BEAUFORT SEA
REGIONAL EXPLORATION PROGRAM
OIL SPILL RESPONSE PLAN

SHELL

ANCHORAGE, ALASKA

MAY 2011

HSE Policy

SHELL COMMITMENT AND POLICY ON HEALTH, SECURITY, SAFETY, THE ENVIRONMENT AND SOCIAL PERFORMANCE

COMMITMENT

In Shell we are all committed to:

- Pursue the goal of no harm to people;
- Protect the environment;
- Use material and energy efficiently to provide our products and services;
- Respect our neighbours and contribute to the societies in which we operate;
- Develop energy resources, products and services consistent with these aims;
- Publicly report on our performance;
- Play a leading role in promoting best practice in our industries;
- Manage HSSE & SP matters as any other critical business activity; and
- Promote a culture in which all Shell employees share this commitment.

In this way we aim to have an HSSE & SP performance we can be proud of, to earn the confidence of customers, shareholders and society at large, to be a good neighbour and to contribute to sustainable development.

POLICY

Every Shell Company:

- Has a systematic approach to HSSE & SP management designed to ensure compliance with the law and to achieve continuous performance improvement;
- Sets targets for improvement and measures, appraises and reports performance;
- Requires contractors to manage HSSE & SP in line with this policy;
- Requires joint ventures under its operational control to apply this policy, and uses its influence to promote it in its other ventures;
- Engages effectively with neighbours and impacted communities; and
- Includes HSSE & SP performance in the appraisal of staff and rewards accordingly.

Peter Voser
Chief Executive Officer

Peter Slaiby
Vice President Alaska Exploration and Appraisal

Originally published in March 1997 and updated by the Executive Committee December 2009.

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FIGURES

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OSRP QUICK GUIDE

A. General

The actions taken during the initial phase of an incident are critical to the effectiveness of the overall response. In the event of an oil spill during Shell's Beaufort Sea Regional Exploration Program, the contact information and forms provided in this Quick Guide will ensure that all required internal and external notifications are made and that an appropriate response is coordinated in a safe and timely manner.

Refer to the **Table of Contents** and the remainder of the OSRP for additional topics and information on notifications, organization, management, and response actions.

B. When to Use

The Quick Guide will be used during the Initial Response (Reactive Phase) of an Incident. Refer to Part 2 for additional information on detailed strategic response planning.

C. Intended Users of the Quick Guide

- Incident Commander
- Qualified Individual
- Operations Officer
- Drilling, Completion, and Well Services Foreman

Refer to Part 2 for additional information on organizational response to oil spills, including escalation and call out of personnel.

D. Forms and Information

Figure 1 Report of an Offshore Environmental Incident Form

Figure 2 Spill Volume Estimator

Refer to Section 2.7 for additional information on Spill Volume Estimation.

Figure 3 Contact Information

3a. Emergency Contact List

3b. Agency and External Notification Information

3c. Command Staff Contact Information

Figure 4 Initial Response Incident Management Forms

4a. Response Objectives

This is a list of basic objectives and strategies. Refer to Section 2 for additional information on managing by objectives.

4b. ICS 201 Incident Briefing
This is to be used during the Initial Response for documentation and briefings. (ICS Forms 201-1 through 201-5).

4c. ICS 214a Individual Log
This is to be used by individuals to document actions and communications.

4d. Notification Status Report
This is to be used by the IC or his designee to record external notifications.

Figure 5 Internet Quick Links

Figure 1: Report of Offshore Environmental Incident Form

(Internal SEPCo HSSE 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 Fountain Incident reporting 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

Slick colors ☐ Silver/Gray Sheen (spill factor = 0.000004) ☐ Transitional Dark (spill factor = 0.004)
☐ Rainbow (spill factor = 0.00004) ☐ Dark (spill factor = 0.04)
☐ Metallic (spill factor = 0.0004)

Size of the slick feet by feet Estimated volume of the spill (feet **x** feet **x** 0.624 **x** spill factor) = **gallons**

Was the slick ☐ 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)**
Visibility(nautical miles)	Ceiling (feet)	Ambient temp. (°F.)

Liquid Spill Properties
API Gravity **Pour Point**

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)

SEPCo Offshore Report of Environmental Incident Form Page 1 of 2 Form OF-REI Rev. January 2010

Figure 1: First Notice Incidental Detail Report (Continued)

(Internal SEPCo HSSE use only) Incident Number______________.

INCIDENT EFFECTS					
Environmental	☐ Inside impermeable containment/ building	☐ Gravel surface (roadway or pad)	☐ Tundra	☐ Confined water body	☐ Unconfined or flowing water body
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
Reputational ☐ 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)	☐		/	
Alaska Department of Environmental Conservation 907-451-2121 (Business hours) 1-800-478-9300 (After hours & weekends)	☐		/	
North Slope Borough 907-852-0440 (Land Management) 907-852-0248 (Risk Management)	☐		/	
United States Coast Guard 907-271-6700	☐		/	
BSEE 907-250-0546 or 907-334-5300	☐		/	
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 HSSE Incident Management Process Gatekeeper for your organization for submission instructions.

SEPCo Offshore Report of Environmental Incident Form Page 2 of 2 Form OF-REI Rev. January 2010

Figure 2: Spill Volume Estimator

Step 1 – Determine Square Miles based on Length X Width.
Step 2 – Multiply Percent Coverage X Square Miles = Total Square Miles.
Step 3 – Enter Spill Appearance Percent based on Aerial Observations.
Step 4 – Multiply Appearance Percentage X Estimated Gallons per Square Miles (Minimum/Maximum) X Estimated Area covered in Square Miles = Estimated Spill Volume.

LENGTH & WIDTH OF AREA COVERED IN MILES

[ ] miles

[ ] miles

[ ] miles²

PERCENTAGE OF COVERAGE WITHIN AREA ABOVE

100%
80%
60%
40%
20%

ESTIMATED AREA COVERED IN SQUARE MILES

[ ] Miles X [ ] % coverage = [ ]

APPEARANCE ON THE WATER

APPEARANCE	%	MIN gal/mi²	MAX gal/mi²			MIN Gallons	MAX Gallons
Sheen		26.88	209.7	X			
Rainbow		209.7	3439	X			
Metallic		3439	34406	X			
Transitional Dark		34406	100000	X			
Dark Color		100000	137088	X			
MINIMUM ESTIMATED TOTAL IN GALLONS							
MAXIMUM ESTIMATED TOTAL IN GALLONS*							

****Use the Maximum Estimated Total for initial Reporting and Response***

Figure 3a: Emergency Contact List

EMERGENCY RESPONSE COORDINATOR	
Curtis Wright Main: 907-771-7234 Cell: 907-538-1653 Email: curtis.wright@shell.com	
SHELL CONTACT LIST	
QI / IC Primary	907-771-7217 Cell 907-223-0061
QI / IC Alternate	907-646-7119 Cell 907-382-5474
QI / IC Alternate	907-771-7221 Cell 907-306-8016
Security	907-273-2420
Wells Manager	907-771-7219
Drilling Superintendent	907-646-7176 Cell 504-874-4697
Regulatory Affairs Manager	907-771-7243
HSSE Manager	907-646-7121
Environmental / SD Advisor	907-646-7116
Drilling Engineer	A - 713-546-6675 Cell 281-507-6963 B - 713-948-1169 Cell 713-382-6434
Shell MOSAG / SART	713-241-2532
OIL SPILL RESPONSE ORGANIZATIONS	
ACS - Primary Address: Pouch 340022, Prudhoe Bay, Alaska 99734 Main Number Prudhoe Bay ACS Operations Manager North Slope Mutual Aid (if applicable) handled through ACS	 907-659-2405 907-659-3202 907-659-2405
MSRC – Tier II/III Address: 220 Spring Street, Suite 500, Herndon, VA 20179 Main Number Herndon Activation Number	 703-326-5660 318-437-9600
AES-RO – Equipment and Tactics Address: 3900 C Street, Anchorage, Alaska 99503 Main Number Anchorage AES-RO Operations Manager	 907-339-6200 907-339-6200

Shell's IC is also identified as the primary QI as defined in OPA 90 and has the responsibility and authority to initiate spill cleanup operations, obligate funds to carry out response activities, implement response actions, and immediately notify appropriate Federal Officials and Response Organizations and act as liaison with the pre-designated FOSC.

NOTE: PLEASE REFER TO TABLE 2.7.1-5 AGENCY AND EXTERNAL NOTIFICATION INFORMATION FOR ADDITIONAL EMERGENCY CONTACT NUMBERS.

Figure 3b: Agency and External Notification Information

AGENCY	TELEPHONE	FACSIMILE (FAX)
NRC	800-424-8802	
EPA (NRC will call)	907-271-5083	907-271-3424
Matt Carr (EPA FOSC) direct line	907-271-3616	907-271-3424
EPA Region 10 – 24 hr Duty Officer	206-553-1264	
ADEC - Business Hours	907-451-2121	907-451-2362
ADEC - after hours and on weekends call ALASKA STATE TROOPERS	800-478-9300	
ADNR - Oil Spill Hotline Recording	907-451-2678	907-451-2751
DOI-OEPC (Pamela Bergmann)	907-271-5011	907-271-4102
NSB	907-561-5144	907-562-1940
NSB Wildlife Department (Office)	907-852-0440	907-852-5991
NSB Wildlife Department (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 Mayor’s Office	907-852-0200	907-852-0337
NSB Disaster Coordinator (Pat Patterson)	907-852-2822, 907-852-6111 (24 hrs on call)	907-852-2475
USCG – Sector Anchorage COTP Zone	907-271-6700	907-271-6765
USFWS (spills that may impact the Arctic National Wildlife Refuge)	907-235-6546	907-271-1630
BSEE	907-250-0546	907-334-5302
ADF&G – Fairbanks	907-459-7242	907-452-6410
Alaska Oil and Gas Conservation Commission (AOGCC) – Anchorage AOGCC – North Slope Inspector	907- 279-1433 907-659-3607 Pager, 907-659-2714	907-276–7542 907-659-2717
City of Barrow North Slope Borough Mayor’s Office Inupiat Community of the Arctic Slope	907-852-5211 907-852-0200 907-852-4227	
Village of Nuiqsut Village of Kaktovik	907-480-6727 907-640-6313	
Prudhoe Bay Weather	907-659-5888	

Figure 3c: Command Staff Contact Information

NAME	OFFICE #	PAGER #	CELL #
COMMAND STAFF			
IC/QI			
Sean Churchfield	907-771-7217		907-223-0061
Susan Moore	907-646-7119		907-382-5474
Deputy IC /QI			
Susan Moore	907-646-7119		907-382-5474
Geoff Merrell	907-771-7221		907-306-8016
Public Affairs/Information Officer			
Jennifer Taylor	907-646-7178		907-382-5974
Curtis Smith	907-646-7182		907-242-5227
Liaison Officer			
Pauline Ruddy	907-771-7243		907-223-9381
Greg Horner	907-646-7131		907-227-1065
Safety Officer			
Lucy Jean	907-646-7116		907-301-7614
Mike Corron	907-646-7103		907-223-6878
Legal Officer			
Marc Stone	907-646-7127		713-269-8054
Kyle Parker	907-227-9564		
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)			
Pete Slaiby	504-728-6711		281-857-1888
Gary Cameron	907-771-7249		907-230-5329
Executive Liaison (IC Support)			
Peter Velez	832-337-0222		281-250-0448
Charlie Williams	832-337-1794		281-685-9088
GENERAL STAFF			
Operations Section Chief			
Geoff Merrell	907-771-7221		907-306-8016
ACS Staff	907-659-2405		
AES-RO Staff	907-339-6200		

Figure 3c: Command Staff Contact Information (Continued)

NAME	OFFICE #	PAGER #	CELL #
Staging Area Manager			
ACS Staff	907-659-2405		
Operations Section Branch Directors			
Shell Staff	907-770-3700		
ACS Staff	907-659-2405		
AES-RO Staff	907-339-6200		
Planning Section Chief			
Carol Theilen	907-771-7220		713-504-9260
Darla Dare	907-646-7109		907-854-4876
Technical Specialists			
Michael Macrander	907-646-7123		907-317-9314
Al Allen (Spiltec)	425-869-0988		
Victoria Broje	281-544-7437		281-660-4353
ACS Planning and Development Manager (IMT coach/facilitator)	907-659-3220		
Logistics Section Chief			
Karen Spring	907-646-7111		907-306-6038
Lev Yampolsky	907-646-7160		907-306-2574
Source Control			
Mark Duplantis	907-646-7129		907-317-2013
Jim Miller	907-646-7122		713-253-3778
Finance Section Chief			
Gary Becker	907-646-7151		713-817-1667
Zach Reigle	907-646-7105		517-944-1502

Figure 4a: Response Objectives

INCIDENT NAME: ______________

MAXIMIZE HEALTH & SAFETY OF RESPONSE PERSONNEL		
☐	1)	Safety is the first priority.
☐	2)	Perform site characterizations.
☐	3)	Restrict access to “hot” and “warm” zones to properly trained & equipped personnel.
MINIMIZE HEALTH & SAFETY IMPACTS TO THE GENERAL PUBLIC		
☐	1)	Establish secure safety zones.
☐	2)	Issue notifications to mariners.
☐	3)	Restrict air space over the incident scene.
☐	4)	Conduct air and water quality monitoring, as necessary.
CONTROL & STABILIZE SOURCE		
☐	1)	Be prepared for a fire.
☐	2)	Conduct a damage assessment.
☐	3)	Commence well control operations.
MAXIMIZE PROTECTION OF SENSITIVE AREAS		
☐	1)	Use resources available and ACP to identify sensitive areas.
☐	2)	Develop and implement protection strategies.
☐	3)	Prioritize areas, as necessary.
DEVELOP A COMPREHENSIVE, INTEGRATED PLAN		
☐	1)	Obtain approval to use dispersants.
☐	2)	Obtain approval to commence in-situ burning.
☐	3)	Use high capacity recovery devices in thickest concentrations.
☐	4)	Support on-water operations with surveillance and spotter aircraft (continuously).
☐	5)	Prepare shorelines for the arrival of oil.
☐	6)	Initiate wildlife protection operations.
☐	7)	Initiate NRDA operations.
☐	8)	Establish staging areas.
☐	9)	Develop disposal plans.
☐	10)	Integrate agency response personnel into IMT.
☐	11)	Keep the public informed.
☐	12)	Be prepared to respond to claim issues.

Figure 4b: ICS 201 Incident Briefing Form

1. Incident Name:	**2. Prepared by: (Name)** Date: Time:	**INCIDENT BRIEFING** **ICS 201-1**

3. Map/Sketch (include sketch, showing the total area of operations, the incident site/area, over flight results, trajectories, impacted shorelines, or other graphics depicting situational and response status)

4. Current Situation:

INCIDENT BRIEFING **ICS 201 (pg 1 of 5)**

Figure 4b: ICS 201 Incident Briefing Form (Continued)

1. Incident Name:	2. Prepared by: (Name) Date: Time:	INCIDENT BRIEFING ICS 201-2

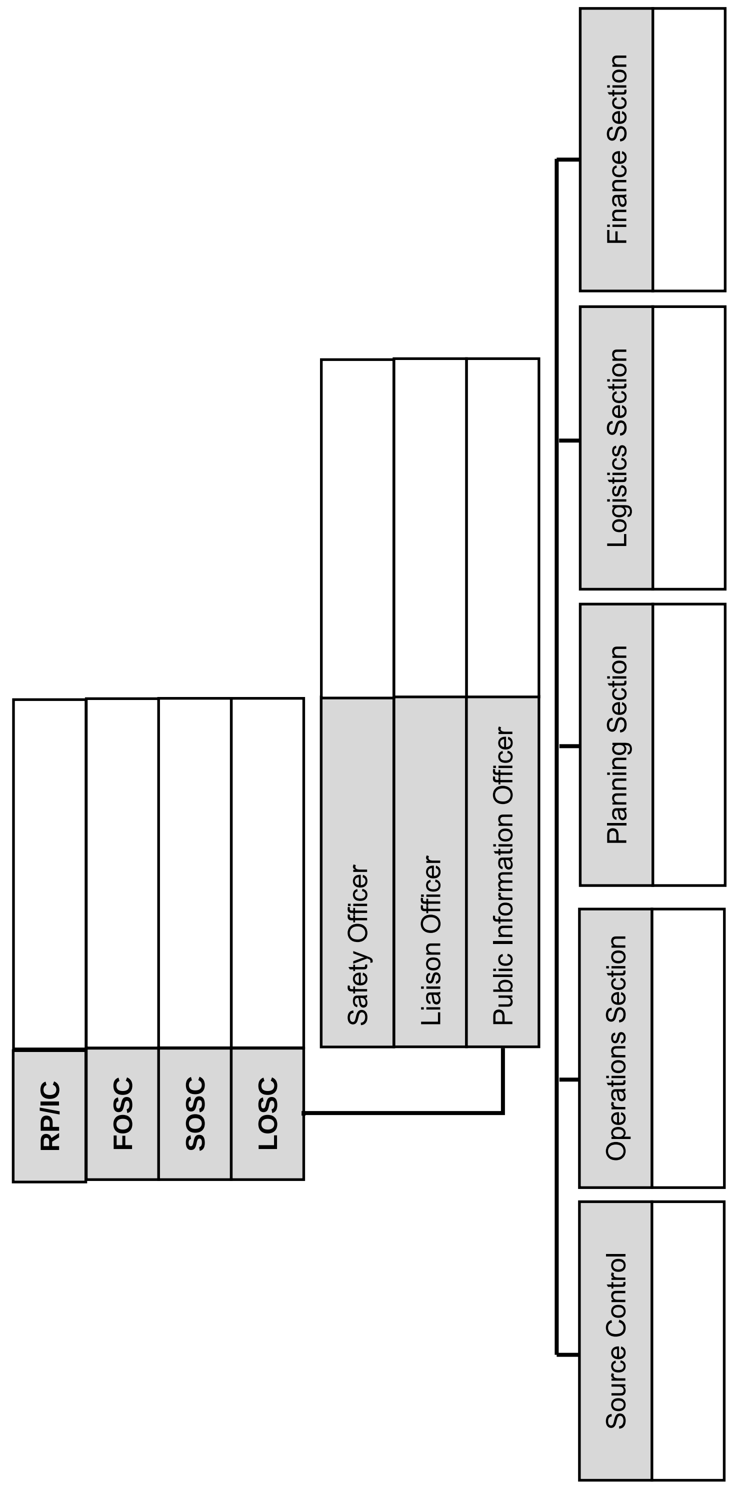
5. Initial Response Objectives, Current Actions, Planned Actions

INCIDENT BRIEFING **ICS 201 (pg 2 of 5)**

Figure 4b: ICS 201 Incident Briefing Form (Continued)

1. Incident Name:	2. Prepared by: (Name) Date: Time:	INCIDENT BRIEFING ICS 201-3

6. Current Organization



INCIDENT BRIEFING **ICS 201 (pg 3 of 5)**

Figure 4b: ICS 201 Incident Briefing Form (Continued)

1. Incident Name:	2. Prepared by: (Name) Date: Time:	INCIDENT BRIEFING ICS 201-4

7. Resource Summary

Resource	Resource Identifier	Date/Time Ordered	ETA	On scene (x)	Note: (location, Assignment, status)

INCIDENT BRIEFING **ICS 201 (pg 4 of 5)**

Figure 4b: ICS 201 Incident Briefing Form (Continued)

1. Incident Name:	**2. Prepared by: (Name)** Date: Time:	**INCIDENT BRIEFING ICS 201-5**

SITE CONTROL	
1. Is Site control set up? ☐ Yes ☐ No	2. Is there an on-scene command post? ☐ Yes ☐ No If so, where?
3. Have all personnel been accounted for? ☐Yes ☐No ☐Don't Know	Injuries: | Fatalities: Unaccounted: | Trapped:
4. Are observers involved, or rescue attempts planned? Observers: ☐Yes ☐No Rescuers: ☐Yes ☐No	5. Are decontamination areas setup? ☐ Yes ☐ No If so, where?
HAZARD IDENTIFICATION, IMMEDIATE SIGNS OF: (IF YES, EXPLAIN IN REMARKS)	
1. Electrical line(s) down or overhead? ☐ Yes ☐ No	2. Unidentified liquid or solid products visible? ☐ Yes ☐ No
3. Wind direction across incident: ☐Towards your position Wind Speed ☐Away from your Position	4. Is a safe approach possible? ☐Yes ☐No
5. Odors or smells? ☐ Yes ☐ No	6. Vapors visible? ☐ Yes ☐ No
7. Holes, ditches, fast water, cliffs, etc. nearby? ☐ Yes ☐ No	8. Fire, sparks, sources of ignition nearby? ☐ Yes ☐ No
9. Is local traffic a potential problem? ☐ Yes ☐ No	10. Product placards, color codes visible? Yes No
11. Other Hazards? ☐ Yes ☐ No	12. As you approach the scene from the upwind side, do you note a change in the status of any of the above? Yes No
HAZARD MITIGATION: HAVE YOU DETERMINED THE NECESSITY FOR ANY OF THE FOLLOWING?	
1. Entry Objectives:	
2. Warning sign(s), barriers, color codes in place? ☐ Yes ☐ No	
3. Hazardous material being monitored? ☐ Yes ☐ No 3a. Sampling Equipment: 3b. Sampling location(s): 3c. Sampling frequency: 3d. Personal exposure monitoring:	
4. Protective gear / level: 4b. Respirators: 4d. Boots:	4a. Gloves: 4c. Clothing: 4e. Chemical cartridge change frequency:
5. Decontamination 5a. Instructions: 5b. Decontamination equipment and materials:	
6. Emergency escape route established? ☐ Yes ☐ No Route?	
7. Field responders briefed on hazards? ☐ Yes ☐ No	
8. Remarks:	

INCIDENT BRIEFING **ICS 201 (pg 5 of 5)**

Figure 4c: ICS 214A Individual Log

1. Incident Name:	2. Prepared by: (Name) Date: Time:		INCIDENT BRIEFING ICS 214a
3. Individual Name:	4. ICS Section	5. Assignment/Location	

6. Activity Log	Page ___ of ___

Time	Major Event or Conversation
7. Prepared By:	**Date/Time**

Individual Log **ICS 214A**

Figure 4d: Notification Status Report

<table>
<tr><td colspan="9">Notification Status Report</td></tr>
<tr><td colspan="4">Incident:</td><td colspan="5">Prepared by: at:</td></tr>
<tr><td colspan="4">Period: ____/___/__ ___:___ to ____/___/__ ___:___</td><td colspan="5">Version Name:</td></tr>
<tr><td colspan="9"></td></tr>
<tr><td>Organization Notified</td><td>Phone</td><td>Date /Time Notified</td><td>Person Contacted</td><td>Person Contacted Email</td><td>Case No.</td><td>Follow Up</td><td>ETA On Site</td><td>Notified By</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td colspan="9">Notes:</td></tr>
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<tr><td colspan="9">Notes:</td></tr>
</table>

Figure 5: Internet Quick Links

PAGE NUMBER	INTERNET QUICK LINK
1-1	http://www.akrrt.org/plans.shtml
1-14	http://www.srh.noaa.gov/
2-22	http://www.alaskacleanseas.org/tech-manual/
A-1	http://www.alaskacleanseas.org/tech-manual/ http://www.msrc.org/download/MEL-All-Nov2-2011.pdf
C-3	http://www.etc-cte.ec.gc.ca/databases/Oilproperties/pdf/WEB_Alaska_North_Slope_(2002).pdf http://www.gomr.boemre.gov/PI/PDFImages/ESPIS/3/3381.pdf
C-20	http://www.asgdc.state.ak.us/maps/cplans/subareas.html#northslope
D-2	http://www.msrc.org/download/MSRC_Cntrl_Disp_Inv.pdf (2 occurences on this page)
D-3	http://www.epa.gov/oem/content/ncp/tox_tables.htm http://www.nalco.com/documents/Annual-Reports/9500A_MSDS.pdf
D-6	http://www.alaska.boemre.gov/ref/EIS%20EA/2012_Shell_CamdenEP_EA/2011_039.pdf
F-2	www.alaskacleanseas.org
H-9	http://www.psych.usyd.edu.au/vbb/woronora/maritime/beaufort.html
H-10	http://www.srh.noaa.gov/ http://www.asgdc.state.ak.us/maps/cplans/base/AK-Circ.pdf

PAGE NUMBER	INTERNET QUICK LINK
H-11	http://climate.gi.alaska.edu/Stations/Arctic/Barrow.html (2 occurences on this page)
I-9	http://www.fws.gov/contaminants/ http://www.nmfs.noaa.gov/pr/pdfs/health/eis_appendixl.pdf
L-1	http://dec.alaska.gov/spar/perp/docs/ISB-Rev1(Final-August%202008).pdf http://dec.alaska.gov/spar/perp/plan.htm
L-2	http://ice-glaces.ec.gc.ca
L-3	http://www.srh.noaa.gov/ http://response.restoration.noaa.gov/sites/default/files/dispersant-application-observer-job-aid.pdf http://response.restoration.noaa.gov/oil-and-chemical-spills/oil-spills/resources/smart.html
M-2	http://www.asgdc.state.ak.us/maps/cplans/subareas.html#northslope (4 occurences on this page)
M-5	http://www.asgdc.state.ak.us/maps/cplans/subareas.html#northslope
N-6	http://www.asgdc.state.ak.us/maps/cplans/subareas.html#northslope

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PART 1 INTRODUCTION AND PLAN CONTENTS [30 CFR 254.22]

This OSRP has been prepared following the applicable CFRs, as noted in the headings. The spill response plan was originally prepared as: *Beaufort Sea Regional Exploration Oil Discharge Prevention and Contingency Plan* (ODPCP) dated January 2010. The ODPCP was written to follow and satisfy guidance from ADEC and requirements of AAC. The current OSRP differs from the ODPCP in several ways including (but not limited to):

- Presentation and organization of this OSRP addresses CFRs;
- This OSRP is specific to response; whereas the State of Alaska requires a prevention component;
- ADEC and BSEE each evaluate plans based on their specific relevant regulatory criteria; ADEC follows AAC and BSEE follows CFR. Therefore, each agency determines adequacy of the spill response plan from the perspective of their regulatory jurisdiction.

In order to maintain the integrity of the original ODPCP in meeting BSEE requirements, information pertinent to ADEC has been incorporated into Appendix N (ADEC Supplement) of this OSRP. This OSRP is comprehensive, in that it addresses all requirements of BSEE and the State of Alaska. Also, information specific to the USCG (33 CFR 154) requirements is presented in Appendix M (USCG Supplement).

Most importantly, the revisions and reorganization inherent in this OSRP in no way affect the availability, quality, or commitment of response assets for Shell's Exploration Program as previously stated in the ODPCP.

This OSRP is developed to serve as a regional oil spill response plan for Shell's multiyear Beaufort Sea Regional Exploration Drilling Program. Each year's drilling operations are planned to total depth at multiple locations. Operations would begin on or about July 10th, depending upon conditions, and continue into freezeup; however, well drilling activities will not be conducted after October 31. Well drilling activities are complete when the well is plugged and abandoned in accordance with BSEE regulations, and there are no exposed formations capable of flowing oil or gas.

The purpose of this OSRP is to:

- Assist the IMT in achieving an efficient, coordinated, and effective response to a discharge incident.
- Meet all regulatory requirements as per the 30 CFR Part 254.
- Assist in preparing for and responding safely and quickly to a discharge originating from facilities covered in this plan.

The ACP is established as the Alaska Federal and State Preparedness Plan for Response to Oil and Hazardous Substance Discharges and Releases (Unified Plan), Volume I and the North Slope Subarea Contingency Plan (Unified Plan, Volume II). The most current version of the ACPs is available online at http://www.akrrt.org/plans.shtml. This OSRP is consistent with the NCP and the Unified Plan.

Shell's Beaufort Sea Regional Exploration Program OSRP regional applicability is based upon responding to a WCD from an exploration well with assets located near the drilling vessel at all times during critical drilling operations into hydrocarbon-bearing zones.

This OSRP is intended as 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, cannot anticipate all possible contingencies. Shell plans to submit permit applications to local, state, and federal agencies containing site-specific drill site and other data in advance of drilling. Regulators with jurisdictional authority will be able to review the drilling campaign updates for a specified season and determine whether the Shell OSRP is applicable for the individual well(s). Depending on the outcome of exploration activities, Shell anticipates, in due course, to submit future applications for permits to proceed with development of its leases. Development of Shell's OCS prospects would require revision to this OSRP or a separate OSRP to address the facilities and activities related to such development.

The OSRP addresses federal oil spill planning regulations of BSEE. The WCD volume presented herein is different than that presented in Shell's EP submittal. The EP presented WCD is based on proprietary reservoir characteristics and modeling which result in a "calculated" WCD, per NTL 10-06. The WCD presented in this OSRP for scenarios is a "planning" volume and exceeds the daily release rate of the calculated WCD for the 30-day duration.

Objectives of the OSRP include:

- Describe Shell's IMT.
- Assign individuals to fill positions on the IMT.
- Define the roles and responsibilities of team members.
- Define notification, activation, and mobilization procedures to be followed if a discharge occurs.
- Document equipment, manpower, and other resources available to assist with the response.
- Ensure compliance with Shell Upstream Americas Corporate Environmental Policy.
- Meeting the requirements of 30 CFR Part 254.
- Ensure consistency with the NCP and ACPs for the area of operation.

Shell recognizes the sometimes harsh conditions associated with operating in the Arctic and is prepared for and committed to preventing oil spills of any size. To achieve this goal, Shell has developed a comprehensive program which includes personnel training and the use of arctic-grade equipment to maintain primary well control and prevent discharges. The spill prevention program includes, but is not limited to the following:

- Fuel transfers will be conducted in strict accordance with USCG-approved procedures onboard each vessel (see Appendix M - USCG Supplement).
- Pollution prevention equipment, maintenance, and surveillance will focus on the prevention of unauthorized discharges.
- The design of drilling procedures will ensure Shell's ability to maintain primary well control at all times throughout drilling operations.
- Equipment utilized for secondary well control will be maintained in top condition, including functional testing and pressure testing as required.
- A weather- and ice-forecasting and monitoring program will be in place to ensure safe continued operations or, if necessary, cessation of operations and protection of personnel and assets.

- Deployment of ice management vessels and the use of dynamic ice management will protect the drilling fleet, enabling the drilling vessel to maintain station or secure the well and move off in a timely way ensuring the safety of personnel and operations.
- Real-time operations monitoring will use state-of-the-art equipment to ensure early recognition of subsurface pressure increases and provide for a timely response to subsurface conditions.

FACILITY INFORMATION STATEMENT

Section 1.1 defines and describes facilities covered by this OSRP including:

- Possible drill sites;
- Leases owned by Shell and its partner companies in the Beaufort Sea; and
- Lease block map.

Section 1.1 also includes the service facilities of the drilling vessels, project operations overview, and schematic diagrams of the drilling vessels.

CONTRACT CERTIFICATION STATEMENT

Shell hereby certifies that memberships, contracts, and/or agreements are in place with ACS, AES, and MSRC to provide immediate access to appropriate spill response equipment and personnel to respond to an incident. Shell also has contractual agreements for response vessels. Appendix B – Contractual Agreements presents certification of contractual agreements with these organizations.

1.1 IDENTIFICATION OF FACILITY COVERED IN THE PLAN [30 CFR 254.22(a)]

Shell has prepared this OSRP for exploration drilling operations on current and future lease holdings within the Beaufort Sea. This OSRP is one important element of Shell's overall commitment to conduct operations in a safe and environmentally sensitive manner. After personnel safety, oil spill prevention is Shell's first priority. That commitment is evident throughout Shell's plans, policies, and procedures for exploration drilling operations, as well as the many local, state, and federal permit applications that Shell has submitted, or will submit, to secure required authorizations prior to initiating the drilling program. This OSRP is specifically designed to aid Shell in preventing spills and, in the unlikely event of a spill, mitigate the impacts of that spill.

The addresses and telephone numbers of Shell for Beaufort Sea operations are provided below:

P.O. Box 576
Houston, TX 77001-0576
Telephone: (877) 273-2443

3601 C Street, Suite 1000
Anchorage, AK 99503
Telephone: (907) 770-3700

Shell's Beaufort Sea leases are generally bounded by the following coordinates (presented in NAD 83 UTM Zone 3 system):

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

Planned drilling and bottom-hole locations are on leases within the federal OCS as regulated by BSEE and all exploration activities will be conducted in compliance with applicable local, state, and federal laws.

Leases owned by Shell and partner companies in the Beaufort Sea as of November 2006 are listed in Table 1.1-1. Shell's Beaufort Sea Regional Exploration Program OSRP is only for the Exploration Drilling Program and does not provide for other facilities that may be needed to support future development of its Beaufort Sea prospects.

For the exploration drilling program, Shell plans that two wells will be drilled, at one or both of the following prospects:

- Sivulliq, located 12 miles north of Flaxman Island, and
- Torpedo, located 18 miles north-northeast of Flaxman Island.

1.1.1 Facility Type

This OSRP addresses planned exploration drilling facilities located on Shell leases within the Beaufort Sea. The Shell and partner company leases are listed in Table 1.1-1 and depicted on Figure 1.1-1.

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

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

TYPE OF FACILITY	CORPORATE NAME	BOEM ID CODE
OCS Leases	Shell Offshore Inc.	06889

In the event that these proposed drill sites change in the course of the permitting process, Shell commits to providing updated drill site location(s) and spill trajectory(ies), as appropriate, as a revision to this OSRP.

Table 1.1-1
Leases Owned by Shell and Partner Companies in the Eastern Beaufort Sea (as of November 2006)

PROTRACTION AREA	OPD NO.	BLOCK NO.	BOEM LEASE # OCS
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		6610*	
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

Table 1.1-1 (Continued)
Leases Owned by Shell and Partner Companies
in the Eastern Beaufort Sea (as of November 2006)

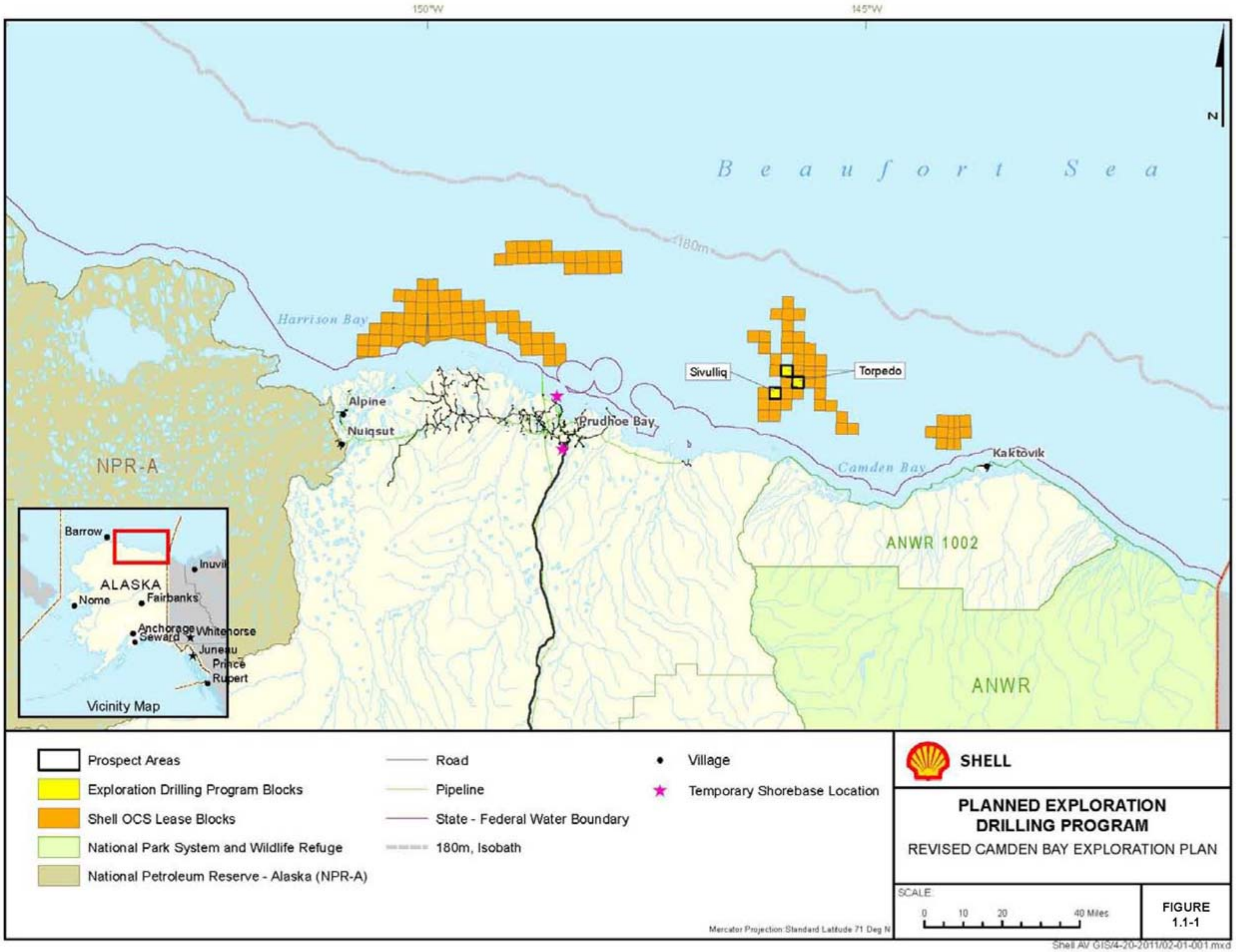
PROTRACTION AREA	OPD NO.	BLOCK NO.	BOEM LEASE # OCS
Beechey Point	NR 06-03	6411	1791
Beechey Point	NR 06-03	6412	1792
Beechey Point	NR 06-03	6460	1793
Beechey Point	NR 06-03	6461	1794
Beechey Point	NR 06-03	6462	1795
Beechey Point	NR 06-03	6463	1796
Beechey Point	NR 06-03	6512	1799
Beechey Point	NR 06-03	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

Table 1.1-1 (Continued)
Leases Owned by Shell and Partner Companies
in the Eastern Beaufort Sea (as of November 2006)

PROTRACTION AREA	OPD NO.	BLOCK NO.	BOEM LEASE # OCS
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
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

* Torpedo is in OCS block Flaxman Island 6610; Sivulliq is in OCS block Flaxman Island 6658.

Figure 1.1-1: Beaufort Sea Planned Exploration Drilling Program



Shell plans to conduct exploration drilling over multiple years in the Beaufort Sea using one of two floating drilling vessels, the *Kulluk* or the *Discoverer*. The *Kulluk* has prior experience drilling in the Beaufort Sea. The *Discoverer* is an ice-reinforced drilling vessel that has been refurbished for use in the Arctic. Exploration wells would be drilled, evaluated, and plugged and abandoned. Operations would be initiated each year following seasonal ice clearing and continue into freezeup.

The drilling vessel will be attended by a minimum of six vessels that will be used for ice management, anchor handling, oil spill response, refueling, resupply, and servicing of the drilling operations. The ice management vessels will consist of an icebreaker and an anchor handler. An ice-capable OSRB, with an associated tug will be located nearby during the planned drilling program. An OSR tanker also will be nearby for its storage capacity of recovered liquids. Deliveries of supplies and fuel are expected over the course of the drilling season and will be carried out either by support vessels or helicopters depending on the materials.

The drilling vessel and its ice management, and support vessels will arrive on location in the Beaufort Sea approximately July 10th and commence drilling as ice, weather, and other conditions allow for safe drilling operations, until October 31st.

Plans, diagrams, and specific information for each future drilling season will be provided in pre-drilling season, project-specific permit application packages to local, state, and federal agencies for review and authorization. BSEE will be afforded pre-drilling season reviews of each exploration plan package for wells planned under coverage of this Beaufort Sea OSRP.

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. 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.

Non-critical drilling activities involve activities that do not penetrate any potential hydrocarbon bearing formations. Such activities begin with spudding the well and include drilling tophole only sections to set conductor casing and surface casing. This is a necessary early step in exploratory well drilling. The depth of these wells will terminate well above any geologic formations that may potentially be hydrocarbon bearing. Nonetheless, two ice management/anchor handling vessels will assist these operations and ACS will be present to provide response equipment and personnel during these non-critical drilling operations. Additionally, ACS response equipment and personnel will remain on-scene until drilling activities are complete. This will occur no later than October 31.

Shell's Beaufort Sea Exploration OSRP 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 BSEE regulations, based on open water conditions; and
- Two associated response strategies that demonstrate regional response capability under different accessibility criteria and assumptions.

Exploration drilling will occur from either of two drilling vessels, the *Kulluk* or the *Discoverer* drilling vessel. Associated with these drilling vessels will be dedicated oil spill response platforms, an oil spill response tug/barge combination (OSR barge) using the *Arctic Endeavor*, and a vessel of opportunity. Shell's response capability is ensured by the on-the-water OSR barge and vessel of opportunity, allowing timely and immediate response in the event of an oil spill. In addition to these response vessels, 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 WCD arising from a well blowout.

The *Kulluk* Drilling Vessel

The *Kulluk* is a MODU designed for drilling in harsh offshore arctic environments in water depths ranging from 24 meters (m) to 55 m. The mobile drilling vessel 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. It can house up to 108 people. A facility diagram is provided below, Figure 1.1-2, and the schematics are provided in Figure 1.1-3.

The *Kulluk* was constructed in 1982 by Misui 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 *Discoverer* Drilling Vessel

The *Discoverer* drilling vessel is designed for drilling in arctic environments and is designed for water depths ranging from 38 m to 305 m. Its drilling depth reaches a maximum of 6,096 m, and it can house up to 120 people. The *Discoverer* is a 514 ft (156 m) moored drilling vessel with drilling equipment on a turret amidships and classified by DNV as a 1A1 Ship-shaped Drilling Unit, winterized for service in the arctic offshore environment. It is designed for water depths ranging from 125 to 1,000 ft (38 to 305 m) and has an eight-point mooring system attached to the bottom of the turret. The drilling vessel is equipped with thrusters, which are used to rotate around the turret, keeping the drilling vessel bow into the weather or ice floe. A facility diagram and schematics of the drillship are provided in Figures 1.1-4 through 1.1-8.

The service facilities on the two drilling vessels are described in Table 1.1-2.

Table 1.1-2
Service Facilities on the Modus

	KULLUK	***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 drilling vessel will be accompanied by support vessels for anchor handling, ice management, and general logistical support for the movement of supplies and personnel. Vessels 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 OSRP be conducted by the following vessels:

- *Arctic Endeavor* (or similar) OSR barge;
- Two VOSSs (the *Aiviq* and the *Harvey Hauler,* or similar) stationed in the Beaufort Sea on site;
- Oil spill response storage using the oil storage tanker, *Affinity*, or comparable (70,000 gross metric tons, with a de-rated storage capacity of approximately 513,000 barrels). The oil spill response storage tanker will be positioned between 25 nm and 200 nm from the drilling vessel while critical drilling activity is underway.

Shell has chosen a conservative 10 knot transit speed for offshore response vessel resources. Although service and maximum speeds for these vessels are significantly faster, the planning speed for response purposes has specifically been reduced to show robust response capability even in heavy sea conditions, reduced visibility, and due to the additional power requirements that may be necessary in the presence of ice. All major response assets are designed for and certified for operation in arctic conditions, including operation in high ice concentrations. The transit speed for the nearshore OSR barge is reduced to 5 knots to provide for similar planning considerations. Please refer to Appendix A for further information regarding general on-site vessel capabilities and, if applicable, class notations.

Fuel Systems

There are four fuel systems on both the *Kulluk* and *Discoverer*. They include the main bunker and fuel transfer, camp and rig utilities, emergency generator, and helicopter fuel systems. Individual characteristics for the separate drilling vessels are included where necessary, along with the following information:

- 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 1.1-3). 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 includes ten day tanks (2 to 90 barrels) and one settling tank (91 barrels) for secondary storage, as well as pumps and centrifuges to deliver fuel to end-use locations.

- The emergency generator fuel system is 9.6 barrels 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 Discoverer, there are two fuel tanks for the helicopter; both with 17-barrel holding capacity.

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

Bilge Systems

There are three bilge systems 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 educator, 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 *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 *Discoverer* is located in the propulsion room to treat effluent propulsion room bilges. The oily bilge system allows bilge water in the propulsion room to be processed to an oily water surge tank with 75-barrel capacity. After the bilge water is run through the oily water separator, the treated water (below 15 parts per million oil in water) is discharged overboard, and the oil and emulsion is contained in the tank.

Bulk Storage Containers

Neither the *Kulluk* nor the *Discoverer* 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-barrel capacity oil storage tanker that will be located between 25 nm and 200 nm away from the drilling vessel while critical drilling activity is underway and will be used for emergency oil spill response.

Transfer Procedures

Fuel transfer procedures are described in Appendix M (USCG Supplement).

Response Vessel Plans and Diagrams

Response vessel plans and diagrams are presented in Appendix A (Response Equipment).

