking on of fuel or the discharging of fuel the following must be adhered to.

NO VESSEL TO VESSEL TRANSFERS WILL TAKE PLACE ON ANY RED ALERT STATUS

a) The appropriate local authorities must be notified of the intent to transfer fuel as soon as is practical before the transfer operation is begun. Preferably 24 hours prior to commencement.

I In Canadian Waters

Contact: Arctic Canada Traffic Systems (Nordreg) via Coast Guard Radio in Inuvik

II In American Waters

Contact:

b) If the transfer location is outside port facility areas, a warning announcement must be broadcast to vessels in the area stating the names of the vessels involved in the transfer, their geographic location and expected duration of transfer. A wide berth should be requested. Once the transfer operation has been completed the warning should be cancelled.

c) Pre-transfer checklist must be completed.

d) Emergency procedures must be reviewed.

e) There shall be a person in charge on the transferring vessel or facility and the receiving vessel or facility who will remain at the sites of the oil transfer operation and be immediately available to the oil transfer personnel. Each person must be familiar with vessel oil transfer procedures and conduct the transfer in accordance with them.

f) The person in charge of oil transfer operations on the transferring vessel or facility shall convene a conference to ensure that each person in charge understands the following details of the transfer operations:

(1) The identity of the product to be transferred;
(2) the sequence of transfer operations;
(3) the transfer rate;

(4) the name or title and location of each person participating in the transfer operations;
(5) details of the transferring and receiving systems;
(6) critical stages of the transfer operation;
(7) federal, provincial, state, and local rules that apply to the transfer of oil;
(8) emergency procedures;
(9) discharge containment procedures;
(10) discharge reporting procedures;
(11) watch or shift arrangement;
(12) transfer shut-down procedures.

g) The vessel alert status be upgraded to yellow and appropriate announcements made.

h) Both the transferring vessel/rig and the receiving vessel/rig must have a person standing by at the loading/offloading station in a position that enables them to monitor the fuelling hose at all times. Both parties must be familiar with the operation of the pump emergency stops and be able to communicate with each other via U.H.F. radio.

i) The area authority will be responsible to verify correct alignment of valves.

j) The area authority will be responsible for the posting of all personnel required for a safe fuel transfer.

k) A person must be assigned to observe the rate of loading for the purpose of avoiding an overflow of tanks. This person must also be able to communicate with the transferring location.

1.2 POST TRANSFER REQUIREMENTS

a) Complete post transfer check list.

b) File all checklists with appropriate signatures.

1.3 EMERGENCY PROCEDURES

1.3.1 Stop Transfer Immediately in the Event Of

- An environmental or well red alert.
- Lost communications.
- Sign of spillage, or damage to hoses and couplings,
- Any detection of accumulated gases.
- Major increase in wind, swell or hazardous ice movement.
- When an electrical storm is present or predicted.
- Severe deterioration in ice or visibility conditions.

1.3.2 Oil Spill Situation

a) Immediately notify Operator's Representative.

b) Initiate spill contingency plan and Emergency Notification.

b) Operator and Drilling unit owner will inform appropriate government Regulatory Agencies, of the situation as follows:

- Location and time of spill.
- Type and approximate quantity of product spilled.
- Precautions being taken at time of notice.
- Current state of tide and local weather.
- Extent of local and shipboard containment and recovery resources.
- Personnel number and skills available on site.
- Request extra resources, and advice, if needed.

EXCEPT AS PERMITTED UNDER PARAGRAPH (b) OF THIS SECTION, NO PERSON MAY RESUME AN OIL TRANSFER OPERATION AFTER IT HAS BEEN STOPPED UNLESS:

- Oil discharge in the oil transfer operation work area is cleaned up, and;
- oil discharged into the water or upon the adjoining shoreline is cleaned up,
- AND ONLY GOVERNMENT AUTHORITY MAY AUTHORIZE RESUMING THE OIL TRANSFER OPERATION IF IT IS DEEMED APPROPRIATE.

1.4 VESSEL TO VESSEL PRE-TRANSFER CHECKLIST

VESSEL TO VESSEL PRE-TRANSFER CHECKLIST		
TASKS	**COMMENTS**	**Area Authority**
A pre-transfer conference. Held		
A pre-transfer announcement made.		
All personnel involved aware of transfer procedures.		
Vessel alert status upgraded to yellow.		
U.H.F. radios will be required, are they fully operational and intrinsically safe?		
Is all firefighting equipment tested, fully operational and in proper location?		
All regulations for transfer are being understood and observed;		
Are flashlights to be used approved?		
Spill containment equipment and materials readily available.		
Ensure transfer emergency shutdown system is tested.		
Hoses to be used have been checked for: a) correct diameter & length to reach other station		
b) chafing, cracks, or other deformation,		
c) damaged fittings,		
d) Lugs on camlock fittings wired.		
e) Pressure rating satisfactory.		
f) Ensure that transfer hoses are adequately supported.		
g) Rubber seal on camlock fittings is in good condition.		
All other craft alongside are authorized and following ignition hazard warnings, etc.		
Has transferring/receiving vessel been electrically bonded to rig?		

1.4 VESSEL TO VESSEL PRE-TRANSFER CHECKLIST

VESSEL TO VESSEL PRE-TRANSFER CHECKLIST		
TASKS	**COMMENTS**	**Area Authority**
Ship's electrical leakage to ground is at a safe level.		
Monitor gas concentration accumulation in still air conditions.		
All doors and ports which are required to be closed are closed.		
All scupper plugs in place.		
Deck area around filling station free of debris		
Manifolds drained before removing blanks.		
Are pressure gauges operational?		
Drip trays all have plugs fitted.		
Ensure that lighting is adequate for all transfer requirements.		
Check all moorings regularly.		
All tank vents open, and flash screens in place.		
Areas authority to verify valve alignment.		
All valves not used shut and blanked on the fuelling stations not being used..		
Regularly check the water around vessels for evidence of leakage.		
Keep a continuous check on hose pressure to ensure recommended pressure is not exceeded.		
All tanks sounded manually prior to beginning of transfer.		
Personnel assigned to deck station.		
Personnel assigned to observe rate of loading.		

Officer In Charge (MATE)	Name:	
	Title:	
Officer In Charge (ENGINEER)	Name:	
	Title:	

1.5 VESSEL TO VESSEL POST-TRANSFER CHECKLIST

VESSEL TO VESSEL POST TRANSFER CHECKLIST			
TASKS	**COMMENTS**		**Area Authority**
Have hoses been drained and capped prior to their return to the vessel (Rig)?			
Ensure that all vessel (Rig) valves and tanks are closed.			
Ensure that hoses and other transfer equipment are properly stowed.			
A post-transfer PA announcement.			
Vessel alert returned to appropriate status transfer recorded in oil record book.			
Officer In Charge (MATE)	Name:		
	Title:		
Officer In Charge (ENGINEER)	Name:		
	Title:		

1.6 INTERNAL FUEL TRANSFER

NO INTERNAL FUEL TRANSFERS ARE TO TAKE PLACE DURING ANY RED ALERT STATUS WITHOUT THE PRIOR APPROVAL OF THE MAINTENANCE SUPERINTENDENT.

INTERNAL FUEL TRANSFER PROCEDURE

General

NO INTERNAL FUEL TRANSFERS ARE TO TAKE PLACE DURING ANY RED ALERT CONDITIONS WITHOUT THE PRIOR APPROVAL OF THE MAINTENANCE SUPERINTENDENT.

Internal fuel transfers will be the sole responsibility of the mechanic ll on shift, exceptions to this rule must be approved by the Maintenance Superintendent.

It is the responsibility of the crane operators, watch keepers, and service hands to make their
fuel needs known to this man.

He will be the only man to open valves and operate pumps. Fueling of the well test unit, cranes,
survival windlass, lifeboats, fast rescue boat, or transfer to the mud pits will be requested by the
equipment user but carried out by this man.

This is a priority task and he will not answer telephone pages etc. during this period. While the
main transfer pump is running he will NOT leave the control switch.

If a vessel general alarm should occur he will shut down any pumps running and close any valves
in use. He will then report to his duty station. Upon reporting to his station he will communicate the internal fuel tank status to the Maintenance Superintendent.

Internal fuel transfer will take place from 10:00 to 12:00 on day shift and 22:00 to 24:00 on night shift.

Fuel will NOT be transferred at any other time, except at the direct direction of the Maintenance Superintendent.

All fuel system discharge points external to the machinery spaces will be kept locked to prevent any
accidental tampering with the valves. Keys will be in the possession of the Mechanic ll.

Fuel system valves used during transfer will all be closed once transfer is completed.

Drain plugs will be kept in fuel oil catch basins at all times, except during cleaning.

The INTERNAL FUEL TRANSFER check list will be filled out during and signed after each transfer. This checklist will provide the daily fuel usage figures for the daily log sheets. Each action on the checklist will be initialled by the mechanic ll.

KULLUK INTERNAL F.O. TRANSFER CHECK LIST

VALVE STATUS DATE___________ TIME____________

	VALVE	OPEN	CLOSED
5S-11C	4HV-1 upper suction		
	4HV-2 lower suction		
5P-10C	4HV-3 upper suction		
	4HV-4 lower suction		
5P-12C	4HV-5 upper suction		
	4HV-6 lower suction		
PUMP MANIFOLD	4-HV7		
	4HV-9		
	4HV-8		
TRANSFER PUMP	4HV-10 suction #1		
	4HV-22 discharge #1		
	4HV-11 suction #2		
	4HV-24 discharge #2		
FLOW METER	4HV-26 to settling tank		
	4HV-28 to deck fill		
	4HV-27 inlet		
	4HV-30 outlet		
SETTLING TANK	4HV-31 inlet		
	2HV-4 upper suction		
	2HV-2 lower suction		
	4HV-5 upper inlet bypass		
	2HV-32 sump drain		
CLEAN OIL TANK	2HV-13 lower suction		
	2HV-15 upper suction		
	2HV-33 sump drain		
	2HV-7 transfer pump suction		
PUMP #1	2HV-9 suction		
	2HV-62 discharge		
PUMP#2	2HV-10 suction		
	2HV-64 discharge		
HAND PUMP	2HV-11 suction		
	2HV-65 discharge		
Common bypass	2HV-60		
FILTER #1	2HV-67 inlet		
	2HV-18 outlet		
	2HV-83 sump		
FILTER #2	2HV-67 inlet		
	2HV-70 outlet		
	2HV-88 sump		
Common Discharge	2HV-55		
CENTRIFUGE #1	5HV-2 inlet		
	5HV-11 outlet		
	5HV-5 heater inlet		
	5HV-6 heater outlet		
CENTRIFUGE #2	5HV-1 inlet		
	5HV-13 outlet		
	5HV-7 heater inlet		

5HV-8 heater outlet

	VALVE	OPEN	CLOSED
MAIN ENGINES	2HV-17 supply #1		
	2HV-18 supply #2		
	2HV-19 supply #3		
	2HV-21 return #1		
	2HV-23 return #2		
	2HV-25 return #3		
BOILER TANK	2HV-74 fill		
	2HV-44 high suction		
	2HV-42 low suction		
	2HV-34 sump		
DIESEL COMP.	2HV-75 supply		
WATER HEATERS	2HV-47 inlet #1		
	2HV-48 inlet #2		
BOILERS	2HV-132 supply #1		
	2HV-131 supply #2		
STEAM GENERATOR	2HV-130 supply		
	2HV-101 return		
INCINERATOR	2H-127 inlet		
	2HV-29 suction		
EMERGENCY GEN.	2H-119 inlet		
	2HV-26 suction		
	2HV-28 return		
DECK SIDE EQUIP.	2HV-77 crane #1		
	2HV-76 crane #2		
	2HV-129 crane #3		
	2HV-122 testing unit		
	2H-132 mud pits		
	2HV-80 well logging unit		
	2HV-82 windlass		
LOADING STAT.	4HV-32 fwd.		
	4HV-33 stb.		
	4HV-35 p.		

TANK LEVEL	START	FINISH
5S-11C		
5P-10C		
5P-12C		

FLOW METER READING
4HV-26 to settling tank
4HV-28 to deck fill main

FUEL TRANSFER SYSTEM STATUS

____

TOTAL FUEL TRANSFERRED ______________________________

TRANSFER CARRIED OUT BY ______________________________
(signature)

NOTE:
INITIAL STATUS OF EACH VALVE
REFER TO AS BUILD DRAWING MB#3 FOR SYSTEM SCHEMATIC
SCHEMATICS ARE POSTED BY PUMP CONTROLS

FUEL TRANSFER PROCEDURE

Contact control room to check that the vessel is not on RED alert status.

Confirm that all fuel supply valves external to the machinery spaces are closed and LOCKED
closed.

COMPLETE THE INTERNAL FUEL TRANSFER CHECK LIST AS THIS PROCEDURE IS CARRIED OUT.

NOTE; IF THERE IS A LEAKING OR OPEN DISCHARGE VALVE, IT WILL SPILL FUEL AT ANY TIME THAT THE PUMP IS RUNNING. ALL SERVICES DOWNSTREAM OF THE CLEAN OIL TANK ARE FED FROM A COMMON HEADER.

To supply fuel to operating equipment day tanks:

Open appropriate valves for the desired fuel pump and filter,and pump fuel from clean oil tank through fuel filters to required day tanks. Do not carry out any other operation while this pump is operating.

If the cranes, etc. require fuel, the mechanic ll will fuel them and lock the valve closed when complete.

NOTE: all valves should be closed, except those required for the normal operation of machinery.

To supply fuel to the settling tank from the main fuel tanks on +5 level:

Note tank Levels and flowmeter reading before start.

Open the appropriate valves to draw fuel from the tank desired, line up the desired pump,
and flow meter. All other valves should be closed.

Return to the engine room and operate the pump from the remote switch by the day tanks. Do not leave until this operation is complete

Once complete and the pump is stopped, return to the +5 pump room and record the fuel tank levels
and the flow meter reading.

NOTE: close all valves.

While out this procedure, inspect fuel system for any sign of leaks. Fill out status blank on checklist.

Sign completed form and note fuel consumption on daily mechanical log. Return completed
checklist to Maintenance Superintendent at end of shift.