Project and Area Overview

Offshore seasonal exploration well activity in the Beaufort Sea occurs in a few key environments. The *Kulluk* or *Discoverer* will travel to the Beaufort Sea in July with a fleet of support vessels and its dedicated OSRB. The movement and positioning of the fleet is dependent on the break-up 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 thick pack ice off shore 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.

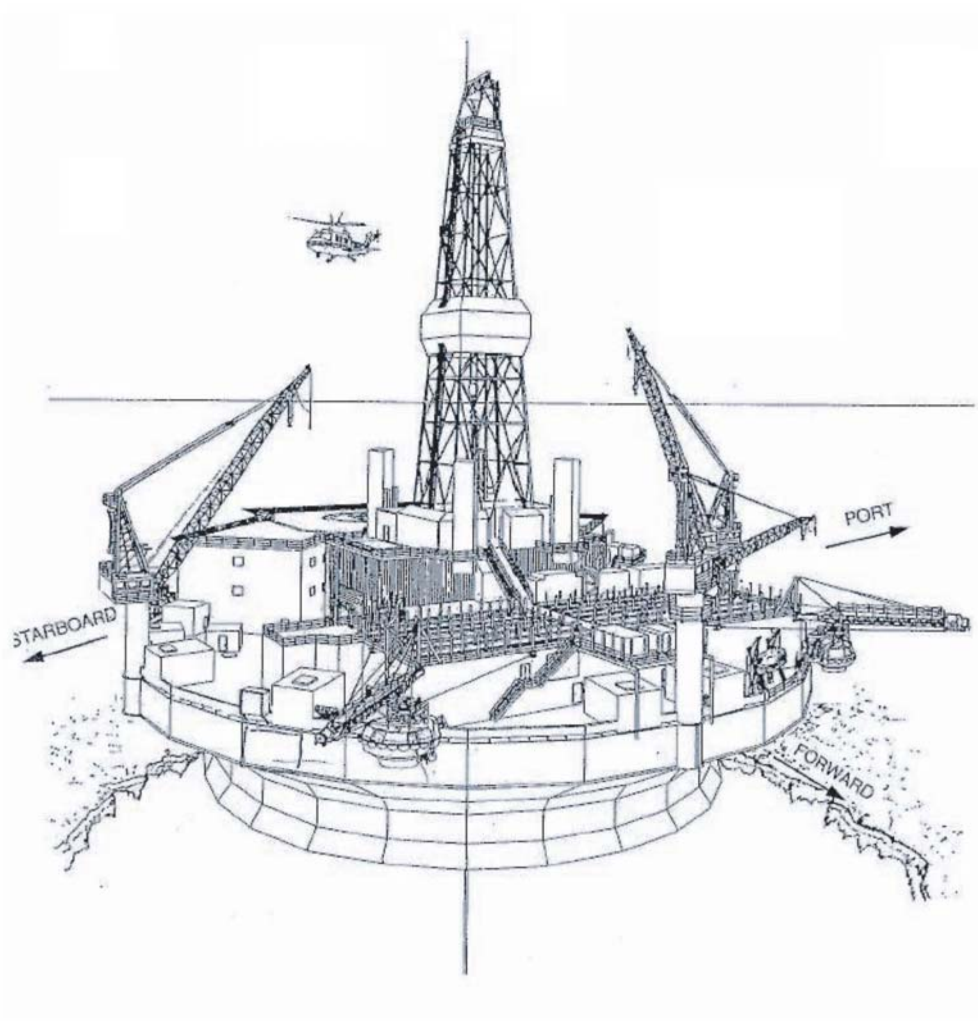
Peak exploration activities will commence in July and August and continue into freeze-up in September and October. During the freeze-up period, exploration will occur between the fast ice (contiguous with the shoreline) and the pack ice. When drilling in water depths of 25 m or more, the environment 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. 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 drilling vessel and support vessel fleet will exit the exploration sites through the open water pathway before winter ensues and the pack ice encroaches on the shoreline.

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 generated predominantly during the open-water season. For much of the summer period (July to August), the close proximity of sea ice will effectively prevent sea states from developing to an extent predicted from the Beaufort wind scale and sea state standard relationship (http://www.srh.noaa.gov/). The appearance of new ice in October will rapidly diminish the wave heights within a few weeks after initial freeze-up along the coast. Potential sea states during the period of maximum open water (mid-August to mid-October) can be estimated from this standard relationship.

The most likely wildlife expected in the Beaufort Sea offshore exploration area includes: polar bear, bowhead, Beluga, and gray whales, as well as both ringed and spotted seals, and marine birds.

FIGURE 1.1-2 KULLUK DRILLING VESSEL

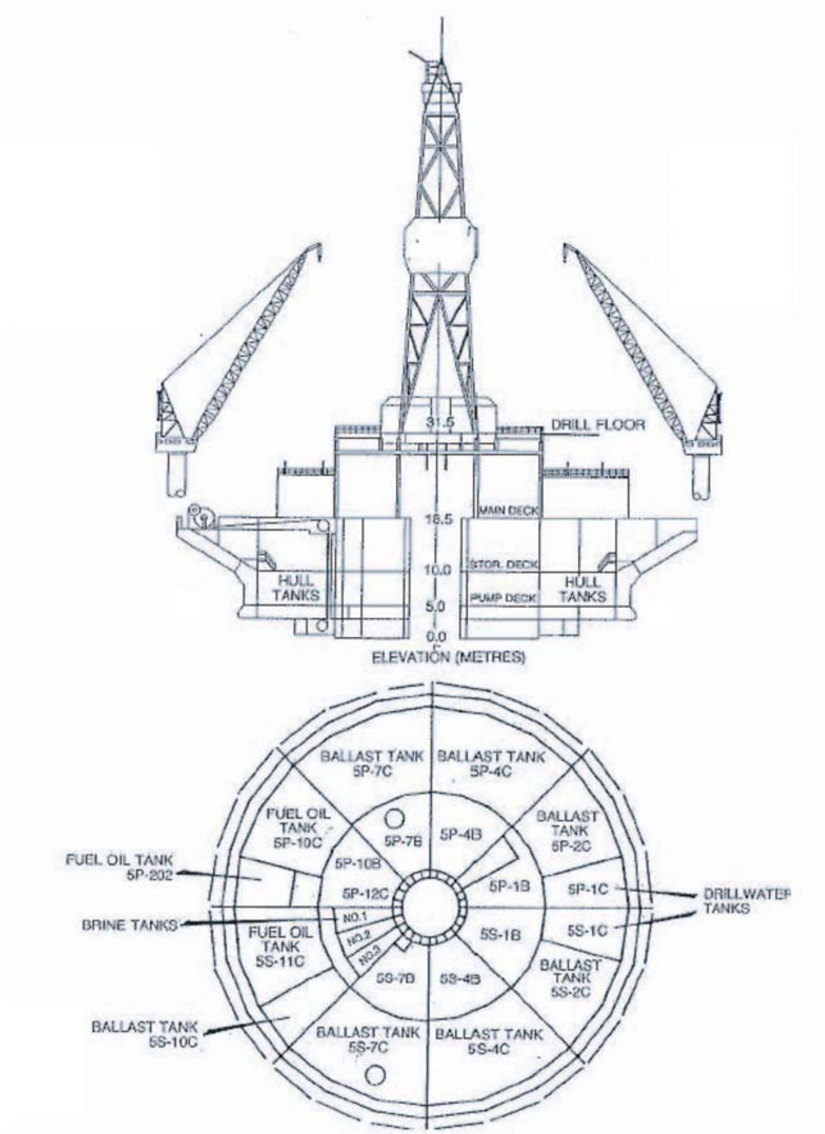


SHELL OFFSHORE, INC.

KULLUK DRILLING VESSEL

May 2011	Figure 1.1-2

FIGURE 1.1-3 *KULLUK* DRILLING VESSEL SCHEMATIC



SHELL OFFSHORE, INC.

KULLUK DRILLING VESSEL SCHEMATIC

May 2011	Figure 1.1-3

FIGURE 1.1-4 DISCOVERER DRILLSHIP OUTBOARD PROFILE SCHEMATIC

PRINCIPLE DIMENSIONS

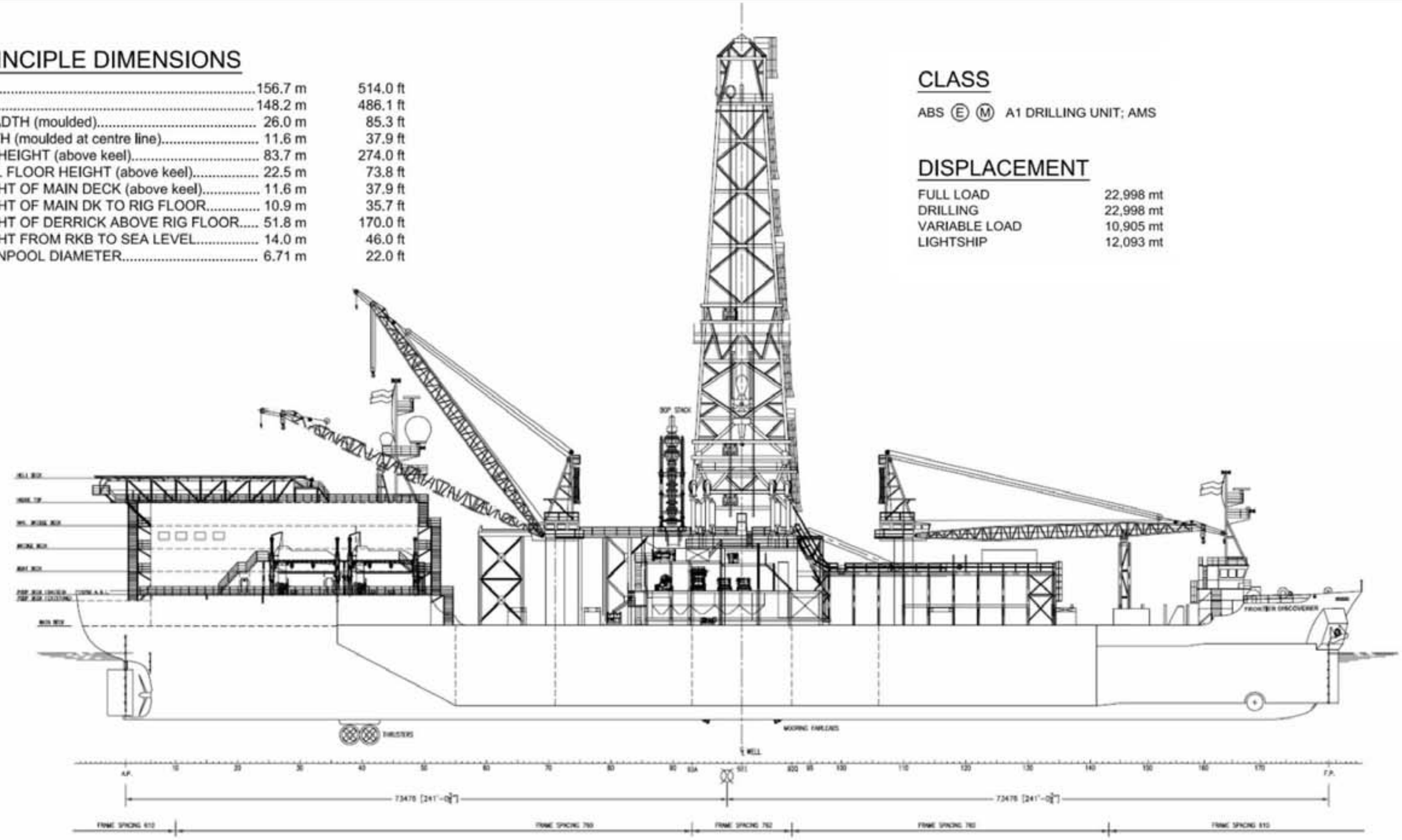
LOA	156.7 m	514.0 ft
LBP	148.2 m	486.1 ft
BREADTH (moulded)	26.0 m	85.3 ft
DEPTH (moulded at centre line)	11.6 m	37.9 ft
MAX HEIGHT (above keel)	83.7 m	274.0 ft
DRILL FLOOR HEIGHT (above keel)	22.5 m	73.8 ft
HEIGHT OF MAIN DECK (above keel)	11.6 m	37.9 ft
HEIGHT OF MAIN DK TO RIG FLOOR	10.9 m	35.7 ft
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

DISCOVERER DRILLSHIP
OUTBOARD PROFILE SCHEMATIC
Beaufort Sea Regional Exploration Program
Oil Spill Response Plan

FIGURE 1.1-4

FIGURE 1.1-5 DISCOVERER DRILLSHIP MAIN DECK AND ABOVE SCHEMATIC

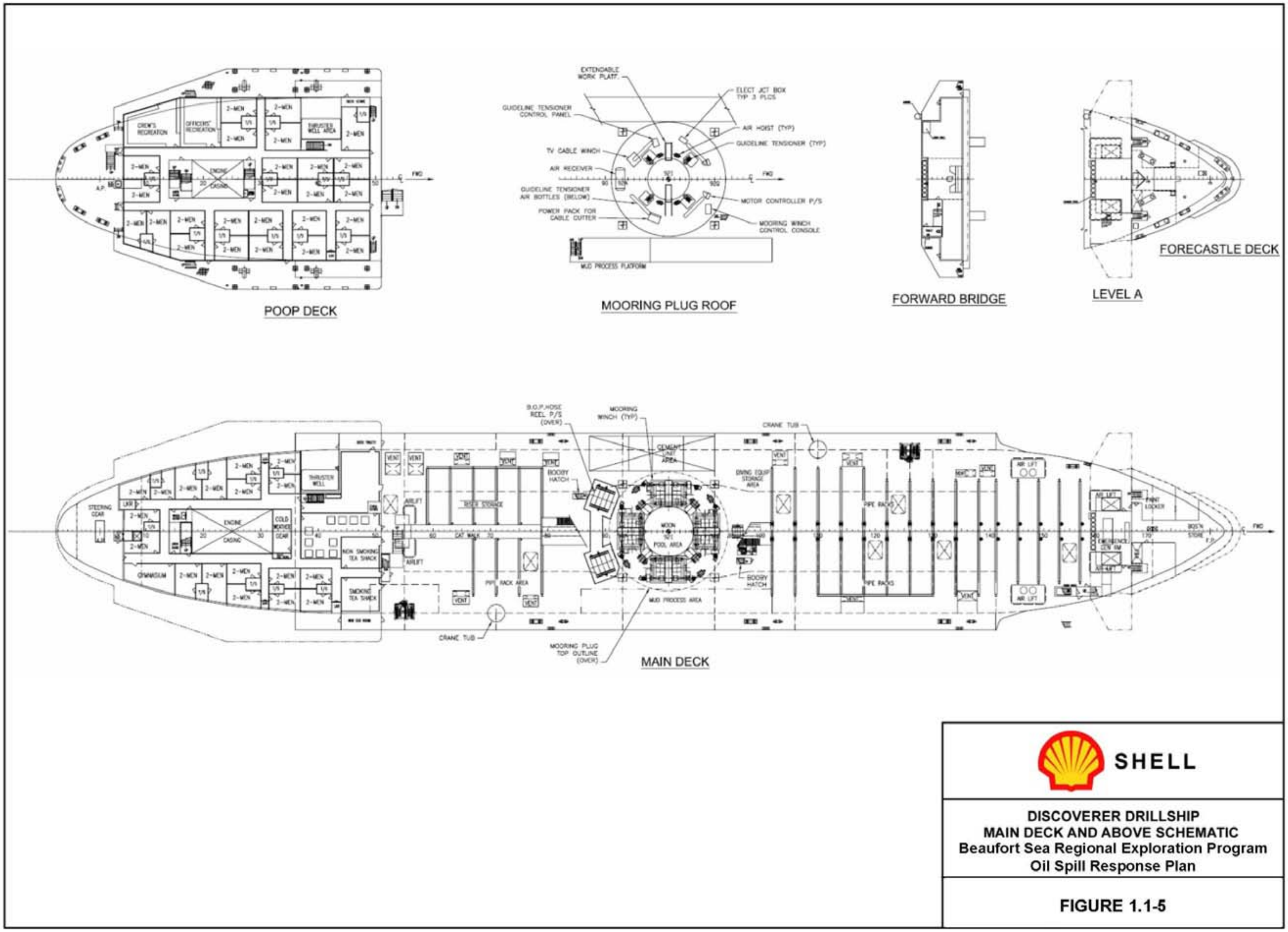


FIGURE 1.1-6 DISCOVERER DRILLSHIP MAIN DECK VIEW

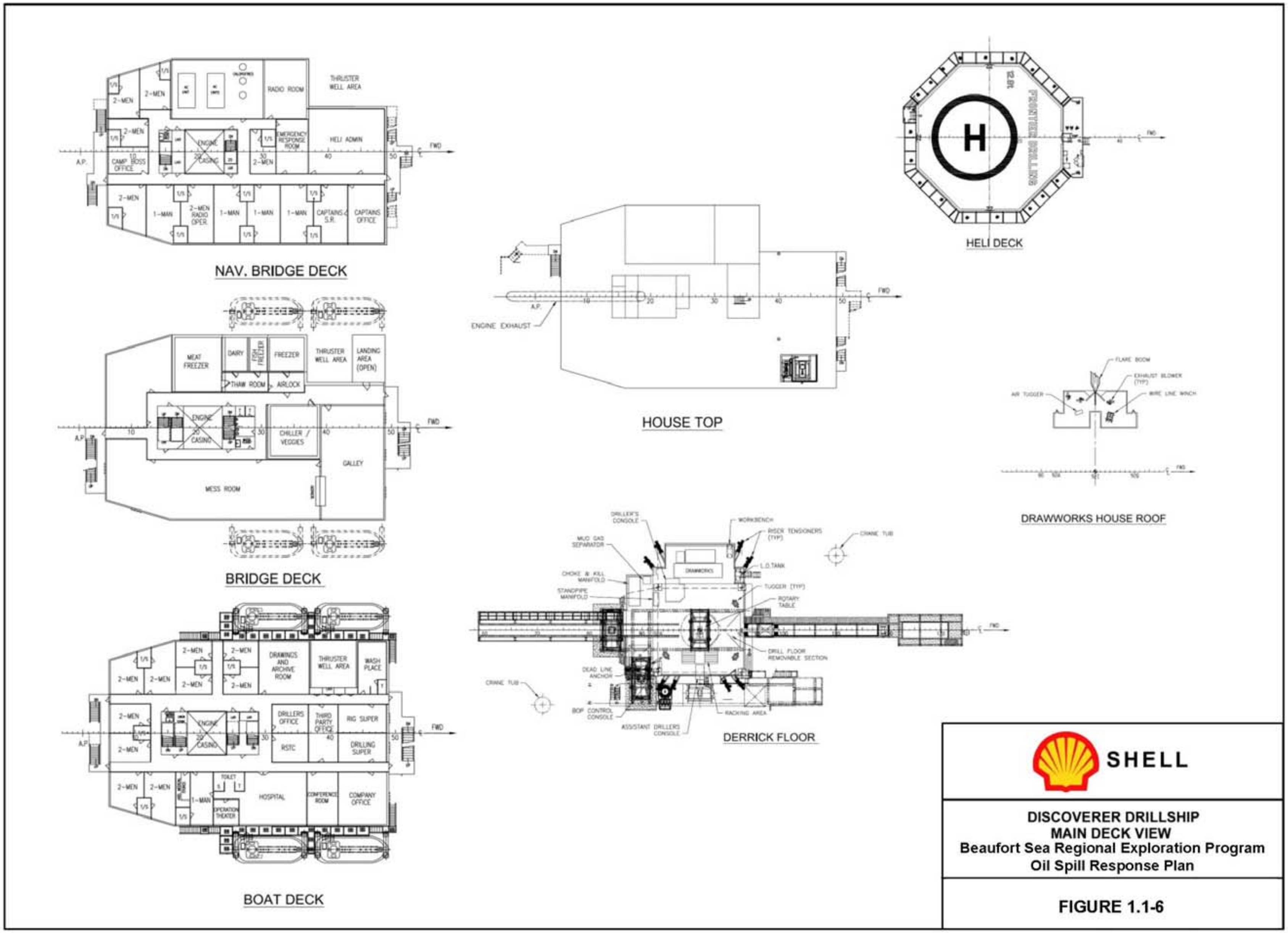


FIGURE 1.1-7 DISCOVERER DRILLSHIP LOWER DECK SCHEMATIC

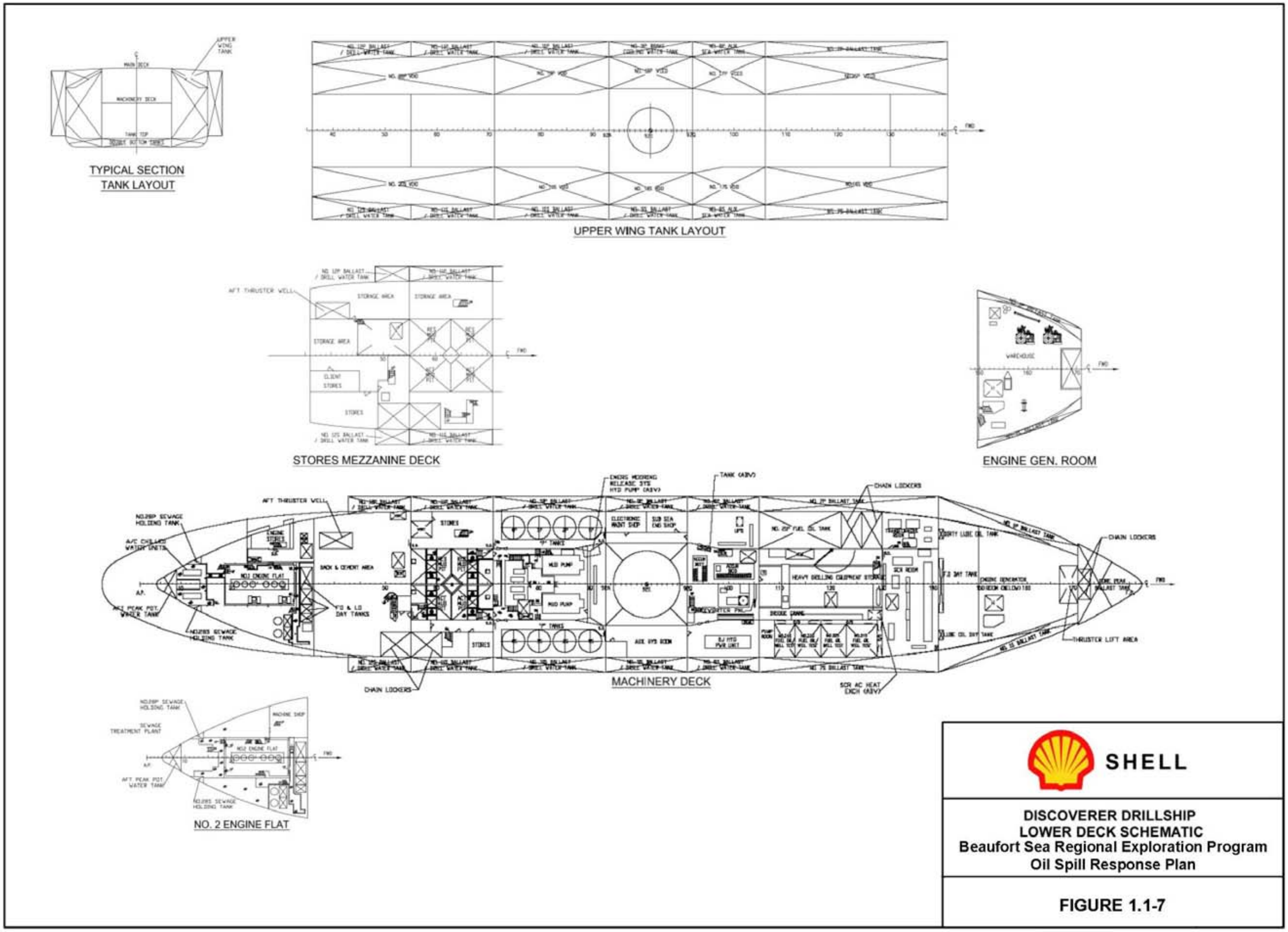
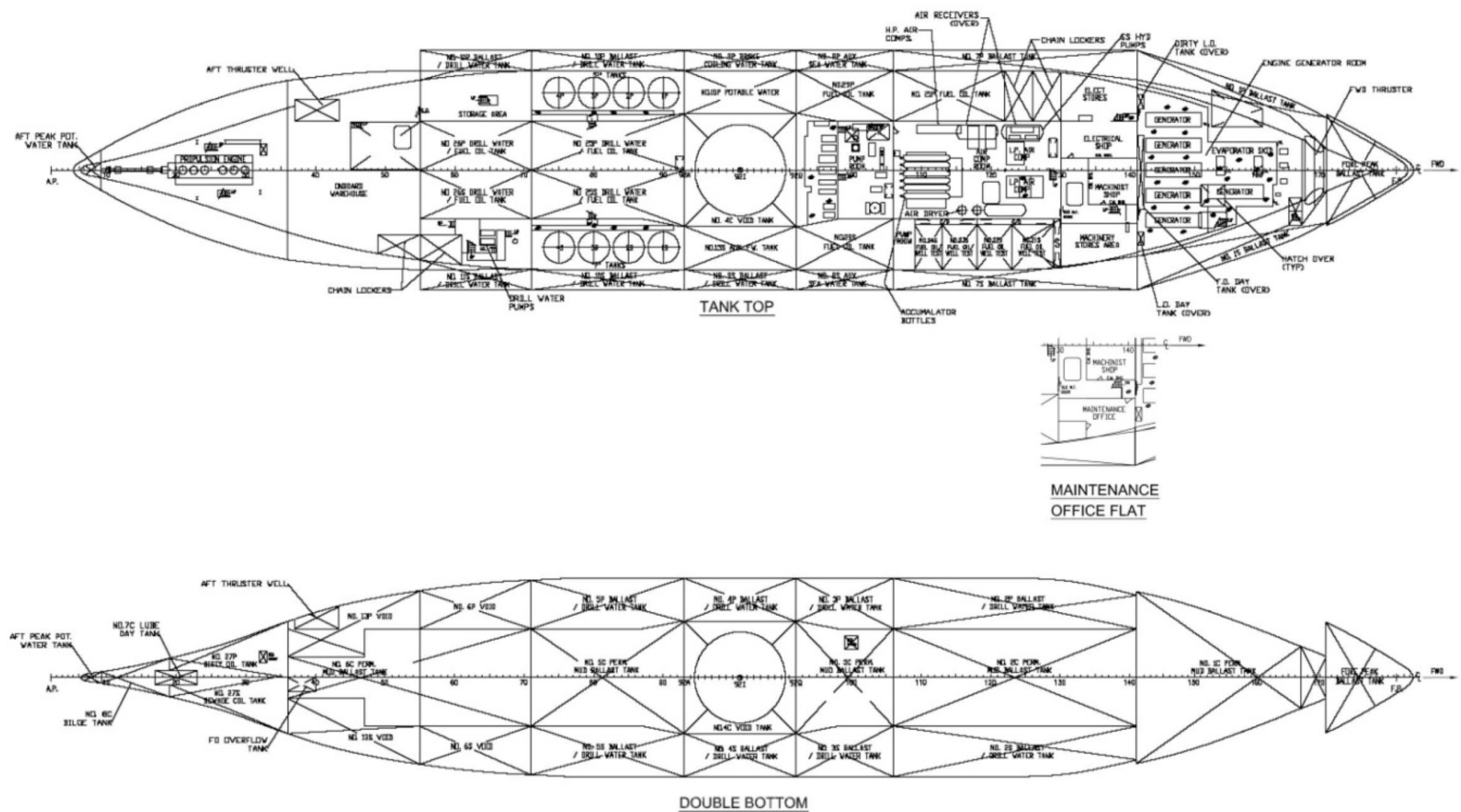


FIGURE 1.1-8 DISCOVERER DRILLSHIP LOWER DECK VIEW 2



SHELL

DISCOVERER DRILLSHIP
LOWER DECK VIEW 2
Beaufort Sea Regional Exploration Program
Oil Spill Response Plan

FIGURE 1.1-8

1.2 RECORD OF REVISIONS [30 CFR 254.22(c)]

REVISION NUMBER	DATE	SECTION – page (p)	TYPE OF CHANGE	DESCRIPTION
1	May 2011	All	MD	Update WCD volume, corresponding scenario and plan revisions. Format change per BSEE request on 12/28/2011

TYPE OF CHANGE (USE THE FOLLOWING CODES):
AU = Annual Update
BI = Biennial Update
AM = An amendment (a change to a Regional OSRP pending approval)
MD = A modification (a change to an approved Regional OSRP)

1.3 UPDATING PROCEDURES

The Emergency Response Coordinator in the Anchorage, AK office maintains this OSRP.

1. Every two years, the OSRP will be reviewed and updated as necessary to reflect personnel and telephone number changes, oil spill containment and cleanup equipment availability, and other new or changed relevant information.

STEP	ACTION
1	Review OSRP at least once every two (2) years.
2	Revise OSRP for changes in operations or organizational structure
3	Coordinate word processing publication, electronic control of document, and distribution of changes.

OSRP review opportunities also occur during response team tabletop exercises, drills, and actual emergency responses.

2. Agency Revision Requirements - The BSEE Chief Oil Spill Response Division will periodically review the equipment inventories of Shell's OSROs to ensure that sufficient spill response equipment is available to meet the cumulative needs of the owners and operators who cite these organizations in their plans. OSRP revisions are performed per 30 CFR 254 as follows:

<table>
<tr><th>IF</th><th>THEN</th></tr>
<tr><td>A change occurs which significantly reduces your response capabilities.</td><td rowspan="4">The Facility must submit revised portions of the OSRP to BSEE, Chief Oil Spill Response Division, within 15 days.</td></tr>
<tr><td>A significant change occurs in the WCD scenario or in the type of oil being handled, stored, or transported at the Facility.</td></tr>
<tr><td>There is a change in the name(s) or capabilities of the oil spill removal organizations cited in the OSRP.</td></tr>
<tr><td>There is a significant change to the ACP</td></tr>
<tr><td>OSRP has become outdated.</td><td rowspan="2">The Chief, OSRD may require you to re-submit your OSRP.</td></tr>
<tr><td>Numerous revisions have made use of the OSRP difficult.</td></tr>
<tr><td>If significant inadequacies are indicated by:
• Periodic reviews.
• Information obtained during drills or actual spill responses.
• Other relevant information.</td><td>The Chief, OSRD may require you to revise your OSRP.</td></tr>
</table>

Submission of Revisions – Shell must:

STEP	ACTION
1	Review OSRP at least once every two (2) years.
2	Submit all modifications to the Chief, OSRD.
3	Notify BSEE Chief, OSRD in writing if there are no modifications.

3. Suggestions for corrections and modifications are solicited from all users of the OSRP and should be submitted directly to Curtis Wright or Geoff Merrell, Shell, 3601 C Street, Suite 1000, Anchorage, AK 99503 (907) 770-3700.

4. Modifications to the OSRP will be submitted to the BSEE Chief, OSRD for review and approval.

5. Updated materials will also be communicated to holders of the OSRP via cover letter or email that will instruct the holder to remove "obsolete pages" from the plan and replace them with the appropriate revised pages.

The **OSRP holder**, immediately upon receipt of revisions, shall:

STEP	ACTION
1	Review and insert revised pages into the Plan.
2	Discard the obsolete pages.

These revisions will be recorded on the Record of Revisions Table (**Section 1.2**).

6. The Emergency Response Coordinator shall have the responsibility for distribution of the OSRP. Distribution will be handled in the following manner:

   - Company personnel who respond to a discharge event will have access to a copy of the OSRP.
   - Any person holding a copy of the OSRP will transfer that copy to their replacement.
   - Various regulatory agencies will also be distributed a copy of the OSRP.

1.4 ACRONYMS AND ABBREVIATIONS

The list in Table 1.4-1 addresses all acronyms and abbreviations used in the OSRP including the Quick Guide and Appendices. The acronyms and abbreviations are defined only here and are not spelled out elsewhere in the document. This approach allows the reader to quickly refer to a list, rather than search for the first appearance in the document where the acronym is defined.

Table 1.4-1
Acronyms and Abbreviations

9500	COREXIT® EC 9500A
A	Casual/Accidental
AAC	Alaska Administrative Code
ABR	ABR Inc. Environmental Research & Services
ACP	Area Contingency Plan
ACS	Alaska Clean Seas
ACS Tactic(s)	tactics in *ACS Technical Manual, Volume I*, Tactics Description
ACS Technical Manual	*ACS Technical Manual, Volume I (Tactics Description), Volume II (Map Atlas), Volume III (Incident Command System)*
ACRT	Auxiliary Contract Response Team
ADDS	Applied Aerial Dispersant System
ADEC	Alaska Department of Environmental Conservation
ADF&G	Alaska Department of Fish and Game
ADNR	Alaska Department of Natural Resources
AES	ASRC Energy Services
AES-RTS	ASRC Energy Services – Regulatory and Technical Services
ACS	Alaska Clean Seas

AES-RO .... ASRC Energy Services – Response Operations, LLC
AEWC .... Alaska Eskimo Whaling Commission
AIMS .... Alaska Incident Management System
AFE .... Application for Expenditure
AK .... Alaska
AM................................... An amendment (a change to a Regional OSRP pending approval) or amplitude modulation
ANS................................. Alaska North Slope
ANWR .... Arctic National Wildlife Refuge
AOGCC........................... Alaska Oil and Gas Conservation Commission
APD................................. Application for Permit to Drill
API .... American Petroleum Institute
APICOM.......................... Association of Petroleum Industry Co-op Managers
ARRT .... Alaska Regional Response Team
ASA................................. Applied Science Associates, Inc.
ASI .... Airborne Support, Inc.
ASRC .... Arctic Slope Regional Corporation
ASTM .... American Society for Testing and Materials
ATV .... all-terrain vehicle
AU .... Annual Update
BAT .... Best Available Technology
bbl .... barrel(s)
bbl/hr .... barrels per hour
bbl/min .... barrels per minute
BD .... Branch Director
BHP................................. brake horse power
BI..................................... Biennial Update
BLM................................. U.S. Department of the Interior, Bureau of Land Management
BMPs............................... best management practices
BOEM .... U.S. Department of the Interior, Bureau of Ocean Energy Management
BOP................................. Blowout Preventer
bopd .... barrels of oil per day
BOPE .... Blowout Prevention Equipment
boph .... barrels of oil per hour
BPXA .... BP Exploration (Alaska) Inc.
BSEE .... U.S. Department of the Interior, Bureau of Safety and Environmental Enforcement
°C .... Degrees Centigrade
CAA................................. Conflict Avoidance Agreement
CFR................................. Code of Federal Regulations
CISPRI .... Cook Inlet Spill Response, Inc.
cm .... centimeter
CMT .... Crisis Management Team
CO_2 .... carbon dioxide

COCP .... Critical Operations and Curtailment Plan
COE .... U.S. Army Corps of Engineers
COTP .... Captain of the Port
CPAI .... ConocoPhillips Alaska Inc.
CRT .... Crisis Response Team
cSt .... centiStoke(s)
cu m .... cubic meters
cu m/hr .... cubic meter per hour
DB .... diving bird
DIC .... Deputy Incident Commander
Discoverer .... drillship *Discoverer*
DNV .... Det Norske Veritas
DOI .... U.S. Department of the Interior
DOI-OEPC .... Department of Interior, Office of Environmental Policy and Compliance
DOR .... dispersant-to-oil ratio
DOT .... U.S. Department of Transportation
DWOP .... Drill-the-Well-on-Paper
E .... east
EDRC .... effective daily recovery capacities
EMS .... Emergency Shutdown
EMT .... Emergency Medical Technician
ENE .... east-northeast
EP .... Exploration Plan
EPA .... U.S. Environmental Protection Agency
EPW .... Exploration and Production - West
ERC .... Emergency Response Coordinator
ERP .... Emergency Response Plan
ERT .... Emergency Response Team
ES .... Endangered Species
ESA .... Environmentally Sensitive Area
ESD .... Emergency Shut Down
ESI .... Environmental Sensitivity Index
ETA .... estimated time of arrival
EU .... Environmental Unit
°F .... degrees Fahrenheit
fax .... facsimile
FEIS .... Final Environmental Impact Statement
FLIR .... forward-looking infrared radar
FM .... Frequency Modulation
FOSC .... Federal On-Scene Coordinator
ft .... foot/feet
FTW .... fitness to work
gal .... gallon(s)
GIS .... Geographic Information System

GMDSS .... Global Maritime Distress and Safety System
gpd .... gallon(s) per day
gph .... gallons per hour
gpm .... gallons per minute
GPS.................................. Global Positioning System
H_2S .... hydrogen sulfide
HAZCOM .... hazard communication
HAZWOPER .... Hazardous Waste Operations and Emergency Response
HDPE .... high-density polyethylene
HERC .... Hercules (C-130 aircraft)
HF .... high frequency
hp .... horsepower
hr .... hour(s)
HSE.................................. Health, Safety and Environment
HSSE .... Health, Safety, Security, and Environment
HT .... Hazard Time
Hz.................................... hertz
IA..................................... Ice Advisor
IAP .... Incident Action Plan
IBRRC.............................. International Bird Rescue and Rehabilitation Center
IC..................................... Incident Commander
ICP .... Incident Command Post
ICS .... Incident Command System
ID..................................... inside diameter
IMO .... International Maritime Organization
IMP.................................. Ice Management Plan
IMT .... Incident Management Team
IR..................................... infrared radar
IRIC .... Initial Response Incident Commander
ISB .... *in situ* burning
ISO .... International Organization for Standardization
IWC .... Ice and Weather Information Center
kbps................................. kilobits per second
kg/m2 .... kilograms per square meter
km .... kilometer(s)
km/day .... kilometers per day
kph .... kilometers per hour
Ku.................................... Kurtz-under
Kulluk .... drilling vessel *Kulluk*
kW................................... kilowatt
lb/lbs................................. pound/pounds
L/T .... Level/Temperature
LEL.................................. Lower Explosive Limit
LGL .... LGL Limited

LMRP .... Lower Marine Riser Package
LOA .... Letter of Authorization
LOSC .... Local On-Scene Coordinator
LRB .... Lamor Recovery Bucket (skimmer)
LS.................................... Level Sensors
m .... meter(s)
mcf .... thousand cubic feet
m^3.................................... cubic meters
m^3/hr................................ cubic meters per hour
m/sec............................... meters per second
MAD .... Mutual Aid Drill
MARPOL.......................... International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978
MAWP.............................. Maximum Anticipated Wellhead Pressure
MBTA .... Migratory Bird Treaty Act
mcf .... million cubic feet
MD................................... A modification (a change to an approved Regional OSRP)
MESA............................... Most Environmentally Sensitive Area
MHz................................. megahertz
mi .... mile(s)
min .... minute
MLC................................. mudline cellar
mm .... millimeter
MMPA .... Marine Mammal Protection Act
MMPD .... Maximum Most Probable Discharge
MMO .... Marine Mammal Observer
mm/min .... millimeter per minute
MMS................................ U.S. Department of the Interior, Minerals Management Service
mmscf/d .... million standard cubic feet per day
MOB .... mobilize/mobilization
MODIS .... moderate-resolution imaging spectroradiometer
MODU .... Mobile Offshore Drilling Unit
MOSAG........................... Multi-business Oil and Chemical Spill Advisory Group
MOU................................ Memorandum of Understanding
mph .... miles per hour
MSAT .... Mobile Satellite System
MSDS.............................. Material Safety Data Sheet
MSRC .... Marine Spill Response Corporation
MT .... Move Off Time
MWD .... Measurement-While-Drilling
M/V.................................. Motor Vessel
N...................................... North
NASA .... National Aeronautics and Space Administration
NCP................................. National Contingency Plan

NE .... northeast
NGO .... Non-Government Organization
NIMS .... National Incident Management System
NMFS .... National Marine Fisheries Service
nm/n mi .... nautical mile(s)
NNE................................. north-northeast
NOAA............................... National Oceanic and Atmospheric Administration
NOFO............................... Norwegian Clean Seas Association for Operating Companies
NPR-A............................. National Petroleum Reserve – Alaska
NPREP............................ National Preparedness for Response Exercise Program
NRC .... National Response Center
NRDA.............................. Natural Resources Damage Assessment
NSB................................. North Slope Borough
NSSAWG .... North Slope Sensitive Areas Work Group
NSSRT .... North Slope Spill Response Team
NSTC .... North Slope Training Cooperative
NTL .... Notice to Leasees
NW .... northwest
O .... Pelagic
O'Brien's .... O'Brien's Response Management Inc.
OCS .... Outer Continental Shelf
ODPCP .... Oil Discharge Prevention and Contingency Plan
OEPC.............................. U.S. Department of the Interior, Office of Environmental Policy and Compliance
OIM .... Offshore Installation Manager
OPA 90 .... Oil Pollution Act of 1990
OSC .... On-Scene Commander
OSHA.............................. Occupational Safety and Health Administration
OSR .... Oil Spill Response
OSRD………………………Oil Spill Response Division, BSEE
OSRL .... Oil Spill Response Limited
OSRO .... Oil Spill Removal Organization
OSRP.............................. Oil Spill Response Plan
OSV................................. Offshore Supply Vessel
OST................................. Oil Storage Tanker
p .... page
P...................................... Present
PEL .... permissible exposure limit
PIC .... person in charge
PLC .... programmable logic controller
PM................................... Primary Maintenance
PPE................................. personal protective equipment
PPS................................. Priority Protection Site
ppt .... parts per thousand

PREP .... Preparedness for Response Exercise Program
psi.................................... pounds per square inch
psig.................................. pounds per square inch gauge
PWD................................ Pressure-While-Drilling
QI .... Qualified Individual
R...................................... Rare
RA .... raptor
RAR................................. Rig Anchor Release
RCRA............................... Resource Conservation and Recovery Act
ROV .... remotely operated vehicle
RP .... Responsible Party
RPS................................. Response Planning Standard
RQ................................... reportable quantity
RRT................................. Regional Response Team
RTOC............................... Real Time Operations Center
RTTI .... Real Time Tracking Information
S...................................... Subsistence Species
SAR................................. Synthetic Aperture Radar or Search-and-Rescue
SART............................... Shell Americas Response Team
SCAT............................... Shoreline Cleanup Assessment Technology
SD .... Shell Drilling
SE .... seabird
sec................................... second(s)
SEPCO .... Shell Exploration and Production Company
SERVS............................ Ship Escort Response Vessel System
SH .... diving bird
Shell .... Shell -Offshore Inc.
Shell Tactic(s) .... Tactics in *Shell Beaufort and Chukchi Seas Regional Tactics Manual*
Shell Tactics Manual........ *Shell Beaufort and Chukchi Seas Regional Tactics Manual*
SHPO............................... State Historic Preservation Officer
SIMOPS .... Simultaneous Operations
Sm................................... sea miles
SMART .... Special Monitoring of Applied Response Technologies
SMC .... Special Management Concern
SMT................................. Spill Management Team
SOLAS .... International Convention for the Safety of Life at Sea
SOSC............................... State On-Scene Coordinator
SPCC .... Spill, Prevention, Control, and Countermeasure
SPCO............................... State Pipeline Coordinator's Office
SSB .... Single Sideband
SSHP .... Site Safety and Health Plan
ST.................................... Secure Time
SW .... southwest
t .... tons

TF	Task Force
TRG	The Response Group
TS	Threatened Species
T-Time	total time to secure well and leave location
TVD	true vertical depth
U	Uncommon
UC	Unified Command
UHF	Ultra High Frequency
Unified Plan	Alaska Federal and State Preparedness Plan for Response to Oil and Hazardous Substance Discharges and Releases
UB	upland bird
USACE	U.S. Army Corps of Engineers
USCG	U.S. Coast Guard
USFWS	U.S. Fish and Wildlife Service
VCR	videocassette recorder
VFR	Visual Flight Rules
VHF	Very High Frequency
VOSS	Vessel of Opportunity Skimming System
VRT	Village Response Team
VSAT	Very Small Aperture Terminal
W	west
WAN	Wide Area Network
WBS	Web-based system
WCC	Woodward-Clyde Consultants
WCCP	Well Control Contingency Plan
WCD	worst case discharge
WF	waterfowl
WNW	west-northwest
WP	working pressure
WRP	Wildlife Response Plan

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TABLE OF CONTENTS

FIGURES

TABLES

PART 2 EMERGENCY RESPONSE ACTION PLAN

2.1 QUALIFIED INDIVIDUAL DESIGNATION [30 CFR 254.23(a)]

The QI and QI Alternate contact information is presented below. These individuals have full authority to implement removal actions and ensure immediate notification of appropriate federal officials and response personnel. Shell's IC is also identified as the primary QI as defined in OPA 90 and has the responsibility and authority to initiate spill cleanup operations, obligate funds to carry out response activities, implement response actions, and immediately notify appropriate federal officials and response organizations and act as liaison with the pre-designated FOSC.

Incident Commander / Qualified Individual

POSITION / NAME	OFFICE	CELL
Primary: Sean Churchfield	907-771-7217	907-223-0061
Alternates: Susan Moore Geoff Merrell	 907-646-7119 907-771-7221	 907-382-5474 907-306-8016

2.2 INCIDENT MANAGEMENT TEAM DESIGNATION [30 CFR 254.23(b)]

Shell's IMT correlates with the "spill management team" designated in 30 CFR 254.23(b). Shell's IMT would define the spill response tactics and provide overall support to the Operation's field spill response technicians to meet the incident-specific objectives. The level of "ramp-up" and activation of IMT staffing is scaled depending on the severity of the incident. Shell intends to integrate IMT staff with federal, state and local representatives to establish a UC.

The oil spill response command system is compatible with the ARRT *Unified Plan*. Shell's 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 NSB, Shell will abide by the regulatory *North Slope Subarea Contingency Plan* to ensure compliance, including emergency notification of the necessary and affected parties, including federal, state, and local agencies. As required by the *North Slope Subarea Contingency Plan*, or when more than one agency has jurisdiction, Shell will also implement a UC System as described within this plan, including the designation of a representative of the NSB as the LOSC within the UC.

UC is a structure that is created at the time of an incident to bring together the ICs of each major organization involved in response operations. In Alaska, the members of UC are usually the FOSC, the RP, and if applicalbe, the SOSC. For this exploration, an LOSC from a neighboring area may join the UC.

The priorities of the UC 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 UC, 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 UC 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., IAPs) developed by the IMT to address the objectives and priorities.

The UC 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 RP, it ensures members of the IMT have access to valuable expertise without diluting their ability to manage response operations.

The RP would fill the role of IC in the UC structure unless the FOSC determines the RP's response is inadequate. In such a circumstance, the FOSC would assume the role of IC.

All emergency response situations will use the 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 IC (person in charge) until that individual relinquishes authority to another person better able to assess the situation.

The 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 may fulfill the role of IC. Personnel would be activated to standby until an assessment is performed. Once the assessment is complete, response personnel are either released or mobilized to the incident location.

For Tier I incidents, drilling vessel personnel would report to a designated secure area until completion of an incident assessment by the on-site representative. Following that assessment, the drilling vessel personnel would be assigned cleanup duties based on their level of training. A spill response technician would be mobilized to assist in this effort as necessary.

Tier II/III responses are initiated by the Drilling Foreman who activates the appropriate IMT(s). Once the response level is ascertained, the appropriate IMT(s) begin(s) to provide support to the field responders (Operations Section) and to coordinate the collection and distribution of information. Shell and their response contractor provide personnel and equipment resources from the on-site OSR vessel, VOSS, and North Slope resources.

For Tier II/III incidents, the Drilling Foreman is the initial On-Scene IC. The drilling vessel personnel may be directed to a secure area to await the arrival of emergency response personnel. Depending on the incident, drilling vessel personnel may be incorporated into the IMT, when applicable.

Upon notification, the QI would ensure activation of the IMT (Tier II or III response). During Tier II events, the Mutual Aid agreements cover resource issues associated with personnel and equipment. The QI acts as the company representative for commitment of additional resources. The QI can be either the IC or the DIC. Tier II or III incidents will normally be managed from the ICP located in Shell's offices at 3601 C Street, Suite 1000, Anchorage, Alaska. Forward command posts could be established on the drilling vessel, at Barrow, and/or at Wainwright, as necessary.

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 personnel from contractors beyond the Mutual Aid agreement limits, if necessary, to complete a spill response (see ACS Tactics L-8 and L-9).

For significant oil spills of Tier II and III magnitude, there may be FOSC, SOSC, and LOSC participation alongside the Shell IC. These individuals may become part of the UC, representing their organization. Each may contribute to the process of:

- determining and establishing overall incident objectives and priorities,
- selecting strategies,
- approval of tactical activities,
- conducting integrated tactical operations, and
- using resources effectively and efficiently.

An organization chart showing the ICS structure for Tier II and Tier III incidents is presented in Figure 2.2-1. The individuals that would comprise the Shell IMT are listed in Table 2.2-1. Responsibilities of the IMT members are described in Table 2.2-2.

Although this OSRP contains procedures applicable to most foreseeable spill scenarios, actual conditions and decisions by the UC will dictate whether deviations from the OSRP are appropriate. IMT members are instructed to act accordingly, as directed by the UC.

Figure 2.2-1
Tier II and Tier III Incident Response Organization Chart

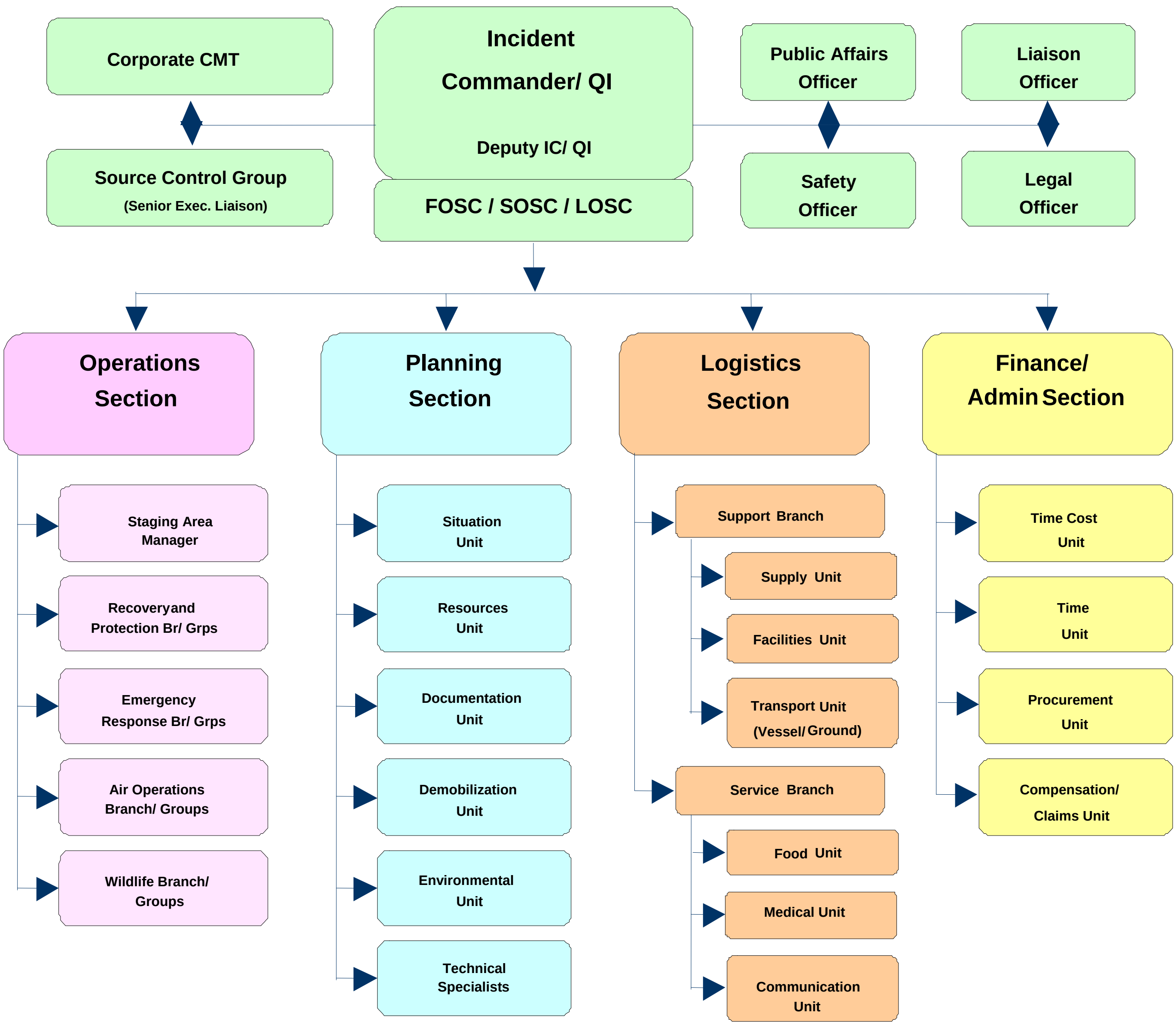


Table 2.2-1
IMT Contact Information

NAME	OFFICE #	PAGER #	CELL #
COMMAND STAFF			
IC/QI			
Sean Churchfield	907-771-7217		907-223-0061
Susan Moore	907-646-7119		907-382-5474
Deputy IC /QI			
Susan Moore	907-646-7119		907-382-5474
Geoff Merrell	907-771-7221		907-306-8016
Public Affairs/Information Officer			
Jennifer Taylor	907-646-7178		907-382-5974
Curtis Smith	907-646-7182		907-242-5227
Liaison Officer			
Pauline Ruddy	907-771-7243		907-223-9381
Greg Horner	907-646-7131		907-227-1065
Safety Officer			
Lucy Jean	907-646-7116		907-301-7614
Mike Corron	907-646-7103		907-223-6878
Legal Officer			
Marc Stone	907-646-7127		713-269-8054
Pat Morris	504-728-4651		504-957-9643
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)			
Pete Slaiby	907-771-3700		
Gary Cameron	907-771-7249		907-230-5329
Executive Liaison (IC Support)			
Peter Velez	832-337-0222		281-250-0448
Charlie Williams	832-337-1794		281-685-9088
GENERAL STAFF			
Operations Section Chief			
Geoff Merrell	907-771-7221		907-306-8016
ACS Staff	907-659-2405		
AES-RO Staff	907-339-6200		

Table 2.2-1 (Continued)
IMT Contact Information

NAME	OFFICE #	PAGER #	CELL #
Staging Area Manager			
ACS Staff	907-659-2405		
Operations Section Branch Directors			
Shell Staff	907-770-3700		
ACS Staff	907-659-2405		
AES-RO Staff	907-339-6200		
Planning Section Chief			
Carol Theilen	907-771-7220		713-504-9260
Darla Dare	907-646-7109		907-854-4876
Technical Specialists			
Michael Macrander	907-646-7123		907-317-9314
Al Allen (Spiltec)	425-869-0988		
Victoria Broje	281-544-7437		281-660-4353
ACS Planning and Development Manager (IMT coach/facilitator)	907-659-3220		
Logistics Section Chief			
Karen Spring	907-646-7111		907-306-6038
Lev Yampolsky	907-646-7160		907-306-2574
Source Control			
Mark Duplantis	907-646-7129		907-317-2013
Jim Miller	907646-7122		713-253-3778
Finance Section Chief			
Gary Becker	907-646-7151		713-817-1667
Zach Reigle	907-646-7105		517-944-1502

Table 2.2-2 IMT Responsibilities and Checklist

POSITION	RESPONSIBILITIES	COMMENTS
INITIAL RESPONSE 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 IMT support as required	
	❑ Conduct internal / external notifications as required	
	❑ Authorize the use of response resources	
	❑ Participate in Incident Command briefings	
LIAISON OFFICER	❑ Notify/call NRC	
	❑ Notify appropriate state agencies	
	❑ Notify federal agencies	
	❑ Request safety zones air/ water (USCG)	
	❑ Request Notice to Mariners (USCG)	
	❑ Submit Dispersant/ *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	
PUBLIC INFORMATION OFFICER	❑ Notify corporate executives	
	❑ 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	

Table 2.2-2 (Continued) IMT Responsibilities and Checklist

POSITION		RESPONSIBILITIES		COMMENTS
SAFETY OFFICER	❑	Evaluate / monitor hazards		
	❑	Notify offset operators		
	❑	Obtain MSDS / 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		
SOURCE CONTROL BRANCH CHIEF	❑	Commence source control operations		
	❑	Verify amount spilled		
	❑	Calculate total potential		
	❑	Mobilize source control specialist		
	❑	Develop / Obtain approval for repair plan		
OPERATIONS SECTION CHIEF	❑	Direct surveillance operations		
	❑	Mobilize Response Contractors as needed and other equipment that is deemed necessary to response efforts by the UC.		
		❑	Equipment / operators / supervisors	
		❑	Take air monitoring equipment	
		❑	Obtain samples of spilled material	
		❑	Prepare shoreline for impact (pre-clean)	
		❑	Contact ASI	
		❑	Spray / Spotter aircraft and personnel	
		❑	Vessel for USCG SMART Team	
		❑	See Appendix G for equipment (potential services not under contract).	
	❑	Send company representative to site/ staging		
	❑	Consider night time spill tracking –RTTI		
	❑	Consider pre-cleaning the shoreline prior to impact		
WILDLIFE BRANCH / GROUPS	❑	Assist in SCAT process to determine shoreline response		
	❑	Contact wildlife specialist/ refuge mgrs. for info.		
	❑	Consider scare cannons		
	❑	Call Wildlife Rehab		

Table 2.2-2 (Continued) IMT Responsibilities and Checklist

POSITION	RESPONSIBILITIES		COMMENTS
LOGISTICS SECTION CHIEF	❑	Locate utility / crew boats, helicopters	
	❑	Prepare Air Operations Plan	
	❑	Set up decontamination stations	
	❑	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 ICP / staging areas	
	❑	Establish services	
	❑	Housing	
	❑	Catering	
	❑	Parts trailers/ mechanics	
	❑	Fueling facilities	
PLANNING SECTION CHIEF	❑	Call Response Group	
	❑	Request trajectories	
	❑	Show dispersant timeline	
	❑	Shoreline impact? Request sensitive areas	
	❑	Update with weather forecasts / surveillance	
	❑	Prepare dispersants / *in situ* burning request form	
	❑	Post / Update charts in ICP	
	❑	Commence NRDA operations (sampling)	
	❑	Determine Sensitive Areas as Identified in the ACP and OSRP	
	❑	Call out technical specialists as needed	
	❑	Coordinate IAP development	
	❑	Set up secured filing system	
	❑	Develop Waste Disposal Plan	
	❑	Obtain USCG approval for decanting	
FINANCE	❑	Issue WBS Element	
	❑	Prepare for claims	
	❑	Review contracts with Logistics/ vendors	

2.3 SPILL RESPONSE OPERATING TEAM [30 CFR 254.23(c)]

2.3.1 Trained and Available on 24-hour Basis

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

All members of the SRT are trained individuals and the positions (including trained alternates) are available on a 24-hour basis, seven days per week. Additional information on Shell and ACS training programs is presented in Appendix F (Training and Drill Information).

2.3.2 Spill Response Coordinator and Alternate(s)

The trained spill response coordinator and alternate are presented below. These individuals have the responsibility and authority to direct and coordinate response operations on behalf of Shell.

Primary Spill Response Coordinator:
Curtis Wright
3601 C Street, Suite 1000
Anchorage, AK 99503
907-771-7234

Alternate Spill Response Coordinator:
Geoff Merrell
3601 C Street, Suite 1000
Anchorage, AK 99503
907-771-7221

The spill-response operating team includes Shell's membership in ACS and contracted services with AES-RO and MSRC. Personnel from these organizations are trained and available 24 hours per day, seven days per week to deploy and operate spill-response equipment. Required mobilization times for these resources depends on the spill event. Mobilization times are described in the Shell Tactics and ACS Tactics. The numbers and specific types of personnel required for response are listed in the Tactics. In addition to these entities, there are other contractual vehicles through which trained personnel and equipment are available. For example, ACS has master service agreements with numerous (more than 30) contractors (ACS Tactic L-9). APICOM has a mutual aid agreement to provide equipment and personnel to members on an as-available basis. Accessing these resources is described in ACS Tactic L-10.

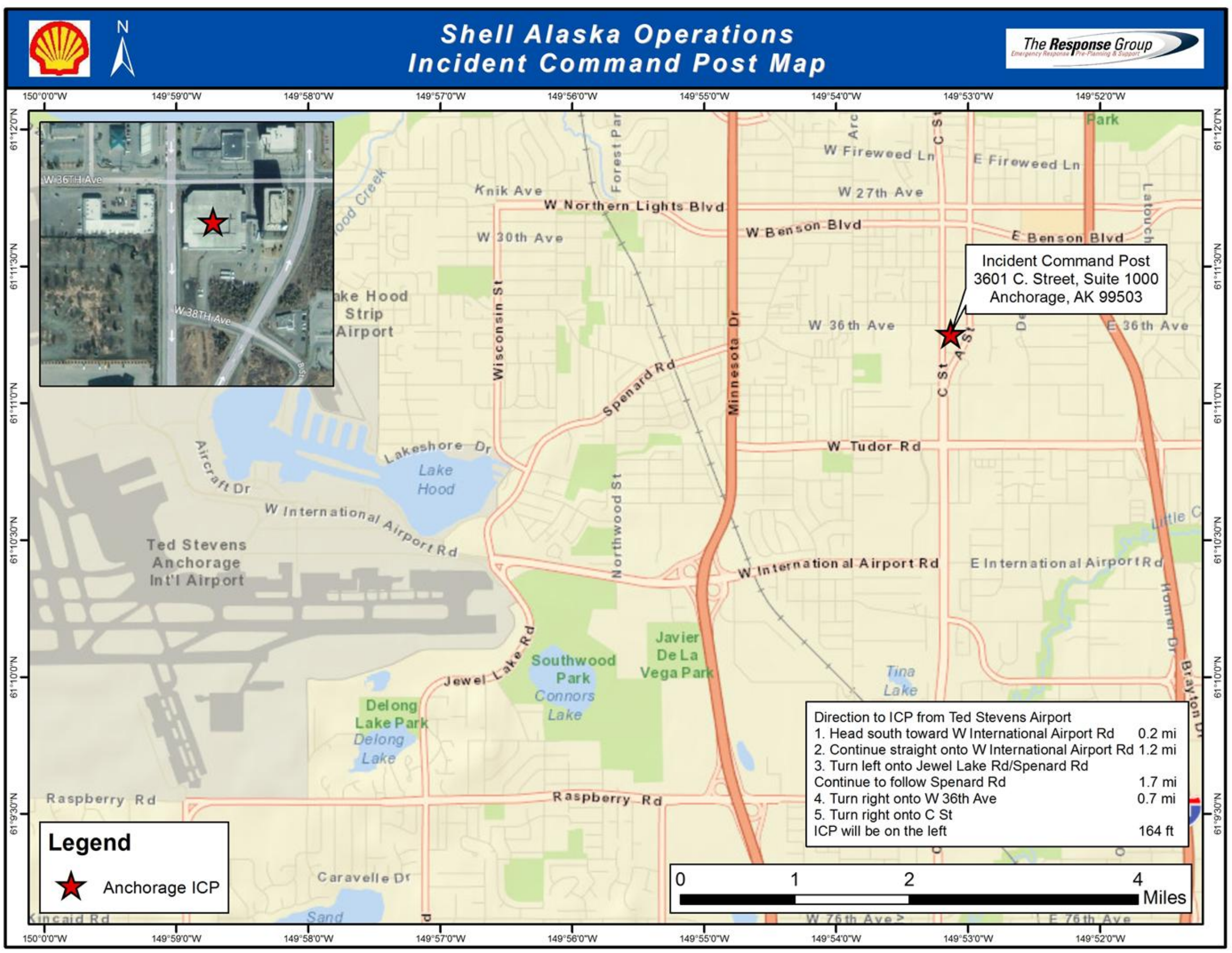
Shell has organized their approach to spill response in the Beaufort Sea based upon dedicated response assets as described in Appendix A. These assets, such as the OSR vessel have been outfitted with equipment that is appropriate for the use in this environment and provides for alternative response techniques. Please refer to Appendix A for additional information on the available assets and response equipment on each TF referenced in Section 2.7 of this document.

2.4 SPILL RESPONSE OPERATIONS CENTER (INCIDENT COMMAND POST) AND COMMUNICATIONS [30 CFR 254.23(d)]

2.4.1 Incident Command Post

Shell's IMT will normally assemble at Shell's Anchorage Command Post (contact number 907-770-3700), located at 3601 C Street, Suite 1000 (map included as Figure 2.4.1-1), or otherwise as agreed with the UC. In the event that a forward command post is deemed necessary, Shell may activate command posts on the OSR vessel, at existing facilities, or activate the Mobile Response Center available through ACS (Tactic L-4). A 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 a secondary command post located in Barrow at Shell's hanger next to the airport. These facilities are effectively equipped for timely activation. ACS's Mobile Response Center may be deployed and equipped to other forward locations as dictated by the UC (see ACS Tactic L-4 for reference on deployment and equipment).

Figure 2.4.1-1 Anchorage Command Center

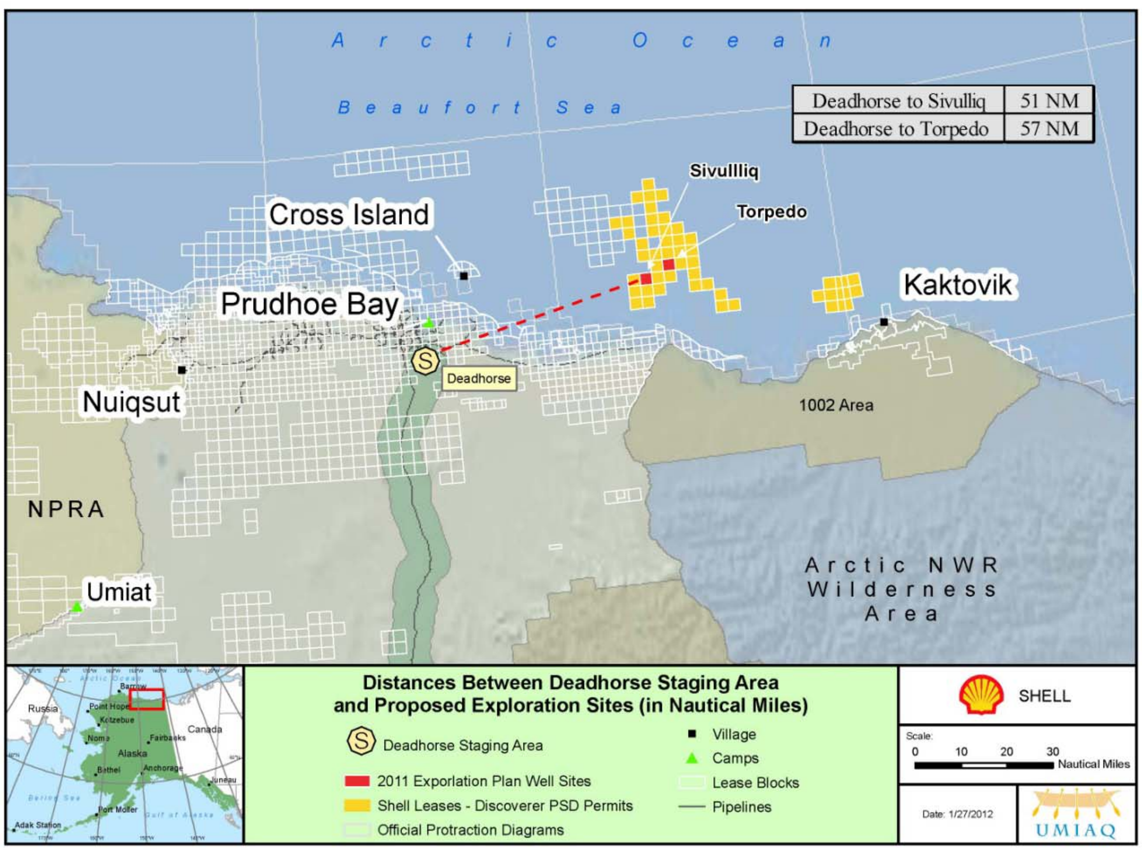


Equipment located at secondary command post facilities in Barrow and Deadhorse includes the following:

- Telephones and telephone books
- Appropriate number of copy and facsimile machines and computer printers
- Desktop and portable computers with printers and fax/modem capability
- Internet and email access
- Office furniture
- Portable radios and marine communications base station
- Cameras and video recording/playback capability
- Office supplies (pens, pencils, paper, flash drives, blank CDs and DVDs, etc.)
- Chart paper with easels and status boards (dry-write)
- Overhead and computer projectors
- Applicable ESI maps
- Applicable MESA maps
- Copies of the Shell Beaufort Sea Regional Exploration Program Oil Spill Response Plan
- Copies of any appropriate local emergency response plans
- Copies of the Unified Plan and the North Slope Subarea Contingency Plans
- Copies of the Shell Upstream Americas Incident Management Handbook.

Staging areas are depicted in Figure 2.4.1-2.

Figure 2.4.1-2 Shell Staging Area Map



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2.4.2 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 participants.

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, CISPRI, SERVS) is provided in Table 2.4.3-1. The frequencies noted have been licensed for use statewide on oil spills. 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 MHz 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.

2.4.3 Communications Equipment

The Shell OSR vessels will be equipped with radio subscriber units that will be tuned to the assigned frequencies. OSR vessels also may use radio channels on the ACS communication network. Also, all vessels will have standard marine radio systems. Additional ACS subscriber units are available for use in OSR or drills. ACS provides for an extensive communications network in the North Slope region, built on the basis of VHF radio coverage. Also, UHF radio can be linked to VHF systems via an ACS UHF-VHF link.

Descriptions of communications resources and systems are provided in ACS Tactics L-5 and L-11A and Shell Tactic LE-2. The following communication frequencies could be used, depending upon the location and emergency situation (Table 2.4.3-1).

Table 2.4.3-1
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-64	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.

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 telephone calls associated with most spills. However, sparsely populated areas may have very limited telephone 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. (See Table G-1 in Appendix G).
- **Cellular Telephone Systems.** Standard cellular coverage in Alaska is limited to populated areas primarily in Southcentral 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 telephones are preferred, to free the user from dependence on commercial power or vehicle batteries.
- **VHF-FM Marine Radio (156 MHz to 158 MHz).** On-water cleanup operations are expected to use 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.
- **VHF-AM Aircraft Radio (118 MHz to 136 MHz).** These VHF frequencies are used for ground-to-air communications, although most aircraft can also monitor VHF marine and many UHF 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).** UHF 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.
- **HF SSB Radio (2 MHz to 20 MHz).** For communication over long distance at sea and in undeveloped areas, operators may consider obtaining HF-SSB 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 31 mi (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 fax communications to standard telephone lines, almost anywhere in the world. The associated costs are relatively high, but these systems can be invaluable in areas where other forms of communication are unavailable, inconsistent, or fax transmissions are critical.
- **MSAT.** MSAT is a satellite system based on the world's most powerful commercial mobile satellite. Voice communications, including continent-wide group and private communications are available through use of the MSAT-G2 radio. The MSAT-G2 radio supports point-to-point and point-to-multi-point communications including push-to-talk, push-to-track, and voice services.

- **Iridium Satellite**. Iridium telephones use satellites to provide worldwide voice and data communications. The network is unique in that it provides whole-earth coverage, including polar regions, oceans, and airways.
- **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 and west to Alpine, including coverage offshore in short distances (less than 10 mi [16 km]).

2.4.3.1 Drilling Vessel Communication

The communications equipment maintained on site at the drilling vessel is listed below. Radio coverage at both the *Kulluk* and *Discoverer* will be with VHF Marine and Land Mobile Radio. Some vessels are equipped with satellite communications capability.

The oil spill response vessel will be equipped with radio subscriber units that are both handhelds and dash mounts programmed with the frequencies of ACS's and Shell-licensed land mobile VHF radio networks that includes a repeater at Badami. Base station radios will also be installed on the *Kulluk* and *Discoverer* for communications with spill response vessels in the area. Both drilling vessels will have VSAT voice and data service in excess of 512 kbps to facilitate as primary communication with on shore resources. Voice telephone calls are the primary means of direct communications with the spill response center in Deadhorse; however, the Shell-licensed radio frequencies are configured for communications use.

The primary means of communications between the Shell Deadhorse facility and the *Kulluk* and *Discoverer* is a satellite voice and data communications network. Standard marine VHF radio will be used to communicate with response vessels and drilling support vessels within a 30- to 50-mile radius of the drilling vessel. The exact range is dependent on topography and, to some extent, on weather. For communication with response ships and other vessels beyond this radius, the ACS radio communication network or satellite-based phones will be used. Additional repeaters may be located on the drilling vessel or in the proposed exploration area in future years to assure that coverage is available to new drill sites within the proposed area of exploration. The on-site satellite system will also provide a communications link with off-site resources, agencies, and company contacts.

The response vessels will be equipped with radio subscriber units that will be tuned to the assigned frequencies on the ACS communications network. Also, all vessels will have standard marine radio systems. Additional ACS subscriber units are available for use in oil spill response or drills.

Once the drilling vessel is on site, a Shell satellite communication network (supplied by Alaska Telecommunications) will be available. The drilling vessel will have 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 drilling vessel will also have a back-up satellite communication network (via Noble Drilling) as well as Iridium Satellite telephones. There will be multiple telephone and facsimile lines for the drilling vessel. Telephone numbers will be provided prior to spud.

2.4.3.2 Intercom System – *Kulluk* and *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 drilling unit pump room, radio room, and control room to the drilling unit pump room, control room, and stairwell, and operates independently of all other systems. This is a hands-free, talk-back system.

2.4.3.3 Page and Alarm System, *Kulluk* and *Discoverer*

This system consists of a camp page 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 high. 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 – 1,260 Hz to 600 Hz – downward sweep in 1.6 seconds, and
- H_2S Gas – Hi-Lo – 780 Hz to 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 if the radio room is not staffed.

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

2.4.3.4 Communication and Navigation Equipment, *Kulluk* and *Discoverer*

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

- ITT 3100 PBX (*Kulluk*) Mitel SX-20 telephone exchange with seven outgoing trucks and associated locals (*Discoverer*)
- Four each, VHF, 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, including a Ku Band satellite system as the primary unit for phones, data and fax, and a secondary VSAT system via Frontier Drilling
- 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 radio-telephones – Raytheon Ray-78; one installed in each crane
- One Sperry SR120 gyro compass
- Pantenna/amplifier entertainment system
- Three independent paging systems for all three cranes

VHF Vessel Frequencies

In addition to the standard VHF Marine radio frequencies, a list of frequencies to be used by the *Kulluk* and *Discoverer* if operating in the Beaufort Sea is presented in Table 2.4.3-1.

Table 2.4.5-1
Vessel Frequencies for the *Kulluk*

TRANSMIT FREQUENCY	RECEIVING FREQUENCY	USE
150.980 MHz	150.980 MHz	Main Shell licensed calling frequency
154.585 MHz	154.585 MHz	Endeavor Task Force
158.445 MHz	158.445 MHz	Affinity Task Force
151.625 MHz	151.625 MHz	Skimmer Task Force
156.900 MHz	156.900 MHz	Marine 18A OS-76
154.585 MHz	150.980 MHz	Alaska Clean Seas Badami Repeater OS-43
156.475 MHz	156.475 MHz	Marine 69 Kaktovik Call Center

2.4.3.5 Patch Number 1 and Patch Number 2

High Frequency radio can be patched to any worldwide telephone. When using these systems, the operator should 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.

2.4.4 Equipment Maintenance

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

- Monthly
  - Rechargeable batteries will be tested and recharged.
  - 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.

2.5 LISTING OF TYPES AND CHARACTERISTICS OF OIL HANDLED/ STORED/ TRANSPORTED AT FACILITY [30 CFR 254.23(e)]

The MSDS for low sulfur diesel is provided in Appendix M **(**USCG Supplement).

No crude oil is expected to be stored at the facility. For the purposes of the OSRP and because the properties of oil from an exploration well would not yet be determined, ANS crude oil is used as an analog oil as it is representative of medium weight oil (25 to 30° API). The following properties are derived from an ANS sample collected from the Trans-Alaska Pipeline System Pump Station 1:

NORTH SLOPE CRUDE OIL PROPERTY DESCRIPTION	VALUE
API Gravity (@15°C)	30.6
Viscosity (@15°C)	16 cSt
Max. Water Content in Oil/Water Emulsion	70% by wt
Asphaltene Content	5% by wt
Pour Point	-55°C
Flash Point	-19°C

Based upon MSDS Number: 00001392 Rev 002, the vapor pressure for ANS Crude Oil was reported to be 12 to 15 psi at 100°F.

2.6 PROCEDURES FOR EARLY DETECTION OF A SPILL [30 CFR 254.23(f)]

Drilling Vessel Integrity Inspections

During drilling, a daily visual inspection of major tanks and lines will be conducted. 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 drilling vessel that 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 contaminants are shipped ashore for proper disposal. Each sump is equipped with level-sensing alarms.

Spill detection methods include:

- Visual inspections during personnel duties
- Support vessels and crew discovery and notification
- All Shell personnel are required to be diligent in observing for leaks or indications of leaks/spills during the course of operations

General Source Control methods include:

- BOPs are utilized as required for drilling operations
- Personnel engaged in offshore operations have been trained to respond appropriately to a source control event. Safety, of course, is first priority.
- A source control group is identified as part of the Spill Management Team. Their duties are to assess the situation, contact well control specialists, divers, or other specialists, as directed by the IC/UC.
- A WCCP will be utilized for well control.

The *Discoverer* Drilling Vessel Discharge Detection

Visual surveillance is used for discharge detection. Visual inspections are an important component of leak and spill detection because automated systems may not detect small leaks and spills. The drilling vessel and fuel-transfer operations will be closely monitored at all times. Operations will be staffed 24 hr per day by drilling personnel. Once per 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 that are contained on-board will be noted, the source of the spill will be located and corrected, and the oil spill will be cleaned up. During drilling, drillers continually monitor the drilling equipment and will stop drilling if unsafe conditions are observed.

Automated Methods

The drilling vessel 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.

Several independent ESD systems limit the scope of any single failure. An ESD can be initiated by process conditions outside pre-set limits or manually initiated by operators at the instrument/control panels. Manually-actuated ESDs (punch-button panels) are also strategically placed throughout the facility. ESDs are specifically provided for the primary systems of ship operations, drilling operations, and fuel transfers. Drill operation shutdowns are located on the drilling unit floor. Fuel transfer ESDs are located on the lower and upper deck of the helideck. Ship-to-ship fuel transfer ESD and drilling operation shut downs, including associated hydraulic systems, are located on the drill floor. ESDs to shut down all ship operations are located in the emergency response room and in the semi-conductor room. Rounds are documented daily. Incidents are recorded using an approved incident reporting and investigation process.

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

The *Kulluk* Drilling Vessel Discharge Detection

On the *Kulluk* drilling vessel, 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 drilling vessel. 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.

Additional discussion of well control processes are generally discussed in Appendix N.

2.7 RESPONSE PROCEDURES [30 CFR 254.23(g)]

Shell is a member of ACS. ACS would be used as primary response contractor for all spill response activities. ACS will be available while critical drilling operations are underway in hydrocarbon bearing zones; and will provide response in the event of an actual oil spill incident, including related maintenance, ongoing assurance of response capabilities, and coordination of training activities. Per the provisions of 30 CFR 254.4, this OSRP incorporates references to the ACS *Technical Manual*, available online at:

http://www.alaskacleanseas.org/tech-manual/

Shell provides response equipment for the offshore response. Response activities will be conducted using ACS Tactics, as defined in the ACS *Technical Manual*, and Shell tactics as defined in the Shell Tactics Manual.

In addition, ACS may mobilize the OSR barge to provide personnel and equipment for nearshore response operations (Shell Tactics LE-1 through LE-4, and ACS Tactics L-1 through L-12). ACS may also mobilize personnel and equipment for shoreline protection and response along the Beaufort Sea coast (ACS Tactics L-1 through L-12). Additional information on resources available to Shell is provided in Appendix A (Response Equipment) and Appendix G (Logistical Support Services and Supplies).

Depending upon 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.

ACS, as a member of APICOM, has access to other OSRO's out-of-region (Tier III) resources beyond those identified on the North Slope through a mutual aid agreement. This agreement, summarized in ACS Tactic L-10 provides for access to equipment and personnel on an as-available basis.

Additional information on resources available to Shell is provided in Appendix A and Appendix G. Depending upon the equipment type, resources may be requested and on location within 72 hours. Logistics contractors are identified in Appendix G. Response equipment, materials, support vessels, and strategies listed in this OSRP are suitable within the limits of current technology for the range of environmental conditions anticipated.

2.7.1 Spill Notification Procedures [30 CFR 254.23(g)(1)]

The person reporting an oil spill to the immediate supervisor or QI 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 presented in Table 2.7.1-1 and Table 2.7.1-2. In order to save time, the Spill Report Form (reference the OSRP Quick Guide and Appendix J - Forms) should be completed while reporting the incident. Information not immediately known may be inserted on the form as soon as it becomes available. The report should not be delayed to gather complete information.

Table 2.7.1-1
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 III 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 effectively respond to with equipment and personnel onboard (such as deploying absorbent containment and recovery materials) (Table 2.7.1-2). No immediate off-site assistance is needed.

Table 2.7.1-2
Initial Spill Response and Notification Process – Tier I 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 Drilling Foreman.
INITIAL ON-SCENE INCIDENT COMMANDER **(Drilling Foreman)**	From a safe distance, determine whether the spill is stopped or contained. Start agency and corporate notifications. Call the IC. Call the Drilling Superintendent (if not available, call the Wells Manager). Complete applicable spill report form (Figure 2.7.1-2). Respond as directed by the IC to contain and recover the spill.
IRIC/QI **(Asset Manager or designee)**	Activate appropriate components of IMT. Determine if Tier I, Tier II, or Tier III spill actions must be taken. Ensure the NRC has been notified (1-800-424-8802).

Tier II Spill: Large spill that would require mobilization of the IMT and/or all dedicated response resources identified in this OSRP.

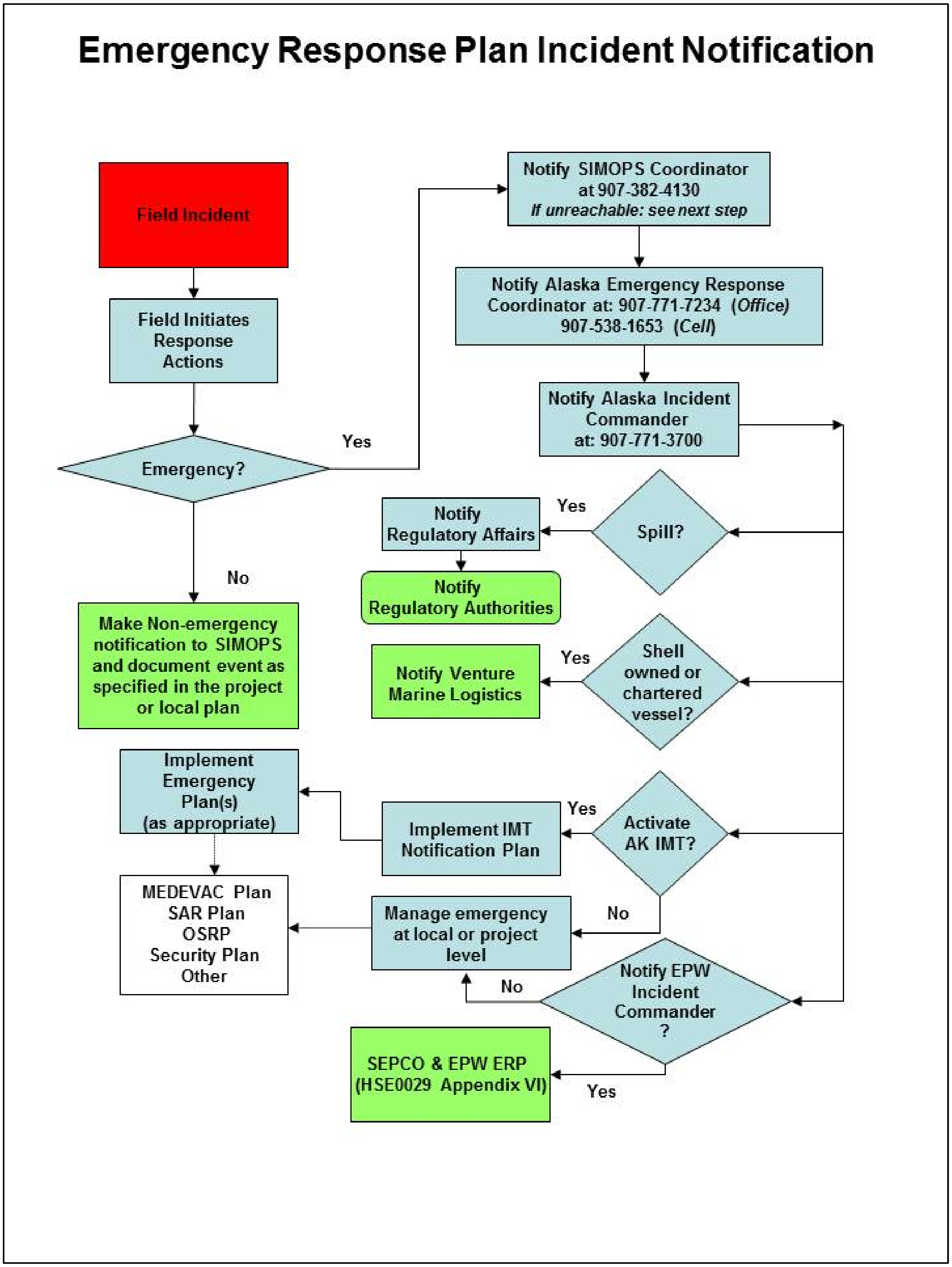
Tier III Spill: Large spill with potential to require mobilization of all resources listed above for Tier II plus additional national or international resources not specified in this OSRP.

Figure 2.7.1-1 presents a flow diagram depicting the internal emergency notification process. If the initial On-Scene IC or the IRIC determines that the spill is a Tier-II or -III event, additional responses and notifications should take place (Table 2.7.1-3 and Figure 2.7.1-2). The names, positions, and telephone numbers of facility personnel responsible for spill notification are listed in Table 2.2-1. A summary of the emergency actions described in this OSRP is available for field personnel. During Tier II or Tier III spill events, Shell's IMT will normally assemble at Shell's Anchorage Command Center located at 3601 C Street, Suite 1000, or otherwise as agreed with the UC.

Table 2.7.1-3
Initial Spill Response and Notification Process – Tier II or Tier III Spill

TIER II OR TIER III SPILL	
PERSONNEL	ACTION TO BE TAKEN
IC/QI	• Gather information; assess magnitude/severity of the spill; and ensure notification of dedicated response resource and Shell management. • Ensure appropriate internal and external notifications are implemented. • Verify notification of the NRC (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 additional resources (in addition to on-site equipment and personnel) if necessary.
LIAISON OFFICER	• Confirm that all state and federal agencies and appropriate Native village authorities and corporations have been notified. • Ensure notification of the NRC (1–800–424–8802). • Request safety zones for air and water. • Request Notice to Mariners (USCG). • Obtain USCG approval to decant. • Prepare written reports to agencies.
PUBLIC INFORMATION OFFICER	• Establish Joint Information Center. • 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 off-site operators. • Obtain MSDSs and prepare initial Site Safety Plan. • Establish first aid posts. • 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 IC. • Conduct safety inspections.
OPERATIONS SECTION CHIEF	• Mobilize and direct on-scene response equipment and personnel. • Coordinate all operations with dedicated response resources and Shell's on-site response personnel. • Coordinate search and rescue operations. • Ensure Shell representation at site / staging areas. • Coordinate with Environmental Unit for identification of protection sites. • Oversee preparation of Air Operations Plan.
PLANNING SECTION CHIEF	• Collect, process, and display incident information. • Contact wildlife specialists and refuge managers for information. • Provide basic environmental support. • Supervise development of IAP.
LOGISTICS SECTION CHIEF	• Determine and supply immediate incident resource and facility needs. • Indentify long-term service and support requirements. • Coordinate and process requests for additional resources.
FINANCE SECTION CHIEF	• Manage all financial aspects of an incident. • Provide financial and cost analysis information as requested.

Figure 2.7.1-1
Internal Emergency Notification Process Diagram



2.7.1.1 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 will assess the situation and then make appropriate agency and corporate notifications as established in the onboard procedures.

The IRIC will then continue 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 presented in Table 2.7.1-4. Table 2.2-1 lists names, positions, and telephone numbers of facility personnel responsible for spill notification. Agency and external notification Information (including Native corporations and villages) is included in Table 2.7.1-5.

The Shell spill report form (Figure 2.7.1-2) must be completed for any reportable spills.

Table 2.7.1-4
Emergency Contact List

Emergency Response Coordinator		
Curtis Wright Main: 907-771-7234 Cell: 907-538-1653 **EMAIL: CURTIS.WRIGHT@SHELL.COM**		
Shell Offshore Inc.		
QI / IC Primary QI / IC Alternate QI / IC Alternate Security Alaska Emergency Response Coordinator Wells Manager Regulatory Affairs Manager HSE Environmental Manager Environmental / SD Advisor Shell MOSAG / SART	907-771-7217 Cell 907-223-0061 907-646-7119 Cell 907-382-5474 907-771-7221 Cell 907-306-8016 (907) 273-2420 (907) 771-7221 (907) 771-7219 (907) 771-7243 (907) 646-7121 (907) 646-7116 713-241-2532	
 Drilling Superintendent Drilling Engineer	***Kulluk*** (907) 646-7122 A (713) 546-6674 Cell (713) 898-7104 B (713) 546-6632 Cell (713) 806-9667	***Discoverer*** (907) 646-7176 Cell (504) 874-4697 A (713) 546-6675 Cell (281) 507-6963 B (713) 948-1169 Cell (713) 382-6434
Oil Spill Response Centers		
Deadhorse Facility Anchorage Shell Headquarters	(907) 382-4130 (907) 770-3700 (504) 728-4369	
OIL SPILL RESPONSE ORGANIZATIONS		
Alaska Clean Seas (ACS), Address: Pouch 340022, Prudhoe Bay, Alaska 99734 Main Number Prudhoe Bay ACS Operations Manager North Slope Mutual Aid (if applicable) handled through ACS	 (907) 659-2405 (907) 659-3202 (907) 659-2405	
ASRC Energy Services (AES), Address: 3900 C Street, Anchorage, Alaska 99503 Main Number Anchorage AES Operations Manager	 (907) 339-6200 (907) 339-6200	

NOTE: PLEASE REFER TO TABLE 2.7.1-5 AGENCY AND EXTERNAL NOTIFICATION INFORMATION FOR ADDITIONAL EMERGENCY CONTACT NUMBERS.