1.7 DIESEL OIL SYSTEM

1.7.1 Product Specifications and Material Safety Data Sheets

DIESEL O

PRODUCT CHARACTERISTIC	*SPECIFICATION* *MIN*	*MAX*	*TEST METHOD* *ASTM*
Pour Point, °C (°F)		-15 (5)	D 97
Cloud Point, °C (°F)		-10 (14)	D2500
Density, kg/L @ 15°C		0.900	D1298
(API Gravity at 60° F)		(25.6)	
Distillation, °C (° F)			D 86
10% Recovered		238 (460)	
90% Recovered		360 (680)	
End Point		371 (699)	
Flash Point, °C (°F)	52 (126)	80 (196)	D 93
Kinematic Viscosity, cSt @ 40°C (SSV at 100 ° F)	1.4 (30)	4.1 (39.5)	D 445
Sulpher, % mass		0.5	D2622
Mercaptan Sulfer, % mass		.005	D3227
Corrosion Copper Strip at 3 h @ 100° C (3h at 210° F)		No. 1	D 130
Water and Sediment, % vol		0.05	D1796
Ash, % mass		0.01	D 482
Carbon Residue (RCR), on 10% bottoms, % mass		0.20	D 524
Total Acid Number, mg KOH/g (% mass KOH)		0.10 (0.01)	D 974
Strong Acid Number, mg KOH/g (% mass KOH)		<0.05 (<0.005)	D 974
Strong Base Number, mg KOH/g (% mass KOH)		<0.05 (<0.005)	D 974
Cetane Number	40		D 613
Electrical Conductivity, pS/m @ 25°C			D2624
Feb. 1 - Jul. 31	135		
Aug. 1 - Jan. 31	200		
Appearance	Bright & Clear		D4176
Colour		3.0	D1500
Stability, Insoluble, mg/100 mL (oz/gal)		2.0 (2.67×10^{-5})	D2274

TRADE NAMES:	Type & Diesel Fuel	SUPERCEDES:
CGSB REFERENCES:	CAN2-3.6-M83 Type B	PLC: M-061

MATERIAL SAFETY DATA SHEET

WHMIS CLASSIFICATION

Combustible Liquid (Class B3)
Poisonous Material (Class D2)

PRODUCT CODE

DATE: April 11, 1990

SECTION I MATERIAL IDENTIFICATION

Trade Name:	DIESEL FUEL
Other Names:	Diesel 20X, 0, 15, 20, 25, 30, 40, 40S, 50, 60 Diesel AA, Diesel GM 35, 45 Domestic Marine Diesel, Power Plus Diesel
Chemical Synonyms and Family:	Petroleum Hydrocarbon
Names of Manufacturer/Supplier Address & Emergency Phone Number:	Petro-Canada Inc. (403) 296-3000 P.O. Box 2844, Petro-Canada Centre Calgary, Alberta T2P 3E3
Poison Control Centre Numbers:	Consult local telephone directory for emergency numbers.
Application:	Diesel Fuels are distillate fuels suitable for use in high and medium speed internal combustion engines of the compression ignition type.

SECTION II TRANSPORTATION

UN Number: 1202 Primary Classification: 3.3 Subsidiary Classification: 9.2

Compatibility Groups: N/A CANUTEC Transport Emergency No. (613) 996-6666

SECTION III COMPOSITION

COMPONENTS	ALLOWABLE LIMITS (8 HR)	% (VOL)	CAS #
Complex mixture of petroleum hydrocarbons (C_9-C_{13})	5 mg/m^3 (oil mist) ** (3.12 x 10^{-4} lb/1000 ft^3)	>99.9	68334-30-5
Anti-static additive, cetane improver, pour point depressant.	N/A	<0.1	N/A

° Aromatic content is 38% maximum (Benzene nil)
°° Petro-Canada recommendation.

NR-Not Regulated N/A- Not Applicable U-Unknown Cette fiche est aussi disponible en francais.

Trade Name: DIESEL FUEL

SECTION IV PHYSICAL DATA

DENSITY: (0 15°C)(60° F)	0.78-0.90 kg/L 56 - 25 API	Boiling Point/Range: (@ 1 atm)(14.7 psi)	145-371°C (approx) (293 - 700 °F)
Vapor Pressure: (approx) (O 25°C)(77 °F)	1 kPa (approx) (0.145 psi)	Percent Volatile: (@ 20°C)(68°F)	25% in 10 Hr.
Vapor Density: (O 20°C)(68°F)	4.5 (approx)	Evaporation Rate:	N/A
Solubility in Water:	Insoluble		
Viscosity (Kinematic): (O 40°C)(100 °F)	1.2-4.1 cSt (29 - 40 SSO)		
Pour Point:	-45 to 6°C (-50 to 20° F)	Appearance & Odor:	Clear to yellow, bright oily liquid with hydrocarbon odor.°°

°° May be dyed purple or red for taxation purposes.

SECTION V FIRE & EXPLOSION DATA

Flash Point (method used - COC):	40°C (minimum)
Flammable limits in air (% by volume):	Lower 0.7% Upper 6.0%
Auto-Ignition Temperature:	>225°C (437°F)
Fire and Explosion Hazards: MODERATE FIRE HAZARD	Treat as combustible liquid.
Extinguishing Media:	Foam, dry chemical, carbon dioxide for small fires, water spray. Do not cut, drill or weld empty containers.
Fire Fighting Procedures:	Use full protective equipment and self-contained breathing apparatus. Cover with extinguishing agent. Use water spray to cool fire-exposed containers and as a protective screen. Do not point solid water stream directly into burning product to avoid spread fire.

Trade Name: DIESEL FUEL

SECTION VI HEALTH HAZARD INFORMATION

Toxicity Data

° Estimated acute LD_{50} - 7650 mg/kg (rat, oral); practically non-toxic. Rabbit primary dermal irritation index (Draize) - 6.8 extremely irritating.
Rabbit eye irritation index (Draize) - O: non irritating

Effects of Overexposure

Inhalation: Inhalation of vapors or mist will cause headaches, nausea, dizziness, and intoxication: severe central nervous system depressant.

Skin and Eyes: Irritation, defatting and drying of skin. Prolonged exposure to skin may cause chapping, cracking or possibly dermatitis. Eye contact may cause irritation, but not permanent damage.

Ingestion:

Emergency and First Aid Procedures Information

Skin: Remove contaminated clothing - launder before reuse. Soap and water wash.
Discard saturated leather articles.

Eyes: Copious warm water flush - 15 minutes. Physician assessment mandatory.

Inhalation: Evacuate to fresh air. Apply Cardio Pulmonary Resuscitation if required. Administer oxygen if available. If resuscitation is required, physician assessment is mandatory.

Ingestion: DO NOT INDUCE VOMITING. If vomiting - take care to prevent aspiration. Give 250 ml (1/2 pint) of milk to drink. Mandatory physician assessment.

Notes to Physician: Gastric lavage should only be done after endotracheal intubation in view of the risk of aspiration which can cause serious chemical pneumonitis for which antibiotic and corticosteroid therapy may be indicated.

° Based on API Study #79-6 on Diesel Fuel where LD_{50} = 9.0 ml/kg.

SECTION VII REACTIVITY DATA

Stability:	Stable under normal storage and use.
Conditions to avoid:	Excessive heat, sources of ignition, formation of oil mist.
Materials to avoid:	Strong oxidizing agents (strong acids, peroxides, chlorine, etc).
Hazardous Decomposition products:	COx, SOx, smoke on combustion.
Can hazardous polymerization occur?:	No.

SECTION VIII SPILL OR LEAK PROCEDURES

Steps to be taken if material is released or spilled:	Avoid contact. Use full protective equipment and breathing apparatus if required. ELIMINATE IGNITION SOURCES. Contain spill. Absorb with inert absorbent such as dry clay, sand or diatomaceous earth, commercial sorbents, or recover using electrically grounded explosion-proof pumps. Place absorbent in closed metal containers. DO NOT FLUSH TO SEWER.
Waste Disposal Method:	Incinerate at licensed waste reclaimer facility.

SECTION IX SPECIAL PROTECTION INFORMATION

Ventilation:	General ventilation. Use explosion-proof mechanical ventilation suitable for group D atmospheres.
Respiratory Protection:	Up to 5 mg/m^3 (3.12 x 10^{-4} lb/1000 ft^3)(oil mist - none required). From 5 to 50 mg/m^3(3.12 x 10^{-4} to 3.12 x 10^{-3} lb/1000 ft^3) use an approved organic vapor respirator suitable for oil mist in areas with sufficient oxygen. Above 50 mg/m^3, use full-face air-supplied or self-contained breathing apparatus.
Protective Gloves:	For direct contact with hydrocarbons of more than 2 hours, VITON or NITRILE recommended. Otherwise, PVC gloves may be worn.
Eye Protection:	Chemical goggles if splashing likely.
Other Protective Clothing:	Long sleeved clothing to minimize skin contact.

Trade Name: DIESEL FUEL

SECTION X SPECIAL PRECAUTIONS

Store in cool, well-ventilated area. Electrically ground/bond during pumping or transfer to avoid static accumulation. AVOID SKIN CONTACT AND INHALATION. Practice good personal hygiene. DO NOT SIPHON BY MOUTH OR USE AS A CLEANING SOLVENT. Launder work clothes frequently. Petro-Canada recommends an allowable exposure of 5 mg/m^3 (oil mist) when handling DIESEL FUELS.

SECTION XI REFERENCES

ACGIH, Threshold Limit Values and Biological Exposure Indices for 1989-90.

CONCAWE, First Aid Measures, Medical Toxicology Data and Professional Advice to Clinicians on Petroleum Products, February 1983.

API, Petroleum Process Stream Terms included in the Chemical Substances Inventory Under the Toxic Substances Control Act (TSCA). 1983

Environment Canada Manual for Spills of Hazardous Materials, March 1984.

Patty's Industrial Hygiene and Toxicology, 3rd Edition, Vol. 2B, 1981.

NIOSH, The Industrial Environment - Its Evaluation and Control, 1973.

API, Acute Toxicity Tests on Diesel Fuel, API # 79-6, 1980.

API, The Toxicology of Petroleum Hydrocarbons, May, 1982.

Petro-Canada and it affiliates assume no responsibility for injury to anyone caused by the material if reasonable safety procedures are not adhered to as stipulated in the data sheet. Additionally, Petro-Canad Inc. and its affiliates assume no responsibility for injury to anyone caused by abnormal use of the material even if reasonable safety procedures are followed. Furthermore, vendee and third persons assume the risk in their use of the material.

INDEX

II. HELI-FUEL SYSTEM

2.1 HELI-FUEL SYSTEM DESCRIPTION

This system provides storage, filtering and transfer of fuel from the fuel pods located on the starboard side aft of the main deck, through the pumps and filters to the delivery skid on the heli-deck.

The two fuel pods are connected to the transfer piping via quick disconnect couplings, with a dry break valve, expansion loop and emergency shut down valve. The emergency shut down valve is operated pneumatically from the control room (central control panel), or manually locally.

The pumps are controlled from a panel in the pump room and activated as required from the fuel metering skid on the heli-deck.

The fuel skid includes a go-no-go filter, a meter, electric rewind hose reel, a nozzle, and a ground cable all encased in a fibre glass box.

See figure 1.

Heli-Fuel Equipment

Centrifugal Pumps

Manufacturer: Roto-King
Quantity: 2
Model No: PUM 00196
Serial No: 1907791, 1907792
Type: AL93
RPM: 1150
Capacity: 0.23 m^3/min (60 gal) (230 liters)
Disch Press: 690 kPa (100 psi) 69 m (210 ft) head

Electric Motors

Manufacturer: Etotech Electric Motor
Quantity: 2
Model No: 6727035 Explosion Proof _X_ yes __ no
Horse Power: 7.5 @ 1150 RPM
Volts: 230/460 v
Amps: 20 amps/10 amps
Cycles: 60
Phase: 3
Frame: 254T
Serial No: SA-006A/B

Filter Separator

Manufacturer: "3L" Filters Ltd.
Quantity: 2
Model: WAV-2028
Serial: 7352-1
Dif Change
Press: 15 PSIG
Op Press: 150 PSIG (max)
Op Temp: 100° F (max)
Hydro Test
Press: 225 PSIG
Capacity: 200 GPM (max)

Filter Coalescer

Manufacturer: "3L" Filters Ltd.
Quantity: 2
Capacity: 3.8 l/S
Disc. Press: 1034 kPa @ 1.8° C
OP Press: 345 kPa @ 1.8° C
0.57 m OD x 1.42 S/FLG

Helicopter Fuel Metering Skid

Filter Separator
Manufacturer: 3-L Filters Ltd, Cambridge Ontario
Model: 3L-75-5
Serial: 7358-1
Op Press: 152 psi

Meter

Manufacturer: Meter Liq Control Corp.
Serial: 112821
Rate: 225 LPM
Model: M5-44200-2

Hose Reel

Manufacturer: MSL Vancouver B.C. (McIntosh)
Model: EAC 1.5-100
Serial: L2-1
Size: 11" dia. Drum
Drive Motor: 1/2 HP Imperial Electric Motor

Hose

Manufacturer: Hewitt (Arctic)
Length: 100'
Dia: 1 1/2"

Ground Reel (Static)

Manufacturer: McIntosh Supply
Type: Spring Rewind
Model: SD2A2-100

Fuelling Nozzles

Quantity: 1
Manufacturer: Dover
Model: 235
Type: Gas pump type 1-½" straight nozzle

Quantity: 1
Manufacturer: JC Carter Co.
Parts #: 60427
Serial #: 23245
Type: Dry break type (Buckeye) 2-½" nozzle

Fibre Glass Cabinet

Manufacturer: McIntosh Supply
Size: 84" X 54" X 39"
Weight: 200 lbs

Heli Fuel Pods

Manufacturer: Specific Equipment Company (Houston, Texas)
Capacity: 2.2 m^3 each
Weight: Empty: 2.53 mt (5,566 lbs)
Weight: Full: 4.70 mt (10,315 lbs)

2.2 HELI-DECK SAFETY EQUIPMENT

Helicopter Firefighting Crash Kit (Outside Reception Room)

1	Jaws of Life
1	Bolt Cutters 24"
3	Seat Belt Cutters
1	Hatchet
2	Burn Blankets

Helicopter Firefighting Equipment (Reception Room)

3	Full Length Fire Coats
3	Pairs of Steel Toed Rubber Boots
3	Firefighting Helmets with Shields
1	Fire Approach Suit (Fyrepel Approach Suit)

Fire Locker #3 (3rd Deck By SCR Entrance)

2	Fire Helmets
2	Full Length Coats
4	Pair Fire Gloves
3	Pairs of Boots (Steel Shank/Toes)
2	Fire Approach Suits
1	Tool Kit
3	Rechargeable Lanterns
3	Safety Lines
2	Fire Axes

2.3 FIXED DRY CHEMICAL SYSTEM (HELIDECK SERVICE)

- 1 x 907 kg (2000 lb) unit
- Purple K Chemical
- Nitrogen Actuator Locations: Helideck port and stbd access ways
- The system can also be activated at the dry chemical tank location by manually operating the nitrogen release valves.
- Hose Locations: Port and Stbd access way locations
  Nozzle Discharge Rate: Flow 3.4 kg/sec (7.5 lb/sec)
  Range 18.2 m - 21.3 m (60/70 ft) nominal

<u>To Operate Hose Reel</u>

- Check that nozzle discharge valve is closed.
- Pull pin on valve of nitrogen cylinder.
- Open valve by rotating lever fully.
- Unwind hose from reel.
- Push nozzle valve handle fully forward to discharge powder.

CAUTION: DO NOT LET GO OF NOZZLE DURING POWDER FLOW.

<u>If Hose Reel Does Not Operate</u>

- After approximately 20 seconds close nozzle discharge valve
- Go to the main unit and operate opening appropriate valves manually.

<u>System Description</u>

The fixed dry powder extinguisher system provides areas of high fire susceptibility with ready access to volumes of dry powder for fighting fires which can not be handled using the portable extinguishers.

The 907 kg (2,000 lb) unit is located in the Heli Foam room (3rd deck of the engine house). This skid unit supplies two hose reels which are located on the landings of the port and starboard helideck access stairways. Dry powder used with the helideck foam system is a very effective method of fighting aircraft fires, especially when jet fuel is involved.

Operating Policies and Procedures

Authority to activate these systems must come from the OIM or his designate.

Activation of the helideck system is at the discretion of the HLO during helicopter operations as the OIM designate.

Each unit is activated by opening the manual operating lever located on the skid or by opening the remote charging valve assembly located next to each hose reel. In either case, opening the valve causes the skid mounted nitrogen cylinders to charge the system. Actual discharge of the dry powder is controlled from the hose reel discharge nozzle.

Note: *BEFORE REMOVAL OF ANY OF THE NITROGEN BOTTLES, ALL PRESSURE MUST BE BLED OUT OF ENTIRE SYSTEM. ONCE REMOVED THEY MUST BE SENT ASHORE AS SOON AS POSSIBLE FOR RECHARGING.*

2.4 FOAM FIRE EXTINGUISHING SYSTEM

System Equipment

- One 757 l (200 gal) capacity foam unit - bladder type (Feecon horizontal SNP tank).
- Two Foam Monitors - 1,893 l/min (500 gal/min) flow capacity maximum (nat. foam PC 50).
- Three Foam Dispensing Hose Reels - 30.5 m (100 ft) x 38 mm (1-1/2") hose (Servall, Goodyear).
  38 mm (1-1/2") nozzle (Rockwood) 373 l/min (100 gpm) flow capacity.
- Associated piping.

System Description

The foam system is provided to quickly suppress helicopter and fuel related fires on the helideck and helifuel storage area.

The foam system consists of a skid having a 757 l (200 gal) tank for the concentrated foaming solution, two foam proportioners (one each for the monitors and hose reels), and associated piping. The fire water pumps supply salt water to the skid where the water is control mixed with the foaming solution. The system is capable of discharging a maximum of 2,840 l/min (750 gal/min) of foam.

The skid is located in the heat foam room on the 3rd deck of the engine house. It is accessible only from an exterior walk way.

The two foam monitors are located on the forward portion of the helideck, one each on the port and starboard sides. A foam dispensing hose reel is located on the landing of each of the rear access stairways from the third deck of the quarters. The third being on the main deck forward of the heli-pad storage area.

The system is manually activated by one of the control boxes located next to each monitor and hose reel. Activation of the system automatically causes alarms on the central fire/gas control panel located in the control room.

Operating Policies and Procedures

At each hose reel and the two monitors there are small red boxes. Inside are two buttons labeled WATER and FOAM. Push WATER first, wait until water is flowing from the nozzle under pressure then activate foam by pushing foam button. System will not work in reverse order. Ensure that the fire line/foam valve is opened at each monitor and nozzle in use (located at each station).

Authority to activate the foam system is the HLOs during helicopter operations.

2.5 RECEIVING JET-B FUEL ON BOARD

From Vessel or Helicopter

From either systems of transportation the fuel will be contained in a heli-fuel pod.

If the fuel is received in a red heli-pod that is identical to the 2 heli-pods that are incorporated in the fueling system changing pods is a simple procedure.

a) Empty Tank

- Pull the pod retaining pins (4) located at the pod base.
- Shut butterfly valve on pod.
- Secure the vent cap shut on the top of the tank.
- Basket a ½" x 20 ft wire rope sling through the framework of the pod at each end. Secure a tag line to pod tank base.
- Have the Crane Operator in crane III plumb his lifting hook over the heli-pod.
- Hook on the 4 eyes of the slings.
- As the Crane Operator takes the weight of the pod, lift up on the quick release sleeve of the fuelling line coupling.
- Lift pod clear of the fuelling station and place on the stbd main deck.

b) Full Tank

- Basket pod with a ½" x 20 ft wire rope sling through the framework of the pod at each end. Secure a tag line to framework.
- Lift pod and plumb over fuelling station pod rack.
- Lower pod into position while one person is guiding in the quick release fitting into position.
- Ensure that the quick release sleeve is spring shut.
- Secure pod into rack with the 4 retaining pins.
- Disconnect slings and remove from pod.

Note: Before handling heli-fuel pods:

- Ensure that there are no helicopters inbound/outbound.
- Stop all hot work on heli-deck, after deck and stbd deck.
- Verify that the foam fire fighting system is operative.
- Have the 150 lb dry chemical wheeled extinguisher in a position adjacent to the heli-pod racks.
- Stop all spark inducing work in the work area.

2.6 PUMP ROOM ALIGNMENT (FUELLING)

- Only one pod, motor, pump, and coalescing filter to be aligned at one time.
- Open the appropriate 4 valves in the pump room.
- Open the service 2 valves located at pods racks exterior to the pump room.
- Align the control panel in the pump room set up for automatic.
- Have an experienced personnel stand by with a UHF radio at the fuel metering skid on the heli-deck.
- Have that person depress the pump actuator and confirm with pump room personnel by radio for pump start up in the pump room.
- Conduct a fuel nozzle test on heli-deck. Use the 2 gallon HLOs bucket provided in the fuel metering cabinet.
- If successful, save the fuel in the bucket for a fuel test.
- Reset litre meter by revolving handle clockwise until all digits indicate zero.
- Shut down pump from cabinet.
- Test for shutdown in pump room
- Tag and date the valves indicating the pod in use. Initial it.
- Enter in the barge log the particulars of the alignment.

2.7 FUEL TESTING

There are two types of fuel testing conducted on board the *Kulluk*.

a) Dynamic Millipore Test

Taken when the fuel line is under pressure at the downstream and upstream locations, (pump room and heli locations respectively). A dynamic millipore probe is inserted in the fuel on each of the two pump lines and one is located on the pipeline in the cabinet on the heli-deck.

These tests evaluate the contamination level of the product from the heli-pods to the nozzle.

If these tests reveal any failure of the pods, filters and pipeline efficiency, helicopters shall be suspended until the cause is rectified.

The dynamic millipore test is conducted bi-monthly and upon the reception of a new shipment of fuel.

Enter the dynamic millipore test results in the fuel log located in the reception room.

b) ASTM Color Standards Test

This test is conducted to determine contamination of the fuel by water.

To conduct this test discharge 4 liters of jet-B fuel into the white enamel pail located on the heli-deck in the cabinet.

Withdraw enough of a sample for a vial sample.

Insert the vial puncture implement into fuel, next, plunge the vial onto the puncture implement, this will induce fuel under pressure into the vile. When full, extract the vial and shake vigorously. This will mix the water seeking chemical with the Jet-B fuel. A white color indicates the fuel is free of water, a pink to reddish color indicates the fuel is contaminated. If contaminated suspend any helicopter fuelling until problem is rectified.

This test shall be conducted prior to fuelling a helicopter and immediately after fuelling. This test shall be conducted by the HLO (Helicopter Landing Officer) and witnessed by the Helicopter Pilot.

These samples shall be dated and marked with call sign of Helicopter and retained by the HLO for at least 1 week's duration.

Enter these test results in the Helicopter fuelling procedure checklist, and fuelling log book (located in the reception room) and the amount of fuel the helicopter received. These entries must be dated and initialed by the observing Helicopter Pilot.

2.8 HELI-FUEL SYSTEM PREVENTATIVE MAINTENANCE

Besides the fuel tests the fuelling system shall be inspected from the heli-pods to the nozzle.

Heli-Fuel Racks

- Quick release coupling valve, leakage and visual condition.
- Inspect for placement/condition of sounding pipe cap, and ventilation cap.
- All valves, operable and lubricated.
- Pneumatic shutdown valve (automated from the control room) activate from control room and have person witness the closure of said valve. Reset upon successful closure.
- Inspect drip tray under heli-pods for cleanliness, dryness, and test drip tray valves for operable condition.

Heli-Fuel Pump Room

- All valves, operable and lubricated.
- Pump alignment switch panel, test each pump/motor system for start and shutdown.
- Check illumination of Heli pump/motor indicator lights.
- Inspect pump room for cleanliness and dryness.

Heli-Deck Fuel Skid

- Inspect Fibreglass HLOs cabinet for damage to shell and insure that cabinet doors are operable.
- Inspect all valves, operable and lubricated.
- Inspect fuel meter, glass face condition, reset handle.
- Inspect system for leakage.
- Ground static reel/wire for operable condition.
- Inspect nozzles for visual condition, ensure that a brass cap is connected to the straight nozzle. Test dry break nozzle for handle activated opening and closure.
- Run out hose inspect for wear and damage.
- Inspect hose reel for revolution and lubrication.
- Inspect drip tray for cleanliness and dryness.
- Ensure that drip tray plugs are conveniently secured beside each scupper.
- Ensure that a white enamel bucket (only) is in place in the cabinet.

2.9 FUELLING PROCEDURE

(Crew Requirement; 1 HLO, 3 Heli-Deck Crew)

Fuelling Crew Positions

HLO (Helicopter Landing Officer) is in charge of fuelling.

1 Crewman dressed in full fire approach suit stationed at the up wind with foam/drychemical hoses at either the port or stbd heli-deck stairwell.

1 Crewman stationed at the upwind foam/water fire monitor.

1 Crewman assists the HLO at the fuel meter cabinet. He will have at hand a 150 lb dry chemical extinguisher, the hose is flaked out on deck prior to the commencement of testing and fuelling.

The Helicopter Pilot is positioned at the helicopter overseeing the operation.

Procedure

This procedure can only be implemented after the above safety positions are assumed.

- Run out and ground the static wire to the helicopter.
- HLO takes a sample (minimum 4 liters) of Jet-B from the fuel sampling valve in the fuelling cabinet. (See fuel testing section).
- On acceptance of fuel sample by HLO and Pilot run out fuel hose to fill location on helicopter.
- Return fuel meter to zero.
- HLO commences fuelling helicopter while crewman is standing by the fuel cabinet.
- Fill to Helicopter Pilots request in liters indicated on meter in cabinet.
- On reaching the fill amount, remove nozzle and re-spool the fuel hose by activating hose reel spooling motor.
- Take another fuel sample.
- Shutdown pumps.
- Have the pilot initial the Helicopter Fuelling Log and Helicopter procedure checklist. This checklist shall also have date, fuel amount, and helicopter call sign.
- Date, initial, and enter call sign on the two fuel samples, place the samples in the fuel test box for storage.
- Re-spool static ground wire.
- Zero fuel meter.
- Close up cabinet.
- Put the 150 dry chemical extinguisher in its cabinet.

2.10 HELICOPTER FUELLING PROCEDURE CHECKLIST

HELICOPTER FUELLING PROCEDURE CHECKLIST		
Type of Fuelling Operation (Hot/Normal)		
Name of Vessel/Rig (Donor)		
Helicopter Call Sign (Recipient)		
Date of Fuelling Operation		
Time of Fuelling Operation		
Location (Rig Site)		
No. of Crewman on Standby Crew		
Inform Control Room		
Expected Type & Quantity of Fuel		
Actual Amount of Fuel (Meter Reading)		
Ground Static Wire To Helicopter		
Take Fuel Sample (First)		
Approval of Sample By Pilot & HLO		
Return Fuel Meter To Zero		
Commence Fuelling as Indicated by Pilot		
Stop Fuelling as Indicated By Pilot		
Remove Nozzle and Re-spool Hose		
Take Fuel Sample (Second)		
Shut-down Pumps		
Have Pilot Sign Checklist & Fuelling Log		
Date, Initial & Call Sign on Two Fuel Samples		
Place Samples in Box For Storage		
Re-spool static ground wire		
Zero Fuel Meter		
Close Up Fuelling Cabinet		
Put the 150 lb Dry Chemical Extinguisher in its Cabinet		
Stand-Down From Fuelling Operation		
Rig Alert Status		
Donor Officer In Charge (HLO)	Name	
	Title	
Recipient Officer In Charge (Pilot)	Name	
	Title	

2.11 PRODUCT SPECIFICATIONS AND MATERIAL SAFETY DATA SHEETS

JET B

PRODUCT CHARACTERISTIC	*SPECIFICATION*		*TEST METHOD*
	MIN	*MAX*	*ASTM*
Freezing Point, °C (° F)		-51 (-60)	D2386
Density, kg/L @ 15°C (API at 60 °F)	0.750 (57.0)	0.801 (45.1)	D1298
Distillation, °C			D 86
Initial Boiling Point, °C (°F)	Report	Report	
10% Recovered, °C (°F)	Report	Report	
20% Recovered,°C (°F)		143 (289)	
50% Recovered, °C (°F)		188 (370)	
90% Recovered		243 (469)	
End Point, °C (°F)	Report	Report	
% Recovered, at 204° C (400° F)		1.5	
Residue, % vol		1.5	
RVP, kPa (psi)	1 (203)	21 (3.05)	D 323
Sulphur, % mass		0.4	D1266/D2622
Mercaptan Sulfur, % mass		0.003	D3227
or Doctor Test		Negative	D 484
Corrosion Copper Strip (2 h @ 100° C/212 °F)		No. 1	D 130
Corrosion Silver Strip (Note 1)		No. 1	IP227/PCP300
Copper, mg/L (Note 2)/(oz/gal)		0.15 (2 x 10^{-5})	3-GP-0 131.1
Aromatics, % vol		25.0	D1319
Olefins, % vol		25.0	D1319
Net Heat of Combustion, MJ/kg (BTU/lb)	42.8 (18,400)	<0.05	D1405/D2382
Combustion Properties: one of the following:			
1. Luminometer No.	45		D1740
2. Smoke Point, mm (inch)	25 (1.00)		D1322
3. Smoke Point, mm (inch)	20 (0.80)		D1322
Plus Naphthalenes, % vol		3	D1840
Electrical Conductivity, pS/m @ point, time and temp. of delivery to purchaser	50	500	D2624
Water Separation Index (Modified)	75		D2550/D3602/
Separation Rating		2	
Interface Rating		lb	D2274
Total Acidity, mg KOH/g (% mass KOH)		0.1 (0.01)	D 974
Particulate Matter, mg/L (oz/gal)			D2276
Purchaser's bulk storage (Note 4)		2.2 (2.94 x 10^{-}	
Aircraft and refuellers		0.44 (5.87 x	
Appearance		bright & clear	

PRODUCT SPECIFICATION

JET B

PRODUCT CHARACTERISTIC	SPECIFICATION MIN	MAX	TEST METHOD ASTM
THERMAL STABILITY:			
JFTOT PROCEDURE			D3241
Press. drop, kPa (psi)		3.4 (0.49)	
Heater deposit rating		<3	
- max. hater tube temp. 260° (500 °F)			
- fuel system pressure 3.45 MPa (500 psi)			
- fuel flow rate 3 mL/min. (7.93×10^{-4} gal/min)			
- test time 150 min.			
COLOUR, Saybolt	Report	Report	D 156

NOTES:	
	1. Purchaser option. 2. Copper content requirement waived for fuels not subject to copper sweetening process. 3. Smoke Volatility Index (SVI) SVI = Smoke Point (mm) + 0.42 (% vol recovered @ 204° C / 4. A minimum of 4L shall be filtered.