Table 2.7.1-5
Agency and External Notification Information

AGENCY	TELEPHONE	FACSIMILE (FAX)
NRC	800-424-8802	
EPA	907-271-5083	907-271-3424
Matt Carr (EPA FOSC) direct line	907-271-3616	907-271-3424
EPA Region 10 – 24 hr Duty Officer	206-553-1264	
ADEC - Business Hours	907-451-2121	907-451-2362
ADEC - after hours and on weekends call ALASKA STATE TROOPERS	800-478-9300	
ADNR - Oil Spill Hotline Recording	907-451-2678	907-451-2751
DOI-OEPC (Pamela Bergmann)	907-271-5011	907-271-4102
NSB	907-561-5144	907-562-1940
NSB Wildlife Department (Office)	907-852-0440	907-852-5991
NSB Wildlife Department (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 Mayor's Office	907-852-0200	907-852-0337
NSB Disaster Coordinator (Pat Patterson)	907-852-2822, 907-852-6111 (24 hrs on call)	907-852-2475
USCG – Sector Anchorage COTP Zone	907-271-6700	907-271-6765
USFWS (spills that may impact the Arctic National Wildlife Refuge)	907-235-6546	907-271-1630
BSEE	907-250-0546	907-334-5302
ADF&G – Fairbanks	907-459-7242	907-452-6410
Alaska Oil and Gas Conservation Commission (AOGCC) – Anchorage AOGCC – North Slope Inspector	907- 279-1433 907-659-3607 Pager, 907-659-2714	907-276–7542 907-659-2717
City of Barrow NSB Mayor's Office Inupiat Community of the Arctic Slope	907-852-5211 907-852-0200 907-852-4227	
Village of Nuiqsut Village of Kaktovik	907-480-6727 907-640-6313	
Prudhoe Bay Weather	907-659-5888	

Figure 2.7.1-2
Shell Report of Offshore Environmental Incident Form

(Internal SEPCo HSSE 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 Fountain Incident reporting 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

Slick colors ☐ Silver/Gray Sheen (spill factor = 0.000004) ☐ Transitional Dark (spill factor = 0.004)
☐ Rainbow (spill factor = 0.00004) ☐ Dark (spill factor = 0.04)
☐ Metallic (spill factor = 0.0004)

Size of the slick feet by feet Estimated volume of the spill (feet **x** feet **x** 0.624 **x** spill factor) = **gallons**

Was the slick ☐ 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**)
Visibility(nautical miles) | Ceiling (feet) | Ambient temp. (°F.)

Liquid Spill Properties
API Gravity **Pour Point**

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)

SEPCo Offshore Report of Environmental Incident Form Page 1 of 2 Form OF-REI Rev. January 2010

Figure 2.7.1-2 (Continued)
Shell Report of Offshore Environmental Incident Form

(Internal SEPCo HSSE use only) Incident Number______________.

INCIDENT EFFECTS					
Environmental	☐ Inside impermeable containment/ building	☐ Gravel surface (roadway or pad)	☐ Tundra	☐ Confined water body	☐ Unconfined or flowing water body
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
Reputational ☐ 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)	☐		/	
Alaska Department of Environmental Conservation 907-451-2121 (Business hours) 1-800-478-9300 (After hours & weekends)	☐		/	
North Slope Borough 907-852-0440 (Land Management) 907-852-0248 (Risk Management)	☐		/	
United States Coast Guard 907-271-6700	☐		/	
BSEE 907-250-0546 or 907-334-5300	☐		/	
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 HSSE Incident Management Process Gatekeeper for your organization for submission instructions.

SEPCo Offshore Report of Environmental Incident Form Page 2 of 2 Form OF-REI Rev. January 2010

2.7.1.2 External Notification Procedures

Appropriate agency verbal notifications and written reports may include:

- NRC
- BSEE
- BLM
- USFWS
- EPA
- USCG
- DOI
- DOT
- ADEC
- ADF&G
- ADNR
- NOAA, NMFS
- NSB
- Village of Kaktovik
- Village of Nuiqsut
- City of Barrow

See Table 2.7.1-5 for contact information.

2.7.1.3 Written Reporting Requirements

Depending on the type and amount of material spilled, individual government agencies have requirements for written reporting, which are the responsibility of Shell. BSEE, USCG, and ADEC reporting requirements will be met. Agency and external notification contacts are listed in Table 2.7.1-5 and agency reporting requirements are summarized in Table 2.7.1-6.

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

Table 2.7.1-6
Agency Reporting Requirements for Oil Spills

		ENVIRONMENTAL COMPLIANCE INITIAL AGENCY NOTIFICATION										ADMINISTRATIVE WRITTEN REPORT (fax is acceptable)			
		AS SOON AS POSSIBLE			SPECIFIC CONDITIONS	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
		NRC EPA	ADEC ADNR	NSB	USCG[3] BSEE[4] ADF&G[5]	ADEC NSB ADNR	ADEC NSB ADNR	FEDERAL LAND ONLY BLM[9]	DOT	SPCO FAX W/IN 48 HR	AOGCC[2] CRUDE GAS	AOGCC[2] CRUDE GAS	EPA[6,11] BLM, BSEE[13]	ADEC[7] ADNR NSB	DOT[10] SPCO
OFFSHORE (DISCHARGES TO WATER)															
Sewage[8]	Any quantity	X	X										X	X	
Any oil or chemical spill	(e.g., oil, drilling fluids, glycol, produced water, or brine)	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	
STAGING AREA															
Chemicals	Exceeds federal RQ[1]	X	X	>55 gal				X					>420 gal	X	
	Less than RQ, or has no RQ		X	>55 gal				X						X	
Selected Hazardous Substances[12]	>55 gal		X	X				X						X	
	10 to 55 gal						X	X						X	
	<10 gal (no report)														
Seawater	To seawater environment (no report)														
	>55 gal to freshwater environment					X		X					>420 gal	X	
	10 to 55 gal to freshwater environment						X	X						X	
	<10 gal to freshwater environment (no report)														
Sewage[8]	Any quantity					X[9]								X	

Table 2.7.1-6 (Continued)
Agency Reporting Requirements for Oil Spills

		ENVIRONMENTAL COMPLIANCE INITIAL AGENCY NOTIFICATION										ADMINISTRATIVE WRITTEN REPORT (FAX IS ACCEPTABLE)			
		AS SOON AS POSSIBLE				WITHIN 48 HR	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] BSEE[4] ADF&G[5]	ADEC NSB ADNR	ADEC NSB ADNR	FEDERAL LAND ONLY BLM[9]	DOT	SPCO FAX W/IN 48 HR	AOGCC[2] CRUDE GAS	AOGCC[2] CRUDE GAS	EPA[6,11] BLM, BSEE[13]	ADEC[7] ADNR NSB	DOT[10] SPCO
Any oil or chemical spill	(e.g., oil, drilling fluids, glycol, produced water, or brine)	X	X	X	X			X			X	X	X	X	
Oil	>42 gal		X	X				X			X	X	>420 gal or 50 mcf gas	X	
	10 to 42 gal					X		X			>25 gal	X		X	
	1 to 10 gal (<1 gal = no report)						X	X				X		X	
IN CONTAINMENT															
Chemicals	Air release, with RQ	X	X					X						X	
	Less than RQ or has no RQ[12]														
Sewage[8]	Any quantity (no report)														
Oil, Glycol, and Select Hazardous Substances[12]	>55 gal (less than = no report)		X					X			X	X	>420 gal or 50 mcf gas	X	

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. For state-regulated wells: Crude oil spills >25 gal; notify AOGCC North Slope Representative. Crude oil spills >10 bbl, notify AOGCC North Slope Representative.
3. All oil spills to or threatening navigable waters.
4. Offshore rig spills <42 gal, call NRC. Notify BSEE (Regional Field Supervisor) for oil spills >42 gal.
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 spills, 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 >4,200 gal, or unless penetrates tundra.
9. See off-pad, on-pad, ice pad/ice roads, and in-containment reporting requirements to determine reporting to these agencies.
10. Glycols, brines, drilling fluids, seawater, produced water, or methanol diluted with 40% or more water.
11. 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.
12. 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.
13. BSEE requires written report 15 days after loss for spills greater than 42 gal.

2.7.2 Spill Assessment [30 CFR 254.23(g)(2)]

Methods to assess spills are defined in detail in the Shell Tactics Manual and ACS *Technical Manual*. These may include tactics for detection and delineation, discharge tracking, spill volume estimation, and trajectory modeling, as identified in Table 2.7.2-1.

Table 2.7.2-1
Spill Assessment Tactics References

SPILL ASSESSMENT CATEGORY	MANUAL	TACTIC	TACTIC TITLE
Detection and Delineation	ACS	T-1	Delineation of Oiled Snow or Tundra
		T-3	Detection and Delineation of Under-Ice Oil
Discharge Tracking	ACS	T-2	Mapping and Surveillance of Spill on Land
		T-4	Discharge Tracking in Open Water
		T-4A	Discharge Tracking in Ice
	Shell	TS-1	Tracking Oil Discharge in Open Water
Trajectory Modeling	ACS	T-5	Trajectory Calculations
		T-6	Blowout Modeling
	Shell	TS-3	Trajectory Modeling
Spill Volume Estimation	ACS	T-7	Spill Volume Estimation
	Shell	TS-2	Spill Volume Estimation

Depending upon the incident, access to resources to implement the spill assessment tactics are presented in Appendix A and Appendix G. Additional information on agreements that provide for access to master service agreements, mutual aid agreements or identify commercially available suppliers are provided within these Appendices. Through Shell's membership in ACS and contracted services with AES-RO and MSRC, trained personnel from these organizations are available 24 hours per day, seven days per week to deploy and operate spill-response equipment. Required mobilization times for these resources depends on the spill event. Mobilization times, for equipment that is not pre-staged, are described in the Shell Tactics and ACS Tactics. The numbers and specific types of personnel required for response are also dependent upon incident specific needs.

Oil location and movement is identified and tracked primarily through the combination of visual observations, aided where practicable by GPS devices and spill tracking software, and commercially available remote sensing techniques. Locating and accurately monitoring the oil slick is important so that meaningful decisions can be made regarding containment and recovery operations and the potential use of non-mechanical response methods.

Aircraft will be used, along with OSR vessel-mounted IR systems and ACS-provided hand-held systems, to locate the source of the spill and the aerial distribution of any resulting slick. Based upon availability and weather conditions, Shell would activate their helicopter or an available aircraft through ACS that is equipped with FLIR. Additional resources include vessel-mounted IR systems onboard the OSR vessels and alternative commercially available aircraft with SAR.

Size and volume of the spill will be determined using the areal extent of the oil, based on GPS boundaries and percentage coverage of oil on water. Slick size and color will be documented using photographs and annotated maps, to provide estimation of oil thickness and quantity through color, and inference from Oil Code Thickness and Concentration Values.

Response vessels are capable of deploying buoys with transmitters. Each tracking buoy is equipped with a transmitter that can be monitored by a receiver located either on a boat or aircraft.

Shell may engage ASA, TRG, and/or NOAA (via ADIOS) to augment trajectory modeling capabilities. 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 may be used to forecast oil movement. Surveillance personnel reports provide coordinates of the leading edge and trailing edge of the slick to feed into, validate, and update spill trajectories.

Continued surveillance during oil spill cleanup operations is important as a means of monitoring operations, conducting a coordinated response, and observing spill migration and spreading. Surveillance will be continued until response operations are complete. Oil location information is digitized and transferred to the IMT for response planning and trajectory modeling. Information is also gathered from the field and fed into the spill management process through the Situation Unit. Spill tracking information is important to the Command Staff to plan strategies and tactics to address UC objectives.

2.7.3 Sensitive Areas [30 CFR 254.23(g)(3)]

Environmentally sensitive areas and areas of public concern include cultural resource sites, public use areas, Native allotments, and bird nesting areas.

NOAA ESI Maps, ACS Technical Manual Atlas Maps, and the North Slope Subarea Contingency Plan are used to identify areas of major concern. For the Beaufort Sea Regional Exploration OSRP, the ACS Technical Manual Map Atlas Sheets 80, 83, 85-87, 89-91, 93, and 100-104 are examples of sensitive areas.

Methods to identify and prioritize sensitive areas and areas of special economic and environmental importance are detailed in the Shell Tactics Manual and ACS Technical Manual. These may include, but are not limited to, those identified in Table 2.7.3-1.

Table 2.7.3-1
Sensitive Area Prioritization Tactics References

PRIORITIZATION CATEGORY	MANUAL	TACTIC	TACTIC TITLE
Sensitive Areas	ACS	W-1	Wildlife Protection Strategy and Permits
		W-2	Wildlife Hazing Equipment
		W-2B	Bird Hazing
		W-6	Identifying and Protecting Sensitive Areas
	Shell	SR-1	Shoreline Assessment

Priority protection sites are identified by the EU based upon oil tracking and trajectory predictions and in consultation with resource agencies and trustees. For the protection of ESAs, the IMT will plan for mitigation of impacts of a spill, or to monitor over-season migration of oil in the ice.

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 human use/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 ESI values.

The environmental sensitivity rankings, together with information about biological resources, sea ice, and human-use resources provided in the North Slope Atlas, are important to the selection of areas identified as priority protection sites. The NSSAWG, 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 Beaufort shoreline that should be recognized as priority protection sites. Table 2.7.3-2 lists the priority protection control sites identified by the NSSAWG.

Table 2.7.3-2
Shoreline Protection Assessment for Flaxman Island to Barter Island

PRIORITY PROTECTION SITES	ACS MAP ATLAS SHEET REFERENCE	LATITUDE / LONGITUDE	PROPOSED TACTICS (AS PER ACS TECHNICAL MANUAL)	ESTIMATED SHORELINE BOOM (IN FEET)
PS74	184	70 10’ N/145 56’ W	C-13 or C-14	3,000
PS75	184	70 08.5’ N/145 47.5’W	C-14	200
PS76	184	70 07’ N/145 41.5’ W	C-14	200
PS77	184	70 05’ N/145 31’ W	C-14	400
PS78	184	70-03.5N/145 32’ W	C-13 or C-14	2,000
PS79	185	70 01.5’ N/145 21’ W	C-13	4,000
PS80	185	70 00.7’ N/145 18’ W	C-13 or C-14	800
PS81	185	70 01.6’ N/145 13’ W	C-13	5,000
PS82	185	69 59.5’ N/145 14’ W	C-13 or C-14	2,000
PS83	185	69 59’ N/145 02’ W	C-14	150
PS84	185	69 58.6’ N/144 58.5’ W	C-14	300
PS85	186	69 57.8’ N/144 57’ W	C-14	200
PS86	186	69 58.6’ N/144 48’ W	C-14	200
PS87	186	69 58.5’ N/144 46’ W	C-14	200
PS88	186	69 58.2’ N/144 42.2’ W	C-14	200
PS89	186	69 59’ N/144 33.5’ W	C-14	150
PS90	186	70 01’ N/144 30’ W	C-14	200
PS91	186	70 02’ N/144 27’ W	C-13 or C-14	1,000
PS92	187	70 02.2’ N/144 11’ W	C-14	500
PS93	187	70 03’ N/144 06’ W	C-14	400
PS93A	187	70 03’ N/144 05’ W	C-14	400
PS94	187	70 03.5’ N/144 01.5’ W	C-13 or C-14	1,000
PS95	187	70 04.8’ N/144 00.5’ W	C-13 or C-14	3,000
PS96	188	70 06.7’ N/143 47’ W	C-13 or C-14	3,000
PS97	188	70 08’ N/143 36’ W	C-13 or C-14	2,000
PS98	188	70 07.7’ N/143 32’ W	C-13 or C-14	1,500
PS99	188	70 07.5’ N/143 22.5’ W	C-13	2,000
PS100	188	70 09’ N/143 14’ W	C-14	800
PS101	189	70 05’ N/143 00’ W	C-13 or C-14	1,000
PS102	189	70 03’ N/142 50’ W	C-14	300
PS103	190	69 58.5’ N/142 32.5’ W	C-13 or C-14	300
PS104	190	69 56.5’ N/142 24’ W	C-14 or C-14	800
PS105	190	69 55’ N/142 20’ W	C-13	1,000
PS106	191	69 52’ N/142 10’ W	C-14	200
PS107	191	69 51’ N/142 06’ W	C-14	400
PS108	191	69 49’ N/141 56’ W	C-13 or C-14	500
PS109	192	69 46’ N/141 39’ W	C-14	200
PS110	192	69 42.4’ N/141 27’ W	C-14	200
PS111	193	69 40.3’ N/141 20’ W	C-13	1,200

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 BOEM. 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. However, sheltered areas commonly have higher biological activity and rank the highest. The following list (extracted from the North Slope ESI) provides the ranking of shoreline habitats for the Beaufort Sea shoreline:

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

Wildlife at risk from exposure to spilled oil or the cleanup process is often, but not always, tied to shoreline sensitivities and is a critical element when considering priority protection sites. Biological information about animal and plant species is also provided in the North Slope 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, walrus, and whales);
- Terrestrial Mammals (bears, caribou, and musk ox); and
- Benthic Habitats (kelp).

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 m in depth.

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.

Working closely with the NSSAWG, ACS has developed Volume 2 of their Technical Manual, the ACS Map Atlas, which includes a comprehensive set of shoreline maps where priority protection sites are identified (see Figure 2.7.3-1). An example is presented in Figures 2.7.3-2 and 2.7.3-3, referring to the ACS Map Atlas for priority protection control sites along the Beaufort Sea coastline. Shell has used the ESI rankings provided in the North Slope Atlas, along with the priority protection sites indicated in the ACS Map Atlas, 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 consultations on site specific environmental assessments, a list of agencies and associated scientists is presented in Table 2.7.3-3.

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 the 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.

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 Brownlow Point. Shell has worked with ACS and other members of NSSAWG to identify and select additional priority protection sites between Brownlow Point and Barter Island. As a result, ACS has updated its mapping inventory to include these additional sites, along with sites east of Barter Island to Demarcation Bay located near the Canadian border.

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 Removal 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 Shell's offshore drilling. 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 2.7.3-1
Beaufort Sea Shoreline Protection
ACS Map Atlas Sheet Index

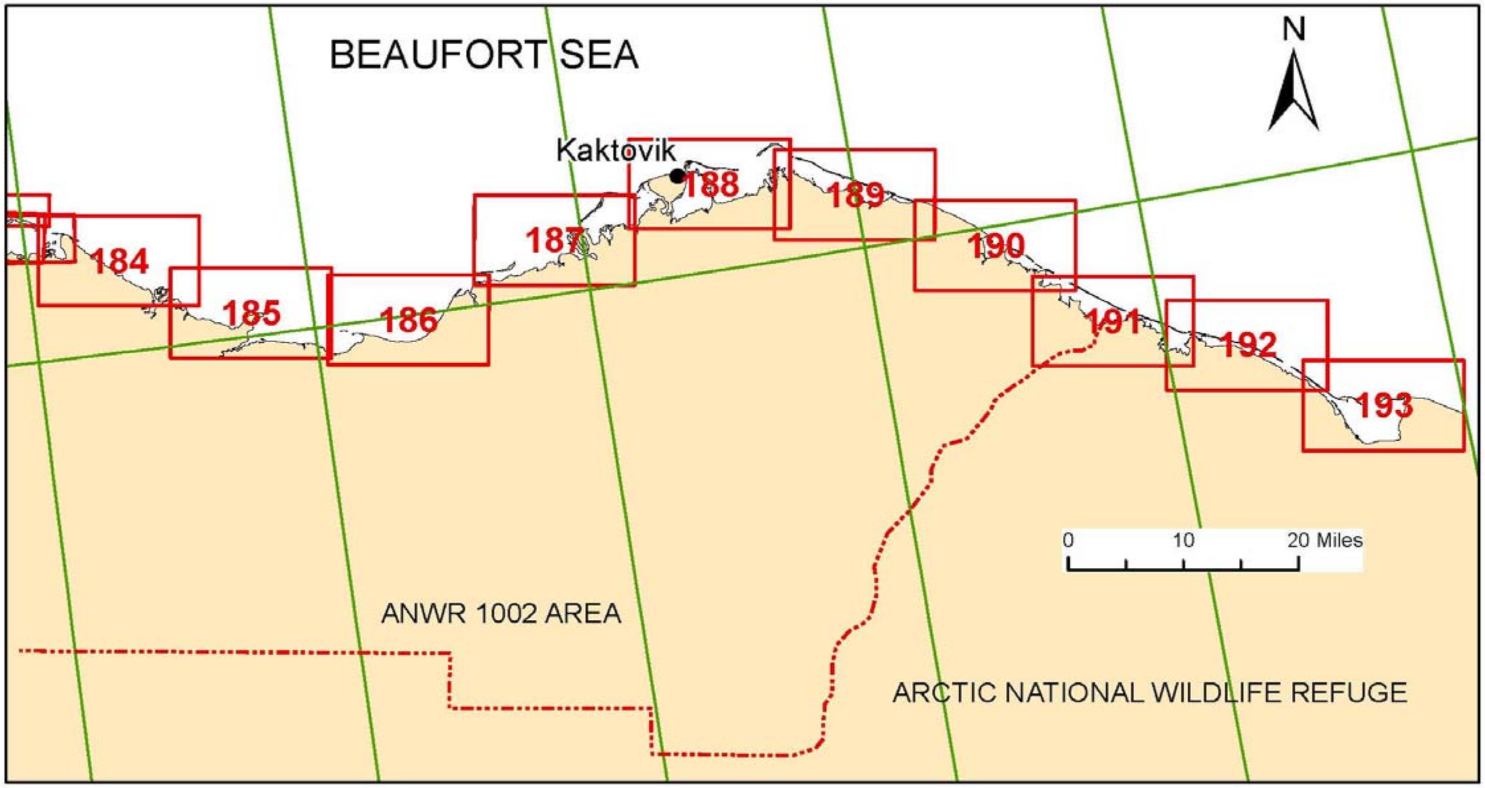


Figure 2.7.3-2
ACS *Technical Manual*, Volume 2

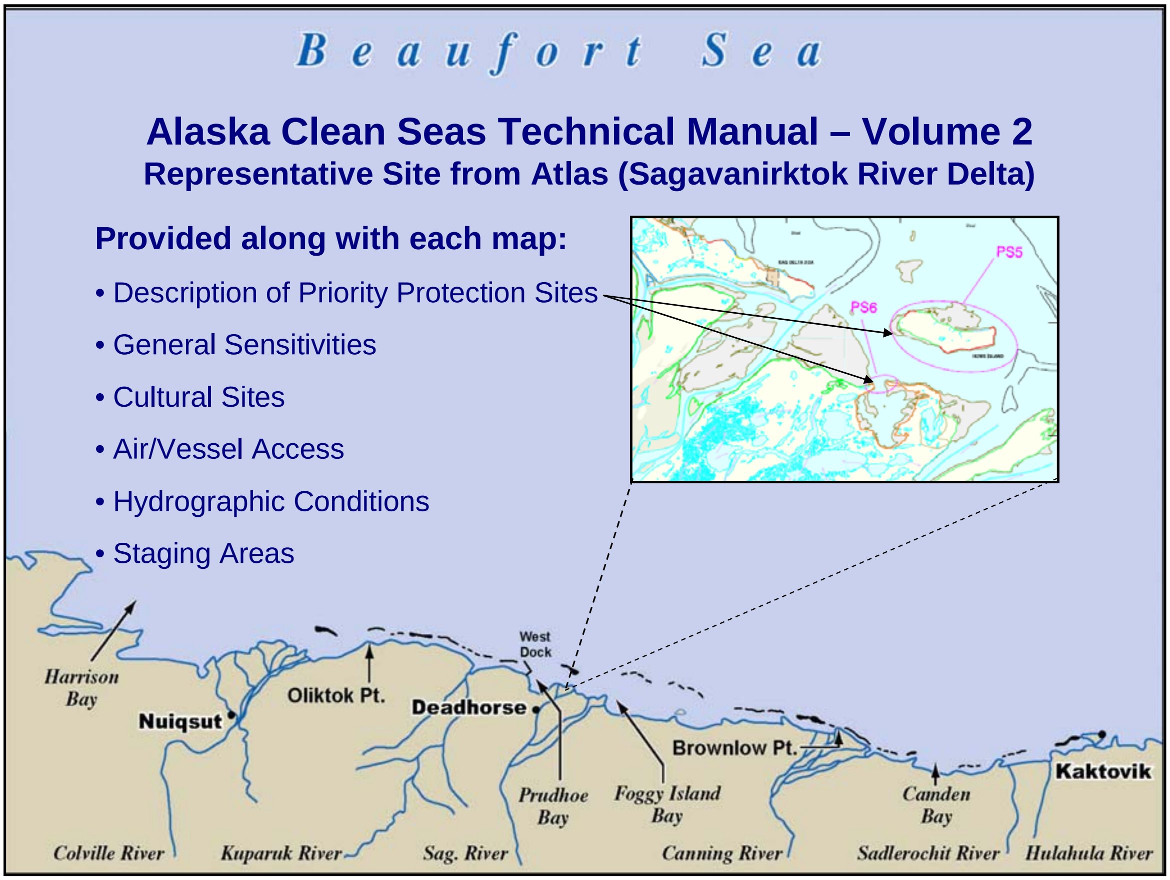


Figure 2.7.3-3
Regional Assessment of Priority Protection Sites

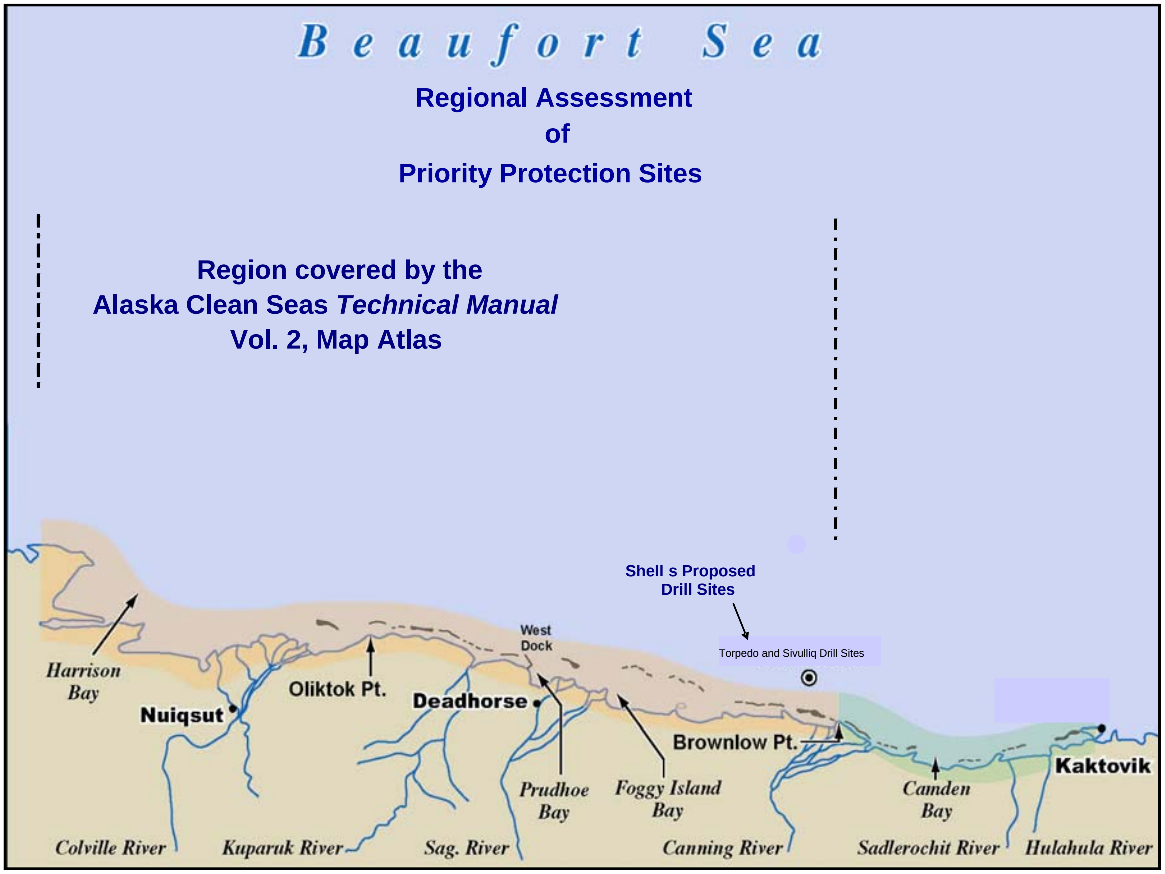


Table 2.7.3-3
Site-Specific Environmental Assessment Agency Consultation List

FEDERAL AGENCY	CONTACT	TELEPHONE	POSITION	CONCERN
USFWS	Rosa Meehan	(907) 786-3800	Supervisor	Marine Mammals
	Eric Taylor	(907) 786-3446 (Direct) (907) 786-3443 (Main)	Chief Waterfowl Management Branch	Migratory Birds
	Doug McBride	(907) 271-2871	Branch Chief	Fisheries Program
BOEM	Dee Williams	(907) 334-5283	Section Chief	AK Environmental Studies
NMFS - Protected Resources Division	Brad Smith	(907) 271-3023 (Direct) (907) 586-7253 (Main)	Division Contact	Whales and Seals
NMFS - National Marine Mammal Laboratory	John Bengtson	(206) 526-4045	Alaska Fisheries Science Center Contact	Alaska Fisheries
Bureau of Land Management	Lon Kelly	(907) 474-2200	Field Manager	Alaska Region
National Park Service	Sara Wesser	(907) 644-3699	Regional Inventory & Monitoring Coordinator	Arctic Network Inventory and Monitoring Program
USFWS	Steve Delehanty	(907) 235-6546	Refuge Manager	Alaska Maritime National Wildlife Refuge
STATE AGENCY	**CONTACT**	**TELEPHONE**	**POSITION**	**CONCERN**
ADF&G	Richard Shideler	(907) 459-7283	Fairbanks Contact	Grizzly Bears
	Lori Quakenbush	(907) 459-7214	Fairbanks Contact	Marine Mammals
	Geoff Carroll	(907) 852-3464	Barrow Contact	All Wildlife
University of Alaska, Fairbanks Institute of Marine Science	Dr. Terry Whitledge	(907) 474-7229	School of Fisheries and Ocean Sciences	Chemical and Biological Oceanography
ADEC	Doug Dasher	(907) 451-2172	Division of Water, Water Quality Standards, Assessment, & Restoration	Water Quality
LOCAL AGENCY	**CONTACT**	**TELEPHONE**	**POSITION**	**CONCERN**
NSB Department of Wildlife Management	Harry Brower	(907) 852-0350	Department Contact	All Wildlife
Northwest Arctic Borough	Ukallaysaaq Tom Okleasik	(907) 442-2500 extension 109	Planning Director	All Wildlife

2.7.4 Resource Protection Methods [30 CFR 254.23(g)(4)]

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 priority protection sites and information from Demarcation Bay westward. NOAA ESI maps contained in the *Sensitivity of Coastal Environments and Wildlife to Spilled Oil, North Slope, Alaska, Atlas* were also used to identify marine mammals and marine bird groups. The ACS *Technical Manual* and the ESI maps also describe 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 potentially exposed to 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 ARRT's *North Slope Subarea Contingency 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 where it can be safely encountered in a thick layer near 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 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 workboats 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 Tactics W-1 to W-6 for decision-making and field procedures.

Shell primary approach to resource protection is to contain and recover oil and to remove oil from the environment as quickly as possible to mitigate impact. See Table 2.7.4-1 for a list of tactics that may be implemented. Shell's offshore response including a description of scaling a nearshore and shorline response is described in the WCD scenario (Appendix C).

Table 2.7.4-1
Sensitive Area Protection Tactics Reference

PROTECTION CATEGORY	MANUAL	TACTIC	TACTIC TITLE
Offshore	ACS	R-18	U-Boom to Skimmer and Mini-Barge
		R-32A	Single Boom-Arm Skimming
	Shell	OR-1A	Deflection Boom Secured to Large Barge
		OR-2A	Deflection Boom Secured to OSR vessel
		OR-2C	OSR vessel Alternatives in Broken Ice
		OR-4A	Deflection Boom and Skimming Vessels
Shoreline and Shoreline and Sensitive Areas	ACS	C-4	Barriers on Land
		C-5	Deflection or Exclusion Booming on Lake or Tundra
		C-13	Deflection Booming in Open Water
		C-14	Exclusion Booming in Open Water
		C-15	Intertidal Booming
	Shell	SR-2	Deflection Booming
		SR-3	Multiple Deflection (Cascading Booms)
		SR-4	Exclusion Booming Near Protection Sites
		SR-5	Shoreside Recovery Trenching
		SR-8	Deluge or Low Pressure Wash
Wildlife	ACS	W-1	Wildlife Protection Strategy and Permits
		W-2	Wildlife Hazing
		W-3	Wildlife Capture and Rehabilitation
		W-4	Salvage of Dead Wildlife
		W-5	Deployment of ACS Mobile Wildlife Stabilization Center
		W-6	Identifying and Protecting Sensitive Areas

Access to resources to implement the sensitive area protection tactics identified are provided within Appendices A, B, and G of this OSRP. Additional information on agreements that provide for access to master service agreements, mutual aid agreements or identify commercially available suppliers are provided within these sections as well. Through Shell's membership in ACS and contracted services with AES-RO and MSRC, trained personnel from these organizations are available 24 hours per day, seven days per week to deploy and operate spill-response equipment. Required mobilization times for these resources depends on the spill event. Mobilization times, for equipment that is not pre-staged, are described in the Shell Tactics and ACS Tactics. The numbers and specific types of personnel required for response are also dependent upon incident specific needs.

Priority protection sites listed in Table 2.7.3-2 identifies the corresponding ACS Map Atlas Reference and the protection tactic for each of these protection sites. For a general discussion regarding how these sites were identified, please refer to Section 2.7.3, Sensitive Areas.

Shoreline recovery operations are staffed by ACS personnel supplemented with NSSRT, ACRT, and VRT responders as needed (reference Appendix A and ACS Tactics L-8 and L-9). Shoreline protection and recovery task forces set up and maintain multiple teams along the shoreline to recover oil. For planning purposes, each task force maintains a minimum of six teams that deploy boom to intercept oil moving along the shoreline, a small skimmer, and Fastanks or bladders set up on the beach to hold the recovered liquids or oily waste and debris. The shoreline response teams have access to numerous storage containers (e.g., Fastanks) for oily waste storage along the shoreline. Additional temporary storage will be provided as needed using lined pits, drums, bladders and other storage containers flown in by helicopter or transported to the areas of need with landing craft. Authorization would be sought prior to burning of oily solids (e.g., wood, vegetation and other combustible materials) at approved onshore burn sites after a careful assessment of the risks and benefits of various controlled burns.

The primary objective of wildlife protection strategies is to protect wildlife by preventing birds and mammals from entering spill or containment areas. Coordination with agency representatives would be mandatory and is further detailed within the Wildlife Response Plan (Appendix I). 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;
- Divert oil from most sensitive areas;
- The drilling vessel will have at least one on-duty MMO onboard at all times, which is considered BAT for wildlife monitoring;
- Hazing of birds and mammals;
- Capture and relocation of wildlife in direct threat; and
- Aircraft monitoring.

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 USFWS 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 and Interaction 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. USFWS 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

Priorities for protection may change based on weather, sea state, oil condition, hours of daylight, and other factors. Reports from the field monitoring and tracking of the trajectory will be considered by the EU, in consultation with appropriate resource trustees, and may be modified as necessary.

2.7.5 Response Asset Mobilization, Deployment, and Support [30 CFR 254.23(g)(5)]

The response will be supervised by ACS utilizing Shell's on-site response vessels and oil spill personnel. The OSR barge (*Arctic Endeavor* or similar) has sufficiently trained personnel to provide containment and recovery for the initial operation period. These personnel are available to respond rapidly to an on-site emergency. The succeeding operation period may be manned by transporting trained response personnel via helicopter or small vessel from a land- or vessel-based staging area.

The oil spill personnel designated to the OSR barge will be accommodated on the drilling vessel or its support fleet in the immediate surrounding area. These personnel may be transported via helicopter from the heli-deck located on the drilling vessel or its supporting vessels, or may utilize small vessels or workboats for transport. The OSR barge will be accompanied at all times by a dedicated tug; typically a Crowley Marine Services point class tug, as described in Appendix A. Vessels of Opportunity providing support services to the drilling vessel will augment the OSR barge. Combined, they provide the primary response effort as outlined elsewhere in this plan.

If necessary, an additional Oil Spill Response Barge (*Klamath* or similar) will mobilize from the Chukchi Sea, arriving on site within 42 hours to be ready to provide secondary clean up response.

The remaining mobilization of staff to support the oil spill response effort, will be progressively mobilized as follows:

- From existing call-out arrangements under ACS, for North Slope Spill Response Teams, from ACS Auxiliary Contract Response Teams, and from the North Slope Village Response Team (with members from Barrow, Atkasuk, Nuiqsut, and Kaktovik); and
- Other qualified staff mobilized from within the Royal/Dutch Shell Group in the U.S. and abroad

Methods to ensure containment and recovery equipment as well as the response personnel are mobilized at the spill site are described in detail in the ACS *Technical Manual*. These may include deployment strategies, logistics, communications, staging areas, and activation of additional resources, among others. Specific tactics are identified and described in Table 2.7.5-1. On-water assets have personnel directly associated with them as described in Appendix A (Response Equipment) and Appendix C (WCD Scenario).

Shell has organized their approach to spill response in the Beaufort Sea based upon dedicated response assets as described in Appendix A (Response Equipment) and Appendix C (WCD Scenario). These assets such as the OSR vessel have been outfitted with equipment that is appropriate for the use in this environment and provides for a variety of response tactics. Please refer to Appendix A for additional information on the available assets and response equipment on each TF referenced in this OSRP.

Table 2.7.5-1
Equipment Mobilization and Deployment (Logistics) Tactics References

LOGISTICS CATEGORY	MANUAL	TACTIC	TACTIC TITLE
Response Asset Mobilization, Deployment, and Support	ACS	L-2	Staging Areas
		L-3	Deployment Strategies
		L-4	Logistical Support
		L-5	Communications
		L-7	Realistic Maximum Operating Limitations
		L-8	North Slope Mutual Aid
		L-9	Accessing Contract Resources
		L-10	Accessing Non-Obligated Resources
		L-12	Logistical Support for On-Water Obligations

Mobilization and deployment of spill response equipment and personnel strategy will conform to the Spill Classification Guidelines (Tiers) as described in the Emergency Action Checklist in Section 1.1. Mobilization of equipment and personnel may be accomplished through the use of mutual aid agreements and master service agreements as listed in the above-referenced Tactics from the ACS *Technical Manual* and through the transportation options described in Table 2.7.5-2.

Equipment mobilization is described in Appendix C (WCD Scenario) for the TFs described in Appendix A. The drilling vessel will have TF-6 and TF-2 on standby within its vicinity during drilling operations into liquid hydrocarbon-bearing zones. The drilling vessel will carry equipment, personnel, and supplies to handle minor operational spills.

Oil spill personnel onboard the offshore OSR assets are available to respond rapidly to an on-site emergency. The mobilization of additional staff and equipment to support the OSR effort will be progressively mobilized as follows:

- From existing call-out arrangements under ACS
- ACRT personnel as well as equipment may be provided through ACS to supplement the offshore, nearshore, and shoreline response operations, as necessary;
- VRT personnel may be provided through ACS to supplement the nearshore and shoreline response operations, as necessary;
- NSSRT personnel may be provided for shoreline response operations, as necessary;
- ACS staff off-rotation outside the North Slope operating area (subject to 70 percent availability for planning purposes);
- Other Shell contractors; and
- Other qualified staff mobilized from within the Royal Dutch Shell Group in the U.S. and abroad. For notification and mobilization of additional Group staff, contact Shell's MOSAG at 713-241-2532. Through the MOSAG link, access to as many as 2,000 Shell employees is available.

During conditions that may limit helicopter operations, the crews would remain on the vessel and continue emergency operations. 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 work boats for transport.

A primary consideration, for initiating mobilization of supplemental out-of-region Tier III offshore response assets, is the on-water distance to the response site. If additional out-of-region resources are indicated, the identification of additional vessels and placement of assets on stand-by would be done by Shell early in the response. Information regarding out-of-region resource vendors and logistical considerations are described in Appendix G. Table G-1 provides a list of vendors with additional vessel assets that further defines ACS Tactics L-10 and L-9 equipment sources. Considerations for mobilization and transit of these resources are also presented in Appendix G.

The shallow waters of the near-shore environs provide an additional constraint to mobilization of out-of-region assets, as suitable vessels are limited to those with sufficiently shallow draft to operate in these waters. Suitable vessels are available from contractors with whom ACS has master service agreements, including a Crowley 200-Series Barge and River Class Tug located at West Dock (Prudhoe Bay).

Transport Procedures

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. Sufficient response personnel are stationed on the vessels to staff for two 12-hr shifts as listed in Table C.4-2 of Appendix C.

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 2.7.5-2
Transportation Options

MODES OF TRANSPORTATION	SEASON		
	DRILLING	BREAKUP/FREEZEUP	WINTER
Helicopters	X[1]	X[1]	X[1]
Fixed-wing Aircraft	X[1]	X[1]	X[1]
Vessels	X	Conditional[2]	Conditional[2]
Vehicles/Heavy Equipment	--	--	Conditional[2]
Heavy ATV	--	--	Conditional[2]

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

Pre-staged Equipment

Appendix A describes the pre-staged equipment and supplies to handle minor operational spills will be kept in a state of readiness on the drilling vessel. It will be accompanied by the primary oil spill response vessels on standby, on location, and ready to assist with any overboard release. Pre-staged equipment would be inspected monthly throughout the drilling season to ensure it is secure and ready for deployment in the event of an emergency. Inspections of response equipment would be performed by ACS as part of their periodic maintenance system, and the inspection records would be maintained through ACS.

Shell and ACS will determine whether additional equipment should be pre-staged along the shoreline to support shoreline response. 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.

Air Access

The drilling vessel can accommodate helicopter operations. Air operations may be limited by weather conditions, as discussed in Appendix H.

Fixed-wing aircraft can transport personnel and equipment to gravel airstrips located at Badami (5,100 feet) and Kaktovik (4,800 feet). These airstrips provide coastal access and can serve as logistical hubs for shoreline protection or cleanup efforts. The Badami airstrip location can be viewed on ACS Map Atlas Sheet 91.

Pre-Approval Mobilization of Dispersant Assets

When dispersants are determined to be a strategic response, assets necessary to provide for aerial dispersal application would be mobilized by the IC prior to actual approval of their use. These assets, mobilized through MSRC, would be staged at Shell's hangar at the Barrow or Deadhorse airport to ensure availability for deployment in the most efficient manner. Please reference Appendix D (Dispersant Plan) for additional information on dispersant use.

2.7.6 Procedures to Ensure Sufficient Recovered Oil Storage for Continued Recovery Operations [30 CFR.23(g)(6)]

Storage equipment for recovery operations, as outlined in Table 2.7.6-1, provides for oil storage capacity in excess of WCD volume recovery requirements.

Table 2.7.6-1
Storage Equipment for Recovery Operations

SUM OF CAPACITY OF OIL STORAGE TANKS		
ELEMENT	**PLANNING CAPACITY (BBL)**	**REFERENCE**
OFFSHORE STORAGE		
OSR Vessel	11,400	Shell Charter, available to ACS
OSR Barge	76,900	Shell Charter, available to ACS
VOSS	13,000	Shell Charter, available to ACS
VOSS	8,000	Shell Charter, available to ACS
OST	513,000	Shell Charter, available to ACS
NEARSHORE STORAGE		
OSR barge	17,000	Shell Charter, available to ACS
ACS Mini-barges	Response Dependent	ACS Technical Manual
AES-RO Mini-barges	946 (4 x 236)	Shell Tactics Manual
SHORELINE STORAGE		
Fastanks	Response Dependent	Shell Tactics Manual or ACS Technical Manual

Shell maintains on-scene storage capacity in excess of the volume sufficient for the first 24 hours of recovery operations. An OST with a minimum capacity of 513,000 bbl will be located not more than 240 n mi away (less than 24 hours) from the drilling vessel while drilling in liquid hydrocarbon-bearing zones, and will be used for emergency oil spill response.