TRADENAMES: Turbine Fuel-Aviation Wide Cut SUPERSEDES:

CGSB REFERENCES: CAN2-3.22-M80 Jet B PLC: M-059

MATERIAL SAFETY DATA SHEET

WHMIS CLASSIFICATION

Flammable Liquid (Class B2)
Poisonous Material (Class D2)

CHEMICAL CODE: 3701, 3703, 3706
3444-02

DATE: August 1, 1988

SECTION 1 MATERIAL IDENTIFICATION

Product Name: Aviation Turbine Gasoline (ATG)

Trade Names: Jet B, Jet B D-1

Chemical Synonyms and Family: International Jet B, International Jet B D-1, Jet Fuel JP-4,

Jet Fuel F-40

Name of Manufacturer/Supplier Address & Emergency Phone Number:
Petro-Canada Inc. (403) 296-3000
P.O. Box 2844, Petro-Canada Centre
Calgary, Alberta T2P 3E3

Poison Control Centre Numbers: Consult local telephone directory for emergency numbers.

Application: Used as aviation turbine fuel. May contain a fuel system icing inhibitor.

SECTION II TRANSPORTATION (NR - Not Regulated by TDG)

UN Number 1863 Primary Classification: 3.1 Subsidiary Classification: N/A

Compatibility Groups: N/A CANUTEC Transport Emergency No.: (613) 996-6666

FLAMMABLE LIQUID

Material Trade Name: AVIATION TURBINE GASOLINE (ATG)

SECTION III COMPOSITION

COMPONENTS	ALLOWABLE LIMITS (8 HR)	% (VOL)	CAS #
Complex mixture of aliphatic and aromatic hydrocarbons (C_6 - C_{14})*	300 ppm (vapour)	100	64741-41-9

* Contains trace amounts of conventional gasoline additives such as antioxidant, anti-static additive and king inhibitor (2-Methoxyethanol)

** Petro-Canada recommendation.

SECTION IV PHYSICAL DATA

Density
(at 15°C)(60°F): 0.750-0.801 kg/L
(approx)
(57 - 45 API)

Boiling point/
Range (at 1 atm): 50 - 250° C
(122 - 482°F)

Vapour Pressure
(at 25°C)(77°F): 21 kPa (3.05 psi) RVP max.
(approx)

Percent Volatile
(at 20° C)(68°F): 100% in 8 hrs

Vapour Density
(at 20°C)(68°F): 3.5 (approx.)

Evaporation Rate: 0.7 - 1.2
(n-butyl acetate = 1)

Solubility in water: Insoluble

Freezing Point: -51° C (max)(-59.8°F)

Viscosity: (< 7 cSt (@ 38° C)
(Kinematic) (<48.5 SSV at 100°F)

Appearance & Odor: Colorless, clear liquid with hydrocarbon odour.

Material Trade Name: AVIATION TURBINE GASOLINE (ATG)

SECTION V — FIRE AND EXPLOSION DATA

Flash Point (method used = TCC):	-25°C (minimum)(-13°F)
Flammable limits in air (% by volume):	Lower 1.3% Upper 7.6%
Auto-Ignition Temperature:	240°C (464°F)
Fire and Explosion Hazards:	Easily ignitable by flame or spark. Vapours are heavier than air and may travel considerable distance to sources of ignition and flash back. do not cut, drill or weld empty containers.
Extinguishing media:	Foam, dry chemical, carbon dioxide for small fires, water spray.
Firefighting Procedures:	Use full protective equipment and self-contained breathing apparatus. Stop flow. Contain spill. cover with exting- uishing agent. Use water spray to cool fire-exposed containers and as a protective screen. isolate all ignition sources in area of spill. Use gas detector in confined spaces. To avoid spreading fire do not point solid water stream directly into burning product.

EXTREME FIRE HAZARD

SECTION VI — HEALTH HAZARD INFORMATION

Toxicity Data:	Estimated acute LD_{50}>1400 mg/kg (rat, oral): practically non-toxic.

Effects of Overexposure

Inhalation:	Irritation of nose and throat; headache, nausea, vomiting, dizziness, fatigue, light-headedness, reduced co-ordination and unconsciousness; central nervous system depressant; kidney and liver damage from long-term exposure. May be narcotic in high concentrations.

Material Trade Name: AVIATION TURBINE GASOLINE (ATG)

Skin and Eyes:	Drying, cracking or inflammation of skin. Prolonged exposure to skin may cause dermatitis. Eye contact may cause irritation, but not permanent damage.
Ingestion:	Overexposure due to ingestion is unlikely for adults since taste and smell limit the amount swallowed. Harmful or fatal if swallowed.

NOTE 1: AVOID BREATHING VAPOUR. AVOID CONTACT WITH SKIN AND EYES. AVOID ASPIRATION.

NOTE 2: Aviation Turbine Gasoline contains a small quantity of benzene which is a suspect human carcinogen.

<u>Emergency and First Aid Procedures Information</u>

Skin:	Remove contaminated clothing - launder before reuse. Soap and water wash. Discard saturated leather articles.
Eyes:	Copious warm water flush - 15 minutes. Physician assessment mandatory.
Inhalation:	Evacuate to fresh air. Apply Cardio Pulmonary Resuscitation if required. Administer oxygen if available. If resuscitation required, physician assessment mandatory.
Ingestion:	DO NOT INDUCE VOMITING. If vomiting - take care to prevent aspiration. give 250 ml. (1/2 pint) of milk to drink. Mandatory physician assessment.
<u>Notes to Physician</u>:	Gastric lavage should only be done after endotracheal intubation in view of the risk of aspiration which can cause serious chemical pneumonitis for which antibiotic and corticosteroid therapy may be indicated.

Material Trade Name: AVIATION TURBINE GASOLINE (ATG)

SECTION VII	REACTIVITY DATA
Stability:	Stable under normal storage and use.
Conditions to avoid:	Sources of ignition, heating greatly increases fire and explosion hazards.
Materials to avoid:	Strong oxidizing agents (nitric acid, sulfuric acid, chlorine, ozones, peroxides, etc.) which causes detonation on contact.
Hazardous decomposition products:	CO_x, SO_x, partially acidized hydrocarbons, smoke on combustion.
Can hazardous polymerization occur?	No.

SECTION VIII	SPILL OR LEAK PROCEDURES
Steps to be taken if material is released or spilled:	Evacuate personnel. Avoid contact. Use full protective equipment and breathing apparatus. Eliminate ignition sources. Shut off source of spill. Absorb with inert absorbent such as dry clay, sand or diatomaceous earth, commercial sorbents, or recover using electrically grounded explosion-proof pumps. Place absorbent in closed metal containers. DO NOT FLUSH TO SEWER. Large spills may be pumped from upwind locations using vacuum trucks and extended hoses. Large pools may be covered with foam to prevent vapour evolution. Immediate shut down and evacuation if wind shifts. Constant monitoring for explosion hazard is required.
Waste Disposal Method:	Incinerate at licensed waste reclaimer facility.

Material Trade Name: AVIATION TURBINE GASOLINE (ATG)

SECTION IX	SPECIAL PROTECTION INFORMATION
Ventilation:	General ventilation. Use explosion-proof mechanical ventilation suitable for group D atmospheres. Local exhaust, if necessary, to control vapours to allowable limits.
Respiratory Protection:	Up to 3000 ppm, use an approved full-face organic vapour cartridge respirator. Above this level, use full-face air-supplied or self-contained breathing apparatus.
Protective Gloves:	NITRILE, VITON.
Eye Protection:	Chemical goggles.
Other Protective Clothing:	Nitrile protective clothing to prevent all contact. DO NOT USE NATURAL RUBBER, NEOPRENE OR PVC (polyvinyl chloride).

SECTION X	SPECIAL PRECAUTIONS

HANDLE AS EXTREMELY FLAMMABLE LIQUID. DO NOT USE AS CLEANING FLUID OR SIPHON BY MOUTH. Store in cool, well-ventilated area. Electrically ground/bond during pumping or transfer to avoid static accumulation. PRECAUTIONS SHOULD BE TAKEN TO MINIMIZE SKIN CONTACT AND INHALATION. High standards of personal hygiene are necessary. Wash skin thoroughly with soap and water after contact and before eating. Launder work clothes frequently. Petro-Canada recommends an allowable exposure of 300 ppm when handling AVIATION TURBINE GASOLINE.

Material Trade Name: AVIATION TURBINE GASOLINE (ATG)

SECTION XI REFERENCES

ACGIH, Threshold Limit Values and Biological Exposure Indices for 1987-88.
CONCAWE, First Aid Measures, Medical Toxicology Data and Professional Advice to Clinicians on Petroleum Products, February 1983.
API, Petroleum Process Stream Terms Included in the Chemical Substances Inventory Under the Toxic Substances Control Act (TSCA), 1983.
Environment Canada Manual for Spills of Hazardous Materials, March, 1984.
NIOSH, The Industrial Enviroment - Its Evaluation and Control, 1973.
Patty's Industrial Hygiene and Toxicology, 3rd Edition, Vol. 2B, 1981.
API, The Toxicology of Petroleum Hydrocarbons, May, 1982.
API, API Project # 1443, September 12, 1980.
API, In Vitro and In Vivo Mutagenicity Studies, Final Report, August 13, 1979.

Petro-Canada and its affiliates assume no responsibility for injury to anyone caused by the material if reasonable safety procedures are not adhered to as stipulated in the data sheet. Additionally, Petro-Canada Inc. and it affiliates assume no responsibility for injury to anyone caused by abnormal use of the material even if reasonable safety procedures are followed. Furthermore, vendee and third persons assume the risk in their use of the material.

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2. *Frontier Discoverer* Fuel Transfer Procedures

Fuel Transfer Procedures: Frontier Discoverer

Prior to taking part in any bunker transfer operations, the Chief Engineer shall ensure that any assistants are fully conversant with the system and understand the implications of the MARPOL regulations.

All persons involved in bunker fuel transfer shall read and understand the posted bunkering procedures.

Prior to working material fuels, crew members are advised to consult the relevant Material Safety Data Sheet (MSDS) in order to familiarize themselves with the potential health risks caused by “inhalation”, “skin contact”, and “ingestion”.

A list of all persons involved in the bunker operation shall be posted in a prominent position.

The Chief Engineer will coordinate with the Chief Officer regarding the possible transfer of ballast to ensure the ship remains in a proper list and trim.

The Chief Engineer will conduct a pre transfer conference with the bunker suppliers, or with the appropriate ship staff for an internal transfer. Ensure sequence of loading/transfer is verified.

The Chief Engineer will check the requirements are carried out, and sign the pre-transfer shore/ship, ship/ship, and bunker checklist forms as appropriate.

Bunker Fuel Transfer Procedure:

1. Suspend all hot work permits.
2. Terminate all internal transfers if in progress.
3. Ensure all fuel storage tank valves are closed.
4. Take a full set of soundings.
5. Clean the inlet strainer and zero the meter count.
6. Liaise with Bridge to confirm which tanks are being filled.
7. Confirm that the bunker connection save all is drained.
8. Ensure deck scuppers are plugged.
9. Check spill kit is on location and complete.
10. Where appropriate, ensure red light and bunker flag are deployed.
11. Bunkering stations to be manned continually during the entire operation.
12. Check hose and bunker line is clear. Make the connection and secure the hose.
13. Establish communication between E.C.R. Bridge and bunker station and fueling vessel.
14. Confirm the pumping rate and quantity to be pumped with fueling vessel.
15. Bridge to make P.A. announcement regarding the start of fueling operations.
16. Ensure any heading or position changes are communicated to the fueling vessel.
17. Open the bunker station valves and tank valves.

18. Start the operation.
19. 10 minutes after starting take a sample. (check the sample with the senior watchkeeper. If ok continue bunkering operations)
20. Take a sample in the middle of the operation. (check sample with senior watchkeeper. If ok continue bunkering operation)
21. Take manual soundings throughout the operation.
22. Always aim to finish on a non full tank.
23. At completion close tank and bunker station valves.
24. Before disconnecting hose, confirm quantity received.
25. Secure bunker hose so that end is over save all.
26. Inform Bridge of terminating operations. Hot work permits may be resumed.
27. Bridge to make P.A. announcement regarding termination of fueling operations.
28. Ensure oil record book is completed with correct information. Also make entries in engine room and deck logs.