2.7.7 Procedures to Remove Oil and Oiled Debris from Shallow Waters and Along Shorelines and Rehabilitate Oiled Waterfowl [30 CFR 254.23(g)(7)]

Through Shell's membership in ACS and contracted services with AES-RO and MSRC, trained personnel from these organizations are available 24 hours per day, seven days per week to deploy and operate spill-response equipment. Required mobilization times for these resources depends on the spill event. The numbers and specific types of personnel required for response are listed in the tactics. In addition to these entities, there are other contractual vehicles through which trained personnel and equipment are available. For example, ACS has master service agreements with numerous (more than 30) contractors (ACS Tactic L-9). APICOM has a mutual aid agreement to provide equipment and personnel to members on an as-available basis. Accessing these resources is described in ACS Tactic L-10, which is also provided in Appendix C. Appendix G provides a list of logistic support vendors and suppliers specific to Alaska.

Shell's response tactics for removal of oil in offshore waters and to mitigate shallow water impact are implemented by equipment and personnel stationed in the vicinity of the drilling vessel. This equipment and personnel are described in Appendix A. A summary of offshore recovery procedures and tactics that may be applied in a response in the Beaufort Sea are outlined in Table 2.7.7-1 (summer conditions) and Table 2.7.7-2 (varying ice conditions).

Table 2.7.7-1
Offshore Recovery Summer Conditions Tactic References

OFFSHORE RESPONSE CATEGORY	MANUAL	TACTIC	TACTIC TITLE
Offshore Response	ACS	T-4	Discharge Tracking in Open Water
		T-5	Trajectory Calculations
		T-7	Spill Volume Estimations
		R-18	U-Boom to Skimmer and Mini-Barge
		R-32A	Single Boom-Arm Skimming
	Shell	TS-1	Tracking Oil Discharge in Open Water
		TS-2	Spill Volume Estimation
		TS-3	Trajectory Modeling
		OR-1A	Deflection Boom Secured to Large Barge
		OR-1B	Deflection Boom with Open Apex and Large Barge
		OR-2A	Deflection Boom Secured to OSR vessel
		OR-2B	Deflection or Containment Boom with OSR vessel Skimmers
		OR-3A	OSR vessel/OSR barge Off-loading to Tanker
		OR-4A	Deflection Boom and Skimming Vessels
		OR-4B	Deflection Boom with Open Apex Skimming Vessels
		OR-5A	34-ft Workboat with Portable Skimmer and Intermediate Storage Devices
		OR-5B	34-ft Workboat with Skimmer and Intermediate Storage Devices
		OR-8	Dispersant Spray from OSR vessel Outriggers
		OR-9A	Aerial Dispersant Application (HERC with ADDS Pack)

Table 2.7.7-2
Offshore Recovery in Varying Ice Conditions Tactic References

OFFSHORE RESPONSE CATEGORY	MANUAL	TACTIC	TACTIC TITLE
Offshore Response	ACS	B-3	In Situ Burning with Heli-torch and Other Igniters
		B-6	Burn Residue Recovery
		T-4	Discharge Tracking in Open Water
		T-4A	Discharge Tracking in Ice
		T-5	Trajectory Calculations
	Shell	OR-1A	Deflection Boom Secured to Large Barge
		OR-1B	Deflection Boom with Open Apex and Large Barge
		OR-2A	Deflection Boom Secured to OSR vessel
		OR-2B	Deflection or Containment Boom with OSR vessel Skimmers
		OR-2C	OSR vessel Alternatives in Broken Ice
		OR-2D	OSR vessel Alternatives in Broken Ice
		OR-2E	OSR vessel Alternatives in Broken Ice
		OR-3A	OSR vessel/OSR barge Off-loading to Tanker
		OR-4A	Deflection Boom and Skimming Vessels
		OR-4B	Deflection Boom with Open-Apex Skimming Vessels
		OR-4C	Containment Using Outrigger and Boom or Ice with Skimming Vessels
		OR-4D	Containment Using Outrigger and Boom or Ice with Skimming Vessels
		OR-5A	34-ft Workboat with Portable Skimmer and Intermediate Storage Devices
		OR-5B	34-ft Workboat with Skimmer and Intermediate Storage Devices
		OR-6	Off-loading Intermediate Storage Devices
		OR-7	Fire Boom/Heli-Torch
		OR-8	Dispersant Spray from OSR vessel Outriggers
		OR-9A	Aerial Dispersant Application (HERC with ADDS Pack)

Table 2.7.7-3
Nearshore Response Tactics References

NEARSHORE RESPONSE CATEGORY	MANUAL	TACTIC	TACTIC TITLE
Shallow Water and Shoreline	ACS	SH-1	Shoreline Assessment
		SH-2	Natural Recovery of an Oiled Shoreline
		SH-3	Shoreline Cleanup Using Flooding and Flushing
		SH-4	Shoreline Cleanup Using Steam Cleaning or Sand Blasting
		SH-5	Shoreline Cleanup Using Manual Removal and Vacuum Methods
		SH-6	Shoreline Cleanup Using Mechanical Removal
		SH-7	Shoreline Cleanup Using Sorbents and Vegetation Cutting
		SH-8	Shoreline Cleanup Using Mechanical Tilling / Aeration
		SH-9	Shoreline Cleanup Using Sediment Reworking and Surf Washing
		SH-10	Shoreline Cleanup Using Burning
		SH-11	Biological / Chemical Shoreline Response Tactics
		SH-12	Summary of Potential Impact of Shoreline Cleanup Techniques
	Shell	SR-1	Shoreline Assessment
		SR-2	Deflection Booming
		SR-3	Multiple Deflection (Cascading Booms)
		SR-4	Exclusion Booms
		SR-5	Diversion Boom with Shoreside Recovery Trench
		SR-6	Passive Recovery (Snare Boom)
		SR-7	Manual Removal, Raking, Tilling
		SR-8	Deluge or Low Pressure Wash
		SR-9	Recovered Fluid Transfer
		SR-10	Burning Oiled Debris
Wildlife & Sensitive Areas	ACS	W-1B	ARRT Capture / Transportation / Stabilization / Treatment Checklist
		W-1C	ARRT Contact Information for Wildlife Resource Agencies
		W-2	Wildlife Hazing Equipment
		W-2A	Mammal Hazing
		W-3	Wildlife Capture and Rehabilitation
		W-4	Salvage of Dead Wildlife
		W-5	Deployment of ACS Mobile Wildlife Stabilization Center

Potential cleanup tactics, employed in the unlikely event a spill reaches the Beaufort shoreline include, but are not limited to, those described in the ACS *Technical Manual*, with additional tactics planned for nearshore and shoreline response described and illustrated in the Shell Tactics Manual (see Table 2.7.7-3). Provided at the end of this section, Figures 2.7.7-1 through 2.7.7-6 illustrate possible variations on these tactics because of the broad range of shoreline, weather, and ice conditions that could exist during the drilling season.

Through Shell's membership in ACS and contracted services with AES-RO and MSRC, trained personnel from these organizations are available 24 hours per day, seven days per week to deploy and operate spill-response equipment. ACS mutual aid agreements and master service agreements provide additional resources when needed. Access to resources to provide Tier III response implement nearshore response tactics are provided within Appendices A, B, and G. Additional information on agreements that provide for access to master service agreements, mutual aid agreements or identify commercially available suppliers are provided within these sections as well. Required mobilization, transit, and deployment times for these resources depends on the spill event. Mobilization times for equipment that is not pre-staged are described in the Shell Tactics and ACS Tactics. The numbers and specific types of personnel required for response are also dependent upon incident specific needs.

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. Barges are ideal for 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 OSVs and 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 three or four 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 also can be pre-staged and personnel can be 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.

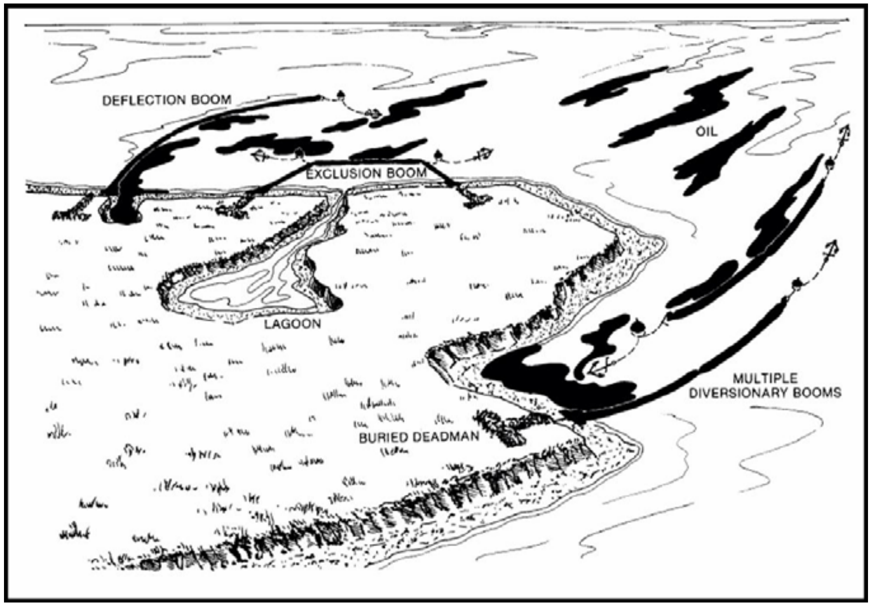
Most of the tactics planned for nearshore and shoreline response are described and illustrated in the ACS shoreline tactics SH-1, SH-2, SH-3, SH-5, SH-6, SH-10, and SH-12; containment tactics C-13 through C-16; and recovery tactics R-15 through R-18 and R-20. Some of these tactics, including slight variations to meet changing conditions along the shoreline, are detailed in Figures 2.7.7-1 through 2.7.7-6.

Wildlife Response Plan

A Wildlife Response Plan (Appendix I) has been developed by Shell in order to provide for coordinated, immediate, and effective protection, rescue, and rehabilitation of (and minimization of risk of injury to) wildlife resources present in the Beaufort Sea region. The plan includes general planning considerations, response strategies, specific protocols, and key resources to guide oil spill response operations in providing protective measures for migratory birds (including waterfowl, seabirds, shorebirds, and raptors), marine mammals, and terrestrial mammals. Species lists for migratory birds, marine mammals, and terrestrial mammals provide population densities for species commonly found in the Beaufort Sea or at onshore locations. The plan incorporates standards established by ACS in the Technical Manual and the ARRT Unified Plan, Annex G – Wildlife Guidelines for Alaska. These plans serve as the foundation for Shell's Wildlife Response Plan.

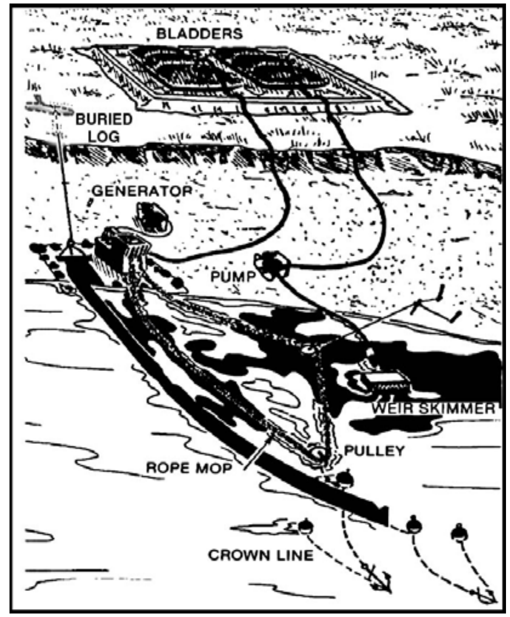
The Wildlife Specialist in the Environmental Unit of the IMT is responsible for permitting and coordinating with State and Federal agencies with jurisdictional authorities for approval and implementation of the Wildlife Response Plan. The Wildlife Specialist will be responsible for activation of the IBRRC, mobilization of the ACS Mobile Stabilization Unit (ACS Tactic W-5) to Deadhorse where oiled waterfowl will be stabilized and prepared for transport to Anchorage for long-term care and rehabilitation utilizing contract resources as identified in ACS Tactic L-9.

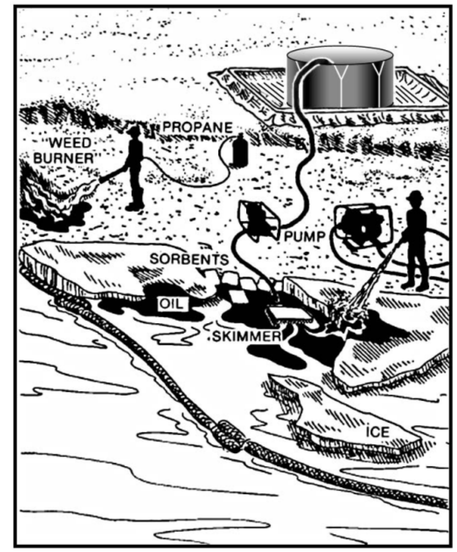
Figure 2.7.7-1
Shoreline Containment and Protection



Concentration of oil at natural and/or man-made collection sites and diversion of oil away from priority protection sites.

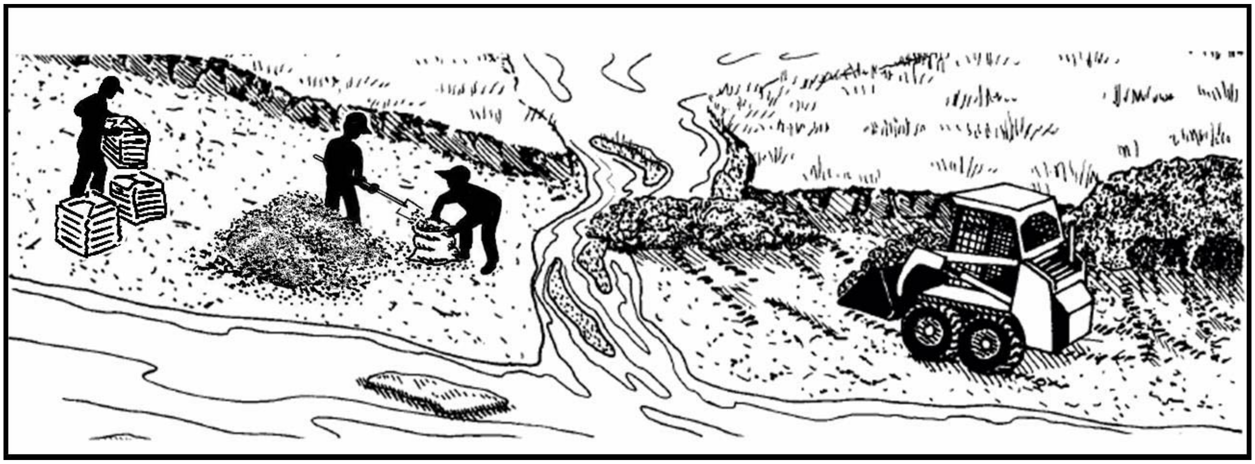
Figure 2.7.7-2
Shoreline Containment and Recovery Operations





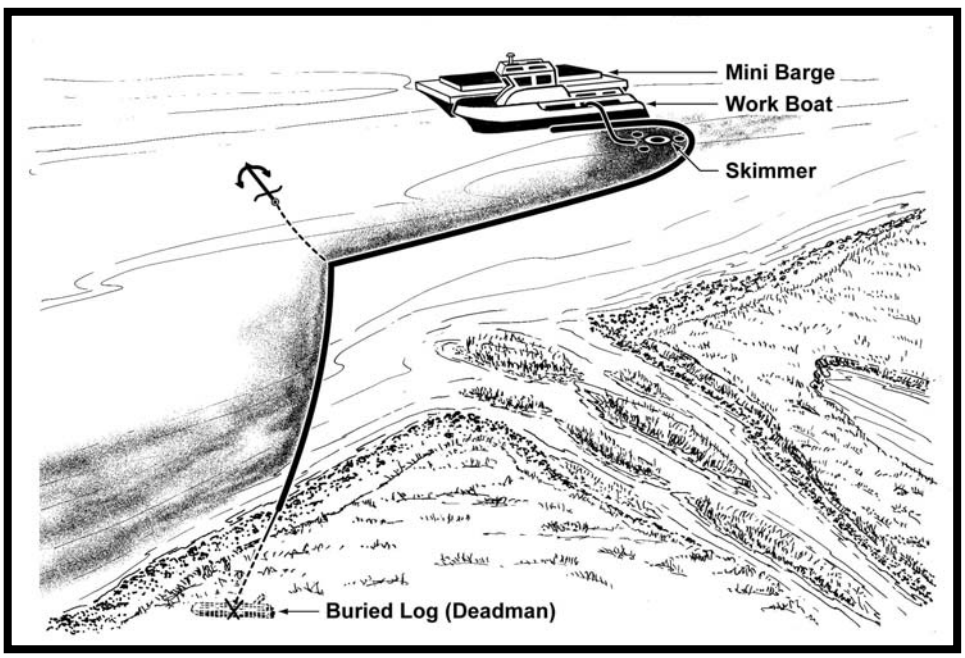
Deflection of oil toward shore for recovery with portable skimmers. Temporary storage of recovered oil in bladders or Fastanks, and burning of isolated pools of oil.

Figure 2.7.7-3
Shoreline Cleanup and Backwater Protection



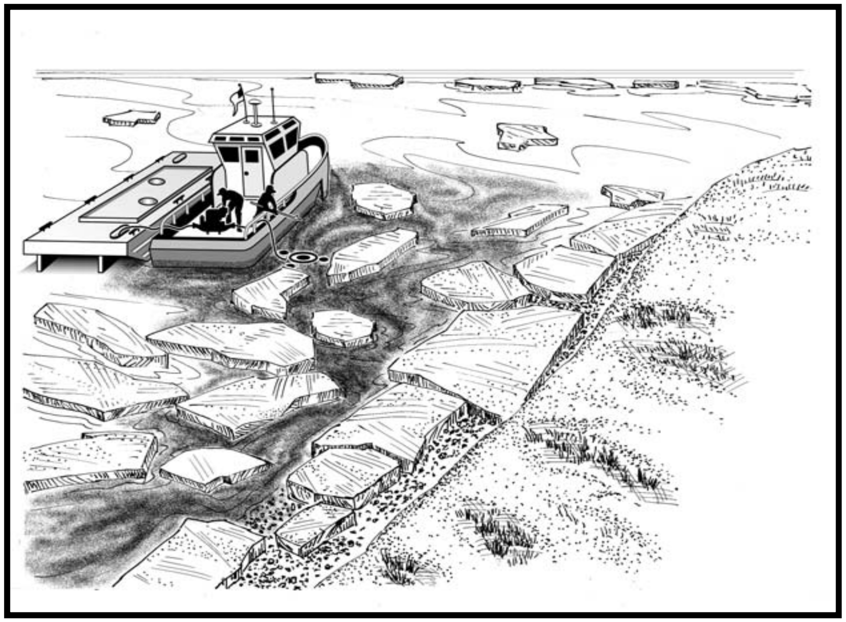
Physical removal of oil and oiled debris from beaches. Temporary blockage of marshes and other wetland areas.

Figure 2.7.7-4
Nearshore Diversion and Recovery of Oil



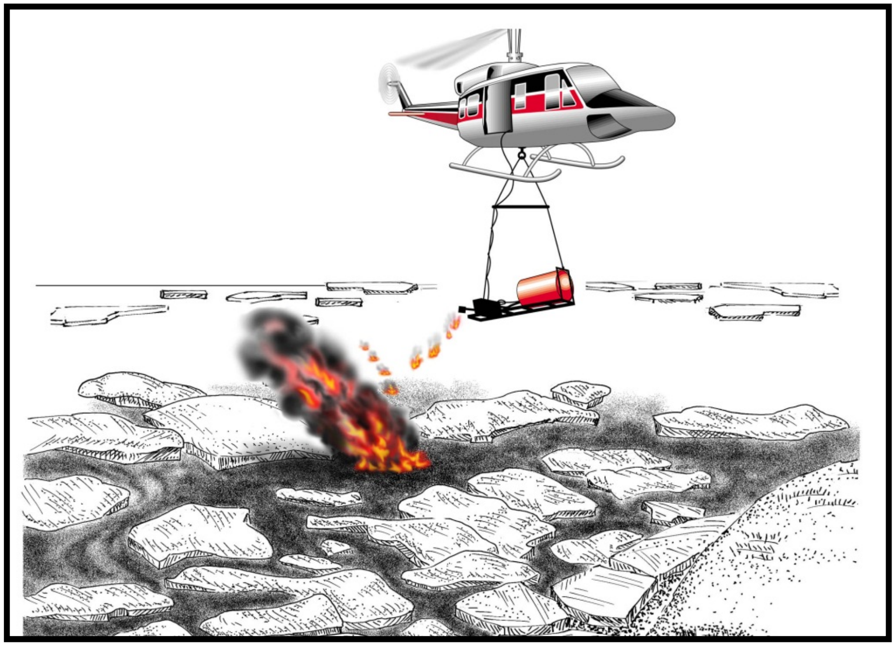
Protection of environmentally sensitive shoreline areas with recovery away from the shoreline.

Figure 2.7.7-5
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 2.7.7-6
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.

2.7.8 Procedures to Store, Transfer, and Dispose of Recovered Oil and Oil-Contaminated Materials [30 CFR 254.23(g)(8)] (in accordance with appropriate jurisdictional requirements)

Procedures for lightering, transfer, storage, and disposal of recovered oil and oil-contaminated materials of oil from tanks are discussed in the Shell *Tactics Manual* and ACS *Technical Manual*, and include, but are not limited to, methods described in Table 2.7.8-1 below. The Recovery and Storage Section of the ACS *Technical Manual* provides additional information for storage and transfer procedures for the individual recovery tactics described within the section. Appendix G, and ACS Tactic L-10, contain additional information regarding logistical support and services suppliers for the handling and transport of waste streams.

Table 2.7.8-1
Storage, Transfer, and Disposal Tactics References

MATERIAL HANDLING CATEGORY	MANUAL	TACTIC	TACTIC TITLE
Storage and Transfer	ACS	R-22	Temporary Storage Options
		R-2	Lightering/Offloading
	Shell	OR-3A	OSR vessel / OSR barge Offloading to Tanker
		OR-6	Offloading Intermediate Storage Devices
		SR-9	Recovered Fluid Transfer
Disposal	ACS	D-1	Processing Recovered Liquids
		D-2	Storage and Disposal of Non-Liquid Oily Wastes
		D-3	Disposal of Non-Oily Wastes
		D-4	Stockpiling Oiled Gravel
		D-5	Processing Contaminated Snow / Ice
	Shell	DP-1	Waste Management and Disposal

Storage and Transfer

Liquids from the nearshore skimmer vessels are stored in mini-barges. Stored liquids on mini-barges are offloaded to the OSRBs or transported to Prudhoe Bay for processing. Liquids and oily waste and debris recovered by the shoreline recovery task forces are stored in Fastanks or bladder tanks. Decanting follows UC plan approval. Stored liquids on mini-barges are off-loaded to TF-5 for transfer to TF-4.

Heavy oil transfer pumps will be used to pump product from the mini-barges to TF-5. These pumps are modified, positive displacement pumps that are hydraulically driven and have been specially developed for pumping extremely viscous product. 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.

As the OSR vessels near their capacities, the recovered oily liquids are transferred to OST. Stored liquids are gauged and manifested. (Recovered liquids received by the TF-6, TF-2, TF-3, and TF-5 will be retained onboard until transferred to TF-4.) Oil transfer from the OSR vessels will be via installed cargo system or hydraulically driven GT-A heavy oil transfer pumps. Each of the tanks on the TF-6 is fitted with a discharge pump capable of a throughput rate of approximately 723 bbl/hr [115 cu m/hr]. The combined pumping capacity of the 8 pumps in each of the tanks onboard the OSR vessel is approximately 5,784 bbl/hr (920 cu m/hr). Temporary storage of oil, oily waste, and debris recovered during a spill cleanup may be provided by tanks located on the OSR vessels. 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.

Once the tanker is on site, the total transport and set-up time to lighter is approximately 2 hours. Assuming the OSR barge uses four of the available transfer pumps, the time to lighter when it is filled to maximum capacity is approximately 6 hours.

As the recovered oily liquids are transferred to the recovered oil tanker, the liquids are gauged and manifested.

Disposal

Temporary storage of oil, oily waste, and debris recovered during a spill cleanup may be provided by tanks or bins, as appropriate, located onshore or on one of the OSRBs. 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 Tactics D-1 through D-3.

At the time of the spill, the Operations Section Chief and EU Leader will jointly determine 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. Recovered fluids stored onboard TF-4 may be disposed of either at Shell Group refineries or other third-party processors, in accordance with Shell environmental policy, and relevant local laws and regulations. In the event disposal and processing of any spill fluids are managed through Prudhoe Bay, this will be in accordance with ACS disposal tactics D1 through D5. In the event they are taken to Prudhoe Bay, recovered fluids would be handled in accordance with Ballot Agreements. A detailed description of Shell's waste management procedures as applicable to a spill response scenario are further described in Appendix K, Oil and Debris Disposal Procedures.Recovered fluids stored onboard the Arctic tanker will be disposed of either at Shell Group refineries or other third-party processors, in accordance with Shell environmental policy, and relevant local laws and regulations.

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

2.7.9 Methods to Implement Dispersant Use and *In Situ* Burn Plans [30 CFR 254.23(g)(9)]

Dispersants

Shell has committed to not using dispersants in the Beaufort Sea. However, in an effort to provide a complete plan, Shell offers the following as an example of how a dispersant mission could be conducted and/or supported. Procedures and methods for implementation of dispersant use plans are described in detail within the Shell Tactics Manual and ACS *Technical Manual* and include, but are not limited to, methods described in Table 2.7.9-1 below.

Table 2.7.9-1
Dispersant Tactics References

NON-MECHANICAL RESPONSE CATEGORY	MANUAL	TACTIC	TACTIC TITLE
Dispersant Use	ACS	DT-1	Dispersant Application Via Vessel
		DT-2	Dispersant Application Via Aircraft
		DT-3	Dispersant Application Via Helicopter
	Shell	OR-8	Dispersant Spray from OSR vessel Outriggers
		OR-9A	Aerial Dispersant Application (HERC with ADDS-Pack)
		OR-9B	Aerial Dispersant Application (Helicopter Spray Bucket)

Access to resources to implement non-mechanical response tactics identified are provided within Appendices A, B, and G. Additional information on agreements that provide for access to master service agreements, mutual aid agreements or identify commercially available suppliers are provided within these sections as well. Through Shell's membership in ACS and contracted services with AES-RO and MSRC, trained personnel from these organizations are available 24 hours per day, seven days per week to deploy and operate spill-response equipment. Required mobilization times for these resources would depend on the spill event. Mobilization times, for equipment that is not pre-staged, are described in the Shell Tactics and ACS Tactics. The numbers and specific types of personnel required for response are also dependent upon incident specific needs.

Additional information regarding methods to implement the dispersant use plan is located in Appendix D.

Shell's Dispersant Plan is consistent with the provisions of Annex F of the Unified Plan. As the situation warrants, Shell may utilize the following references and job aids to implement the Dispersant Use Plan:

- The Alaska Federal / State Preparedness Plan for Response to Oil and Hazardous Substance Discharges/Releases - Unified Plan, Change 3, available at: http://dec.alaska.gov/spar/perp/plan.htm
- NOAA's Office of Response and Restoration Dispersant Application Observer Job Aid, available at: http://response.restoration.noaa.gov/book_shelf/489_disperse.pdf
- NOAA's Office of Response and Restoration SMART Program, available at: http://response.restoration.noaa.gov/smart

In Situ Burning

Procedures and methods for implementation of *in situ* burn plans are described in detail within the Shell Tactics Manual and ACS *Technical Manual* and include, but are not limited to, methods described in Table 2.7.9-2 below.

Table 2.7.9-2
***In Situ* Burning Tactics References**

NON-MECHANICAL RESPONSE CATEGORY	MANUAL	TACTIC	TACTIC TITLE
In Situ Burning	ACS	B-1	In-Situ Burning Plan
		B-1A	In-Situ Burn Plan and Application Form
		B-2	Burning Oily Vegetation
		B-3	In-Situ Burning with Heli-Torch and Other Igniters
		B-4	Deployment and Use of Fire Containment Boom
		B-5	Burning Oil Pools on Any Solid Surface
		B-6	Burn Residue Recovery
		B-7	Burn Extinguishment on Water
	Shell	OR-7	Fire Boom / Heli-Torch

Access to resources to implement non-mechanical response tactics identified are provided within Appendices A, B, and G. Additional information on agreements that provide for access to master service agreements, mutual aid agreements or identify commercially available suppliers are provided within these sections as well. Through Shell's membership in ACS and contracted services with AES-RO and MSRC, trained personnel from these organizations are available 24 hours per day, seven days per week to deploy and operate spill-response equipment. Required mobilization times for these resources would depend on the spill event. Mobilization times, for equipment that is not pre-staged, are described in the Shell Tactics and ACS Tactics. The numbers and specific types of personnel required for response are also dependent upon incident specific needs.

Additional information regarding methods to implement the *in situ* burning plan, is located in Appendix E.

Shell's *In Situ* Burning Plan is consistent with the provisions of Annex F of the Unified Plan. As the situation warrants, Shell may utilize the following references and job aids to implement the *In Situ* Burning Plan:

- The Alaska Federal / State Preparedness Plan for Response to Oil and Hazardous Substance Discharges/Releases - Unified Plan, Change 3, available at: http://dec.alaska.gov/spar/perp/plan.htm
- NOAA's Office of Response and Restoration SMART Program, available at: http://response.restoration.noaa.gov/smart

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APPENDIX A

RESPONSE EQUIPMENT [30 CFR 254.24]

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APPENDIX A RESPONSE EQUIPMENT [30 CFR 254.24]

A.1 EQUIPMENT INVENTORY [30 CFR 254.24(a)]

Spill response equipment is available through Shell for offshore and nearshore operations, and through Shell leased equipment and OSROs for onshore operations. Table A-1 lists OSRO contact information, applicable tactics, and references to equipment inventory lists.

For Tier I, II, and III spill responses, in-region (North Slope) resources would be made available as needed. These assets include:

- Shell-chartered personnel, equipment, and vessels; and
- Personnel, equipment, and vessels from OSROs (ACS and AES).

ACS is one of the primary equipment providers for Shell in the Beaufort Sea. As provided for in 30 CFR 254.4, Shell's OSRO equipment list, mutual aid and master service agreements are referenced within this OSRO to demonstrate additional response capability beyond that identified to meet the WCD (Appendix C).

Specific equipment available to support shoreline protection and recovery activities described in the WCD are listed in ACS Tactic L-6. Shell response assets available on the OSR vessels staged in the Beaufort Sea are presented in Shell Tactic LE-3. The response equipment operating limitations are provided in ACS Tactic L-6 and L-7 and further discussed in Appendix H within context of the potential environmental conditions that may be encountered in the Beaufort Sea.

Description of response equipment is provided by reference to Tactics and associated OSRO inventories through website links and/or contact information per provisions of 30 CFR 254.4.

Table A-1
OSRO Contacts and Equipment

OSRO	TELEPHONE	TACTIC	EQUIPMENT INVENTORY
ACS - Primary Address: Pouch 340022 Prudhoe Bay, Alaska 99734 Main Number Prudhoe Bay ACS Operations Manager North Slope Mutual Aid (if applicable) handled through ACS	 907-659-2405 907-659-3202 907-659-2405	ACS Tactics: L-3 L-5 L-6, L-6A L-7 L-10 L-11	Available from ACS Technical Manual, online at: http://www.alaskacleanseas.org/tech-manual/
MSRC – Tier II/III Address: 220 Spring Street, Suite 500, Herndon, VA 20179 Main Number Herndon Activation Number	 703-326-5660 318-437-9600	N/A	Available from MSRC Major Equipment List, online at: http://www.msrc.org/download/MEL-All-Nov2-2011.pdf
AES-RO – Equipment and Tactics Address: 3900 C Street, Anchorage, Alaska 99503 Main Number Anchorage AES-RO Operations Manager	 907-339-6200 907-339-6200	Shell Tactic: LE-3	Staged on Vessels within the Beaufort Sea.

Shell response equipment for the Beaufort Sea is staged on each TF to provide operational flexibility in the event of a spill. Activation of Shell response equipment would be scaled as dictated by incident-specific response needs and environmental conditions. Not all equipment is deployed at once. For example, the WCD scenario illustrates the use of discrete recovery assets from each TF which are activated to meet specific response objectives by Shell's IC or QI.

Major Shell-chartered and contracted equipment on each Shell TF is presented in Table A-2. Table A-3 lists personnel resources for a WCD.

Table A-2
Shell-Chartered Equipment Information

TASK FORCE	EQUIPMENT DESCRIPTION	QUANTITY	OWNER	DISTANCE TO SITE
TF-1	OSR Vessel (300-ft)	1	Shell Charter	< 420 n mi
	34-ft Work Boat	3		
	Lamor LSC-5 Brush Skimmer	2		
	Ocean Boom	2,600 ft		
	Vertical Rope Mop Portable Skimmer	1		
	Duplex Mini-Brush/Disc Portable Skimmer	1		
	Storage Bladder (100 bbl)	1		
	Fire Boom System (*In Situ* Burning Containment)	500 ft		
	Dispersant Application Systems (Spray Arms)	2		
TF-2	VOSS	1	Shell Charter	25 n mi
	Transrec 150 Umbilical Weir Skimmer	1		
TF-3	VOSS	1	Shell Charter	25 n mi
	Transrec 150 Umbilical Weir Skimmer	1		
TF-4	OST (513,000 bbl minimum storage capacity)	1	Shell Charter	< 240 n mi
TF-5	OSR Barge	1	Shell Charter	< 420 n mi
	Transrec 150 Umbilical Weir Skimmer	2		
TF-6	OSR Barge	1	Shell Charter	On-site
	Support Tug for OSR Barge	1		
	Lamor LSC-5 Brush Skimming Package	2		
	34-ft Workboats (Boom Deployment / Towing)	3		
	Lamor LORS-2C Brush Skimming Package	2		
	47-ft Response Vessel (Transport / Boom Deployment)	1		
	Coastal Boom (Shared w/ TF-7 & 8)	6,000 ft		
	Duplex Mini-Brush/Disc Portable Skimmer	1		
	Vertical Rope Mop	1		
	100-bbl Flexible Containment System	1		
	249-bbl Interim Storage Mini-barge	4		
	Ocean Boom	2,600 ft		
	Fire Boom Systems (*In Situ* Burning Containment)	500 ft		

Table A-2 (Continued)
Shell-Chartered Equipment Information

TASK FORCE	EQUIPMENT DESCRIPTION	QUANTITY	OWNER	DISTANCE TO SITE
TF-7	Conventional Boom (Shared with TF-8)	10,000 ft	Shell Charter	Staged in Deadhorse Incident Specific
	Coastal Boom (Shared with/TF-8)	4,000 ft		
	Shoreline Guardian Boom	4,000 ft		
	Mine Barges	4		
	Workboats	6	ACS[3]	Staged in Deadhorse
TF-8	Oleophilic Skimmers[2]	20	ACS[3]	Staged in Deadhorse Incident Specific
	Bladders (500 to 2,640 gal)[2]	36		
	Portable Folding Tank (2,500 gal)[2]	50		
	IMO Tanks (6,000 gal)[2]	1		

[1] See Table A-6 and vessel specifications for additional information on available offshore assets

[2] Equipment is identified for nearshore and shoreline response efforts. All equipment is available through Shell or Shell OSROs and may be activated by the IC or QI. On-site equipment and supplies may be contained in heated storage units to ensure their operability during cold temperatures, as necessary. There are a number of conexes included in the vessel fleet which include a supply of contingency materials, tools, PPE, and spare parts.

[3] ACS activation number is (907) 659-2405.

Table A-3
Personnel Resources for Worst Case Discharge

TASK FORCE	UNIT DESCRIPTION	RESPONDER POSITIONS PER SHIFT	SHIFTS PER DAY	TOTAL PERSONNEL	TASK FORCE SIZE
TF-1	OSR Response Supervisor	1	2	2	36
	OSR Vessel Deck Crew	3	2	6	
	34-ft Work Boat Operator x 3 boats	6	2	12	
	Lamor Skimmer Operators	2	2	4	
	OSR Vessel Operating Crew (*Nanuq* or similar)	12	N/A	12	
TF-2	VOSS Supervisor	1	2	2	38
	VOSS Deck Crew	3	2	6	
	Trans Rec Skimmer Operators	2	2	4	
	VOSS Operating Crew (*Aiviq* or similar)	26	N/A	26	
TF-3	VOSS Supervisor	1	2	2	28
	VOSS Deck Crew	2	2	4	
	Trans Rec Skimmer Operators	2	2	4	
	VOSS Operating Crew (*Harvey Hauler* or similar)	**18**	N/A	18	
TF-4	Tanker Deck PIC	1	1	2	20
	Tanker Deck Crew	3	2	6	
	Tanker Operating Crew (*Affinity* or similar)	**12**	N/A	12	
TF-5	OSR Response Supervisor	1	2	2	23
	OSR Barge Deck Crew	3	2	6	
	TransRec Operators	4	2	8	
	OSR Barge (Tug) Operating Crew (*Klamath* or similar)	**7**	N/A	7	
TF-6	Recovery Supervisor	1	1	1	19
	OSR Barge Deck Crew (*Endeavor* or similar)	3	1	3	
	47-ft Skimmer Boat Operators	3	1	3	
	34-ft Work Boat Operator x 3 boats	6	1	6	
	Barge Operating Crew (tug)	**6**	N/A	6	
TF-7	Shoreline Protection Supervisor	1	1	1	37
	Shoreline Protection Labor	4	1	4	
	29-ft Work Boat (ACS Type C) Operators	4	1	4	
	18 to 26-ft Work Boat (ACS Type A & B) Operator	8	1	8	
	24-ft Work Boat Operators	4	1	4	
	Mini barges	8	1	16	
TF-8	Shoreline Recovery Supervisor (Supported by TF-7)	1	1	1	11
	Shoreline Recovery Labor (Supported by TF-7)	10	1	10	
Ice Manage-ment	Ice Management Vessel (*Nordica* or Similar)	30	N/A	30	30
Subsea Contain-ment	Subsea Containment and Processing Unit	67*	N/A	67	67
	TOTAL PERSONNEL			**309**	**309**

For ACS personnel, the Total is the sum of vessel operators, technicians, and general laborers. For ACS personnel, the Team Leader is a separate person.
* Staffed during incident
Shift = 12hrs TF-6, TF-7 and TF-8 operate one 12-hr shift per day.
All TF-4 tasks, including PIC, will be performed by the tanker crew with no additional response staff from Shell or ACS.
Additional support personnel availability is described in Appendix A, ACS Tactics L-8, L-9 and L-10.

A.2 MARINE VESSELS IN SUPPORT OF BEAUFORT SEA EXPLORATION DRILLING PROGRAM

Table A-4
List of Marine Vessels in Support of
Beaufort Sea Exploration Drilling Program

Vessel	Description
OSR Vessel	M/V *Nanuq* or similar
OSR Barge (Offshore)	M/V *Klamath* or similar
OSR Barge Tug (Offshore)	Sea Robin Class Tug or similar
OST	*Affinity* or *Perserverence* or similar
VOSS (Anchor Handling Icebreaker)	M/V *Aiviq* or similar
VOSS	M/V *Harvey Hauler* or similar
OSR Barge (Nearshore)	*Arctic Endeavor* or similar
OSR Barge Tug (Nearshore)	*Point Oliktok* or similar
OSR Barge Carried Support Vessels:	Including:
47-ft Skimmer Boat	*Rozema* or similar
34-ft Work Boat	*Kvichak* or similar
249-bbl Mini-Barge	46-ft or similar
Anchor Handling / Ice Management Vessel	M/V *Tor Viking* or similar
Multi-purpose Icebreaker	M/V *Nordica* or similar
Subsea Containment and Processing System	*Arctic Challenger* or similar

MSV *TOR VIKING* MULTI-PURPOSE ANCHOR HANDLER/ICEBREAKER OR SIMILAR

The MSV *Tor Viking* is a multifunctional, diesel-powered vessel, providing ice management capabilities, towing, and supply services. The ship is equipped with double hulls between all tanks that contain oil.

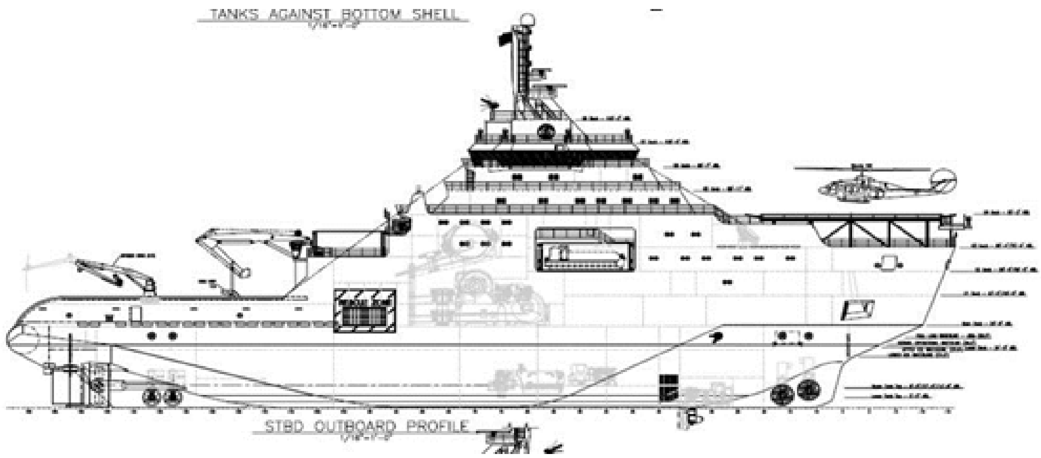
DNV ID:	21779	IMO No:	9199622
Operational Status:	In Operation	Class Relation:	In DNV Class

Speed: 16 knots − Abt. 42.7 MT
Engine Output: 13,440 kW
Dimensions:

Loa:	83.7 m	Gross Tonnage (ITC 69):	3,382
Lbp:	75.2 m	Net Tonnage (ITC 69):	1,145
Breadth Moulded:	18 m	Deadweight Tonnage:	2,528
Depth Moulded:	8.5 m	Bollard Pull Forward	200 T
Draught:	7.2 m	Bollard Pull Astern	120 T

Flag:	Sweden	Signal Letters:	SLJT
Port:	SKÄRHAMN		
Owner:	Trans Viking Icebreaking & Offshore AS		
Manager:	Viking Supply Ships AS Kristiansand, Norway		
Yard:	Havyard Leirvik A.S. (108910)	Year of Build:	2000
Type:	630 – Supply Vessel/Tug		
Class Notation:	✠1A1 ICE-05 Icebreaker (for max draught 6.70m) Tug Supply Vessel SF HELDK-SH E0 DYNPOS-AUTR NAUT-OC DK(+) HL(2.8)		

M/V *AIVIQ* MULTI-PURPOSE ANCHOR HANDLER OR SIMILAR



GENERAL SPECIFICATIONS

Length	360 ft
Width	80 ft
Draft	24 ft
Accommodations	64 berths
Maximum Speed	15 knots
Fuel Storage	12,575 bbl

THE M/V *FENNICA* MULITPURPOSE ICEBREAKER OR SIMILAR

The *Fennica* was specifically designed as a multifunctional icebreaker for operations in the northern seas for anchor handling, towing and ice management. The *Fennica* is equipped with a heli-deck and life saving watercraft.

GENERAL SPECIFICATIONS

Deadweight Capacity	4,500 TONS
Power	21,000 KW
Length	116 M
Width	26 M
Draft	8.4 M
Cruising Speed	16 KNOTS
Berthing	82
Class	✠1A1-EOEO ICEBREAKER POLAR-10 TUG SUPPLY VESSEL SFSF OR HELDK EPR EO DYNPOS -AUTR

OSR VESSEL – *NANUQ* OR SIMILAR

GENERAL SPECIFICATIONS

Vessel Name	*Nanuq* (Hull 235)
Principal Dimensions	301 ft 6 inches x 60 ft x 24 ft
Horsepower	7,268 BHP
Deck Space	169 ft x 50.5 ft
Main Engines	(2) 3608 Caterpillar
Bow Thruster	2 x 1,700 HP/CP Tunnel
Stern Thruster	1,700 HP/CP Tunnel
Electronics	As per GMDSS requirements
Fuel Oil Capacity	6,867 bbl
Liquid Storage	12,690 bbl
Certification	USCG Subchapter L (OSV) and I (cargo); ABS=✠A1 (Hull); ABS=✠AMS (Machinery); ABS Load Line; ABS DP-2; Ice Class A1, SOLAS 2000; MARPOL 99

KVICHAK 34-FT OIL SPILL RESPONSE WORK BOAT OR SIMILAR

Vessel use:

- Operates in open ocean and shallow water with adequate protection to propellers and rudders.
- Capable of operating in up to 6-ft seas depending upon wave characteristics.
- Has an approximate 7,000 lbs of bollard pull.
- Vessel strengthened with ice belting around waterline for incidental ice contact.

GENERAL SPECIFICATIONS

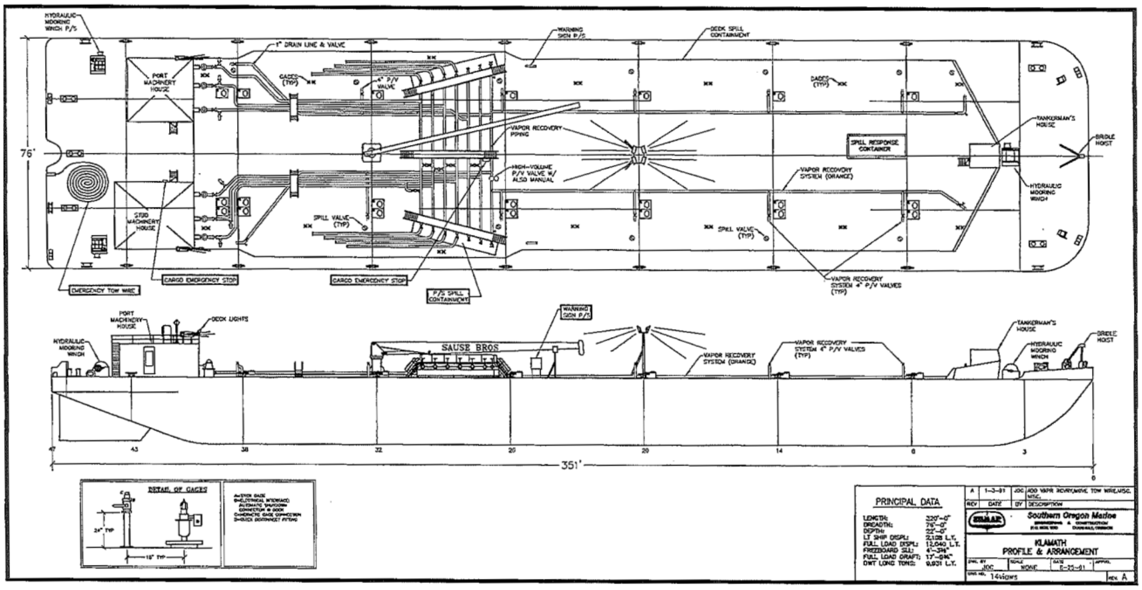
Overall Length	34 ft 6 inches
Overall Beam	12 ft
Deck Length	34 ft
Draft, Light Load	32 inches
Draft, Full Load	38 inches
Engine, Twin Marine Diesels	305 hp, each
Approx. Top Speed	20 knots
Approx. Bollard Pull	7,000 lbs
Fuel Oil	300 gal

THE M/V *HARVEY SPIRIT* OFFSHORE SUPPLY VESSEL OR SIMILAR

GENERAL SPECIFICATIONS

Length	280 ft
Width	60 ft
Draft	15.9 ft
Accommodations	37 berths
Maximum Speed	13 knots
Fuel Storage	6,233 bbl

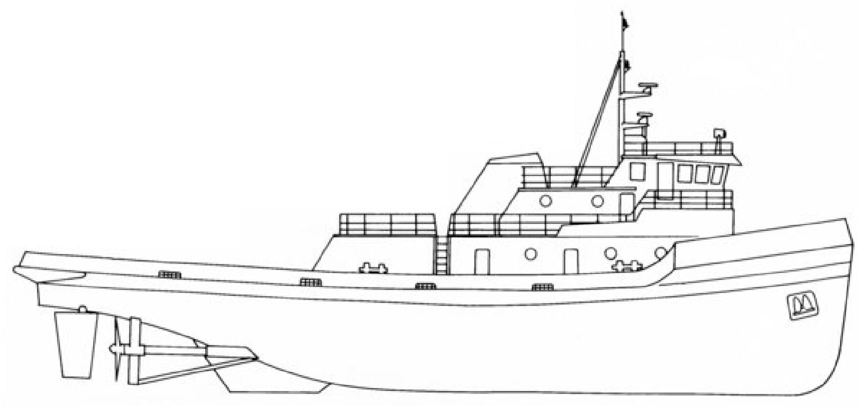
OFFSHORE OIL SPILL RESPONSE BARGE *KLAMATH* OR SIMILAR



GENERAL SPECIFICATIONS

Length	351 ft
Width	76 ft
Depth	22 ft
Liquid Cargo Storage (95%)	76,900 bbl
Classification	ABS - +A1, Grade B Oil Tank Barge

OFFSHORE SEA ROBIN CLASS TUG OR SIMILAR



GENERAL SPECIFICATIONS

Length	126 ft
Width	34 ft
Draft	16.5 ft
Main Engines	(2) 3606 Caterpillar
Horsepower	5,000 BHP
Fuel Storage	1,786 bbl

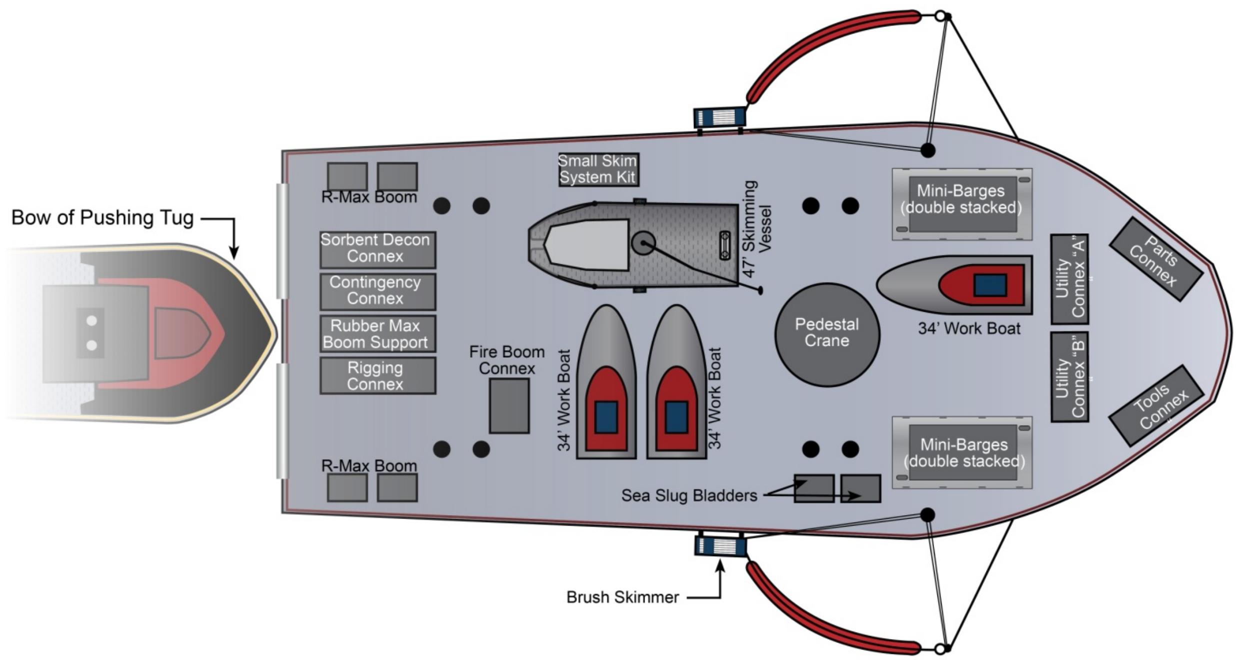
ARCTIC TANKER: *AFFINITY* OR *PERSEVERANCE* OR SIMILAR

Shell has chartered for the purposes of mass oil storage an arctic tanker with ST Shipping and Transport Pte Ltd for the provision of the *Affinity* or its identical sister ship, the *Perseverance*. A tanker with similar functional specifications would be engaged if the *Affinity* and the *Perseverance* are unavailable when operations begin.

A summary of its principal dimensions and capabilities follows:

Name:	***Affinity***	***Perseverance***
IMO Number:	9289776	9289752
Where Built:	ST Shipbuilding Co. Ltd, Korea	
Date Delivered:	05 Jul 2005	08 Jun 2005
Type of Vessel:	Oil Tanker	
Type of Hull:	Double Hull	
Port of Registry:	Singapore	
Flag:	Singapore	
Classification:	Det Norske Veritas	
Class Notation:	+1A1 Tanker for Oil ESP, ICE-1A, E0, VCS-2, T-MON	
Dimensions (meters):		
Length:	228	
Breadth:	32.292	
Draft (summer):	14.3	
Tonnages (metric):		
Gross Tonnage :	42,661	
Deadweight (tonnes):	73,741	73,789
Crude Capacity (bbl):	553,494	
Performance:		
Engine Output (kW):	13,736	
Engine Type/Builder:	Marine Diesel/STX	
Engine Designation:	6S60 MC-C	7S60 MC-C
Speed (knots):	16	

OIL SPILL RESPONSE BARGE AND ICE CLASS TUG OR SIMILAR



GENERAL SPECIFICATIONS

Vessel Name	*Point Oliktok*	Vessel Name	*Arctic Endeavor*
Principal Dimensions	90 ft x 32 ft x 11.5 ft	Principal Dimensions	205 ft x 90 ft x 15 ft
Horsepower	2110	Horsepower	Non-powered
Deck Space	30 ft x 30 ft	Deck Space	Approx. 200 ft x 80 ft
Main Engines	(2) Caterpillar 3512	Liquid Storage	18,636 bbl
Certification	USCG - Uninspected Towing Vessel ABS - A1, Towing Service, AMS	Certification	USCG - Freight Barge ABS - +A1, Oil Tank Barge, Ice Class C

ROZEMA 47-FT OIL SPILL RESPONSE WORK BOAT (WITH LAMOR HK2 BRUSH SKIMMERS)

Vessel use:

- Rapid response to the spill site.
- Oil recovery via LAMOR brush skimmer system.
- Operates in shallow water with adequate protection to propellers and rudders.
- Capable of operating in 6- to 8-ft seas.
- Has an approximate 22,000 lbs of bollard pull.
- Able to tow vessels and barges with a maximum weight of 75 gross tons alongside, astern, and pushing ahead.
- Capable of slow speed operation for skimming oil via the engine's MGX transmissions.
- Vessel strengthened around waterline for incidental ice contact.

GENERAL SPECIFICATIONS

Length Overall	51 ft x 16 ft 8 inches x 54 inches
Deck Length	47 ft
Deck Width	16 ft
Fuel Tank	800 gal
Engine, Twin Marine Diesel	600 hp, each
Molded Dimensions	47 ft x 16 ft
Approx. Top Speed	22 knots
Approx. Bollard Pull	22,000 lbs
Approx. Draft	60 inches light

249-BARREL MINI-BARGES

GENERAL SPECIFICATIONS

Overall Length	46 ft
Overall Beam	12 ft
Overall Depth	5 ft 5 inches
Maximum Storage Capacity	249 bbl in two tanks

A.3 AERIAL SUPPORT OF BEAUFORT SEA EXPLORATION DRILLING PROGRAM

Shell has chartered rotary-wing and fixed-wing aircraft for the support of the Beaufort Sea exploration drilling program. Assets are available for support in both Deadhorse and Barrow.

Rotary-wing aerial support assets supporting Deadhorse include Bell 412 (or similar) helicopters and an Agusta Westland AW139 helicopter (or similar) for multi-purpose duties that may include personnel transport, freight transport, and search and rescue. Fixed wing aerial support assets supporting Deadhorse include a Lockheed C-130A Hercules (or similar) and a DHC 6 Twin Otter for personnel, freight transport, and MMO overflights.

Aerial assets supporting Barrow include a rotary-wing S92 Helicopter for passenger support and a fixed-wing DHC-6 Twin Otter for MMO Overflights.

Table A-5
List of Aircraft in Support of
Beaufort Sea Exploration Drilling Program

SUPPORT FOR DEADHORSE	
Aircraft	Description
Rotary-wing multi-purpose support	Bell 412 (IFR) Twin Turbine Helicopter or similar
Rotary-wing multi-purpose support	Agusta Westland AW139 (IFR) Twin Turbine Helicopter or similar
Fixed-wing multi-purpose support	Lockheed C-130A Hercules or similar
Rotary-wing for passenger support	S-92 Helicopter
Fixed-wing for MMO Overflights	DHC-6 Twin Otter
SUPPORT FOR BARROW	
Aircraft	Description
Rotary wing for passenger transport	S-92 Helicopter
Fixed-wing for MMo Overflights	DHC-6 Twin Otter

*GENERAL SPECIFICATIONS
BELL 412 (IFR) TWIN TURBINE HELICOPTER

specifications may vary between operators' configurations

DIMENSIONS

Length	56 ft 2 inches
Width	9 ft 4 inches
Height	15 ft 1 inches
Main rotor diameter	46 ft 0 inches

CARGO/BAGGAGE

Tailboom cargo space - 28 cu ft (400 lbs)

Internal cargo space - 220 cu ft with 49 inches x 92 inches

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/1,455 lbs (293 gal [one aux tank])
Fuel consumption	110 gph/800 pph
Average cruise speed	117 kts/135 mph

Maximum range - 252 n mi/290 sm (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 (round-trip)	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

*GENERAL SPECIFICATIONS
AGUSTA WESTLAND AW139 (IFR) TWIN TURBINE HELICOPTER

***specifications may vary between operators' configurations*

DIMENSIONS

Length	54.7 ft
Height	16.3 ft
Width (landing gear)	10.0 ft
Main Rotor Diameter	45.3 ft

CARGO/BAGGAGE

Tailboom cargo space – 120 cu ft

Internal cabin dimensions – 8.9 ft L x 6.9 ft W x 4.6 ft H

Sliding doors on both sides – 5.5 ft wide each

SPECIFICATIONS

Max ramp gross weight	14,219 lbs
Max T/O weight	14,110 lbs
Average basic weight	8,600 lbs
External sling load	TBD
Standard fuel capacity	413 gal / 2,808 lbs
Aux fuel tank	132 gal / 898 lbs
Fuel consumption	150 gph / 1,020 gph
Average cruise speed	140 knots
Max range with aux tank & reserves	430 n mi
Passenger seats (offshore)	12
Crew (pilots)	2

POWER PLANT

Two (2) Pratt & Whitney PT6C-67C turboshaft engines with FADEC

LANDING GEAR

Retractable tricycle landing gear with emergency pop-out float system

LOADING INFORMATION

Basic weight	8,600 lbs
Pilots x 2 (offshore survival gear)	500 lbs
Max fuel (standard tanks only)	2,808 lbs
Operating weight	11,908 lbs
Maximum gross weight	14, 110 lbs
Minus operating weight	11,908 lbs
Total Payload	2,202 lbs

****FUEL REQUIRED –** *includes ~30 minutes reserve fuel*

TOTAL DISTANCE	**FUEL REQUIRED	PAYLOAD OUTBOUND	FLIGHT TIME
430 nm	3,670 lbs	1,340 lbs	3.1
250 nm	2,336 lbs	2,674 lbs	1.8
100 nm	1,214 lbs	3,796 lbs	0.7

*GENERAL SPECIFICATIONS
LOCKHEED C-130A HERCULES

specifications may vary between operators' configurations

DIMENSIONS

Length	97.8 ft
Height	38.3 ft
Wingspan	132.6 ft

DISPERSANT PAYLOAD 3,250 gal

SPECIFICATIONS

Max Gross Weight	124,200 lbs
Average Basic Weight	~60,000 lbs
Fuel Capacity	Unknown (depends on configuration)
Fuel Consumption	575 - 800 gal per hr (dependent upon altitude / airspeed)
Average Cruise Speed	298 knots
Maximum Range	2,000 n mi
Passenger Seats	Not Authorized
Crew	2 pilots 1 Flight Engineer

POWER PLANT

Power Plant	Four (4) Allison T56 engines; 3,750 SHP each

LANDING GEAR

Retractable

LOADING INFORMATION

Basic Weight	~60,000 lbs
Full Fuel	Unknown (depends on configuration)
Pilots / Crew	600 lbs
Operating Weight	Unknown without fuel load
Max Gross Weight	124,200 lbs
Minus Op Weight	Unknown without fuel load
Total Dispersant Payload	3,250 gal / ~26,000 lbs

TOTAL DISTANCE	**FUEL REQUIRED	PAYLOAD OUTBOUND	FLIGHT TIME
2,000 n mi	Full	None	7.0
1,400 n mi	Unknown	26,000 lbs	4.5

****FUEL REQUIRED –** *includes ~30 minutes reserve fuel*

*GENERAL SPECIFICATIONS
SIKORSKY S-92 HELICOPTER

specifications may vary between operators' configurations

DIMENSIONS

Length	60 ft 7 inches
Width	12 feet 9 inches
Height	15 feet 5 inches
Main rotor diameter	56 ft 4 inches

CARGO/BAGGAGE

Passenger Cabin Volume: 700 cu ft (19.82 cu m)

Baggage compartment volume: 140 cu ft (3.96 cu m)

Sliding doors (SAR config.)

SPECIFICATIONS

Maximum gross weight:	26,500 lbs
Empty weight (standard SAR config.):	16,831 lbs
Useful load:	9,669 lbs
Fuel capacity:	760 gal/2,877 liters (210 gal [two aux tanks)
Average cruise speed:	138 kts/280 kph
Maximum range:	467 n mi/865 km (30-minute fuel reserve)
Passenger seats	10-19 passengers, depending upon configuration
Crew	2 pilots

POWER PLANT

Two (2) General Electric CT7-8A turboshaft engines with integral particle separators and pneumatic starters.

LANDING GEAR

Fixed skid type landing gear with automatic and pilot activated emergency pop-out float system.

LOADING INFORMATION

Basic weight	16,831 lbs
Pilots (2)	400 lbs
Engine oil	33 lbs
Windshield Washer Fluid	4 lbs
Manuals	10 lbs
Two additional crew	400 lbs
Loose SAR equipment	200 lbs
Operating Weight	**17,878 lbs**

A.4 DISCUSSION OF SHELL TECHNOLOGIES AND SYSTEMS

For information purposes, Shell is providing Table A-6 to further describe the response assets available to deploy in the event of a spill in the Beaufort Sea. Shell has reviewed the ADEC BAT 2004 Conference Report issued in June 2006 and has adopted the following recommended technologies for the purposes of this OSRP. 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 BAT for conditions commonly found in the Beaufort Sea. Brief descriptions of these technologies and systems follow:

Table A-6
Response Assets Available to Deploy

TECHNOLOGY / SYSTEM	DESCRIPTION
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.
Transrec 150 Weir Skimmer	Transrec 150 weir skimmer is a well-proven recovery system and selected by major response organizations, including SERVS, MSRC, and the NOFO, as the primary open-ocean-skimming device. NOFO has performed extensive field tests of the Transrec skimmer both in actual spill events and open ocean trials using free crude oil. Shell's OSR assets include four (4) Transrec 150 weir skimmers. The offshore OSR barge is equipped with two (2) skimmer units mounted near the stern of the vessel, port and starboard. The two VOSS, staged within 3 hr of the drill site, are each equipped with one skimmer unit mounted near the stern of the vessel. This configuration permits the self-propelled, floating skimmer heads attached to a 312-ft (95-m) umbilical hose to be maneuvered into the thickest oil layers within the apex of the containment boom for optimum recovery. Each Transrec 150 has a name-plate recovery capacity up to approximately 2,516 bbl/hr (400 cu m/hr), giving Shell's OSR skimming capability a combined total capacity up to 10,064 bbl/hr (1,600 cu m/hr).
Lamor-Lori Brush Skimmers	Lamor-Lori brush skimmers, each consisting of two (2) five-parallel stiff-brush chains, were selected as proven systems for conducting recovery operations. Shell's OSR vessel and Nearshore OSR barge are each equipped with two of these over-the-side skimming packages, yielding a total name-plate recovery capacity of approximately 2,580 bbl/hr or 410 cu m/hr for each vessel. 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 percent free water.
Lamor-Lori Brush Skimmers	Lamor-Lori brush skimmers were selected as the primary recovery system for Shell's 47-ft, self-propelled skimmer that will be stored on, and launched from the OSR barge. 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 approximately 516 bbl/hr (82 cu m/hr) gives this system a total potential recovery of approximately 1,032 bbl/hr (164 cu m/hr). 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.

Table A-6
Response Assets Available to Deploy (Continued)

TECHNOLOGY / SYSTEM	DESCRIPTION
Vertical Rope Mop Skimmers	Vertical Rope Mop Skimmers by Crucial Inc. have been selected as part of Shell's backup recovery system, each skimmer consists of eight continuous loops of oleophilic fiber mops with a combined name-plate capacity of approximately 503 bb/hr (80 cu m/hr). Stored onboard the OSR vessel, two of these skimmers provide an additional 1,006 bbl/hr (160 cu m/hr) 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.
Duplex Disc/Brush Skimmers	Small Duplex Disc/Brush skimmers with a floating Lobe Pump, providing for the careful placement of a skimming device into smaller pockets of oil (within a boom or trapped among ice cakes). Two of these disc/brush skimmers, each rated at approximately 88 bbl/hr (14 cu m/hr), will be located onboard the primary OSR vessel, giving flexibility for the recovery of oil from isolated pools. Their combined recovery potential represents another approximately 176 bbl/hr (28 cu m/hr).
RubberMax Boom	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 International 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 m (656 ft) of boom. The height of the boom is 67 inches (170 cm) with a freeboard of 24 inches (60 cm) and a draft of 43 inches (110 cm). Eight of these systems will be available on site for use in multiple configurations such as a large open-apex deflection system; deflection booms secured to an OSR vessel, providing deflection for an OSR vessel; and as independent U-boom configurations for the collection of oil.
Hydro-Fireboom Packages	Three water-cooled, Hydro-Fireboom packages, each with 500 ft (152 m) of inflatable boom [with 14-inch (36 cm) floatation and 18-inch (46 cm) skirt] are stored on Shell's OSR vessel and OSR barge. 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 contained 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 bopd. This boom has undergone rigorous testing with pit burns and in large tanks (Ohmsett Facility in New Jersey).

A.4.1 Capping Stack Overview

The Arctic Capping stack is designed to be the primary response tool during a blowout scenario in the Alaskan OCS. The capping stack will be maintained and deployed from the icebreaker Fennica (or similar), positioned as a primary ice management vessel in the Beaufort Sea or the Chukchi Sea. The stack will be maintained in a ready-to-respond condition, including periodic function testing per regulations. The entire capping stack is designed to 10,000psi, consisting of new equipment built in accordance to API 16A. Trendsetter Engineering in Houston is building and testing the capping stack.

The capping stack is built with the primary purpose of being able to land on a failed BOP and shut the well in. The capping stack engages with the BOP through an H4 connector which latches onto the H4 mandrel on top of the BOP stack. This connection uses the metal-to-metal seal to achieve a connection to 10,000 psi. The capping stack includes a spacer spool, designed to elevate the rams and ROV control panels above the mud line cellar and several feet above the sea floor to ensure good visibility during operations. Dual blind rams are included to give redundancy in ability to shut the well in and seal. Sufficient onboard hydraulic capacity exists to engage the H4 connector on the BOP and to shut both of the blind rams. Additional hydraulic capacity is obtained from the remote subsea BOP control module. The supply umbilical on this module can be connected to the capping stack to utilize the controls on the capping stack to function all components repeatedly. Included in the capping stack for deployment is a diverter spool with side outlet valves which can be used for a soft shut in. Additionally, these sacrificial valves can be removed and flowlines can be installed on the connector to enable either a cap and divert scenario or a kill scenario.

To assist with deployment, guide line funnels are installed on the main frame of the capping stack. Pressure and temperature sensors are also included, which can be monitored acoustically from any vessel in the area. All controls have been designed inclusive of standard ROV tooling, allowing any of the fleet ROVs to operate the capping stack.

A.5 MANPOWER SOURCES AND AVAILABILITY

Through Shell's membership in ACS and contracted services with AES-RO and MSRC, trained personnel from these organizations are available 24 hr per day, seven days per week to deploy and operate spill-response equipment. Onshore support personnel may include, oil spill responders, wildlife rehabilitation specialists, and other operations support personnel. NSSRT personnel (Tactic L-8) and ACS ACRT (Tactic L-9) would be a source of available trained responders and support staff. Recent reports depicting available responders beyond those already pre-staged on Shell-chartered vessels are presented within this section, which include but are not limited to the NSSRT and ACRT.

In the event of an oil spill, non-essential project personnel identified for the NSSRT would be relieved from their various work sites to free up bed space and other support infrastructure for the use of response personnel. In addition to these entities, there are other provisions through which trained personnel as well as equipment are available. For example, ACS has master service agreements with numerous (more than 30) contractors (ACS Tactic L-9). APICOM has a mutual aid agreement to provide equipment and personnel to members on an as-available basis. Accessing these resources is described in ACS Tactic L-10, which is also provided in Appendix C. Appendix G provides a listing of logistical support vendors and suppliers specific to Alaska.

It is recognized that the onshore Operations group in particular may require additional facility support due to the limited infrastructure in the area. Reference Appendix G for additional logistical supply service contractors. Shell is prepared to mobilize rapid deployment man camps that are fully air transportable by readily available commercial aircraft for immediate mobilization. These camps can be deployed, erected and functional in less than five days. As per Appendix A and G, Shell has contracts and arrangements with multiple, proven and reliable, vendors to provide turn-key, short-notice services as needed.

The information presented below is a summary of personnel available through North Slope Mutual Aid Agreement and ACS Tactic L-8.

December, 2011

Company	*1-Dec*	*7-Dec*	*14-Dec*	*27-Dec*	*AVG*
Alyeska	11	19	19	12	15.25
ACS	11	10	11	10	10.50
BP Exploration	80	93	86	74	83.25
ConocoPhillips	35	31	29	31	31.50
Pioneer	10	9	9	10	9.50
ENI	5	5	5	5	5.00
TOTAL	152	167	159	142	155.00

Company	*Target*	*Average*	*MIN*	*# Days Below Target*
Alyeska	6	15.25	11	0
ACS	18	10.50	10	4
BP Exploration	49	83.25	74	0
ConocoPhillips	28	31.50	29	0
Pioneer	4	9.50	9	0
ENI	2	5.00	5	0
TOTAL	107	155.00	142	0

Non-Producing Members Additional Responders

Company	*1-Dec*	*7-Dec*	*14-Dec*	*27-Dec*	*AVG*
Anadarko	5	4	4	2	3.75
Brooks Range	0	0	0	0	0
Shell Offshore Inc.	1	1	1	1	1
ExxonMobil	0	0	0	0	0
TOTAL	6	5	5	3	4.75

Company	*Target*	*Average*	*MIN*	*# Days Below Target*
Anadarko	2	3.75	2	0
Brooks Range	2	0.00	0	4
Shell Offshore Inc.	2	1.00	1	4
ExxonMobil	2	0.00	0	4
TOTAL	8	4.75	3	4

This report shows only the number of qualifying responders. These responders have current hazwoper, full or half face fit test, and hazwoper physical, according to Alaska Clean Seas records.

* ACS target number will be changing due to re-assignment of ACS personnel to the outlying area they represent.

ACRT/VRT Summary Report
Fourth Quarter, 2011

Auxiliary Contractor Response Team General Activities

A. Summary of ACRT Availability

Description	TOTAL	12 Hour	24 Hour	48 Hour	72 Hour
CCI	per contract 60				
General Laborer	**113**	30	30	30	23
Skilled Tech	72	20	20	20	12
Team Leader	19	6	6	4	3
Vessel Op. N/S	11	2	2	3	4
Vessel Op. O/S	11	2	2	3	4
PENCO	per contract 100				
General Laborer	**100**	52	21	17	10
Skilled Tech	53	31	15	5	2
Team Leader	30	19	7	2	2
Vessel Op. N/S	5	2	2	1	0
Vessel Op. O/S	1	1	0	0	0
TRIDENT	per contract 75-150				
General Laborer	**137**	25	25	50	37
Skilled Tech					
Team Leader					
Vessel Op. N/S					
Vessel Op. O/S					
TOTAL ACRT General Laborers	**350**				
VRT	per contract 20-50				
General Laborer	**29**	18	11	0	0
Skilled Tech	0	0	0	0	0
Team Leader	0	0	0	0	0
Vessel Op. N/S	0	0	0	0	0
Vessel Op. O/S	0	0	0	0	0

Total Responders (ACRT + VRT) **379**

Individual Contractor Summary

PENCO
The Quarterly Personnel Callout used to generate this report was conducted on 30 DEC 2011. These numbers are reflected in the table on the previous page. In 2012, Penco will continue to provide a minimum of 100 qualified responders to the North Slope ACRT.

CCI
The Quarterly Personnel Callout used to generate this report was conducted on 31 DEC 2011. These numbers are reflected in the table on the previous page. Beginning in 2012, CCI will increase to providing 80 qualified personnel to the North Slope ACRT.

UMIAQ
The Quarterly Personnel Callout used to generate this report was conducted on 04 JAN 2012. These numbers are reflected in the table on the previous page. No other training classes or dispatch callouts occurred during the fourth quarter. In 2012, UMIAQ will continue to provide a minimum of 20 qualified personnel to the North Slope Village Response Team.

A.6 INSPECTION AND MAINTENANCE PROGRAMS [30 CFR 254.24(b)]

ACS performs routine inspection and maintenance of all ACS response and prestaged land-based equipment. ACS has fulfilled the equipment maintenance and testing criteria that these classifications require. ACS Tactic L-6 lists available equipment and a summary of the preventative maintenance program.

ACS holds the following USCG OSRO classifications:

- River/canal environments: Classes MMPD, WCD1, WCD2, and WCD3;
- Inland environments: Classes MMPD, WCD1, WCD2, and WCD3;
- Nearshore environments: Classes MMPD, WCD1, WCD2, and WCD3;
- Offshore: Classes MMPD, WCD1, WCD2, and WCD3; and
- Open ocean environments: Classes MMPD, WCD1, WCD2, and WCD3.

Response equipment that is pre-staged on vessels or at Deadhorse will be stored so that it can be rapidly deployed and maintained in response-ready condition. During the drilling season, monthly inspections will be performed on all offshore oil spill response equipment and pre-staged in Wainwright as provided for in Shell Tactic LE-1 and LE-3. Records of equipment inspections will be maintained by contractors.

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APPENDIX B

CONTRACTUAL AGREEMENTS [30 CFR 254.25]

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APPENDIX B CONTRACTUAL AGREEMENTS [30 CFR 254.25]

Certification of contracts or membership agreements with OSROs, cooperatives, spill-response service providers or IMT members who are not employees that are cited in the OSRP are outlined in Table B-1.

Table B-1
Certification of Memberships and Contractual Agreements

I hereby certify that Shell Offshore, Inc. currently has a contract or membership agreement with the following service providers:

SERVICE	COMPANY	BEGINNING DATE	ENDING DATE
Equipment Provider – Vessels	Harvey Gulf International Marine, LLC	February 1, 2010	Ongoing
Equipment Provider – Vessels	Crowley Marine Services	November 17, 2006	Ongoing
Equipment Provider – Barges	Crowley Marine Services	April 26, 2011	Ongoing
Equipment Provider – Barges	Crowley Marine Services	May 1, 2007	Ongoing
Equipment Provider - Vessels	Edison Chouest Offshore	January 1, 2007	Ongoing
Equipment Provider – Vessels	ST Shipping & Transport PTE Ltd of London	January 31, 2007	Ongoing
Oil Spill Primary Response Action Contractor	Alaska Clean Seas	December 22, 2008	Ongoing
Oil Spill Response Equipment and Personnel	ASRC Energy Services	January 15, 2007	Ongoing
Oil Spill Response Equipment and Personnel	Ukpeagvik Inupiat Corporation	October 1, 2009	Ongoing
Response Services	Marine Spill Response Corporation	December 31, 1994	Ongoing
Equipment Provider and Personnel	Superior Energy Services, Inc.	December 18, 2011	2016

The subject contract or membership agreements provide immediate access to available personnel and/or equipment on a 24-hour per day basis.

Signed: ______________________
Curtis Wright

Title: Emergency Response Coordinator

Date: January 15, 2012

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APPENDIX C

WORST CASE DISCHARGE SCENARIO [30 CFR 254.26]

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APPENDIX C WORST CASE DISCHARGE SCENARIO [30 CFR 254.26]

This WCD scenario was prepared to comply with BSEE regulations in 30 CFR 254.26. It is prepared as an illustration of the spill and response conditions that could be expected in the event of a WCD. The scenario makes certain assumptions about spill conditions and describes equipment, personnel, and strategies that would be used to respond to a WCD.

In the event of a discharge in the Beaufort Sea, drilling operations in the Chukchi Sea will cease in order to relieve the OSR assets for assistance with oil spill response in the Beaufort.

This WCD scenario meets the requirements of the BSEE "in adverse conditions" with equipment that is "suitable, within the limits of current technology, for the range of environmental conditions" anticipated.

Spill response decisions depend on safety considerations, weather, and other environmental conditions. It is the discretion of the IC and PIC of the spill response to select any sequence or take 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.

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

The scenario provides a simulation of a WCD with the type of responses that could be employed to the maximum extent practicable.

C.1 WCD VOLUME [30 CFR 254.26(a)]

Table C.1-1
Worst Case Discharge Location

TYPE OF OPERATION	FACILITY NAME ID NO.	BLOCK NO. WHERE THE SPILL ORIGINATES	DISTANCE IN MILES FROM THE SHORE
Exploratory	00689	Torpedo	20

Table C.1-2
U.S. BSEE Worst Case Discharge Volume
Exploration Well Blowout

ELEMENT	CAPACITY (BBL)	REFERENCE
Estimated Daily WCD	16,000	30 CFR 254.26
Total WCD (Daily Volume X 30 Days)	480,000	30 CFR 254.47(b)
Total Storage Capacity Requirements	480,000	30 CFR 254.26(d)(4)(i)

The WCD volume and storage capacities are calculated to address the BSEE requirements. BSEE references a 30-day timeframe [30 CFR 254.47(b)] and establishes guidelines for calculating the WCD volume (30 CFR 254.26). The WCD volume is presented for Shell's OSRP as 16,000 bopd x 30 days to total 480,000 bbl.

The WCD volume presented here is different than that presented in Shell's EP submittal. The OSRP blowout planning scenario used here for oil spill planning exceeds the WCD calculated for the EP. The EP's WCD is based on proprietary reservoir characteristics and modeling which result in a "calculated" WCD, per NTL 10-06 with the agreement and approval of BOEM. The WCD volume presented in this scenario is a "planning" volume and exceeds the daily release rate of the calculated WCD for the 30-day duration.

The properties of the crude oil from the proposed drilling location is expected to be broadly comparable to the analysis of samples obtained previously from the Hammerhead prospect (now called Sivulliq) in 1985:

API gravity (60 °F):	20.2
Viscosity (60 °F):	468 cp
Water content in oil/water Emulsion (wt %):	12
Asphaltene content (wt %):	0.5
Pour point (°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…"

C.2 TRAJECTORY ANALYSIS [30 CFR 254.26(b)]

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 trajectories in this plan are consistent with the results presented in the MMS Environmental Impact Statement. The MMS report reveals probabilities of impact to be typically 0.5 percent to 3 percent 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 Torpedo.

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.

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

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 adverse wind and sea conditions that could conceivably drive oil directly toward shore and other sensitive resources.

SIMAP Oil Spill Modeling Summary

To illustrate one of the possible surface oil trajectories during the month of August, RPS - Applied Science Associates used SIMAP (Spill Impact Model Application Package). Environmental input data included geographical, hydrographic, current, and wind (long-term record) that were mapped in gridded format for the location. This modeling took into account oil weathering processes, but assumed that no recovery is taking place, therefore representing a conservative prediction of slick fate and behavior.

The following release parameters were used:

Beaufort Sea Drill Site: 70 22.70 N, 146 01.86 W
Release Duration: 30 days
Volume: 16,000 BOPD
Model Duration: 30 days
Depth of Release: 32m
Oil properties

- API gravity: 20.2
- Viscosity (15°C): 468 cP
- Water content = 12% by weight
- Asphaltene content: 0.5
- Pour point (°F): -10

The SIMAP model also requires detailed evaporation and PAH concentration distribution data. Alaska North Slope Crude (2002), as reported by Environment Canada, was used as proxy for these data inputs.
http://www.etc-cte.ec.gc.ca/databases/Oilproperties/pdf/WEB_Alaska_North_Slope_(2002).pdf

Currents

RPS-ASA has used annual means analysis of surface current data in the Chukchi and Beaufort Seas produced by the coupled ice-ocean hydrodynamic model of Haidvogel, Hedstrom and Francis (2001) - http://www.gomr.boemre.gov/PI/PDFImages/ESPIS/3/3381.pdf. The current data from this model were also used by BOEMRE in the EIS trajectory analyses for the Chukchi Sea and Beaufort Sea areas.

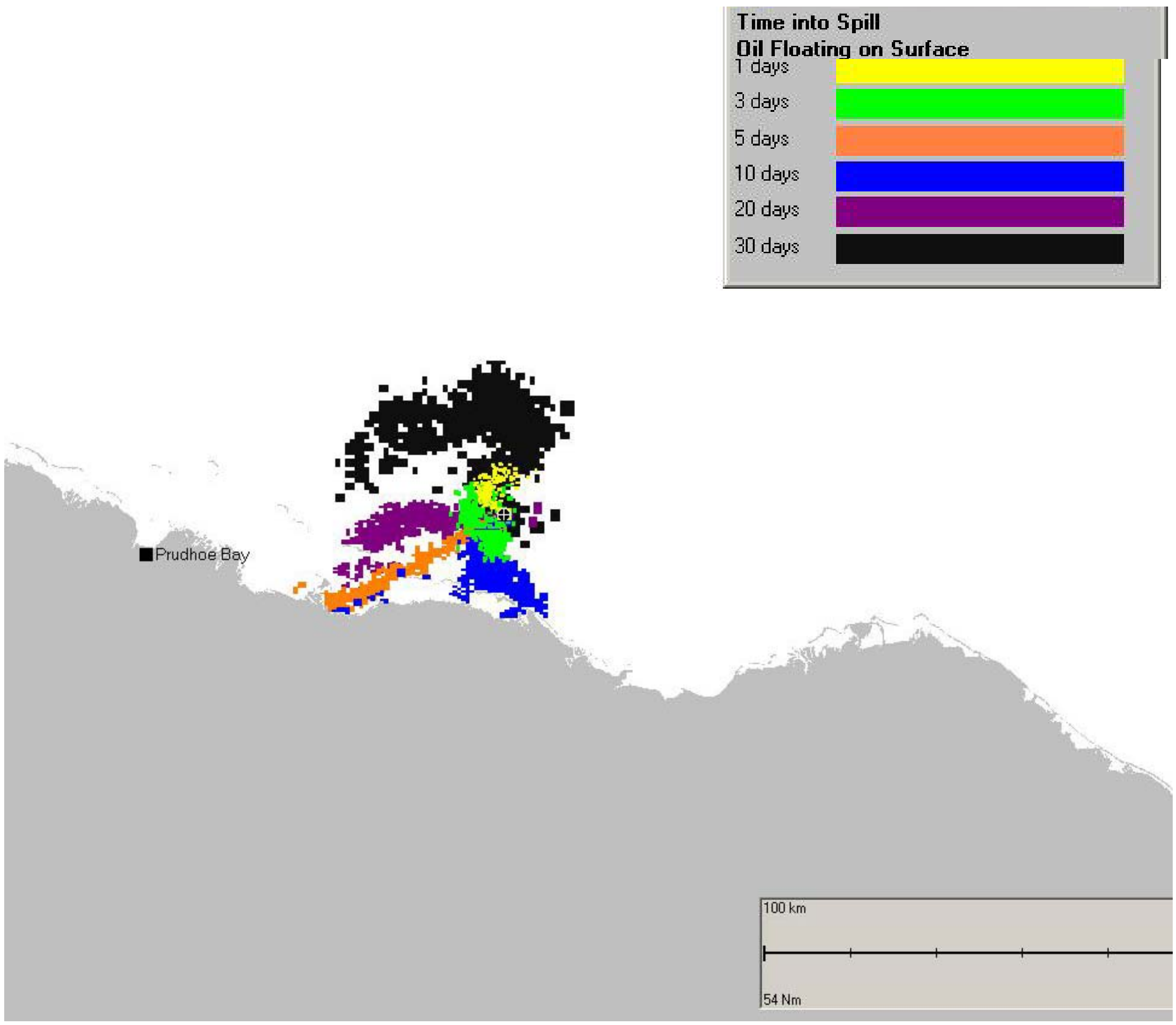
Winds

Variable offshore wind data from the operational hindcast database for the Beaufort Sea were used for this modeling. A database covers the time period from 01/01/1998 through 12/31/2007. Records of fourteen wind stations around the Sivulliq site were used for this simulation (OceanWeather Inc. BORE grid). These stations have the following bounding coordinates: 148.0 – 145.5 W and 70.1 – 70.8 N.

Modeling results

Figure C.2-1 shows the location of surface oil after 1, 3, 5, 10, 20 and 30 days following the release.

Figure C.2-1
Worst Case Discharge 30-Day Trajectory



The Sivulliq location is marked as a black circle with a cross indicating the release point. Colors indicate the extent of the slick after corresponding number of days. This simulation shows how surface oil changes drift direction under the influence of variable winds and currents. This figure shows a general extent of an oil slick over time and includes both thin sheen and recoverable oil.

In the event of a spill, oil movement would be tracked using a combination of visual observations and remote sensing techniques, aided where practicable by GPS devices and spill-tracking software, and commercially available remote sensing techniques. Within the first 4 hours of initial notification of the blowout, the Kuparuk Twin Otter with FLIR is deployed. Response vessels can also deploy buoys with transmitters. Both systems are capable of real-time tracking of the leading edge of the oil. Based upon availability and weather conditions, a helicopter with FLIR, vessel-mounted IR systems onboard the OSR vessels, or alternative commercially available aircraft with SAR could also be deployed. Overflights would include spill tracking, vessel movements, wildlife monitoring, and operational system performance.

In tandem, or in the event overflights are hampered by weather, response vessels would deploy buoys with transmitters. These 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 OSC for response planning and trajectory modeling. Satellite tracking of oil is initiated (RADARSAT or EnviroSat) and coordinated with the use of tracking buoys.

The NOAA and/or ASA OILMAP trajectory models would be used to provide initial trajectory predictions based on wind speed and direction observed in the field. The trajectory model forecasts would be updated as the blowout progresses, to monitor oil movement based upon actual field measurements.

C.3 ENVIRONMENTAL RESOURCES [30 CFR 254.26(c)]

The NOAA ESI Maps, ACS Map Atlas, and the North Slope Subarea Contingency Plan are used to identify areas of concern. As part of the Planning Section, the EU Leader would coordinate with resource agency representatives and local representatives to prioritize resource sensitivities and activate protection guidelines. The Cultural Resource Specialist and SHPO would coordinate to identify sites of concern and advise Operations of necessary site protection needs. Shell's EU would begin development of a shoreline protection plan, and SCAT, would be placed on standby.

For the purposes of this scenario, implementation of protection tactics would be completed for the sensitive areas. Based on trajectory calculations and oil tracking, barrier islands are identified as the first area to be potentially impacted by oil (see Figure C.2-1).

Based upon historical wind data and the MMS current model the RPS-ASA trajectory predicts that, without containment and recovery, the earliest potential oil contact with shorelines would occur by Day 5. Response includes nearshore and shoreline protection strategy and tactics.

Five days into a discharge event, oil floating on the surface could potentially reach the southern portion of Stockton Islands, Mikkelsen Bay, and Goose Island. There are two areas near this projected trajectory with priority protection sites – PS2 and PS3 in southern Mikkelsen Bay. ACS Shoreline Protection Task Forces would be mobilized to deploy deflection and exclusion booms at selected protection sites PS2 and PS3.

Ten days into a discharge event, oil floating on the surface could potentially become more concentrated at PS2 and PS3 priority protection sites mentioned above. However, by this point in time, protection methods will already be in place. Also at ten days, Flaxman Island and Maguire Islands, located offshore north of Point Thomson and stretching east to offshore of Brownlow Point, could potentially be affected. These portions of Flaxman Island and Maguire Islands have no priority protection sites, but ACS Shoreline Protection Task Forces could deploy exclusion or deflection boom as a preventative measure.

In full, over a 30 day spill trajectory, oil floating on the surface is predicted to stay offshore in a range stretching from due east of the Kadleroshilik River to west of Brownlow Point.

Trajectory modeling would be performed throughout the response using field-collected data to track oil and assess protection priorities. Upon receiving notification of a spill event ACS nearshore recovery teams would mobilize from Prudhoe Bay to recover oil that escaped containment from the offshore Task Forces. Teams would utilize skimmer boats with LORI LSC skimmers and mini-barges for storage. The ACS shoreline protection task force (TF-7) using two teams and two boats, would mobilize from Prudhoe Bay to deploy exclusion booms at protection sites identified through aerial surveillance activities and trajectory analyses. These sites are prioritized and boomed in order of proximity to the spill. The primary objective of TF-7 is to prevent oil from entering priority sites. TF-7 does not recover discharged oil.