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3. Oil Spill Response Vessel and Barge Fuel Transfer Procedures

OSRV Fuel Transfer Procedure

Ship's Fuel Oil *Transfer Procedure* Per 33 CFR 155.750 **M/V** North American Hull Number 235 Edison Chouest Offshore, LLC August 17, 2005

Table of Contents

1

Introduction

This fuel oil (F.O.) transfer procedure is prepared in accordance with 33 CFR 155.750. It is a requirement for the vessel personnel to use this transfer procedure for each transfer of F.O. to (Loading), from (Off-Loading), and within the vessel (transferring). This procedure is to be kept in a place where it can be easily seen and used by members of the crew when engaged in transfer operations. Any exemptions or alternatives granted must be placed in front of the transfer procedures.

(1) Fuel Oils Transferred - Description and Safety Precautions

Diesel Oil (D.O.) is a light brown, non-viscous liquid that has an odor similar to kerosene. It has a flash point between 110 and 190 deg F and an autoignition temperature of 494 deg F. D.O. is both a skin and eye irritant. Safety precautions should be taken when handling, such as wearing protective gloves and glasses. Keep sparks, flames and other sources of ignition away. In case of a leak or spill, notify personnel on notification list in part (9) of this procedure. When large spills occur evacuate area and remove all sources of ignition. In case of a fire (class B) isolate hazard area and begin extinguishing the fire with the use of carbon dioxide, dry chemical, foam, or water fog. Direct application of water or foam to a pool of D.O. can cause frothing and thereby increase the fire.

(2) Fuel Oil (F.O.) Transfer System

The fuel oil transfer system can be arranged to load from the on deck fuel oil fill/discharge connection, off-load fuel oil from the on deck fuel oil fill/discharge connection or from the rig fuel oil discharge connection or transfer fuel oil between the various tanks within the ship. Diagrams of the fuel oil transfer piping drawing and vents piping drawing are after this procedure.

Tanks and Pumps:

Tanks	Location	Capacity (Gal.)
FO #2-P	21 - 41	22755
FO #2-S	21 - 41	21919
FO #3-C	41 - 57	19484
FO #4-C	57 - 73	22078
FO #5-C	73 - 92	23376
FO #5-P	73 - 92	25043
FO #5-S	73 - 92	25043
FO #6-C	92 - 112	26945
FO #6-P	92 - 112	21535
FO #6-S	92 - 112	21535
FO #7 P	107 - 116	12172
FO #7 S	107 - 112	12172
FO DAY TANK-P	29 - 34	13528
FO DAY TANK-S	27 - 34	18345
FO OVERFLOW-P	36 - 41	2516.2

Pumps

1) Fuel Oil Cargo Pump Located @ Frame 40	Aurora 344A 4"x5"x 9a 75 HP, 3600 RPM Motor 760 GPM @ 290 TDH, 480V
2) Fuel Oil Transfer Pump Located @ Frame 36	Barnes 25CCE 3"x3" 15 HP, 3600 RPM Motor 320 GPM @ 115 TDH, 480V
3) Maximum Transfer Rate For Cargo and Transfer Pumps Combined:	1080 GPM

Note: TDH indicates total head (in feet) developed across pump.

Transferring

The fuel oil cargo pump is used primarily for transferring fuel from the vessel to offshore drilling rig installations. The fuel oil transfer pump is used primarily for transferring fuel oil between the various fuel oil tanks within the vessel. The procedure for transferring fuel oil to and from any combination of two (2) different tanks is as follows:

1. Ensure the F.O. pumps are off.

2. Ensure the following valve line-up is correct and performed in the order given before beginning any transfer (valves can be referenced on the system diagram after this procedure):

   a) Close the following valves:
      1) All F.O. tank fill valves,
      2) All F.O. tank suction valves,
      3) F.O. transfer pump discharge valve(s) for deck connections

   b) Open the following valves:
      1) Appropriate F.O. tank suction valve for tank being transferred from (including appropriate tank valve)
      2) F.O. transfer pump suction valve from suction header
      3) F.O. transfer pump discharge valve to fill header
      3) F.O. meter inlet and outlet valves (if required)
      4) Appropriate F.O. tank fill valve for tank being transferred to (including appropriate tank valve)

3. When communication is established (via sound powered phone, intrinsically safe VHF, or other acceptable means) and the personnel are in their proper positions in accordance with the rest of these procedures - transferring may begin at the order of the person in charge to begin pumping. Inspect entire line-up for leaks after pumping is started.

4. When transferring is complete the system should be secured in accordance with part (8).

Loading

The fuel oil transfer piping system is designed to allow either simultaneous or individual loading (filling) of any combination of the various fuel oil tanks within the vessel from the main deck fuel oil fill/discharge connections. The procedure is as follows:

1. Ensure the F.O. pumps are off.

2. Ensure the following valve line-up is correct and performed in the order given before beginning any transfer (valves can be referenced on the system diagram after this procedure):

   a) Close the following valves:
      1) All F.O. tank fill valves,
      2) All F.O. tank suction valves,
      3) F.O. meter inlet and outlet valves
      4) F.O. transfer pump discharge valve for deck connections

   b) Open the following valves:
      1) Appropriate F.O. tank fill valve(s) for tank(s) being filled (including appropriate tank valves)
      2) F.O. fill valve from deck connection
      3) Main deck F.O. fill/discharge connection and flange - being ready to catch any fuel still in the pipe with a bucket and making immediate hose connection with gasket.

3. When communication is established (via sound powered phone, intrinsically safe VHF, or other acceptable means) and the personnel are in their proper positions in accordance with the rest of these procedures - transferring may begin at the order of the person in charge to begin pumping. Inspect entire line-up for leaks after pumping is started.

4. When loading is complete the system should be secured in accordance with part (8).

Off-Loading

The fuel oil transfer pumps are capable for simultaneous or individual off-loading to an offshore drilling rig installation of any combination of the various fuel oil tanks within the vessel or in the event of dry-docking of the vessel and it is needed. The procedure is as follows:

1. Ensure the F.O. pumps are off.

2. Ensure the following valve line-up is correct and performed in the order given before beginning any transfer (valves can be referenced on the system diagram after this procedure):

   a) Close the following valves:
      1) All F.O. tank fill valves,
      2) All F.O. tank suction valves,
      3) F.O. meter inlet and outlet valves

   b) Open the following valves:
      1) Appropriate F.O. tank suction valve(s) for tank(s) being transferred (including appropriate tank valve)
      2) F.O. transfer pump suction valve from suction header
      3) F.O. transfer pump discharge valve to appropriate deck discharge connection
      4) Main deck F.O. discharge connection - being ready to catch any fuel still in the pipe with a bucket and making immediate hose connection with gasket.

3. When communication is established (via sound powered phone, intrinsically safe VHF, or other acceptable means) and the personnel are in their proper positions in accordance with the rest of these procedures - transferring may begin at the order of the person in charge to begin pumping. Inspect entire line-up for leaks after pumping is started.

4. When off-loading is complete the system should be secured in accordance with part (8).

(3) Personnel Requirement for Fuel Oil Transfer

For loading and off-loading of fuel oil, a minimum of one person in charge and two transfer personnel are required to be on duty for the entire duration of the operation.

For transferring of fuel oil between the tanks within the vessel a minimum of one person in charge and one transfer personnel are required to be on duty for the entire duration of the transfer operation.

(4) Duties of Required Personnel for Fuel Oil Transfer

Duties of Person in Charge

The person in charge is designated by the operator and shall hold a valid license as a master, mate, pilot, engineer, or operator. The person in charge will generally be attending duties in the pilothouse but may be temporarily below deck as required. In the event that the person in charge is not in the pilothouse, a designed person with communications capabilities must be in the vicinity of an emergency shutdown switch. The person in charge is responsible for seeing that the following is accomplished:

1. Assume responsibility for the vessel in filling out the declaration of inspection before commencing transfer operations. All items on this declaration must be fully understood and agreed upon by the deliverer and recipient of cargo and any discrepancies will be noted in writing.

2. Read, understand, and follow this procedure.

3. Expedite transfer of fuel oil without causing any damage to the vessel, its equipment or environment.

4. Constantly watch for any changes in condition that could cause any spill.

5. Notify the proper person(s) in case of a spill. The procedure for spill reporting is found in part (9) of this procedure.

6. Proper tending to the vessel's moorings as specified in part (5).

7. Take charge of all topping operations as specified in part (7).

8. Properly secure vessel and equipment upon termination of transfer as specified in part (10).

9. Remove all spillage from containment boxes as specified in part (8).

10. Instruct and direct the transfer personnel.

Duties of Transfer Personnel

The person in charge designates the transfer personnel. Acceptable transfer personnel shall include; persons designated by the person in charge, qualified deck hands, AB/OS, or qualified crew. Passengers or persons other than crew will not be acceptable for use as transfer personnel. For loading and off-loading one-transfer personnel will be located at the appropriate deck connection and another transfer personnel will be located in the engine room attending the transfer equipment. For transferring operations (within the vessel) it is not necessary to have a transfer personnel located on deck. The transfer personnel are responsible for seeing that the following is accomplished:

1. Follow instructions of the person in charge.

2. Maintain communication with the person in charge.

3. Initiate an emergency shut-down to stop the transfer operation whenever oil or hazardous material from any source is discharged:
    1. In the transfer operation work area; or
    2. Into the water or upon the adjoining shoreline in the transfer area.

4. Immediately report any spills or leakage or potential hazards to the person in charge.

(5) Mooring Duties for Oil Transfer

Deck Officer on Watch - In charge of tying up and letting go of mooring. Insure proper signals hoisted or lit aloft and scuppers plugged.

Bosun, AB's, & OS's - Assist as directed in mooring. Rig ladder during ship to barge operations.

(6) Emergency Shut-Down

For loading, immediate means of communication with the fueling facility must be made available in order to request that the pumping be stopped if an emergency shutdown were to become necessary. If loading from a barge, an emergency stop switch should be given to the vessel by the barge unit.

For off-loading fuel from the ship or transferring fuel within the ship, immediate communication with the transfer personnel attending the transfer equipment is necessary in order to request that the pumping be stopped and appropriate valves be closed. In the event that an emergency shut-down is necessary, appropriate personnel must activate the shut-down. An emergency stop button for the pumps is located on the control panels. These control panels are located in the pilothouse, near the liquid mud and fuel oil fill connection on main deck, and on the local pump control panel.

The person in charge must be able to maintain communication with the barge or shore side fueling facility and transfer personnel via voice, sound powered phone, or portable radio. If portable radios are used they must be intrinsically safe as defined in 46 CFR 110.15-100 and 46 CFR 11.80.

(7) Topping Off

During topping off operations, the flow shall be continually reduced to a level that will allow controlled closure of the discharge valve to that tank and precludes overfilling or spillage. The tanks shall be continuously sounded to ensure tank levels during the topping off phase and continuous communication between the transferring and sounding personnel must be maintained. This phase of the transfer procedure is the most critical and requires the full attention of the person in charge.

(8) Transfer Completion

Once the transfer is complete: all pumping is stopped, all fill valves are closed, all connections drained and removed, and blank flanges replaced and secured with gaskets. The person in charge visually checks all valves and flanges to be sure they are closed after the oil transfer is complete.

Emptying of the Discharge Containment Areas

Containment areas are to be drained and cleaned so as to prevent any oil from spilling overboard. This is to be done by using a hand pump, rags, and/or absorbents. Collected spillage shall be properly disposed of to prevent any re-release because of torn bags or faulty containers. In addition to the required fixed containment area, at each oil tank vent, overflow, and fill pipe a 5 gallon portable container and rags should be placed to clean and collect any oil that might have spilled.

(9) Accidental Oil Discharges

AS SOON AS A SPILL IS SIGHTED, IMMEDIATE ACTION SHALL BE TAKEN TO STOP OR REDUCE THE SOURCE. REFER TO THE SHIPBOARD OIL POLLUTION EMERGENCY PLAN. REPORT ALL SPILLS TO EDISON CHOUEST OFFSHORE DISPATCHER OR PERSON IN CHARGE AT (985) 632-7144, THEN TO THE U.S. COAST GUARD AT 1-800-424-8802.

(10) Closing and Opening the Vessels Openings

The person in charge is to ensure that the vessel is properly secured and equipment stowed upon transfer completion. This includes, but is not limited to:

1. Dogging of all hatches, ullages, doors vents, sounding ports, and any other vessel openings that maintain the seaworthy condition of the vessel and prevent the inadvertent release of oil or hazardous material in the event of an accident.

2. Securing booms, cargo hoses and any other gear that is not permanently fastened to the hull that might move while the vessel is underway.

3. Closing of all fuel valves necessary to prevent shifting of fuel.

4. Remove all spillage from containment boxes using rags or "sugie" cloth to soak up excess oil.

(11) Transfer Hose Markings

Hoses used for the transfer of hazardous materials are to be marked or stenciled as follows, with:

1. The name of the product for hose intended service.

2. Maximum working pressure.

3. Minimum service temperature for service at other than ambient temperature.

4. Manufacture date.

5. Date of latest possible pressure testing in accordance w/ USCG 33 CFR 156.170.

OIL TRANSFER PROCEDURES
POINT THOMPSON CLASS

This statement of oil transfer procedures is to meet USCG 33 CFR 155.720. It addresses: (a) transfers of oil to or from the vessel, and (b) transfer of oil from tank to tank within the vessel. It must be posted or available at the on-deck fueling station during all oil transfer proceedings.

This procedure applies only to the following vessels:

POINT BARROW
POINT MILNE
POINT OLIKTOK
POINT THOMPSON

1. List each of the products transferred to or from the vessel, including the following information:

   (i) Generic or chemical name,

   (ii) Cargo information as described in 154.310 (a), (5), (ii) of this chapter, and

   (iii) Applicability of oil transfer procedures.

   (i) The vessel carries two separate petroleum products: (a) #2 Diesel Fuel and (b) lubricating oil. The #2 Diesel Fuel is a Grade D petroleum product. The lubricating oil is a Grade E petroleum product. Attached are the Material Safety Data Sheets for each product.

   (ii) The following cargo information applies to #2 Diesel Fuel

Section (a):	Oil: Fuel Oils: Number 2 – D
Sections (b) through (g):	See attached Material Safety Data Sheets

   The following cargo information applies to the lubricating:

Section (a):	Oil: Lubricating
Sections (b) through (g):	See attached Material Safety Data Sheets

   (iii) Each product applies to and will be addressed in the following procedures of oil transfer.