ACS shoreline recovery teams (TF-8) using workboats and skimmers, install deflection boom at the shoreline to recover oil. Boom is anchored to the shoreline and offshore, and oil is collected with a skimmer and stored in Fastanks. One team works 10 locations within a 5-mile area. Two crews can manage shoreline operations for 10 miles. Personnel from ACS, supplemented with backup response teams from the NSSRT, ACRT, and VRTs (reference Appendix A.5), can be mobilized on short notice to deal with oil in the unlikely event that it could threaten any of the nearshore and shoreline environments along the Beaufort Sea. Individuals on these teams are also trained in Wildlife Protection strategies.

Tactics in the shallow coastal and nearshore environments of the Beaufort Sea are best carried out using relatively small response boats. ACS may mobilize numerous small workboats and landing craft to support these operations providing for the transport of people and equipment to remote locations. These shallow-draft 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.

C.4 WCD RESPONSE [30 CFR 254.26(d)]

In the event of a WCD or Tier III event, Shell would activate their IMT and mobilize necessary resources to provide adequate spill response. Shell has pre-planned an operational approach to a WCD that establishes task forces based upon specific recovery capability and objectives. The operational approach for mechanical response to the WCD is depicted in Figure C.4-1.

Shell will have the following OSR vessels staged and available during drilling operations to provide response support for any type of oil spill, including a WCD event. Shell has chosen a conservative 10 knot transit speed for offshore response vessel resources. Although service and maximum speeds for these vessels are significantly faster, the planning speed for response purposes has specifically been reduced to show robust response capability even in heavy sea conditions, reduced visibility, and due to the additional power requirements that may be necessary in the presence of ice. All major response assets are designed for and certified for operation in arctic conditions, including operation in high ice concentrations. The transit speed for the nearshore OSR barge is reduced to 5 knots to provide for similar planning considerations. Please refer to Appendix A for further information regarding vessel capabilities and, if applicable, class notations.

- OSR barge (*Endeavor* or similar), stationed near the drilling vessel while drilling into liquid hydrocarbon-bearing zones in the Beaufort Sea;
- Two VOSSs stationed on site with the drilling vessel (the *Aiviq* and the *Harvey Hauler*, or similar) while drilling into liquid hydrocarbon-bearing zones;
- Three 34-foot oil spill response workboats;
- One 47-foot workboat equipped with over-the-side brush skimmer;
- OSR vessel (*Nanuq* or similar), stationed not more than 420 n mi away in the Chukchi Sea
- OSR barge (*Klamath* or similar), stationed not more than 420 n mi away in the Chukchi Sea; and
- OST stationed between 25 and 200 n mi from the drilling vessel while critical drilling activity is underway. The OST would be the Arctic tanker *Affinity* or similar (70,000 gross metric tons, with a de-rated storage capacity of at approximately 513,000 bbl).

Table C.4-1 provides a list of major equipment that would support primary mechanical response to an offshore blowout. For Shell-chartered assets, activation and mobilization time is incorporated in the total time to the site, as response equipment is pre-staged on offshore and nearshore response vessels for immediate deployment throughout the drilling season. These task forces are identified in Table C.4-1, which illustrates the response equipment available to each task force. For consistency with ACS and Shell Technical Manuals, mobilization times provided in Table C.4-1 include load out times for response assets, and are the combined times to get assets out of storage, prepare them for operation, and make them ready to travel. For offshore response, the mobilization time is “0” as each TF’s equipment is pre-staged on board. Figure C.4-1 is a pictorial overview of the described primary response assets in recovery mode. Response equipment, materials, support vessels, and strategies described herein are suitable within the limits of current technology for the range of environmental conditions anticipated.

While Shell has demonstrated access to dispersant inventory and application equipment as well as *in situ* burning, treatment of a spill by these countermeasures is not represented in Table C.4-1. For example, with the dispersant inventory available to Shell within 24 hours [25,000 gal on scene + 3,200 gal (MSRC)] approximately 13,428 bbl of oil may be dispersed. Continued use of these response strategies may be performed as outlined in the Dispersant Use Plan (Appendix D) and *In Situ* Burning Plan (Appendix E).

On a daily basis, Shell provides the immediate spill response equipment within the Beaufort Sea through direct charter or contract. In addition, ACS can mobilize the OSR barge to provide personnel and equipment for nearshore response operations (Shell Tactics LE-1 through LE-4, and ACS Tactics L-1 through L-12) and ACS can mobilize personnel and equipment for shoreline protection and response along the Beaufort Sea coast (ACS Tactics L-1 through L-12). Refer to Table C.4-2 for the numbers and types of Shell personnel on site.

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 UC Logistics Section.

Table C.4-1
Worst Case Discharge Major Equipment

EQUIPMENT DESCRIPTION				RECOVERY CAPABILITIES		EQUIPMENT LOCATION			DEPLOYMENT TIMES			
TASK FORCE	ASSET	QUANTITY	OWNER	EDRC (bbl)	DE-RATED STORAGE (bbl)	STORAGE AREA	STAGING AREA	DISTANCE TO SITE	MOBIL-IZATION[a]	TRANSIT	DEPLOY[b]	TOTAL
TF-1	OSR Vessel (300-ft)	1	Shell Charter	12,384	11,400	Equipment Pre-Staged on Vessel	Chukchi Sea	< 420 n mi	0	< 42 hr	<1 hr	< 43 hr
	34-ft Work Boat	3										
	Lamor LSC-5 Brush Skimmer	2										
	Ocean Boom	2,600 ft										
TF-2	VOSS (*Aiviq* or similar vessel)	1	Shell Charter	12,072	13,000	Equipment Pre-Staged on Vessel	Beaufort Sea	~ 25 n mi	0	~ 2.5 hr	<1 hr	~ 3 hr
	Transrec 150 Umbilical Weir Skimmer	1										
TF-3	VOSS (*Harvey Hauler* or similar vessel)	1	Shell Charter	12,072	8,000	Equipment Pre-Staged on Vessel	Beaufort Sea	~ 25 n mi	0	~2.5 hr	<1 hr	~ 3 hr
	Transrec 150 Umbilical Weir Skimmer	1										
TF-4	OST Arctic Tanker (*Affinity* or similar)	1	Shell Charter	0	513,000	Pre-Staged	Beaufort Sea	< 240 n mi	0	24 hr	0	24 hr
TF-5	OSR Barge	1	Shell Charter	24,144	76,900	Equipment Pre-Staged on Vessel	Chukchi Sea	< 420 n mi	0	< 42 hr	<1 hr	< 43 hr
	Transrec 150 Umbilical Weir Skimmer	2										
TF-6	OSR Barge	1	Shell Charter	12,384	17,000	Vessel on-site in Beaufort Sea	Vessel on-site in Beaufort Sea	0	0	0	1 hr	1 hr
	Support Tug for OSR Barge	1										
	Lamor LSC-5 Skimmer	2										
	34-ft Workboats	3										
	Lamor LORS-2C Brush Skimmer	2		4,944								
	47-ft Response Vessel	1										
	Coastal Boom (Shared with TF-7 & 8)	6,000 ft										
	Ocean Boom	2,600 ft										
TF-7	Conventional Boom (Shared with TF-8)	10,000 ft	ACS	0	0	Prudhoe Bay	Shoreline	Incident specific	< 12	2	3	< 63 hr
	Coastal Boom (Shared with TF-8)	4,000 ft										
	Shoreline Guardian Boom	4,000 ft										
	Anchor Containment Boom	2,000 ft										

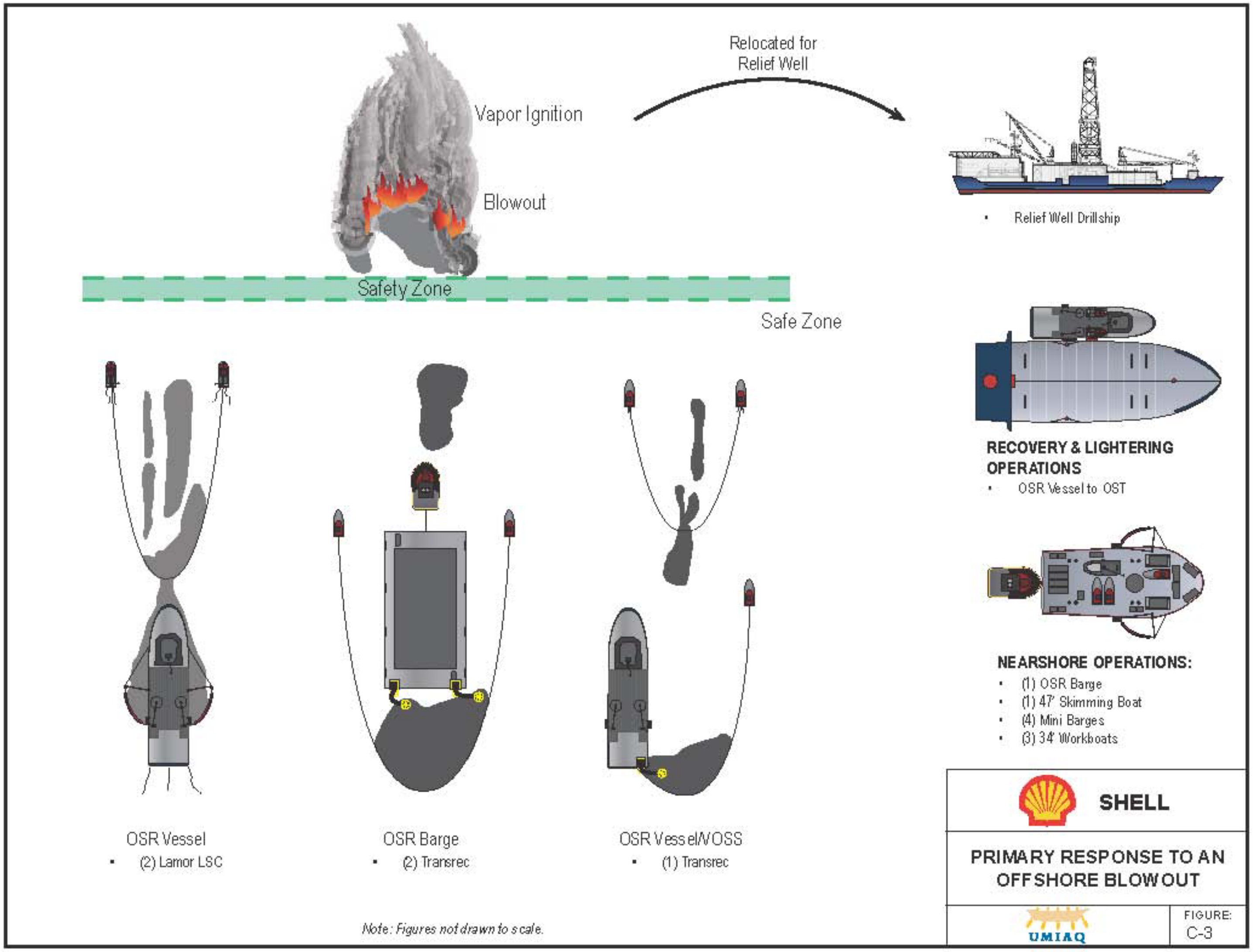
Table C.4-1 (Continued)
Worst Case Discharge Major Equipment

EQUIPMENT DESCRIPTION				RECOVERY CAPABILITIES		EQUIPMENT LOCATION			DEPLOYMENT TIMES			
TASK FORCE	ASSET	QUANTITY	OWNER	EDRC (bbl)	DE-RATED STORAGE (bbl)	STORAGE AREA	STAGING AREA	DISTANCE TO SITE	MOBIL-IZATION[a]	TRANSIT	DEPLOY[b]	TOTAL
	26 to 32-ft Landing Craft	4	ACS			Prudhoe Bay	Shoreline	Incident specific	< 12	< 48	3	
	Workboats	6										
TF-8	Workboats	2	ACS	2,400	> 3,547	Prudhoe Bay	Shoreline	Incident specific	< 12	< 48	3	< 63 hr
	Oleophilic Skimmers	20										
	Bladders (500 to 2,640 gal)	36										
	Anchor Boom	6,000 ft										
	Portable Folding Tank (2,500 gal)	50										
	IMO Tank (6,000 gal)	1										
			TOTAL	80,400	~892,847							

Notes

[a] Mobilization times for all assets listed as "0" indicate the assets are pre-staged on the vessels for immediate deployment throughout the drilling season. Loadout time is "0" for these TFs. For equipment staged in Prudhoe Bay, mobilization time includes loadout. Shell-chartered vessels are staged to respond within the time limits established. Transit times have been reduced to reflect the potential adverse conditions that may include heavy seas, reduced visibility, and the presence of ice that may necessitate additional power requirements.
[b] Deployment times for all offshore TFs are estimated based upon equipment being readied en-route for immediate deployment upon arrival at response site.

Figure C.4-1
Primary Response to an Offshore Blowout



WCD Scenario

Appendix A (Table A-2) provides a complete list of equipment and resources by task force that are available and may be activated. Specific application of equipment and response resources for a WCD event are delineated in Table C.4-1 of this Appendix.

Shell has chosen a conservative 10 knot transit speed for each of the offshore response vessels and the OST. Although service and maximum speeds for these vessels are significantly faster, the planning speed for response purposes has specifically been reduced to show robust response capability even in heavy sea conditions, reduced visibility, and due to the additional power requirements that may be necessary in the presence of ice. All major response assets are designed for and certified for operation in arctic conditions, including operation in high ice concentrations. TF-6, TF-2, and TF-3 with sufficient storage for recovered liquids are staged near the Shell drilling vessel and would be used to initiate response operations. TF-6 is outfitted to deploy boom, high capacity skimmers, and workboats for encountering and recovering oil surfacing from an uncontrolled well blowout. By Hour 20, the OST (TF-4) would arrive on site. By Hour 42, TF-5 would arrive to assist with containment, perform skimming operations, and lightering fluids to the OST (TF-4). At this time, TF-6, TF-2, and TF-3 would stop skimming and begin the process of lightering to TF-4. TF-6, TF-2, and TF-3 have the storage capacity to handle 42 hours of oil recovery operations. When TF-6, TF-2, and TF-3 stop skimming, they would be replaced by TF-5 which has a recovery rate of 1,006 bbl/hr. At Hour 72, recovery operations would rotate every 24 hours. TF-6, TF-2, and TF-3 would comprise one shift, with TF-5 as the opposite shift. Recovery rates of the offshore task forces are detailed in Table C.4-1. The recovery capacities exceed the rate that oil is released from the blowout location.

For planning purposes, Shell has also taken a conservative approach to the development of their OSR program with assumptions that are made to ensure adequate capability to protect sensitive areas. To scale the potential shoreline response assets needed and for planning purposes, the WCD scenario assumes that 10 percent of the 16,000-bopd discharge escapes the primary offshore recovery efforts at the blowout. The unrecovered 1,600 bopd is assumed to drift toward the mainland, driven by ocean currents and prevailing winds. TF-7 would be deployed from Prudhoe Bay to recover oil that is often encountered in windrows and linear slicks. TF-7 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 would be used to transport recovered oil to Prudhoe Bay for processing. For purposes of the WCD Scenario, it is assumed that half of the oil reaching the nearshore environment would be recovered by the skimming systems dispatched from TF-7. The remaining 800 bopd are assumed to migrate toward the shoreline where ACS would mobilize personnel and equipment to intercept the oil and deploy boom for shoreline protection.

Shoreline recovery operations (TF-8) are staffed by ACS personnel supplemented with NSSRT, ACRT, and VRT responders as needed. TF-8 personnel consists of one supervisor and ten laborers (see Table C.4-2 of WCD Scenario). Shoreline recovery teams would install up to 6,000 feet of the available deflection boom at the shoreline to recover oil (see Table C.4-1 of WCD Scenario). Boom is anchored to the shoreline and offshore, and oil is collected with a skimmer and stored in a Fastank. One team works 10 locations within a 5-mile area. Two crews can manage shoreline operations for 10 miles. The shoreline response teams have access to numerous storage containers (e.g., Fastanks) for oily waste storage along the shoreline. Additional temporary storage would be provided as needed using lined pits, drums, bladders and other storage containers. Authorization would be sought for the burning of oily solids (e.g., wood, vegetation and other combustible materials).

Adverse Weather: In consideration of the relatively limited drilling season, adverse weather conditions could most likely occur during the month of October, characterized by: diminishing daylight hours; temperatures dropping to 10˚F to 20˚F; increased winds; and snow accumulations on shore of approximately 4 inches. While winds usually are from the east blowing westward there are periods of time starting in October where winds will blow easterly and occasionally southerly. This condition is a result of the Brooks Range barrier which blocks cold southward moving surface air currents and forces them either westward or eastward. From October through April, mountain barrier winds can result in along shore divergence in the shelf wind field (Kozo 1980, 1984). The drill site is within this area of divergence in the shelf wind field resulting in differing wind directions. As temperatures begin to plummet in early fall/winter landfast ice begins to form in inland areas and lagoons in late September and/or early October. This ice would provide an effective natural barrier to sea surface oil flows reaching the shoreline once it is formed. While this would provide a barrier it also could limit the access to shoreline areas for cleanup operations.

The Torpedo drill site is approximately 20 miles offshore and does not generally have contiguous ice cover until mid November or early December (Brower et al.1988, Belchansky et al. 2004). There is however, the potential for the drill site area to receive broken ice flows driven by wind at any time during and after summer breakup for the proposed drilling season (July through October).

Each of these environmental conditions has the potential to reduce effectiveness of the recovery operations. Particularly in October and later, there may be times when the elements challenge or exceed the effectiveness of mechanical recovery capability. During these temporary adverse conditions, recovery operations may be subject to fog, rain, snow, high winds, rough seas, and varying ice conditions. Once freeze-up occurs (November/December) spill management efforts would likely be limited to non mechanical means. Appendix H presents more detailed information regarding weather and ice conditions.

In recognition of the limitations of mechanical equipment, Shell has provided for extending their response operations through the use of alternative response countermeasures. Shell has designed their OSR in consideration of the environmental conditions expected in the Beaufort Sea, and those extremes that may be encountered (e.g., reduced speeds for vessel transits). Using best available technology, Shell has developed or applied tactical approaches to responding in these conditions, equipping their OSR vessels with multiple skimmers that provide for alternative approaches to recovery operations (e.g., Shell Tactic OR-2C, 2D, and 2E - OSRV Alternatives in Broken Ice). Appendix H, Response Operating Conditions and Limitations, describes a wide variety of natural conditions that may affect recovery operations in the Beaufort Sea. Specifications for Shell’s chartered OSR equipment are presented in Appendix A. ACS equipment information is provided in ACS Tactic L-4 through Tactic L-7.

Ice incursions may occur during the drilling season and, with the onset of fall, cold air temperatures result in the formation of new ice (typically grease ice and the formation of thin continuous layers of elastic ice called “nilas”). Any continuous layers of ice, and even low concentrations of individual ice cakes or floes (such as 1/10 to 2/10 concentrations), can obstruct containment or deflection boom, 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. 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 concentrations increase and mechanical recovery operations efficiencies are reduced, alternative response technologies including *in situ* burning and dispersant application will augment response operations when feasible and permitted.

As ice conditions persist, the ice-class vessels may use ice management techniques to create open leads until late in the season. The vessels would deploy rope mop skimmers and other over-the-side skimmers to access oil trapped next to or within heavier ice concentrations, until the conditions threaten the safety of personnel and/or the effective use of vessels. At this point, all physical removal tactics would cease, and cleanup operations would turn to the elimination of oil pockets through the use of controlled burning and dispersant application, as practical. Shell Tactics OR-7 through OR-9B and ACS Tactics B-3 through B-7 would be considered for oil on water and solid surface burning or discrete application of dispersant. *In situ* burn tactics would be modified as appropriate for the controlled burning of oil herded against large ice floes, trapped within heavy concentrations of ice, accumulated in thick layers against shorelines or landfast ice. When the presence of ice precludes the use of a vessel for mechanical recovery operations, tactics for application of dispersant may be modified to extend the window for dispersant use and provide for additional mixing energy using the vessel's drives to enhance the dispersion process. In some cases, the energy induced from moving ice floes may also provide the energy needed to stimulate dispersion of oil. Burning can be accomplished with the use of heli-torches. Visual monitoring of the effectiveness of these techniques would be conducted.

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 carry the device (heli-torch) to ignite the oil and vapors directly over the blowout. During early freeze-up, ice-management vessels upstream of the blowout can enhance the efficiency of this operation by keeping the area free of heavy ice incursions 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 enhance 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 freezeup conditions would soon be encapsulated under a stable ice cover as new ice forms around and beneath the oil. The encapsulation process prevents oil from coming into contact with wildlife. Depending on the concentration of the oil and the thickness of ice and snow, methods to monitor and track oiled ice could include various commercially available options such as Shell Global Solutions Light Touch system (developed for methane detection from oil in or under ice); use of Ground Penetrating Radar; and laser fluorosensors (showing considerable potential for detecting and mapping oil).

Shell, its Alaska and International Response Teams, and Shell-contracted support from ACS, are prepared to conduct extensive monitoring and tracking of any oil that is released to the Beaufort Sea. Tracking of oiled ice may involve the release of metocean buoys 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, landfast ice can vary substantially from year to year, the seasonal pack ice zone, although mobile, may experience 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.

Proven techniques for the removal (or mining) of oil from within or below landfast ice may be feasible where it is safe to access and work on a stable ice layer. Under other ice conditions, particularly with new ice and in moving broken ice, it will be impractical and unsafe to work from on the ice surface of the oiled zone because of its movement and extensive ridging and rafting of the ice.

As daylight hours increase and the ice begins to melt and weaken, the heavier deposits of oil contained beneath and within the ice would begin to move through brine channels and accumulate in melt pools at the surface. These pools would be readily detectable, they would contain oil that is nearly as fresh as when the pools were encapsulated, and they would likely remain concentrated enough to support combustion. Any oil released as fine droplets and widely dispersed would remain within the ice until the ice melts enough to expose it. These droplets would eventually surface and be herded by wind into pockets of oil that could potentially be ignited. Aerial ignition would continue well into the breakup period, as conditions for combustion 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 would be used to contain and recover oil and burn residue before it could reach shorelines and other sensitive habitats.

Out of Region Resources

Shell's Logistics Section Chief would be responsible for activating facilities, transportation, communications, services, and material in support of an incident. The Logistics Service Branch may include communications, information technology, medical, and food units. The Support Branch may include transportation, personnel, equipment, facilities, and supplies.

Out-of-region resources, or Tier III resources beyond those identified on the North Slope, may be acquired from a variety of organizations. The current OSR program in the Beaufort is scaled appropriately for the WCD volume. In preparation for any contingency, additional information regarding the cascading of out-of-region oil spill equipment, assets, and personnel, such as staging locations and Alaska-specific infrastructure information, is presented in Appendix G. ACS has established a number of master service agreements with a variety of contractors for services that may be required in a spill response. These are described in ACS Tactic L-9.

Appendix G contains a list of vendors in Alaska that may be called upon to support Shell's spill response operations. During a Tier II or III incident, air operations will primarily be conducted from the Deadhorse airport. Shell maintains a fleet of logistics vessels as described in the EP to provide ocean-freight service during the drilling season. In the event of emergency, Shell will have access to additional fire boom through contracts with other OSROs such as MSRC, Clean Gulf Associates, and OSRL.

Shell Logistics and their OSROs maintain call-out contracts with a variety of marine, road, aviation, and expediting and logistics management service providers world-wide to support operations. This robust logistics support network is Shell-managed and available on short notice. Much of the heavy-lift capability, either marine or air-based, would be consolidated in staging yards at either Dutch Harbor (marine) or the Anchorage airport (aviation) and forwarded to the staging area at Deadhorse. These resources and access through ACS are detailed in ACS Tactic L-9 and L-10. ACS may mobilize additional personnel and equipment resources via the APICOM mutual aid agreement described in ACS Tactic L-10. Other qualified staff can be mobilized from within the Royal Dutch Shell Group in the U.S. and abroad through Shell's MOSAG. Through the MOSAG / SART link, access to as many as 2,000 Shell employees is available.

Deadhorse and Anchorage have been identified as primary staging areas for personnel and other physical resources in support of a response effort. Resources may be flown to the site via charter or commercial aircraft from any of the designated staging areas. The equipment designated for onshore support is easily transportable by multiple, readily available, aircraft in the Deadhorse area. Reference Appendix G and ACS Tactic L-4 for additional information on the region's available infrastructure and logistical considerations.

Equipment coming from out-of-region areas would be flown or trucked to the Anchorage airport for immediate relocation to the designated forward-staging area in Deadhorse. Depending on the equipment type, resources could be requested and on location within 72 hours. Logistic contractors are identified in Appendix G.

Shell's QI, IC, or their designee may contact other service companies if the UC deems that such services are necessary to the response effort. These out-of-region (out of the North Slope area) resources may be requested through ACS agreements as described in ACS Tactics L-8, L-9, and L-10. Appendix A (Response Equipment) provides information on the identification and access to equipment and personnel. Shell may also mobilize and activate MSRC equipment to support long-term response needs.

Table C.4-2
Personnel Resources for Worst Case Discharge

TASK FORCE	UNIT DESCRIPTION	RESPONDER POSITIONS PER SHIFT	SHIFTS PER DAY	TOTAL PERSONNEL	TASK FORCE SIZE
TF-1	OSR Response Supervisor	1	2	2	36
	OSR Vessel Deck Crew	3	2	6	
	34-ft Work Boat Operator x 3 boats	6	2	12	
	Lamor Skimmer Operators	2	2	4	
	OSR Vessel Operating Crew (*Nanuq* or similar)	12	N/A	12	
TF-2	VOSS Supervisor	1	2	2	38
	VOSS Deck Crew	3	2	6	
	Trans Rec Skimmer Operators	2	2	4	
	VOSS Operating Crew (*Aiviq* or similar)	26	N/A	26	
TF-3	VOSS Supervisor	1	2	2	28
	VOSS Deck Crew	2	2	4	
	Trans Rec Skimmer Operators	2	2	4	
	VOSS Operating Crew (*Harvey Hauler* or similar)	**18**	N/A	18	
TF-4	Tanker Deck PIC	1	1	2	20
	Tanker Deck Crew	3	2	6	
	Tanker Operating Crew (*Affinity* or similar)	**12**	N/A	12	
TF-5	OSR Response Supervisor	1	2	2	23
	OSR Barge Deck Crew	3	2	6	
	TransRec Operators	4	2	8	
	OSR Barge (Tug) Operating Crew (*Klamath* or similar)	**7**	N/A	7	
TF-6	Recovery Supervisor	1	1	1	19
	OSR Barge Deck Crew (*Endeavor* or similar)	3	1	3	
	47-ft Skimmer Boat Operators	3	1	3	
	34-ft Work Boat Operator x 3 boats	6	1	6	
	Barge Operating Crew (tug)	**6**	N/A	6	
TF-7	Shoreline Protection Supervisor	1	1	1	37
	Shoreline Protection Labor	4	1	4	
	29-ft Work Boat (ACS Type C) Operators	4	1	4	
	18 to 26-ft Work Boat (ACS Type A & B) Operator	8	1	8	
	24-ft Work Boat Operators	4	1	4	
	Mini barges	8	1	16	
TF-8	Shoreline Recovery Supervisor (Supported by TF-7)	1	1	1	11
	Shoreline Recovery Labor (Supported by TF-7)	10	1	10	
Ice Manage-ment	Ice Management Vessel (*Nordica* or Similar)	30	N/A	30	30
Subsea Contain-ment	Subsea Containment and Processing Unit	67*	N/A	67	67
	TOTAL PERSONNEL			**309**	**309**

For ACS personnel, the Total is the sum of vessel operators, technicians, and general laborers. For ACS personnel, the Team Leader is a separate person.
* Staffed during incident
Shift = 12hrs TF-6, TF-7 and TF-8 operate one 12-hr shift per day.
All TF-4 tasks, including PIC, will be performed by the tanker crew with no additional response staff from Shell or ACS.
Additional support personnel availability is described in Appendix A, ACS Tactics L-8, L-9 and L-10.

Figure C.4-2
ACS Tactic L-10

TACTIC L-10 Accessing Non-Obligated Resources (Page 1 of 2)

OIL SPILL RESPONSE COOPERATIVES

The Association of Petroleum Industry Co-op Managers (APICOM) has a mutual aid agreement to provide equipment and personnel to members on an as-available basis. Co-ops are under no obligation to provide resources. Resource availability may be restricted by either a co-op's member companies or regulatory obligations. A list of APICOM members is provided below.

APICOM MEMBERS

Cooperative	Location	Phone	Fax
Burrard Clean Operations	Vancouver, BC	(604) 985-0855	(604) 985-0955
Chadux Corporation	Anchorage, AK	(907) 278-3365	(907) 278-3330
CISPRI*	Kenai, AK	(907) 776-5129	(907) 776-2190
Clean Bay Incorporated	Concord, CA	(925) 685-2800	(925) 825-2203
Clean Caribbean Cooperative	Ft. Lauderdale, FL	(305) 983-9880	(305) 987-3001
Clean Casco Bay, Inc.	Portland, ME	(207) 828-4511	(207) 828-4516
Clean Channel Assoc., Inc.	Houston, TX	(713) 676-1318	(713) 676-2571
Clean Coastal Waters, Inc.	Long Beach, CA	(310) 432-1415	(310) 437-1510
Clean Gulf Associates	New Orleans, LA	(504) 593-6724	(504) 593-6725
Clean Harbors Cooperative	Edison, NJ	(908) 225-2301	(908) 417-3921
Clean Islands Council	Honolulu, HI	(808) 528-4449	(808) 521-7049
Clean Rivers Cooperative	Portland, OR	(503) 220-2040	(503) 295-3660
Clean Seas	Carpinteria, CA	(805) 684-3838	(805) 684-2650
Clean Sound Cooperative, Inc.	Edmonds, WA	(206) 744-0948	(206) 771-3244
COPIM St-Laurent LTEE	Levis, Quebec	(418) 833-8989	(418) 833-9649
Corpus Christi Area Oil Spill Control Assoc.	Corpus Christi, TX	(512) 882-2656	(512) 880-3299
Delaware Bay & River	Lewes, DE	(302) 645-7861	(302) 645-4006
Humbolt Bay Oil Spill	Eureka, CA	(707) 445-3002	(707) 445-4306
LOOP	New Orleans, LA	(504) 368-5667	(504) 363-9284
M.I.R.G.	MIRG	(504) 394-0893	(504) 392-2467
MSRC Gulf Region	Lake Charles, LA	(318) 437-9600	(318) 433-9678
MSRC Northeast Region	Edison, N.J.	(908) 417-0500	(908) 417-1314
MSRC Northwest Region	Seattle, WA	(206) 774-6772	(206) 774-7770
MSRC South Region	Port Hueneme, CA	(805) 986-8384	(805) 986-8388
MSRC Southeast Region	Miami, FL	(305) 375-8410	(305) 577-8523
Oil Spill Service Centre	Southampton, G.B.	011-44-703-331551	011-44-703-331972
PIER Atlantic, Ltd.	Dartmouth, NS	(902) 461-9170	(902) 461-9590
PIMEC	Ontario, Canada	(416) 492-5713	(416) 492-5713
SEAPRO	Ketchikan, AK	(907) 225-7002	(907) 247-1117
SERVS*	Valdez, AK	(907) 835-6902	(907) 835-6944

* Both CISPRI and SERVS maintain fishing vessel charter contracts for response in the event of a spill in their respective areas. Under contracts, vessel operators and deck hands are trained in spill response activities such as booming, skimming, and mini-barge operations. These vessels can be made available through either the APICOM mutual aid agreement or provisions in the specific fishing vessel contracts.

ACS Tech. Manual Vol. 1, 9/01 *NOTE: All values given on these pages are for planning purposes only.*

Figure C.4-2
ACS Tactic L-10 (Continued)

Accessing Non-Obligated Resources (Page 2 of 2) **TACTIC L-10**

ACCESSING STATE OF ALASKA RESOURCES

State of Alaska resources may be made available in a spill response when a compelling need can be demonstrated, such as a greatly enhanced response. The State will consider the availability of private sector resources prior to committing equipment.

The point of contact for accessing state resources is the State On-Scene Coordinator (SOSC).

The spiller will be responsible for all costs associated with mobilization, activation and/or use of State of Alaska equipment.

ACCESSING FEDERAL GOVERNMENT RESOURCES

Federal resources may be made available in a spill response when a compelling need can be demonstrated, such as a greatly enhanced response. The Federal Government will consider the availability of private sector resources prior to committing equipment.

The point of contact for accessing federal resources is the Federal On-Scene Coordinator (FOSC).

The spiller will be responsible for all costs associated with mobilization, activation and/or use of federal government equipment.

ACCESSING RESOURCES FROM OTHER C-PLAN HOLDERS

The SOSC can authorize the release of response equipment from other facilities in Alaska operating under a state-approved contingency plan. On the North Slope, these facilities are located in the villages.

NOTE: All values given on these pages are for planning purposes only. ACS Tech. Manual Vol. 1, 9/01

Introduction to the Varying Ice Strategy Table C.4-3.

In accordance with 18 AAC 75.425(e)(1)(f), response strategies may be required by ADEC to account for variations in receiving environments and seasonal conditions. Table C.4-3 presents the response strategy developed by Shell to present tactics that may be employed in varying ice conditions. Table C.4-3 is included in this OSRP for illustration purposes.

For the purposes of the strategy, a Shell exploration well on the Torpedo prospect blows out at sub-sea on October 1, nine days before freeze-up. While open water at the Torpedo 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.

Table C.4-3
Response Strategy
Subsea Well Worst Case Discharge Blowout in Varying Ice Conditions

ADEC REQUIREMENT	RESPONSE STRATEGY	ACS / REGIONAL TACTIC
(i) Stopping Discharge at Source	The On-Site Shell Drill Foreman notifies ACS and AES personnel on the OSRB 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. An oil storage tanker located between 25 nm and 200 nm from the drilling location is also notified and immediately begins mobilizing to the spill location.	ACS A-1, A-2 Regional LE-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 drilling vessel is moved from the well blowout. As in the open-water scenario, the FOSC approves the ignition of the blowout for safety reasons.	ACS S-1 through S-6
(iii) Well Control Plan	Well control is discussed in Appendix N of this OSRP.	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 four hours of initial notification of the blowout, the Kuparuk Twin Otter with 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.	ACS T-4, T4A ACS T-5 ACS 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 (ACS 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. 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 ESI maps, ACS Map Atlas, and the *North Slope Subarea Contingency Plan* are used to identify areas of major concern.	NOAA ESI Maps ESI 3-5 ACS Atlas Maps 80, 83, 85-87,89-91, 93,100-104, 184-188 ACS R-15 through R-18 http://www.asgdc.state.ak.us/maps/cplans/subareas.html#northslope

Table C.4-3 (Continued)
Response Strategy
Subsea Well Worst Case Discharge Blowout in Varying Ice Conditions

ADEC REQUIREMENT	RESPONSE STRATEGY	ACS / REGIONAL TACTIC
(v) Protection of Environmentally Sensitive Areas and Areas of Public Concern (Continued)	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 these sites, stakes will be positioned to identify areas for on/in-ice recovery techniques.	ACS T-2
(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 a large swath, open apex U-boom configuration, funneling oil immediately downstream of the blowout into narrow, thick bands. The concentrated bands of oil are intercepted by the OSRB and the other two on site response vessels, which work in a rotation cycle, filling only a portion of the onboard storage capacity with each recovery cycle. 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 centimeters 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 OSR barge and the other two on site response vessels.47-foot vessel, and the vessel of opportunity. Oil encounter rates are substantially reduced, and the large OSR barge, together with the smaller skimming vessels (the 47-foot boat with built-in Lamor brushes, the ACS skimming workboats, and the vessel of opportunity), are limited to spot-removal techniques in the heaviest of concentrations. As oil accumulates in pockets, recovery continues with the OSR barge operating rope-mop and direct suction skimmers along with the over-the-side Lamor brush skimmers.	Regional OR-1B , and 10 ACS, B-3 B-5 ACS B-3 Regional OR-1C-D, 4C-D, 5A, 7, and 10 ACS B-5

Table C.4-3 (Continued)
Response Strategy
Subsea Well Worst Case Discharge Blowout in Varying Ice Conditions

ADEC REQUIREMENT	RESPONSE STRATEGY	ACS / REGIONAL TACTIC
(vi) Spill Containment and Control Actions (continued)	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.	ACS R-31
	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 workboats and barges are loaded onto the larger OSR barge. ACS boats return to 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.	Regional OR-7
	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, 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, workboats, 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 each of the OSR barges.	

Table C.4-3 (Continued)
Response Strategy
Subsea Well Worst Case Discharge Blowout in Varying Ice Conditions

ADEC REQUIREMENT	RESPONSE STRATEGY	ACS / REGIONAL TACTIC
(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.	
	TF-6: Primary response is provided by personnel and equipment located on the OSR barge. This equipment includes an OSR barge with two large brush skimmers; one 47-foot skimming vessel (with built-in brush skimmers); three 34-foot workboats; and containment and fire boom.	Regional OR-2A to 2D
	TF-2: Secondary response is provided by *Aiviq* (or similar) equipped with a Transrec 150 skimmer, TF-2 has a planned storage capacity of 13,000 bbl.	Regional OR-5A to 5B
	TF-3: Secondary response is provided by *Harvey Hauler* (or similar) equipped with a Transrec 150 skimmer. TF-3 has a planned storage capacity of 8,000 bbl.	Regional OR-10
	TF-4: An approximately 513,000-barrel tanker located between 25 nm and 200 nm from the drilling location is deployed immediately. It arrives within 20 hours. Decanting (if required) follows FOSC plan and USCG approval. TF-4 provides oil storage capacity for the offshore recovery task forces.	
	Within 1 hour, Task Force 6 initiates recovery of oil in the open water west of the drilling vessel, which is located north of Mikkelson Bay. Two workboats tow boom in a large, U-shaped configuration with an open apex that allows oil to filter through to an OSR barge 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 stages of freeze-up.	
	By Hour 33.5, Task Forces 2 and 3 assist Task Force 6 in open water recovery operations. Decanting follows FOSC plan approval. Cleanup 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.	

Table C.4-3 (Continued)
Response Strategy
Subsea Well Worst Case Discharge Blowout in Varying Ice Conditions

ADEC REQUIREMENT	RESPONSE STRATEGY	ACS / REGIONAL TACTIC
(viii) Lightering Procedures	Lightering crews offload recovered oil from the OSR barges and the other vessels to the tanker. Once the tanker arrives on site, it remains in close proximity (within a mile or two) of the recovery operations, so transit times to the tanker are minimal. With the use of BAT 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 (for a full tank). 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.	ACS R-28 Regional OR-3A and OR-6
(ix) Transfer and Storage of Recovered Oil/Water; Volume Estimating Procedure	As the OSR barges and other vessels near capacity, the oil spill response platform transits to TF-4 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.	ACS 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 approval. Non-liquid oily wastes are classified and disposed of according to classification. Non-oily wastes are classified and disposed of accordingly.	ACS D-1 through D-3
(x) Plans, Procedures, and Locations for Temporary Storage and Disposal (continued)	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 Appendix K).	
(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 and security staff trained by government biologists are assigned to protect bears and workers (see Appendix I).	ACS C-13, C-14 ACS W-1 ACS W-2A, W-2B ACS W-5, W-6

Table C.4-3 (Continued)
Response Strategy
Subsea Well Worst Case Discharge Blowout in Varying Ice Conditions

ADEC REQUIREMENT	RESPONSE STRATEGY	ACS / REGIONAL TACTIC
(xii) Shoreline Cleanup Equipment	Shoreline cleanup operations are based on a plan approved by the Unified Command.	ACS SH-1
	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.	ACS B-5, B-6, C-12
	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.	ACS SH-1
	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,	ACS B-2
	• Deluge of minor to moderately oiled shoreline in the river, including those areas where heavier concentrations were manually removed, and	ACS SH-3
	• Natural recovery for those areas where residual staining may remain, but further recovery would cause more harm than good.	ACS SH-2

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APPENDIX D

DISPERSANT USE PLAN [30 CFR 254.27]

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APPENDIX D DISPERSANT USE PLAN [30 CFR 254.27]

D.1 OVERVIEW

Dispersants are chemical formulations containing surfactants that, when applied to a slick, lower the surface tension between oil and water, facilitating the formation of oil droplets under wave action and preventing them from coalescing and resurfacing, therefore enhancing oil dispersion and biodegradation into the water column. Dispersants may be strategically applied to reduce oil impacts to sensitive shoreline or to remove oil concentrations from the water surface reducing marine bird and mammal contact with oil slicks.

Dispersant use is strictly regulated and has very specific policies and procedures associated with it. Dispersant application requires approval from the FOSC. The ARRT, comprised of federal, state, and local governmental agencies, will act as an advisory board to the FOSC.

Shell has committed to not using dispersants in the Beaufort Sea. However, in an effort to provide a complete plan, Shell offers the following as an example of how a dispersant mission could be conducted and/or supported.

The option to apply dispersants to a spill within the Beaufort Sea will most likely be evaluated by the FOSC and UC when environmental conditions reduce the efficacy of mechanical recovery or when the spill volume and duration warrant consideration of its use.

There are several reasons to consider dispersants as a viable treatment option: Aerial application provides an increased vantage point to locate and target oil slicks for treatment; increased mobility compared to on-water assets; and an increased oil encounter rate. Vessel-based platforms using spray arms provide the ability to apply dispersants in discrete areas and at times when aerial assets may not be available. Mixing of the dispersants into oil using the OSR vessel's propulsion system facilitates the effectiveness of oil dispersion. Dispersants also provide the ability to treat a significantly larger volume of oil than can be mechanically recovered in a similar time period. The resulting potential to mitigate sensitive resource and shoreline impacts warrants the consideration of dispersant use.

D.2 INVENTORY AND LOCATION OF DISPERSANT [30 CFR 254.27(a)]

The NCP requires that dispersants proposed for use are listed in the NCP Product schedule. Products currently stockpiled for use by industry in Alaska include COREXIT® EC9500A (9500). Shell would have 25,000 gallons of 9500 available for use in Alaska, with approximately 23,700 gal available for mobilization from Anchorage and 1,300 gal pre-staged with ACS on the North Slope. Both of these products are solvent-based "concentrate" dispersants that may be applied in their undiluted (neat) or diluted form. Table D.2-1 presents a summary of current dispersant inventory and locations.

Table D.2-1
Dispersant Inventory and Location

SHELL DISPERSANT	LOCATION	VOLUME
9500	Anchorage, AK	23,700 gal
9500	North Slope, AK	1,300 gal
9500	Mesa, AZ (MSRC C-130 Payload)	3,200 gal
9500	MSRC Inventory	http://www.msrc.org/download/MSRC_Cntrl_Disp_Inv.pdf.
9500	ACS Mutual Aid Agreements (ACS Tactic L-10)	CISPRI: 13,200 gal Contact: (907) 776-5129 Inventory Location: Anchorage (11,000 gal) Nikiski (2,200 gal)
		Alyeska Pipeline Service Company: Total 72,827 gal Contact: (907) 834-6963 or (907) 461-7141 Inventory Location: Anchorage (61,882 gal) Valdez (10,975 gal)

The MSRC C-130 aircraft would be mobilized to Barrow or Deadhorse with a full payload (3,200 gal) of 9500 dispersant.

Through their contract with MSRC, Shell also has access to additional inventories of dispersants. This list may be accessed via MSRC's Dispersant Inventory list at http://www.msrc.org/download/MSRC_Cntrl_Disp_Inv.pdf.

In order to sustain sufficient inventory of dispersant during a Tier III incident, Shell in coordination with its contracted OSROs, will call for the manufacturing of additional dispersant from Nalco Company. Nalco has indicated that it has the capability to ramp up within 10 days to begin replenishing much of the anticipated daily dispersant usage for 9500. Nalco has confirmed that a baseline average of 40,000 gal of dispersant can be produced on a daily basis once Nalco reaches full production. Nalco has the ability to produce around 50,000 gpd, but this is dependent on availability of dispersant mixture ingredients.

D.3 PRODUCT TOXICITY DATA [30 CFR 254.27(b)]

Shell has access to stockpiles containing one type of dispersant 9500. This product is included in the EPA's NCP Product Schedule. 9500 was developed in the early 1990s, is effective on heavier crude, and is made of materials that are considered more environmentally friendly than previously produced dispersants. A summary of the physical properties of 9500 is provided below:

COREXIT 9500:
Specific Gravity at 60ºF: 0.95
Density at 60ºF: .... 7.93 lb/gal
Flash point: 176ºF
Pour point: .... -71ºF
Viscosity at 32ºF: .... 177 cSt
Viscosity at 60ºF: .... 70 cSt
Viscosity at 100ºF: .... 27 cSt
Solubility in fresh water: .... soluble

Toxicity information for 9500 is also available online at http://www.epa.gov/oem/content/ncp/tox_tables.htm. MSDS Sheets for 9500 may be accessed at http://www.nalco.com/documents/Annual-Reports/9500A_MSDS.pdf .