2. Describe each of the transfer systems on the vessel, including:

   (i) A line diagram of the vessels oil transfer piping, including the location of each valve, pump, control device, vent, and overflow;

(ii) The location of the shutoff valve or other isolation device that separates any bilge or ballast system from the oil transfer system; and

(iii) A description of any procedure for emptying the discharge containment system as required by 155.310 and 155.320.

(i) Attached are drawings that show all piping, valves, and vents for the oil transfer system on the vessel. The vessel is fitted with 7 diesel oil tanks and 2 lubricating oil tanks, for a total capacity of 72,310 gallons of petroleum products. Each tank is filled only through a main deck stand pipe. There are no valves in the system between the fuel line on the main deck and the tank. Each fuel tank is interconnected by fuel suctions. All engines return their fuel to the 2 centerline fuel tank. This is the only fuel transferring capability on the vessel.

The vessel's fuel tank fill lines have no shutoff valves. The dock facility hose must have either an automatic back pressure nozzle or a quick closing shutoff valve.

NOTE: The tug Pt. Thompson and Pt. Oliktok are fitted with a fuel pump, hose, nozzle and hose reel so it can discharge fuel off the vessel. This pump cannot be used for internal fuel transfers.

(ii) All vessels in this class do not have any connections between the bilge or ballast system and the oil transfer system.

(iii) As listed for vessels (100 gross tons but less than 300 gross tons):

Equip each fuel oil or bulk lubricating oil tank vent, overflow, and fill connection with a portable container of at least 5 U.S. gallon capacity during oil transfer operations.

Disposal of these containers pursuant to 155.320, the portable containers will be carried to the engine room and pumped into the waste oil or contaminated oil tank using the appropriate pump.

The vessel's lubricating oil tank fills make containment impractical. The products for these tanks will be transferred using a back pressure shut-off nozzle.

3. List the number of persons required to be on duty during the oil transfer operations.

The Chief Engineer and one assigned person from the Deck Department is required to be on duty during the oil transfer procedure.

4. List the duties by title of each officer, person in charge, tankerman, deckhand, and any other person required for each oil transfer operation.

The vessel's Chief Engineer is the designated Person In Charge (P.I.C.) of the oil transfer. The assigned Deck Department assistant is responsible to the P.I.C. and will assist him as directed.

5. List the procedures and duty assignments for tending the vessel's moorings during the transfer operations.

   The deckhand or Deck Department officer on watch will be responsible for tending the mooring lines, or seeing that they are properly tended. The P.I.C. and his assistant shall not tend to mooring lines if it takes them away from their oil transfer duties.

6. List the procedures for operating the emergency shutdown and communication means required by 155.780 and 155.785 respectively.

   The emergency shutdown procedure on board the vessel is the main deck valve at the deck fill station. This valve is the usual operating station of the P.I.C. of the oil transfer operation.

   The communication means required in 155.785 applies during vessel to vessel oil transfer transfers. A portable radio device may be used to comply with this paragraph. When deemed proper, voice communication is also sufficient. Conditions such as vessel proximity, weather, and time of day dictate which form of communication is necessary.

7. List the procedures for topping off tanks.

   Tanks will be topped off at reduced flow rates. This shall be accomplished by having the Marine Terminal Operator (M.T.O.) reduce the loading rate. The system for topping off shall be discussed during the pre-transfer conference, as detailed in the Declaration of Inspection. Topping off procedures will commence when the tank is at the 80% capacity amount. Tanks will be filled no more than a maximum of 12 inches from the tank top.

8. List the procedures for ensuring that all valves used during the oil transfer operation are closed upon completion of transfer.

   Upon completion of any transfer, the specific manifold, tank, or header valves will be closed. Upon completion of fuel transfer, the deck fill standpipe or tank fill cap will be closed and the camlock cover installed as a safety precaution.

9. List the procedures for reporting oil discharges into the water.

   If a spill occurs, take the following steps:

   (a) Stop all transfers,
   (b) Stop flow of oil into the water if possible,

(c) Immediately report the spill to the United States Coast Guard, the nearest Crowley office, and to your supervisor. The toll free number for reporting spills to the USCG is:

1-800-592-9911 Group Seattle
or
1-800-424-8802 National Response Center

10. List the procedures for closing and opening the vessel openings as described in 155.815.

Prior to commencing oil transfer operations, all manhole covers, ullage openings, freeing ports, and scuppers will be properly closed. Only those sounding tubes of tanks being filled will be open. Bulwark openings will be blocked off plugs. Vessels built prior to 1986 can utilize wooden damage control plugs to seal bulwark openings. Vessels built after 1986 must use threaded pipe plugs or caps to seal off bulwark openings. All freeing ports will be blocked with absorbent bags.

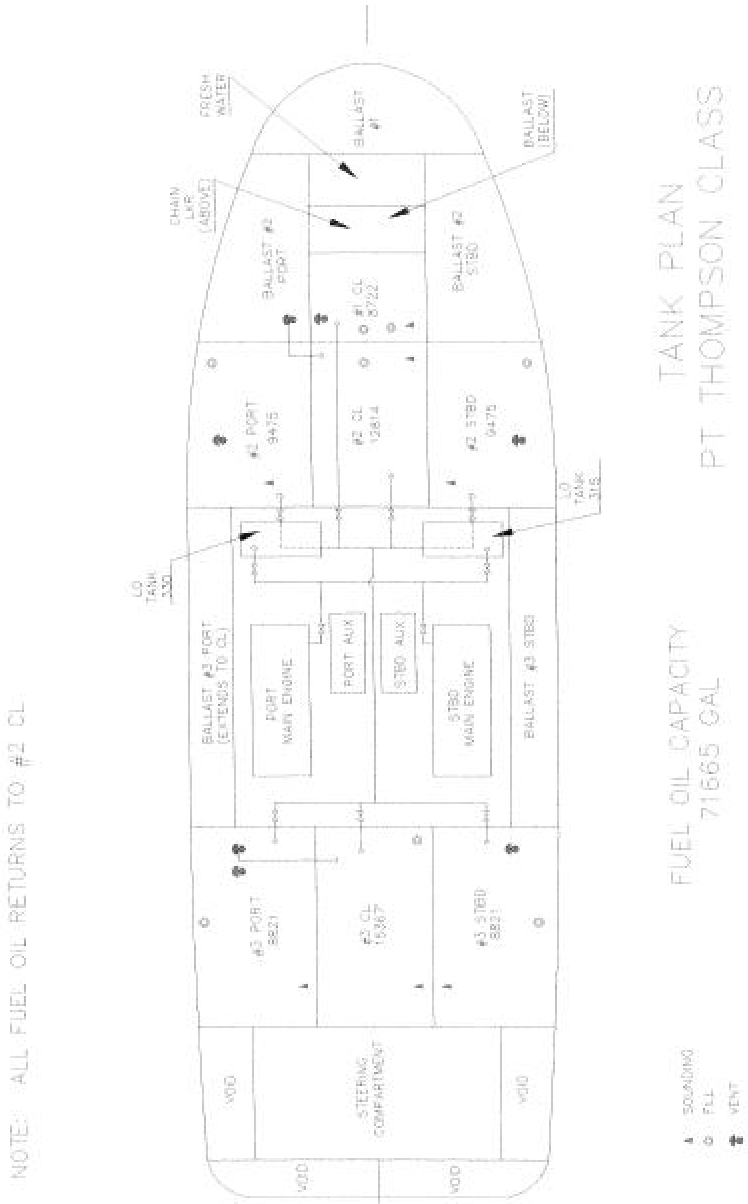
Vents will be fitted with 5 U.S. gallon containers if they are not within fixed on-deck containment. Any other opening that maintains the sea worthy condition of the vessel and prevents the inadvertent release of oil in the event of a tank vessel accident must be kept closed.

11. List any statements explaining that each hazardous material transfer hose is marked with either the name of each product which may be transferred through the hose or with letters, numbers or other symbols representing all such products and the locations in the transfer procedures where a chart or list of the symbols used and a list of the compatible products which may be transferred through the hose can be found for consultation before each transfer.

The vessel carries three sections of 3 inch petroleum product transfer hoses, intended for use solely for #2 diesel fuel. Each hose is tested annually and stenciled with the date of the test and the Maximum Working Pressure.

No additional amendments are incorporated in the oil transfer procedures as required under 33 CFR 155.760

Arctic Endeavor/Tug Fuel Transfer Procedure
Crowley Marine Services



APPENDIX D:
OIL AND DEBRIS DISPOSAL PROCEDURES

INTRODUCTION

The collection, storage, transportation, treatment and disposal of waste will be conducted in a manner that is both safe and environmentally sound. Procedures are in place to insure that all laws and regulations are followed and that necessary permits are obtained in conjunction with waste management.

Wastes generated from an oil spill response will be handled in accordance with federal and state hazardous waste regulations and company policy. Most of the waste collected during response operations will be classified as exploration and production exempt waste .

However, crude oil contains benzene, which can be considered hazardous waste under the Resource Conservation and Recovery Act's (RCRA) toxicity characteristic rule. The hazardous waste characteristics include ignitability, reactivity, corrosivity and toxicity. Oily waste will be tested before a disposal option is selected. Benzene will nokrmally volatilize rapidly from a spill. If oily waste is determined to be hazardous under RCRA, it will be labeled accordingly and sent to a permitted facility for disposal.

In the event of a spill, a site-specific waste management plan will be developed to address the equipment, staffing, and other support necessary to address waste management issues under the known conditions of the spill. The template for the Shell Waste Management Plan (which will be attached to the Incident Action Plan) is provided in Figure D-1. If an oil spill occurs during Shell's Beaufort Sea exploration operations, wastes may be generated offshore, near shore, and onshore.

WASTE CATEGORIES

Oil spills can result in several different types of generated wastes including those listed below. This waste may include oiled personal protective equipment (PPE), possible shoreline debris, and oily sorbents.

- **Oily Liquid Wastes**
  - Recovered or skimmed mixtures
  - Used engine oils, hydraulic fluids
  - Fuels contaminated with water and solids
  - Engine room bilge/ballast waters from vessels
  - Wash waters from cleaning boats, equipment, and gear
  - Other oily waters

- **Non-Oily Liquid Wastes**
  - Sewage, liquid human waste (gray and black waters)

- **Oily Solid Wastes**
  - Sand, gravel, tar balls
  - Asphalt patches
  - Sludge
  - Sorbent pads/boom/wood
  - Shoreline vegetation
  - Oily personnel gear and clothing
  - Damaged response equipment and gear
  - Empty drums and containers

- **Non-Oily Solid Wastes**
  - Domestic trash and garbage
  - Bagged human waste
  - Discarded equipment and construction materials

Wildlife carcasses and contaminated fish may be retained by trustee agencies. Once they are released or determined to be solid wastes, tier disposal will comply with applicable regulations.

COLLECTION AND SEGREGATION OF RECOVERED OIL

- Oil and emulsion from offshore oil recovery will be transferred from skimmer vessels with storage tanks or barges to the Arctic tanker for storage and ultimate disposal.

- Oil and emulsion from near shore oil recovery will be collected with shallow draft vessels and/or mini-barges. Mini-barge would be used for temporary storage of oily liquid wastes.

- Oil and emulsion from shoreline oil recovery will be collected with skimmer systems and pumped off into holding tanks. Each tank's oil and free-water volumes will be gauged and logged, and then pumped to mini-barges or other storage containers. Solid waste and debris will be removed and brought to a segregated interim storage area.

OIL AND DEBRIS SEPARATION AND DISPOSAL

Oil spill cleanup offshore using mechanical recovery will involve the further handling of recovered oil and oiled materials. These should be transported from offshore to the staging area for proper handling or from onshore directly to the appropriate reclamation/ disposal site.

Figure D-2 depicts separation methods for recovered oil/water/debris. The figure also depicts methods that may be employed to separate free and/ or emulsified water from the oily liquid waste.

TEMPORARY STORAGE OF RECOVERED OIL AND WASTE

- Oil recovered at sea via skimmer(s) is transferred to portable tanks onboard recovery vessels or barges.

- The skimmer tanks allow for gravity separation of the oil from the water. The separated water is transferred through a hose and discharged forward of the recovery pump. This method is called "decanting." This process is vital to the efficient mechanical recovery of spilled oil because it allows maximum use of limited storage capacity, thereby increasing recovery operations. Approval must be obtained from the USCG and respective State agencies by the Incident Management Team Liaison Officer prior to decanting.

- Recovered fluids stored onboard the Arctic tanker will be disposed of at a Shell Group refinery or a 3rd part processor.

- Oiled debris collected at sea requires specific handling. Contaminated materials should be placed in leak proof, sealable containers on the recovery vessels and transported to appropriate facilities for processing, recycling, or disposal.

- Oil recovered from onshore areas will typically contain substantial quantities of water and debris. Excess water, sand, and other beach materials greatly increase the quantity of waste and its associated cost for transportation, processing, and disposal. To remedy this, different methods can be employed at the cleanup site to separate oiled debris from excess materials that may be returned to the shoreline. Using screens, filters, conveyor systems and settling tanks, oil/ water mixtures can be drained from debris and collected in temporary containers for further treatment.

- Clean sand and beach materials can be separated from oiled materials.

- Oil spills would occur in remote sites that are some distance from transportation routes and storage facilities. In these situations, temporary on-scene storage arrangements may be required. Oil may be stored in tanks, 55-gallon drums, bladders, or empty fuel storage tanks. Such tanks permit decanting of water from the oil. These pits should be lined with plastic sheeting to prevent oil leakage and soil penetration.

- Contaminated gravel will be temporarily stored on site and later transported by vessel or air off site to a designated waste treatment or disposal facility.

DISPOSAL REGULATIONS

- Oiled Materials – If these materials have not contacted extraneous substances, they will be disposed of at a Shell approved disposal site.

- Oil and oily wastes that are contaminated or excessively weathered will require transport to an approved disposal site. Any transport or disposal of material that is considered hazardous waste must follow the requirements of the RCRA.

- Regulatory Guidelines

  - All wastes scheduled for disposal at a Prudhoe Bay oilfield facility, with prior written approval from the facility owner, will be handled in accordance with the requirements of the U.S. Environmental Protection Agency (EPA), Alaska Department of Environmental Conservation (ADEC), and Alaska Oil and Gas Conservation Commission regulations and policy guidelines. These regulations and guidelines have been synthesized into an operational document titled, “Alaska Waste Disposal and Reuse Guide” (red book) prepared by BP Exploration (Alaska) Inc. and ConocoPhillips Alaska, Inc. (CPAI) to ensure consistency in waste handling practices on the North Slope. This includes directions for using the North Slope manifest, and other requirements for third party contractors using BP or CPAI facilities.

  - Only state licensed hazardous material haulers are used to transport recovered oil. These licensed waste haulers must have an EPA ID number and a state transporter ID number.

  - When completing the manifest, Shell Exploration and Production is listed in the manifest as the generator. The manifest should be signed by the designated Shell representative, and marked with the statement: “This material is being disposed of by Shell as part of a response action in accordance with the National Oil and Hazardous Substances Pollution Contingency Plan (40 CFR 300).”

  - Recovered waste oil must be properly packaged and labeled prior to transport in accordance with 40 CFR 262.30.

  - All wastes shipped off-site for disposal must be transported in compliance with applicable regulations. These include the RCRA regulations in 40 CFR 262-263, the DOT Hazardous Materials Regulations in 49 CFR 171-178, and applicable ADEC regulations. Ensure shipments of waste collected during spill cleanup activities are transported in appropriate containers to eliminate secondary releases during transport. If the nature of the waste precludes packaging in the required container, the Incident Commander should request emergency exemptions from the regulations following procedures outlined in 49 CFR 107.

  - Waste haulers will use only state-certified disposal sites.

  - Unit personnel must track the Hazardous Waste Manifest and retain the appropriate records per 40 CFR 262.40. Unit personnel should receive a signed copy of the manifest from a designated disposal facility within the specified time limits.

DISPOSAL TRANSPORTATION AND DESIGNATED SITES

- Transportation of oil and oily waste at sea may be accomplished via barge, OSRV, or tanker.

- Transportation of oil or oily waste from shoreline locations will be by shallow draft vessel, , towed bladders, or air (helicopter sling-loads of small containers, if approved).,
- Oil or oily debris recovered from a spill site may only be disposed of at authorized sites (List is maintained by Shell HSE).

FIGURE D-1
WASTE MANAGEMENT PLAN

Always work safely in an environmentally sound manner. Minimize waste. Consider waste management and generation in all actions. Never mix waste; always segregate. Report any accident or incident to your supervisor immediately. Reference the Waste Management Plan for the specific process required for each waste type.

A. INTRODUCTION

Incident Name: ______________________

Date of Incident: ______________________

Time of Incident: ______________________

Individual in Charge of Site: ______________________

B. SITE DESCRIPTION

Location of Site: ______________________

Description of Site Including Surrounding Area (e.g., beach, marsh) - attach map: ______________________

____

Access/Limitations (e.g., highway/bridge limitations, boat/shallow water) - attach map: ______________________

____

____

Any Additional Information / Considerations: ______________________

____

Present Weather Conditions: ______________________

____

12-Hour Forecast: ______________________

____

24-Hour Forecast: ______________________

____

C. SITE-SPECIFIC SAFETY PLAN

This plan must be completed and attached before starting any physical work. One plan must be completed for each waste handling/storage area.

FIGURE D-1
WASTE MANAGEMENT PLAN

D. TYPE OF WASTE GENERATED FROM RESPONSE OPERATIONS

Wastes generated by oil spill cleanup fall into several different types. Use the following to identify your wastes. Remember - never mix wastes!

Waste Stream	Sources
Non-Hazardous	
- Oily Liquid	Offshore and onshore recovery operations; vessels, vehicle, aircraft and equipment operations; personnel and equipment decontamination operations; waste storage and disposal area storm water runoff control operations; wildlife washing operations; equipment demobilization operations.
- Non-Oily Liquid	Sewage collection operations; gray water collection operations; laundry operations; oil/water separation operations; wildlife rehabilitation operations.
- Oil Solids	Offshore and onshore recovery operations; debris removal operations; in-situ burning operations; site restoration operations; personnel and equipment decontamination operations; equipment demobilization operations; wildlife capture, cleaning and rehabilitation operations.
- Non-Oily Solids	Offshore and onshore recovery operations; debris removal operations; garbage collection operations; construction operations; site restoration operations; wildlife capture, cleaning and rehabilitation operations; equipment demobilization operations.
Hazardous	
Vessels, vehicle, aircraft and equipment operations; dispersant use operations; wildlife rehabilitation operations.	

FIGURE D-1
WASTE MANAGEMENT PLAN

E. CONTAINERIZED AND STORED WASTE

Waste accumulated at spill cleanup sites will have to be containerized and stored. Use **F through K** of possible waste streams to identify temporary storage techniques. Note that each waste stream will have to be classified as to its hazardous nature. Additionally, each container will have to be properly identified and marked for hazard communications as well as properly marked and labeled to meet Department of Transportation requirements before shipment. All hazardous waste must be transported immediately to the nearest shore base for continued storage.

F. TEMPORARY WASTE SITES will have to be identified and established. These sites will need to be in close proximity to the cleanup site. Security requirements must be considered along with the access to outside transportation. These storage areas should be established with the following considerations: distance to living/working areas (cleanup operations as well as the general public), tidal influx, local wildlife impact, security, cleanup of spilled product and rainwater runoff. The following section should be completed for each temporary storage site. To establish security, contact the Logistics Section Chief.

Site Location	Security	Access

G. COMPANY-APPROVED TREATMENT, RECYCLING AND DISPOSAL FACILITIES are listed below. Prior contact must be made with the facility as soon as the waste is identified and an estimated volume is established.

Company Name, Address, Phone Number	Contact (Complete When Called)	Type Waste Approved For

FIGURE D-1
WASTE MANAGEMENT PLAN

H. **COMPANY-APPROVED WASTE TRANSPORTERS** shall be used to haul all waste. The following is a list of transporters presently used to transport wastes. The shipper must ensure that all Department of Transportation requirements are met. Additionally, all waste must be accompanied by a properly completed manifest or shipping paper. All containers must be secure and strong. All dump trucks or roll-off bins should be lined to prevent spillage or contamination of other areas.

Company Name, Address, Phone Number	Contact (Complete When Called)	Type Waste Approved For

I. **WASTE MATERIAL MUST BE CONTROLLED WHEN ENTERING AND LEAVING** the storage area. The following can be used to accomplish this task.

Waste Type	Type / # Containers	Control Number	Date IN	Date OUT	Transporter	Disposer	Type / Manifest #

J. If **ADDITIONAL HELP OR ASSISTANCE** is required, immediately contact your on-scene safety or environmental representative or contact the Operations Section Chief or the Safety Officer.

FIGURE D-1
WASTE MANAGEMENT PLAN

K. **EQUIPMENT, MANPOWER AND EXPENDITURES** must be controlled and documented. The following can be used for this purpose. If additional assistance is required for cost control, contact the Finance Section Chief. If additional assistance is required for purchasing or locating equipment or supplies, contact the Logistics Section Chief.

EQUIPMENT					
Waste Handling Equipment	**Vendor**	**S.O. #**	**Days Used**	**Cost Per Day**	**Total Cost**

MANPOWER					
Waste Handling Equipment	**Vendor**	**S.O. #**	**Days Used**	**Cost Per Day**	**Total Cost**

OTHER COSTS (Fuel, Tools, Repair, Container Rental/Purchase, Other Equipment)					
Waste Handling Equipment	**Vendor**	**S.O. #**	**Days Used**	**Cost Per Day**	**Total Cost**

TOTAL COST = ______

L. **WASTE MANAGEMENT SITES** are identified in **this Section**.

M. Report all **ACCIDENTS/INCIDENTS** immediately to your supervisor. Always work safely and in an environmentally sound manner.

FIGURE D-2
Oil/ Water/ Debris Separation Strategies

The different types of wastes generated during response operations require different disposal methods. Waste shall be separated by material type for temporary storage prior to transport. The following table lists some of the options available for separating oily wastes into liquid and solid components. The table also depicts methods that may be employed to separate free and/or emulsified water from the oily liquid waste.

TYPE OF MATERIAL	SEPARATION METHODS
(1) LIQUIDS	
Non-emulsified oils	Gravity separation of free water
Emulsified oils	Emulsion broken to release water by: • Heat treatment • Emulsion breaking chemicals • Centrifuge • Filter/belt press
(2) SOLIDS	
Oil mixed with sand	• Collection of liquid oil leaching from sand during temporary storage • Extraction of oil from sand by washing with water or solvent • Mechanical sand cleaner • Removal of solid oils by sieving
Oil mixed with cobbles, pebbles or shingle	• Screening • Collection of liquid oil leaching from beach material during temporary storage • Mechanical sand/gravel cleaner • Extraction of oil from beach material by washing with water or solvent
Oil mixed with wood, plastics, seaweed and sorbents	• Screening • Collection of liquid oil leaching from debris during temporary storage • Flushing of oil from debris with water
Tar balls	Separation from sand by sieving

FIGURE D-3
TEMPORARY STORAGE METHODS

Container	On-shore	Off-shore	Solids	Liquids	Notes
Barrels	✓	✓	✓	✓	May require handling devices.
Barges		✓	✓	✓	Liquids only in tanks. Consider venting of tanks.
Oil Storage Tanks	✓	✓		✓	Consider problems of large volumes of water in oil.
Bladders	✓	✓		✓	May require special hoses or pumps for oil transfer.
Pits	✓		✓	✓	Liner(s) required.
Roll-off Bins	✓		✓		Require impermeable liner and cover.
Mud Tanks	✓	✓	✓	✓	500 gallon - 500 Bbls
Frac Tanks	✓	✓	✓	✓	Portable, can be deployed anywhere.

APPENDIX E:
WILDLIFE CAPTURE, TREATMENT AND RELEASE PROGRAMS BEAUFORT SEA OIL SPILL RESPONSE PLANNING

Wildlife Capture, Treatment and Release Programs Beaufort Sea Oil Spill Response Planning

November 2006

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Attachments

1.0 EXECUTIVE SUMMARY

Wildlife Permits for Secondary and Tertiary Response:

- Develop a wildlife assessment (affected species, concentrations relative to spill)
- Prepare a plan of operations for protection, hazing, capture, or treatment
- Complete State and Federal permit applications
- Mobilize qualified wildlife response contractors

Resources to develop agency acceptable wildlife response plans, listed in order of preference (Specific contractors are identified in Table 1):

- Local resident possessing traditional knowledge
  - Whaling Captains and crews
  - Alaska Eskimo Whaling Commission (AEWC)
  - Village Elders and Leaders
  - Marine Mammal Observers (MMO)
  - Subsistence Advisors
- Trained Biologists with permit experience
  - ASRC Energy Services, Lynx Enterprises, Inc. (AES Lynx) Personnel
  - Other subcontractor support (ABR, LGL)
- Alaska Clean Seas (ACS)
  - ACS Permits for Birds and Terrestrial Mammals (Tactic W-1)
  - Master Service Agreement with International Bird Rescue and Rehabilitation Center (IBRRC)
  - ACS Mobile Wildlife Stabilization Center
- Wildlife Response Contractors
  - International Bird Rescue and Rehabilitation Center (IBRRC)
    - Their network of subcontractors
  - Medical Support Personnel
- Agency Personnel
  - NSB Department of Wildlife Management
  - Alaska Department of Fish and Game
  - U.S. Fish and Wildlife Service
  - U.S. National Marine Fisheries Service

Table 1
Wildlife Response Contractors

	Potential Contractors Wildlife Response Contractors					
Species	**Observe and/or Identify**	**Develop Wildlife Assessment**	**Haze**	**Collect and Hold**	**Treat**	**Carcass Collection[4]**
Migratory Birds	AES Lynx[1] ABR[6] , LGL[6]	AES Lynx[1] ABR[6] , LGL[6]	ACS AES Lynx [1]IBRRC	IBRRC[2,3,4]	IBRRC[2]	AES Lynx ACS
Walrus and Polar Bears	AES Lynx[1]	AES Lynx[1]	ACS[4] AES Lynx[1] IBRRC	IBRRC[2,3,4]	IBRRC[5]	AES Lynx ACS
Whales, Porpoises, Seals and Sea Lions	AES Lynx[1]	AES Lynx[1]	ACS[4] AES Lynx[1] IBRRC	IBRRC[2,3,4]	IBRRC[5]	AES Lynx ACS
Terrestrial Mammals	AES Lynx[1] ABR[6] , LGL[6]	AES Lynx[1] ABR[6] , LGL[6]	ACS[4] AES Lynx[1] IBRRC	IBRRC[2,3,4]	IBRRC[5]	AES Lynx ACS
Endangered Species*	AES Lynx[1] ABR[6] , LGL[6]	AES Lynx[1] ABR[6] , LGL[6]	ACS[4] AES Lynx[1] IBRRC	IBRRC[2,3,4]	IBRRC	AES Lynx ACS

Notes:
1. The capability is available through AES Lynx, however, it requires enhancement to be response-ready. AES Lynx would contract for directly local hire directly or through other North Slope based corporations.
2. IBRRC is available through the ACS Master Services Agreement.
3. IBRRC would likely contract or sub-contract local experts or residents.
4. Village Response Teams are available through ACS Master Service Agreements to fill these roles.
5. This response action is likely restricted to young animals.
6. The capability of this contractor to perform these duties is assumed through other experience, not necessarily oil spill response.

*Endangered and threatened species are listed in Appendices 2 through 4 of the Alaska Regional Response Team (ARRT) Wildlife Protection Guidelines. Check at the time of the spill for current listing**.**

ACS = Alaska Clean Seas
AES Lynx = ASRC Energy Services, Lynx Enterprises, Inc.
ABR = ABR Inc. Environmental Research & Services
IBRRC = International Bird Rescue and Rehabilitation Center
LGL = LGL Limited

2.0 BACKGROUND INFORMATION

Marine mammal spill response options in the Arctic Ocean remain limited due to federal prohibitions and the practicality of capturing large animals for treatment. The Exxon Valdez incident provided the impetus for the development of a successful bird and sea otter capture and treatment program in the State of Alaska. Regulatory agencies have promoted a strong bird capture and treatment capability for North Slope operators.

Concerns over potential affects of drilling activities in the Beaufort Sea have lead to the seasonal drilling mitigation measures and restrictions in lease stipulations issued by the State of Alaska Division of Oil and Gas and the Minerals Management Service (MMS). MMS leases require lessees to enter into Conflict Avoidance Agreements with the AEWC before exploring for oil offshore. This includes the use of MMO during the seismic and drilling phases of an operation to address subsistence and whale harvest protection mitigation measures. The expectation of the AEWC is that the state stipulations along with the Conflict Avoidance Agreements required by the MMS would impose drilling restrictions during whale migration at varying times anywhere between June 1 and October 31, depending on the drilling location.

In recent years the focus has been to incorporate wildlife protection measures into facility design, implement wildlife monitoring and conflict avoidance programs, and develop response plans to contain and control oil spills at the source, thereby preventing the spread of oil and direct impacts to habitats and wildlife.

Response options such as hazing are available and can be effective for birds and certain terrestrial mammals. However, hazing large marine mammals is difficult and success has been mixed. Depending upon the species, wildlife conditioned to the human activity may not respond to hazing and the risk of oiling may be a lesser concern than the consequences of hazing, such as when seals abandon their pups. Due to these considerations, capture, treatment and rehabilitation need to be credible and sensitive to local concerns and knowledge.

Facilities exist in the State of Alaska to capture and stabilize oiled birds and marine mammals. On the North Slope, ACS maintains a Mobile Wildlife Stabilization Center and maintains a service agreement with the IBRRC.

3.0 PERMITS AND INFORMATION REQUIREMENTS

The permits required to are based on the jurisdiction and resource protection interests of each agency. See the attachment for a brief description of these responsibilities and interests. Each permit can be applied for during the response to the Unified Command, using the checklists and permit applications provided in Annex G of the Unified Plan. A copy of these applications and checklists has been enclosed.

The permit applications were developed by the ARRT for use by responsible parties during a spill event, if needed. The ARRT serves as a regional body for federal and state agencies to coordinate planning and preparedness activities in support of response operations for pollution incidents. For a detailed description of wildlife response planning requirements and options in Alaska, refer to the 176 pages of “Annex G – Wildlife Protection Guidelines” to the “Unified Plan” for the State of Alaska, located at the Alaska Regional Response Team's website: http://www.akrrt.org/UnifiedPlan/index.shtml.

The Unified Command requires the following types of information to process the request: potentially affected species, estimated distribution, habitat types, spill trajectory, and hazing or treatment options. Qualified individuals to generate a "Wildlife Assessment" can be provided by the responsible party (RP) and/or agency personnel, at the discretion of the Federal on Scene Commander (FOSC).

The Wildlife Assessment is best performed by biological specialists and locals with traditional knowledge of the species affected, such as subsistence hunters. Federal agencies actively promote the involvement of local knowledge to come up with alternatives for wildlife rescue and protection. For example, Barrow residents played a major role in the planning for the rescue the grey whales in 1988.

The following table is taken from the ACS Technical Manual, Tactic W-1 and summarizes permits required for hazing, capture, and holding of live animals.

Table 2
State and Federal Permits and/or Authorizations Required for Hazing, Collecting, or Holding Live Animals

	Alaska Department of Fish and Game		**U.S. Fish and Wildlife Service**		**National Marine Fisheries Service**	
Species	**Collect and Hold**	**Haze**	**Collect and Hold**	**Haze**	**Collect and Hold**	**Haze**
Migratory Birds	No	Yes	Yes	No	No	No
Sea Otters, Walrus and Polar Bears	No	No	Yes	Yes	No	No
Whales, Porpoises, Seals and Sea Lions	No	No	No	No	Yes	Yes
Terrestrial Mammals	Yes	Yes	No	No	No	No
Endangered Species*	Yes	Yes	Yes	Yes	No	No

Source: App. 16 of the ARRT Wildlife Protection Guidelines, Alaska Unified Plan
*Endangered and threatened species are listed in Appendices 2 through 4 of the ARRT Wildlife Protection Guidelines. Check at the time of the spill for current listing.

4.0 ARCTIC OCEAN CONSIDERATIONS

Species identification is crucial to developing the wildlife assessment and response plans. The following species, separated into birds and mammals, are those likely to be encountered in the Arctic operating area:

4.1 MIGRATORY BIRDS

The major group to which each species belongs is indicated as follows: waterfowl (WF), seabird (SE), and other diving bird (DB), shorebird (SH), raptor (RA), and upland bird (UB). Also indicated are endangered species (ES), threatened species (TS), and those of special management concern (SMC) to the Alaska Department of Fish and Game (ADF&G). Species of SMC are generally defined as species established as a priority for study and management by public agencies to prevent their populations from declining to a level warranting a listing action under the Endangered Species Act.

Table 3
Migratory Birds

Species of Concern	Population Density Code	Species of Concern	Population Density Code
Loons (DB)	P/S	Scoter (WF)	U/S
Grebes (DB)	A	Mallard (WF)	R/S
Tundra Swans (WF)	P/S	Bald Eagles (RA)	A
Greater White-fronted Goose (WF)	P/S	Osprey (RA)(SMC)	A
Snow Goose (WF)	P/S	Arctic Peregrine Falcon (RA)	P
Emperor Goose (WF)	R/S	Snowy Owl (RA)	U/S
Black Brant (WF)	P/S	Sandhill Crane (SH)	U/S
Canada Geese (WF)	P/S	Wandering Tattler (SH)	A
Oldsquaw (WF)	P/S	Bristle-thighed Curlew (SH)(SMC)	R
Greater Scaup (WF)	U/S	American Golden Plover (SH)	P
Red-breasted Merganser (WF)	R/S	Semipalmated Plover (SH)	U
Northern Pintail (WF)	P/S	Aleutian Tern (SE)	A
Bufflehead (WF)	A	Arctic Tern (SE)	U
Goldeneye (WF)	A	Gulls (SE)	P/S
Canvasback (WF)	A	Murres (SE)	P/S
Northern Shoveler (WF)	R	Guillemots (SE)	U
Spectacled Eider (WF)(TS)	U/S	Murrelets (SE)	R
Steller's Eider (WF)(TS)	U/S	Kittlitz's Murrelet (SE)(SMC)	R
King Eider (WF)	P/S	Puffins (SE)	R
Common Eider (WF)	P/S	Northern Fulmar (SE)	R
Harlequin Duck (WF)(SMC)	R	Black-legged Kittiwake (SE)	P

Table 3
Migratory Birds

Species of Concern	Population Density Code	Species of Concern	Population Density Code
American Widgeon (WF)	U/S	Cormorants (SE)	R
Green-winged Teal (WF)	U/S	Ptarmigan (UB)	P/S
Wandering Tattler (SH)	A	Northern Shoveler (WF)	R
Bristle-thighed Curlew (SH)(SMC)	R	Spectacled Eider (WF)(TS)	U/S
American Golden Plover (SH)	P	Steller's Eider (WF)(TS)	U/S
Semipalmated Plover (SH)	U	King Eider (WF)	P/S
Aleutian Tern (SE)	A	Common Eider (WF)	P/S
Arctic Tern (SE)	U	Harlequin Duck (WF)(SMC)	R
Gulls (SE)	P/S	American Widgeon (WF)	U/S
Murres (SE)	P/S	Green-winged Teal (WF)	U/S
Guillemots (SE)	U	Scoter (WF)	U/S
Murrelets (SE)	R	Mallard (WF)	R/S
Kittlitz's Murrelet (SE)(SMC)	R	Bald Eagles (RA)	A
Puffins (SE)	R	Osprey (RA)(SMC)	A
Northern Fulmar (SE)	R	Arctic Peregrine Falcon (RA)	P
Black-legged Kittiwake (SE)	P	Snowy Owl (RA)	U/S
Cormorants (SE)	R	Sandhill Crane (SH)	U/S
Ptarmigan (UB)	P/S		

P = Present U = Uncommon R = Rare A = Casual/Accidental O = Pelagic (well offshore) S = Subsistence Species

4.2 MARINE MAMMALS

Table 4
Marine Mammals

Species of Concern	Population Density Code	Species of Concern	Population Density Code
Polar Bear (FWS)	P/S	Beluga Whale (NMFS)(SMC)	P/S
Ringed Seal (NMFS)	P/S	Brown Bear	P/S/SMC
Spotted Seal (NMFS)	P/S	Black Bear	P/S
Bearded Seal (NMFS)	P/S	Caribou/Reindeer	P/S
Pacific Walrus (FWS)	P/S	Moose	P/S
Ribbon Seal (NMFS)	P(pack ice)/S	Muskoxen	P/S/SMC
Bowhead Whale (NMFS)(ES)	P/S	Dall Sheep	P/S
Gray Whale (NMFS)	P	Wolf	P/S
Minke Whale (NMFS)	U	Arctic Fox	P/S
Aquatic Furbearers	P/S	Red Fox	P/S
Harbor Porpoise (NMFS)	P/S	Killer Whale (NMFS)	P

P = Present U = Uncommon R = Rare O = Pelagic (well offshore) S = Subsistence Species TS = Threatened Species ES = Endangered Species SMC = Special Management Concern

ATTACHMENT 1
AGENCY JURISDICTION/RESPONSIBILITIES

Under federal statutes, the National Marine Fisheries Service (NMFS, as an agency of the U.S. Department of Commerce (DOC)) has responsibility for managing and protecting all cetaceans and pinnipeds, except walruses. The Fish and Wildlife Service (FWS, as an agency of the U.S. Department of the Interior (DOI)) has responsibility for managing and protecting migratory birds, walruses, sea otters, and polar bears.

FWS has joint statutory responsibility with ADF&G for management of wildlife on all federal lands in Alaska (i.e., national park system units, national wildlife refuges, national forest system lands, military reservations, and other DOI- and federally-managed public lands).

DOC, through NMFS, is responsible for the administration of the Endangered Species Act as it applies to certain cetaceans (whales and porpoises) and pinnipeds (seals, sea lions, etc.) in Alaska. These include most species of whales and the northern (Steller) sea lion. DOI, through FWS, is responsible for the administration of the Endangered Species Act as it applies to remaining marine mammals and terrestrial mammal and bird species in Alaska. These species found in Alaska are as follows:

- Beluga Whales
- Bowhead Whales
- Humpback Whales
- Gray Whales
- Killer Whales (Orcas)
- Minke Whales
- Northern Right Whales

The Marine Mammal Protection Act (MMPA) of 1972 gave NMFS responsibility for the management and conservation of all but three species of marine mammals in Alaska. The USFWS, Region 7, Alaska, Marine Mammals Management Office is responsible for management of the three Alaska species: polar bears, sea otters, and Pacific walrus.

The hyperlink connects to the following resources:

- Wildlife Hazing, Capture and Treatment Facilities
- Oil Spill Hazing and Treatment Application Forms

Hyperlink: Facilities and Permit Applications.pdf

APPENDIX F:
PRODUCT SPECIFICATION FOR LOW SULFUR DIESEL FUEL OIL

MARKETING AND SUPPLY SALES SPECIFICATION
LOW SULPHUR DIESEL LIGHT

Effective: June 1, 2006
Location: Western Canada.

PARAMETER	MIN	MAX	TEST METHOD
Appearance	Clear and Bright		Visual
Ash, % mass		.010	ASTM D482
Colour	Report		ASTM D156, D1500
Distillation - 10% Recovered, °C		215.0	ASTM D86
Distillation - 90% Recovered, °C		290.0	ASTM D86
Density, kg/M3		850	ASTM D1298, D4052
Cetane Number	40.0		ASTM D613
Corrosion - Copper - 3 hrs @ 50°C		No. 1	ASTM D130
Electrical Conductivity, pS/m September 01 - April 15 @ 20°C April 16 - August 31@ 20°C	 200 (1) 100 (1)		ASTM D2624
Flash°C	40.0 (2)		ASTM D93, D3828
Lubricity	Meets Requirements		CAN/CGSB 3.517 Para 6.22
Mercaptan Sulphur, ppm		120	ASTM D3227
Micro Carbon Residue - 10 % Btms, % mass		0.10	ASTM D4530
Operability, °C	See Table A		ASTM D2500, D5773, CGSB 140.1
Pour Point, °C	Report		ASTM D97, D5949
Sulphur, mg/kg Up to Aug 31st, 2006 September 1, 2006		 500(3) 15(4)	ASTM D5453, D7039
Total Acid Number, mg/KOH/g		0.10	ASTM D974
Viscosity @ 40°C, cSt	1.30	3.00	ASTM D445
Water and Sediment, % vol		0.05	ASTM D1796(mod), D2709

TABLE A
CLOUD SCHEDULE (°C)

Terminal	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Vancouver	-34	-34	-34	-34	-34	-34	-34	-34	-34	-34	-34	-34
Nanaimo	-34	-34	-34	-34	-34	-34	-34	-34	-34	-34	-34	-34
Victoria	-34	-34	-34	-34	-34	-34	-34	-34	-34	-34	-34	-34
Kamloops	-37	-37	-34	-34	-34	-34	-34	-34	-34	-34	-34	-37
Prince George	-43	-43	-43	-43	-43	-43	-43	-43	-43	-43	-43	-43
Terrace	-43	-43	-43	-43	-43	-43	-43	-43	-43	-43	-43	-43
Calgary	-37	-37	-34	-34	-34	-34	-34	-34	-34	-34	-34	-37
Edmonton	-43	-43	-43	-43	-43	-43	-43	-43	-43	-43	-43	-43
Regina	-43	-43	-43	-43	-43	-43	-43	-43	-43	-43	-43	-43
Saskatoon	-43	-43	-34	-34	-34	-34	-34	-34	-34	-34	-43	-43
Winnipeg.	-43	-43	-43	-43	-43	-43	-43	-43	-43	-43	-43	-43
Hay River- Truck	-45	-44	-43	-43	-43	-43	-43	-43	-43	-43	-43	-45
Hay River-Marine	-48	-48	-48	-48	-48	-48	-48	-48	-48	-48	-48	-48
Whitehorse	-48	-48	-48	-48	-48	-48	-48	-48	-48	-48	-48	-48

Notes: (1) The fuel's minimum electrical conductivity shall apply at the shipping terminal.
(2) The fuel's minimum flash point shall be 43°C at the shipping terminal.
(3) The maximum sulphur will be 8 mg/kg at the refinery flange into pipeline, and 10 mg/kg into refinery connect rail & truck rack. Terminal storage will be converted to 12 mg/kg or less during the transition period of June through August.
(4) The maximum sulphur at the refinery "flange" will be 8 mg/kg into pipeline, and 10 mg/kg maximum into refinery connect rail or truck rack.

Meets: Automotive Low Sulphur Diesel Fuel, CAN/CGSB 3.517-2000 Type A-LS,
Regular Sulphur Diesel, CAN/CGSB-3.6-2000 Type A