D.4 EQUIPMENT MOBILIZATION [30 CFR 254.27(c)]

Mobilization of resources required to implement Shell Tactics OR-8, OR-9A, and OR-9B or ACS Tactics DT-1, DT-2, or DT-3 for possible deployment will not be dependent upon FOSC or UC approval. The approval evaluation and coordination process takes time. Mobilization of the MSRC (C-130), UNIVAR (bulk storage facility for dispersant in Anchorage) and Oasis Environmental (dispersant monitoring and testing contractor), will be prior to obtaining approval for dispersant use, to ensure these resources are pre-staged and readily available in Barrow, AK when the FOSC approval is granted. These resources may be flown via charter or commercial airfreight to Barrow within 24 hours. By the end of Day 1, a complete dispersant support operation could be readily available to the UC.

Dispersant equipment and supplies are identified within Shell Tactics OR-8, OR-9A, and OR-9B and ACS Tactics DT-1, DT-2, and DT-3. Additional support for on-going dispersant application would be made through activation of ACS's APICOM mutual aid agreements described in ACS Tactic L-10. Table D.4-1 lists dispersant equipment and locations.

Table D.4-1
Dispersant Equipment and Location

SHELL DISPERSANT EQUIPMENT	STAGING LOCATION	APPLICABLE TACTIC	RESPONSE TIME (hr)	
			MOB & TRANSIT	DEPLOY
Hercules Aircraft C-130 with 3,200 gal of dispersant	Mesa, AZ	Shell OR-9A	24	0.5
Helicopter / Fixed-Wing Support	Anchorage / Barrow / Deadhorse	Shell OR-9A OSRP Appendix A ACS Tactic L-4	<24	1
Spray Arms	OSR Vessel	OR-8	<42	0.5
Spray Bucket	Deadhorse	OR-9B	1	1
Supplemental Aerial Dispersant Platforms	Variable	ACS Tactic L-4 and L-10	Variable	Variable

Aerial application of dispersants would likely involve fixed-wing aircraft because helicopters have limited payload-range capabilities. Shell has access to large fixed-wing aircraft through service agreements, and additional aircraft may be mobilized as needed. As an established member of the MSRC, Shell has access to a C-130 with integrated dispersant tanks that would be staged, maintained, and mobilized out of Mesa, AZ. The C-130 would arrive in Barrow or Deadhorse with a qualified crew and operator within 24 hours of initial notification. A spotter plane (fixed-wing) would also be provided by MSRC and travel in tandem with the C-130 for staging and deployment. The integrated dispersant tanks on the MSRC C-130 have a 3,200 gal capacity. As a member of MSRC and ACS, Shell also has access to additional dispersant stockpiles and spotter aircraft. Reference Shell Tactics OR-9A and OR-9B for information on aerial dispersant application equipment staging, mobilization, and capacities.

Compared to aircraft delivery systems, vessels may be slower with limited transit speeds, limited swath widths, and are subject to the variability of sea state. However, vessel application systems can be of great value when conditions preclude the use of that vessel for other mechanical recovery operations. Should it become too rough to deploy booms for the recovery and/or burning of oil, vessels might be used to apply dispersants at or near the spill site. In broken ice, dispersants could be applied and then agitated using the vessel propulsion system to enhance the dispersion process. Any application of dispersants, whether from vessels or aircraft in open water or in broken ice, would always involve a thorough assessment of the benefits and risks, and involve appropriate authorization for use. Reference Shell Tactic OR-8.

D.5 DISPERSANT APPLICATION PROCEDURES [30 CFR 254.27(d)]

Upon approval, incident-specific conditions associated with the approval shall be met. Both alternative response techniques (aircraft and vessel) shall require a test to determine if its use is feasible given environmental and oil conditions. If the event warrants the consideration of alternative measures, assets will be immediately mobilized to support operations. The efficient use of both techniques decreases as the oil weathers, presenting a relatively narrow window of opportunity for its use. In addition, dissipation of a dispersed oil plume into deeper waters (more than 30 ft [10 m]) is preferable and relies upon timely deployment of an application platform. On-site assets shall be deployed upon approval by the UC.

Initiation of dispersant application will normally involve the following steps:

1. Prior to UC approval, dispersant support contractors and other resources are mobilized to Barrow for immediate availability.

2. Ready vessel-mounted dispersant equipment.

3. Within the IC, integrate planning, logistics, and operations functions to provide necessary support to air and sea dispersant application platforms.

4. UC will provide a Dispersant Use Plan utilizing Figure D.8-1 and ensure ongoing monitoring of the dispersant effectiveness using SMART protocols.

5. The IC will monitor the efficiency and effectiveness reports of missions to provide a basis for the UC to determine if dispersant use will continue.

Procedures and methods for implementation of the Dispersant Use Plan are described in detail within the Shell *Tactics Manual* and ACS *Technical Manual* and include, but are not limited to, tactics listed in Table D.5-1.

Table D.5-1
Non-mechanical Response Tactics References

NON-MECHANICAL RESPONSE CATEGORY	MANUAL	TACTIC	TACTIC TITLE
Dispersant Use	ACS	DT-1	Dispersant Application Via Vessel
		DT-2	Dispersant Application Via Aircraft
		DT-3	Dispersant Application Via Helicopter
	Shell	OR-8	Dispersant Spray from OSR Vessel Outriggers
		OR-9A	Aerial Dispersant Application (HERC with ADDS-Pack)
		OR-9B	Aerial Dispersant Application (Helicopter Spray Bucket)

D.6 POTENTIAL CONDITIONS FOR DISPERSANT APPLICATION [30 CFR 254.27(e)]

Shell has committed to not using dispersants in the Beaufort Sea. However, in an effort to provide a complete plan, Shell offers the following as an example of how a dispersant mission could be conducted and/or supported.

Shell has incorporated the flexibility to implement multiple strategies and tactics into their response preparedness and planning. Mechanical recovery and removal of oil from the environment is the primary method of response that Shell intends to employ for OSR. Use of dispersants will be considered as options to augment mechanical response methods. Dispersant would be used with the consent of the FOSC or UC to augment mechanical response.

While the primary response method to be employed by Shell in the Beaufort Sea is mechanical recovery, Shell also recognizes the limitations of mechanical response equipment in various sea states and environmental conditions as well as the need for strategic flexibility to maximize oil spill response in the Beaufort Sea. The capability of applying dispersants extends response operations beyond the limitations of mechanical equipment or the slick-threatened sensitive resources, coastal areas and state waters. The decision to use dispersants is dependent upon several factors including: the effectiveness of mechanical response; whether dispersant application strategies can be employed to augment, and not impede, mechanical recovery; and whether environmental conditions are conducive for dispersant use.

Dispersant application will be considered as a secondary response technique. Alternate, non-mechanical response options may be employed to augment mechanical recovery strategies or to supplement them if conditions make mechanical recovery ineffective. Additionally, the response options may be employed if their use is deemed to be more environmentally beneficial than if their use is withheld. Note that the equipment necessary to conduct initial non-mechanical response missions is already made available by Shell and exists on the OSR vessels described in Appendix A. The cascading of additional non-mechanical resources, from outside the immediate region, is well established.

A critical window of opportunity exists in which dispersant is best used. Generally, dispersants are most effective on fresh crude oil as the dispersant reacts with the more volatile hydrocarbons. Over time, spilled oil in the marine environment will weather, losing volatile hydrocarbons and forming water-in-oil emulsion. For the Beaufort Sea well blowout scenario, the use of dispersants may be considered daily until several days after well control is achieved. Shell's OSR vessel is equipped with dispersant application spray arms system.

Effective dispersion of oil is affected by multiple factors including:

- oil properties;
- oil weathering or emulsification;
- sea state or mixing energy;
- oil and water temperature;
- seawater salinity;
- type of dispersant; and
- application systems and strategies.

Shell recognizes that when proposing the use of dispersants on spills from exploration operations there may be critical unknowns (e.g., oil properties and whether the oil is chemically dispersible). When proposing the use of dispersants in open water, the following should be considered.

- The oil properties will be unknown until Shell's exploration operations are complete. SMART protocols also recommend a field test application for any proposed treatment of spilled oil with dispersants. Because the oil properties in this prospect are currently unknown, there is an expectation that an on-site test for dispersant use in the Beaufort Sea would be a UC condition of approval. On-site dispersability tests will be conducted by subjecting 20 drops of an on-site collected oil sample to one drop of dispersant chemical. This will provide an initial dispersability determination (i.e., it is either dispersible or not) by visual observation. However, caution should be used due to the large droplet size, as this test will only provide a gross visual estimate and may not be indicative of the improved efficiency gained by proper dispersant application. A more comprehensive chemical analysis of a down-hole recovered oil sample will be performed after the first exploratory well drilling (presuming drilling success), and results could be available for the initial well within several days after processing at a shore-based laboratory.

- Wind waves [greater than 3 to 4 ft (0.9 to 1.2 m)] (Beaufort Scale 4) reduce or impede the containment of oil with booms. Dispersant effectiveness requires some wave energy (or deliberate mixing) and is not normally applied to oil on calm waters. Having the option of using dispersants as a response strategy could extend response operations beyond mechanical recovery and *in situ* burning possibilities. Dispersants can be applied effectively with only light wind chop (Beaufort Scale 1); however, dispersants are much more effective with breaking waves as seas approach a Beaufort Scale 3. The upper limit for dispersant use is typically around Beaufort Scale 6 to 7 (waves at 10 to 14 ft [3.0 to 4.3 m]); however, the limitation is not because of wave conditions, but because of the effects of strong winds on droplet size and distribution. Natural dispersion under these conditions will also play a major role in removing oil from the surface.

- As required by Subpart J of the NCP, the dispersant proposed and available for use in Alaska (9500) is on the NCP Product Schedule and approved for use by EPA. Tests have shown that 9500 is an effective dispersant on Alaskan oils in cold water (SL Ross 2003). Additionally, information on dispersed oil toxicity and biodegradability by Arctic species is incorporated by reference in Appendix L (Bibliography) (see Gardner, et al., 2011 and Perkins et al., 2011).

- As water temperature decreases, oil viscosity increases. Dispersants are most effective for oil viscosities less than 2,000 cSt and almost no dispersion occurs for viscosities exceeding 10,000 cSt. A general rule of thumb is that all crude oils are initially amenable to dispersion except those crude oils with high initial viscosities or that would be solid at seawater temperatures. If the water temperature is below the pour point of the oil, dispersant will simply roll off of the oil layer (NRC 1989). Seawater freezes at around 28°F (-2°C). Water temperatures in the Beaufort Sea appear to be undergoing a warming trend (MMS 2007).

- Salinity in the Beaufort Sea ranges between 27 and 32 ppt (http://www.alaska.boemre.gov/ref/EIS%20EA/2012_Shell_CamdenEP_EA/2011_039.pdf). Values below this range are not expected offshore in the sale lease area. Increased salinity generally decreases the solubility of dispersants in the water enhancing oil/dispersant interaction (Chandrasekar et al. 2006).

- Oil slick thicknesses should be about .004 inches (0.1 mm) or greater for the effective use of dispersants. Oil at thickness of .004 inches (0.1 mm) would require a dosage of about 5 gal of dispersant per acre for a commonly accepted DOR ratio of 1:20.
- Although near shore (<33 ft [10 m] water depth) dispersant application may in some cases be considered to protect sensitive resources, operations in the Beaufort will more likely be offshore (approximately 50 n mi) near the lease sale area. Consistent with the guidelines established by the Unified Plan, the optimal water depth to disperse oil is ≥33 ft (10 m). The water depths in the lease area range from approximately 104ft to 124ft (32 m to 38 m).
- Results of studies indicate that chemically dispersed oil does not adhere to some organisms or habitats to the extent of untreated oil (NRC 1989).
- The encounter rate to treat a spill using aerial and on-water application platforms is significantly higher than on-water recovery operations.
- A standard DOR application rate of 1 to 20 would be used; however, this may be modified based upon incident specific needs and UC approval. Multiple passes or applications may also provide an added level of control. The MSRC C-130 dispersant system may deliver up to four payloads, depending upon the actual transit distance from the Barrow staging area to the spill location, over a 12- to 18-hr period. With a dispersant-to-oil ratio of 1:20, one payload results in treatment of approximately 1500 bbl of oil.

The use of dispersants in broken ice also presents challenges, but certain broken ice conditions may present the potential for improved efficiency. When proposing the use of dispersants in broken ice conditions, the following should be considered.

- Low air and water temperatures often result in greater oil equilibrium thicknesses, thereby reducing spreading rates and areas of coverage. These reductions limit the potential for impact with natural resources while providing the potential for much higher oil encounter rates for dispersant application. For maximum effectiveness, dispersant should be applied “neat” or undiluted. Shell has chosen 9500 for use, undiluted, in the Beaufort Sea.
- Evaporation rates are reduced, leaving the lighter and more volatile components in the oil longer, thereby extending the time in which the oil could be dispersed.
- The presence of ice can dampen wave action and limit the fetch over which winds might otherwise create large waves. While this would enhance burning opportunities, oil is more readily dispersed with induced agitation and/or wave energy. Tests have shown that moving broken ice can actually stimulate dispersant action. Dispersant efficiencies increase with the amount of mixing energy even more so than with increases in salinity (Chandrasekar et al. 2006). The OSR vessel propulsion system may be used to create surface turbulence, thereby enhancing mixing energy for dispersants in areas where wave action is diminished by the presence of ice.

- Sea-ice formation results in increased salinity. Brine rejection during sea-ice growth strongly affects salinity of upper ocean water. This may result in improved oil dispersion as tests have shown an increase in the dispersability of some oils with an increase in salinity (Chandrasekar et al. 2006). The salinity of seawater normally ranges between 32 and 35 ppt.

- Emulsion formation may be slowed dramatically by high ice concentrations. Fresh unemulsified crude is more efficiently dispersed.

D.7 DECISION AND APPROVAL PROCESS [30 CFR 254.27(f)]

Request for approval of the use of non-mechanical response methods will be made to the UC. The ARRT, comprised of federal, state, and local governmental agencies, will act as an advisory board to the FOSC.

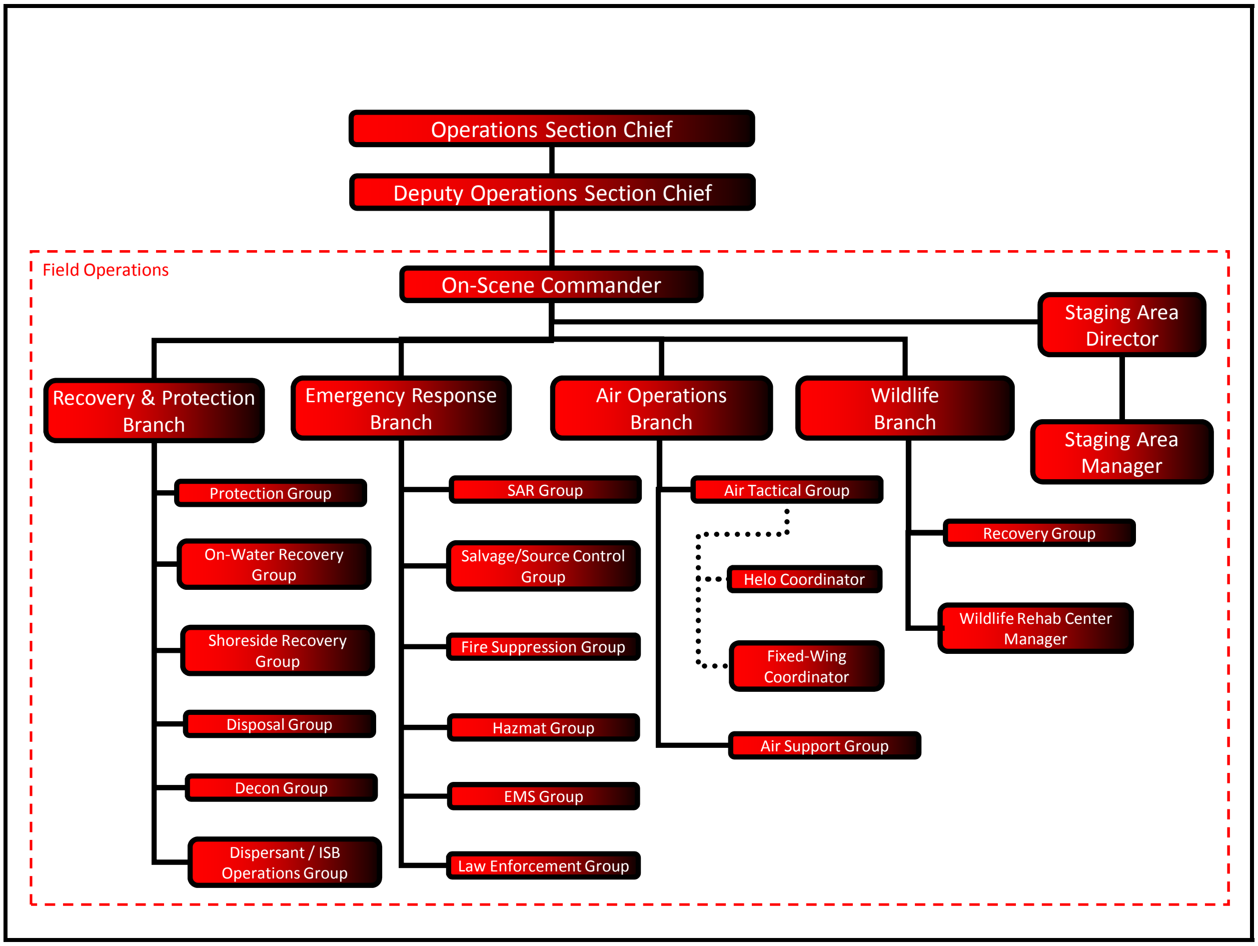
The need for the use of non-mechanical response methods to augment mechanical recovery is determined and approved by the FOSCs and SOSCs within the UC. Input and considerations from local stakeholders and regulatory authorities shall be vetted through the On-Scene Coordinators and IC.

For dispersant use, the request for approval will be made consistent with the guidance procedures outlined in Annex F “Chemical Countermeasures: Dispersants, Chemical Agents, and Other Spill Mitigating Substances, Devices or Technology” of the Unified Plan.

Use of dispersants in “undesignated zones” within federal waters is under the command of the USCG as the FOSC. Consistent with the Unified Plan Annex F guidance, Shell will follow the undesignated zone request for approval procedures. Although the FOSC has final authority within OCS waters, the request for approval will be made through the UC. Prior to the use of dispersants in state waters, approval would be requested from the ADEC, acting as the SOSC.

Figure D.7-1 provides an example of the Field Operations organization Shell may use when dispersant is considered as a viable response strategy. Figure D.8-1 shows the Oil Spill Response Checklist: Dispersant Use, as presented in the Unified Plan, Annex F (Change 3).

Figure D.7-1 Field Operations: Dispersants Operations Group



D.8 MONITORING

The oil properties will be unknown until Shell's exploration operations are complete. SMART protocols also recommend a field test application for any proposed treatment of spilled oil with dispersants. Because the oil properties in this prospect are currently unknown, there is an expectation that an on-site test for dispersant use in the Beaufort would be a UC condition of approval. On-site dispersability tests will be conducted by subjecting 20 drops of an on-site collected oil sample to one drop of dispersant chemical. This will provide an initial dispersability determination (i.e., it is either dispersible or not) by visual observation. However, caution should be used, due to the large droplet size, as this test will only provide a gross visual estimate and may not be indicative of the improved efficiency gained by proper dispersant application. A more comprehensive chemical analysis of a down-hole recovered oil sample will be performed after the first exploratory well drilling (presuming drilling success), and results could be available for the initial well within several days after processing at a shore-based laboratory.

When dispersants are considered for use as a response option, the UC may require that monitoring of the dispersed oil is performed consistent with one of the three tiers defined within NOAA's dispersant use SMART protocol. Accepted by the response community as a standardized approach to monitoring dispersant applications, the protocol tiers provide escalating levels of monitoring effort. The UC approves the monitoring requirements appropriate for the response and the incident-specific environmental conditions.

Shell would mobilize aerial and on-water monitoring contractors through their primary OSRO, ACS. Tier I SMART protocols would be implemented for approved dispersant application. Subject to UC and ARRT approvals for dispersant use, implementation of Tier II or Tier III SMART protocols provide for real-time fluorometry data collection, supplemented with water sample collection for later chemical analyses. The fluorometry readings provide data on the dispersant efficacy and the dispersed oil plume. Tier III also provides for the collection of data on physical parameters such as water temperature, conductivity, and turbidity that, when correlated with Tier I visual observations and Tier II / Tier III fluorometry readings, may be used to evaluate dispersant efficacy. Current drogues or buoys also may be deployed to track the dispersed oil plume.

Figure D.8-1 Oil Spill Response Checklist: Dispersant Use

TAB D: OIL SPILL RESPONSE CHECKLIST: DISPERSANT USE IN ZONES 2 AND 3 AND IN UNDESIGNATED AREAS

I. SPILL DATA (TO BE COMPLETED BY RESPONDING PARTY AND SUBMITTED TO FEDERAL ON-SCENE COORDINATOR)

A. Name of incident: ____________________

B. Date and time of incident: Month/Day/Year____________; Time__________

C. Incident: Grounding____ Transfer Operations____ Explosion ____

Collision____ Blowout____ Other____________________

D. Did source burn? Yes____ No____

Is source still burning? Yes____ No____

E. Spill location: Latitude__________; Longitude__________

F. Distance (in miles) and direction to nearest land: ____________________;

nearest town____________________

G. Product released: North Slope Crude____ Cook Inlet Crude____

Chevron Residual____ Diesel #2____ JP4____ Other: ____________________

H. Product easily emulsified? Yes____ No____

I. Product already emulsified? No____ Light emulsion (0-20%)____

Moderate emulsion (21-50%)____ Heavy emulsion (>51%)____ Unknown____

J. Estimated volume of released product: ____________________ gals____ bbls____

K. Estimated volume of product potentially released: ____________ gals____ bbls____

L. Release status: Continuous____ Intermittent____

One time only, now stopped____

If continuous or intermittent, specify rate of release: ________ gals____ bbls____

M. Estimated water surface covered (square miles): ____________________

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Figure D.8-1 Oil Spill Response Checklist: Dispersant Use (Continued)

II. WEATHER AND WATER CONDITIONS AT THE TIME AND LOCATION OF SPILL (TO BE COMPLETED BY RESPONDING PARTY AND SUBMITTED TO FEDERAL ON-SCENE COORDINATOR)

A. Temperature: Air________°F Water_______°F

B. Weather: Clear____ Partly Cloudy____ Overcast____ Rain____ Snow____ Fog____

C. Tidal State: Slack tide____ Incoming (flood)____ Outgoing (ebb)____

D. Dominant current, net drift: Speed_________knots Direction (from)__________________

E. Wind Speed: _______knots Direction (from):___________

F. Sea state: Calm____ Choppy____ Swell____Waves: <1ft____ 1-3ft____ >3ft____

G. Water depth (fathoms____ feet____): 0-3____ 4-10____ 11-30____ 31-99____ >100____

H. Ice Present: Yes____ No____; Percent coverage: <10%____ 11-30%____ 31-50% ____

51-100%____

I. Other considerations: Low visibility____ Rip tides____ Whirlpools____ Eddies____

Other____

NOTE: (1) SEE SECTION IV FOR WEATHER AND WATER CONDITIONS FORECAST (TO BE COMPLETED BY NOAA SCIENTIFIC SUPPORT COORDINATOR).

(2) SEE SECTION V FOR PREDICTED OIL BEHAVIOR (TO BE COMPLETED BY NOAA SCIENTIFIC SUPPORT COORDINATOR).

(3) RESPONDING PARTY HAS OPTION OF ALSO SUBMITTING INFORMATION ON PREDICTED OIL BEHAVIOR TO FEDERAL ON-SCENE COORDINATOR.

III. PROPOSED DISPERSANT USE PLAN (TO BE COMPLETED BY RESPONDING PARTY AND SUBMITTED TO FEDERAL ON-SCENE COORDINATOR)

A. Reason(s) for requesting dispersant use:

B. Dispersant zone where dispersant would be applied (check one or more):
Zone 1___ Zone 2___ Zone 3

C. Location of area to be treated relative to the following, as shown on attached chart:

Slick/Traj ectory
Dispersant zone
Nearest land

D. Name of dispersant proposed for use:

COREXIT 9527___ COREXIT 550___ OFC C-609___ Other

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Figure D.8-1 Oil Spill Response Checklist: Dispersant Use (Continued)

E. Application platform(s): Hercules C-130__ Helicopter__ Vessel

Safety plan for applicable platform in place Yes__ No

F. Dispersant dosage goals:

Ratio of dispersant-to-oil: 1:20__ Other

Gallons per acre: 5 gals per acre__ Other

G. Total amount of dispersant to be used:______gals

H. Time of dispersant application: Start time_____ Day____;

Finish time_______ Day

I. Estimated percentage of spill area to be treated:

1-5%__ 6-20%__ 21-40%__ 41-70%__ 71-99%__ 100%

Signature of Requestor: ____

Printed Name of Requestor: ____

Title of Requestor: ____

Requestor Affiliation: ____

Requestor Representing: ____

Time and Date Request Submitted to Federal On-Scene Coordinator: _______________________

IV. WEATHER AND WATER CONDITION FORECAST FROM TIME OF SPILL. (TO BE COMPLETED BY NOAA SCIENTIFIC SUPPORT COORDINATOR)

A. Wind Speed (knots):

24-hour projection: ____________________

48-hour projection: ____________________

B. Wind Direction (from):

24-hour projection: ____________________

48-hour projection: ____________________

C. Sea conditions:

24-hour projection:

Calm____ Choppy____ Waves <1ft____ Waves 1-3 ft____ Waves >3ft____

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Figure D.8-1 Oil Spill Response Checklist: Dispersant Use (Continued)

48-hour projection:

Calm____ Choppy____ Waves <1ft____ Waves 1-3 ft____ Waves >3ft____

D. Tidal information for three tidal cycles (see attached graph).

E. Dominant current (net drift):

Speed: ________________________knots Direction (from): ______________

V. PREDICTED OIL BEHAVIOR (TO BE COMPLETED BY NOAA SCIENTIFIC SUPPORT COORDINATOR)

Untreated oil forecast:

Estimated trajectory (see attached graph): ____

Expected area(s) and time(s) of land fall: ____

Estimated percent naturally dispersed and evaporated within first 24 hours: __________

VI. RESOURCES AT RISK (TO BE COMPLETED BY RESOURCE AGENCIES)

A. Habitats (see attached charts):

____Sheltered tidal flats

____Coastal marshes

____Other

B. Biological Resources (see attached charts):

Fish:

Pelagic & Larval____

Bottomfish: ____

Intertidal mollusks: ____

Crustacea: ____

C. Human Resources:

Commercial facilities and enterprises_____(see attached chart)

Public facilities and enterprises_____(see attached chart)

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Figure D.8-1 Oil Spill Response Checklist: Dispersant Use (Continued)

	Distribution		Estimated Numbers of Individuals				
Taxon	General	Concentrated	1-10	11-50	51-100	101-1000	>1000
Endangered/Threatened Species							
1.							
2.							
3.							
Non-Endangered/Threatened Species							
Sea otters							
Fur seals							
Other seals							
Toothed whales							
Baleen whales							
Polar bears							
Walrus							
Waterfowl							
Seabirds							
Diving birds							
Shorebirds							
Raptors							
Ungulates							
Bears (Brown & Black)							
Furbearers							

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Figure D.8-1 Oil Spill Response Checklist: Dispersant Use (Continued)

Historic and archaeological resources:

Present____, (Appropriate information to be provided to FOSC)

Not present____

Unknown____

Commercial harvest areas:

Generally distributed____

Concentrated______(see attached chart)

Subsistence harvest areas:

Generally distributed____

Concentrated______(see attached chart)

VII. FEDERAL ON-SCENE COORDINATOR'S EVALUATION OF RESPONSE OPTIONS (TO BE COMPLETED BY FEDERAL ON-SCENE COORDINATOR)

A. Has mechanical clean-up been fully evaluated? Yes____ No____

B. Has in-situ burning been fully evaluated? Yes____ No____

C. Why is dispersant use necessary? ____

D. Will dispersants be used in addition to mechanical recovery and/or in-situ burning?

Yes____ No____

E. Will dispersants be used instead of mechanical recovery and/or in-situ burning?

Yes____ No____

VIII. ALASKA REGIONAL RESPONSE TEAM RECOMMENDATION TO FDERAL ON-SCENE COORDINATOR REGARDING DISPERSANT USE (TO BE COMPLETED BY ALASKA REGIONAL RESPONSE TEAM CO-CHAIRMAN)

Time and Date Request Received by Alaska Regional Response Team Co-Chairman: _______________

A. ____No dispersants may be applied.

B. ____Dispersants may be used under noted conditions (if any) in limited or selected areas (see attached chart).

C. ____Dispersants may be applied as requested above in Section III.*

*Requests exceeding 20 gallons per acre require Alaska Regional Response Team approval

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Figure D.8-1 Oil Spill Response Checklist: Dispersant Use (Continued)

Signature of Alaska Regional Response Team Co-Chairman: ______________________________

Printed Name of Alaska Regional Response Team Co-Chairman: ___________________________

Time and Date of Recommendation: ____

IX. FEDERAL ON-SCENE COORDINATOR'S DECISION REGARDING DISPERSANT USE (TO BE COMPLETED BY FEDERAL ON-SCENE COORDINATOR)

Time and Date Request Received by Federal On-Scene Coordinator: ______________________

A. ____No dispersants may be applied.

B. ____Dispersants may be used under noted conditions (if any) in limited or selected areas (see attached chart).

C. ____Dispersants may be applied as requested above in Section III.

Signature of Federal On-Scene Coordinator: ____

Printed Name of Federal On-Scene Coordinator: _____________________________________

Time and Date of Decision: ____

[ARRT Approved on 4/15/92]

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APPENDIX E

IN SITU BURNING PLAN [30 CFR 254.28]

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APPENDIX E *IN SITU* BURNING PLAN [30 CFR 254.28]

Shell has incorporated the flexibility to implement multiple strategies and tactics into their response preparedness and planning. Mechanical recovery and removal of oil from the environment is the primary method of response that Shell intends to employ for OSR. Use of *in situ* burning will be considered as an option to augment mechanical response methods. *In situ* burning would be used with the consent of the FOSC or UC to augment mechanical response.

E.1 *IN SITU* BURNING EQUIPMENT

Operational Preparedness

Shell and its contractors maintain a comprehensive inventory of equipment to initiate and sustain burning operations throughout the proposed drilling season. The Shell Tactics Manual and ACS Technical Manual contain specific tactical guidelines for offshore operations with and without ice. Many of these tactics (e.g., Shell Tactics OR-1B, OR-2B and OR-4B and ACS Tactic R-20) illustrate ways to intercept oil with an open-apex U-boom configuration so that thin or scattered oil slicks can be concentrated for recovery or captured downstream of the open-apex for burning within a fire boom.

Some of the tactics within each manual are specific with guidelines for implementing and sustaining burning on open water and in the presence of ice (e.g., Shell Tactic OR-7 and ACS Tactics B-3, B-4, B-5, B-6 and B-7). These tactics are incorporated in this OSRP by reference, along with shoreline concepts for burning nearshore in Appendix C (WCD Scenario) and Section 2.7.4. Table E-1 summarizes the Shell and ACS inventory of specialized major response equipment to support a large-scale *in situ* burn operation.

ACS conducts *in situ* burning training and competencies several times a year at different North Slope locations. Typical courses involve at least an hour of classroom instruction and an hour of field exercises involving basic combustion theory, guidelines for safe operating procedures, and gelled fuel mixing and heli-torch deployment. This training is in addition to other required training (Appendix F). ACS personnel practice the techniques involved with controlled burning operations at sea that could involve several vessels and aircraft working in close proximity.

Table E-1
***In Situ* Burning Equipment**

EQUIPMENT	QUANTITY	AVAILABILITY	LOCATION	OWNER
HydoFire Boom (500 ft [152 m] per system)	2	Immediate	*Nanuq/Endeavor*	Shell
Cooling Water Pumps and Hoses	2	Immediate	*Nanuq/Endeavor*	Shell
Fire Boom [50-, 76- and 102-cm (20-, 30- and 40-inch) skirts]	5,353 m (17,564 ft)	Immediate	Deadhorse (Prudhoe Bay)	ACS
Heli-torch (55 gal)	6	Immediate	Deadhorse	ACS
Heli-torch (300 gal)	2	Immediate	Deadhorse	ACS
Heli-torch SureFire gel	544 kg (1,200 lbs)	Immediate	Deadhorse	ACS
Air-Deployable Igniters	> 1,400	Immediate	Deadhorse	ACS
Heli-torch Batch Mixers (gelled fuel)	2	Immediate	Deadhorse	ACS

In addition, Shell and ACS maintain all appropriate logistical support for controlled burning, including boom-tending vessels, helicopters and vessels to transport and deploy equipment and ignition systems, and fire extinguishers.

Table E-2 presents example TFs assigned to implement tactics identified in Table E-3. Shell's primary response objective is mechanical removal of oil from the environment. In the event environmental conditions result in the reduced mechanical equipment efficiencies, alternative countermeasures could be used to augment the response. Shell may reassign existing TF to implement *in situ* burning tactics. Pre-staged equipment may be readily deployed from onsite TFs to augment or extend recovery operations beyond the limits of mechanical recovery. Deployment times, as well as limitations and considerations, to implement these tactics are provided in the referenced Tactics.

Table E-2
***In Situ* Burning Example TFs**

TASK FORCE	EQUIPMENT DESCRIPTION	QUANTITY	OWNER	TACTIC REFERENCE
TF-1	OSR Vessel (300-ft)	1	Shell Charter	ACS Tactic B-4, B-6, and B-7
	34-ft Work Boat (Shared with TF-2, 4, & 5)	3		
	Fire Boom System (*In Situ* Burning Containment)	500 ft		
	Dispersant Application Systems (Spray Arms)	2		
	Transrec 150 Umbilical Weir Skimmer	1		
TF-6	OSR Barge	1	Shell Charter	ACS Tactic B-4, B-6, and B-7
	Support Tug for OSR Barge	1		
	34-ft Workboats (Boom Deployment / Towing)	3		
	47-ft Response Vessel (Transport / Boom Deployment)	1		
	Fire Boom Systems (*In Situ* Burning Containment)	500 ft		
TF-B	Helicopter	1	ACS	Shell Tactic OR-7
	Heli-torch (alternative hand ignitors)	1		
	Batch Mixer	1		
	Surefire Gel and Fuel	>20 pounds		

As described in Appendix A and Appendix G, Shell has access to trained personnel and equipment to implement TF-B through its membership with ACS. Transit times for helicopters are described in Appendix G.

Hours of Daylight and Visibility (see Appendix H)

E.2 *IN SITU* BURNING PROCEDURES

Regulatory approval must first be obtained before using *in situ* burning, depending on whether the burn operations will be conducted in federal or state waters. The "*In Situ* Burning Guidelines for Alaska" (ADEC, EPA, and USCG August 2008) Application for *in situ* burning would be submitted to the UC. An incident-specific burn plan would be contained within the application.

If the Shell IC or the UC decides to use *in situ* burning and obtains the necessary authorization, ACS will carry out the response (see Shell Tactic OR-7 and ACS B-1 through B-7).

- Use towed open-apex boom configuration(s) as necessary to collect and concentrate and release oil directly into fire-resistant booms. Conventional boom may be used for this operation.
- Collect and contain the oil using fire-resistant booms. Relocate the contained oil a safe distance from the open-apex configuration and other vessels.
- In light ice cover (with ice-deflection/management support), collect and contain oil using fire-resistant booms.
- In higher ice concentrations, locate naturally occurring pools of thick oil.
- As appropriate, use fire monitors and/or wash propulsion to gently direct oil into heavier concentrations against ice floes or densely packed ice cakes. Wind may naturally provide such desired herding of oil.
- Ignite the oil using the heli-torch or hand-held igniters, following established safety procedures to avoid flashback or ignition of any ongoing spill source.
- Monitor the burn using SMART, maintain constant watch on the fire and smoke plume, condition of containment boom, speed and position of boom-towing vessel, and other safety hazards and issues as appropriate.
- To the extent possible, recover and dispose of the burn residue.

Additional information on the use of non-mechanical response techniques are detailed within the Shell Tactics OR-7, OR-8, OR-9A, and OR-9B.

Procedures and methods for implementation of the *In Situ* Burning Plan are described in detail within the Shell Tactics Manual and ACS Technical Manual and include, but are not limited to, methods described in Table E-3.

Table E-3
***In Situ* Burning Tactics Reference**

RESPONSE CATEGORY	MANUAL	TACTIC	TACTIC TITLE
In Situ Burning	ACS	B-1	*In Situ* Burning Plan
		B-1A	*In Situ* Burning Plan and Application Form
		B-2	Burning Oily Vegetation
		B-3	*In Situ* Burning with Heli-Torch and Other Igniters
		B-4	Deployment and Use of Fire Containment Boom
		B-5	Burning Oil Pools on Any Solid Surface
		B-6	Burn Residue Recovery
		B-7	Burn Extinguishment on Water
	Shell	OR-7	Fire Boom / Heli-Torch

E.3 ENVIRONMENTAL EFFECTS OF *IN SITU* BURNING

Strategies to recover, burn, or disperse oil offshore prior to the spill reaching State of Alaska lands and waters would be of the highest priority when responding to a spill in the Beaufort Sea.

Non-mechanical response operations, including *in situ* burning and dispersant use, would be conducted far from Alaska's shorelines (Shell's leases are 20 n mi or more offshore) as a component of the overall tactical plan to protect ESAs and areas of public concern. The UC in consultation with natural resource agencies will require appropriate measures be implemented to protect ESAs, areas of public concern, and the public from adverse effects when authorizing these response operations. The Unified Plan and UC process of approving *in situ* burning requires coordination with resource trustees as members of the ARRT. These procedures ensure that sensitive environments, critical habitat, and threatened or endangered species receive priority for mitigating impact of spilled oil and planning response operations, which includes *in situ* burning. Continuous on-site monitoring required by the UC provides the IMT with information to immediately suspend or modify operations, precluding adverse impacts to resources or the public.

Consistent with the guidance within the Unified Plan, residue from burning operations would be recovered where practicable using manual collection methods to retrieve the residue within fire booms or from secondary booms (see ACS Tactic B-6). Burn operations would be conducted in OCS waters far offshore and closely monitored for wildlife in the area. Trustee agencies would be consulted for recommendations or necessary approvals to protect wildlife from the potentially negative consequences of burn operations and any unrecovered residues.

Shell is taking a number of steps to safeguard the area for *in situ* burning consistent with the *In Situ* Burning Guidelines. *In situ* burning would be conducted only under authorization of the UC, in consultation with the ARRT, during emergency situations where *in situ* burning of oil augments mechanical recovery operations, burning is feasible, and the burn would be a safe distance from populated areas.

The source location of a spill associated with Shell's exploration activities would be at a great distance from shore (more than 20 n mi), which far exceeds the minimum safe distance (>1 mile) to protect populated areas from the use of *in situ* burning. At this distance from population centers, Shell will perform continuous visual monitoring of the burn and resulting smoke plume. At any time during an authorized burn where there is potential for impacting a populated area, Shell will activate resources to implement air quality monitoring consistent with NOAA's SMART protocols. As detailed in the *In Situ* Burning Guidelines, the UC would consult and coordinate with resource trustee agencies anytime threatened or endangered species or their critical habitats are, or could be, present in the area of the burn. These agencies would provide recommendations to mitigate impacts of the resource from burn operation or possible oil spill impacts.

Although the burn residue itself is low volume (typically less than 2 to 3 percent) and low toxicity; batch samples of the floating residue would be analyzed to confirm composition and toxicity. Every effort would be made to recover burn residue as time and conditions allow.

One of the most important factors that influence response activities is the movement and amount of ice. Ice can pose a significant challenge for spill response; however, experience has shown that low temperatures and ice can often enhance spill response and reduce environmental impacts. For example:

- Low air and water temperatures often result in greater oil equilibrium thicknesses, thereby reducing spreading rates and areas of coverage. These reductions greatly reduce the potential for impact on natural resources while providing the potential for much higher oil encounter rates for mechanical recovery and burning operations.

- Evaporation rates are reduced, leaving the lighter and more volatile components in the oil longer, thereby enhancing the ease with which the oil could be ignited.
- Ice may actually dampen wave action and limit the fetch over which winds might otherwise create large waves.
- While ice, even in low concentrations, can preclude the effective use of oil containment boom, responders may still operate with short boom extensions and skimmers to maneuver among ice pieces and intercept oil.
- When ice concentrations preclude the use of any boom, the ice will often serve as a natural barrier to the spread of oil and help concentrate the oil for pocket-recovery operations with stationary skimmers. The natural containment of oil against ice will often result in thicknesses that could significantly enhance the efficient removal of oil by burning.
- When high ice concentrations (very close pack) and/or continuous stable ice conditions prevail, any spilled oil (especially from a subsea blowout) will likely become immobilized and encapsulated within the ice and therefore isolated from any contact with airborne or waterborne resources.
- Oil encapsulated within the ice will be preserved physically and chemically so that its unweathered state upon release (deliberately exposed, or naturally released during breakup) will support combustion.

In addition to the environmental factors described above, there are other spill source considerations that should be recognized as they influence the full potential for elimination of spilled oil by burning:

- The spill scenarios associated with Shell's operations in the Beaufort Sea involve the release of oil and gas from a subsea blowout (in contrast to an above-water release such as from a fixed drilling structure). Oil would therefore be released to a relatively small area on the water with initial slicks with widths of typically a few hundred meters or less. Even with the gas-induced flow of oil and water toward the surface and the resulting radial spread of oil outward from the source, the initial area of involvement will be localized and manageably contained and/or deflected with booms.
- Because of the likely release of large quantities of natural gas and vapors from the surfacing oil, it is likely that early ignition of that gas would be desirable as soon as the drillship is moved off location. The vapor cloud could be readily ignited using standard ignition procedures, thereby eliminating the accidental ignition of the source when vessels are in close proximity. The early ignition of the source would not only be prudent for safety reasons, it is possible that significant quantities of oil could be eliminated through combustion at/near the source. The potential ignition is intended to improve on-site safety conditions for responders; potential oil elimination is an ancillary benefit. As such, no WCD reduction is taken. Additionally, because potential ignition is not posed as a response tactic, we anticipate the decision to ignite surfacing gas would be made by the UC as a part of a fully developed, and agreed upon, portion of an IAP, and independent of the in situ burning guideline process.
- With or without ignition of the blowout, prevailing atmospheric conditions in the Beaufort Sea will support safe operating conditions at or beyond a few hundred meters downwind of the source.

To summarize key points: the nature of oil released to the surface; the oil's limited spread due to reduced temperatures (and possible ice); and the potential for responders to access the oil before it moves far from the source and begins to weather, all enhance the potential for successful recovery and/or burning operations.

E.4 GUIDELINES FOR WELL CONTROL AND SAFETY OF PERSONNEL AND PROPERTY

Safety procedures and planning in accordance with established guidelines are emphasized throughout the training, preparation, and conduct of *in situ* burning operations.

In situ burning is monitored to ensure that fire does not spread to any nearby uncontained oil and that burns are conducted at safe operating distances from all vessels and personnel. Personnel and equipment used in conducting the operation maintain safe distances from the spill source and ongoing natural gas normally already ignited. The safe working distances from an *in situ* burn on water depend on the size of the fire and the exposure time, as presented in Table E-4. Safety procedures and planning in accordance with established guidelines are employed throughout the training, preparation and conduct of *in situ* burning operations. Although the planning and conduct of operations are the same, distinction is made between the elimination of oil as a response technique, and the ignition of surfacing gas as a safety measure. When ignition of oil *in situ* as a response action is proposed, the permitting process on the *In Situ* Burning Guidelines for Alaska will be followed. The elimination of gas as a safety measure, not related to oil elimination, is a UC decision that may follow the same planning process, but does not seek the permit necessary in the *In Situ* Burning Guidelines and issued by the ARRT.

Table E-4
Safe Working Distances From the Fire

PERSONNEL EXPOSURE TIME (ACTIVITY)	PERSONNEL MINIMUM DISTANCE FROM FIRE (FIRE DIAMETERS)
Indefinite (monitoring)	1.2 m (20 ft)
5 min (ignition)	0.6 m (2 ft)

Aerial ignition with gelled fuel from a heli-torch or with other ignition devices is coordinated, taking into account prevailing weather conditions, oil pool size and distribution, and the need for strict adherence to established safety practices.

E.5 CONDITIONS FOR USE

In situ burning will be considered as a secondary response technique. Alternate, non-mechanical response options may be employed to augment mechanical recovery strategies, or to supplement them if conditions make mechanical recovery ineffective. Additionally, the response options may be employed if their use is deemed to be more environmentally beneficial than if their use is withheld. Note that the equipment necessary to conduct initial non-mechanical response missions is already made available by Shell and will be staged on the OSR vessels. The cascading of additional non-mechanical resources, from beyond the immediate region, is well established.

Upon approval, incident-specific conditions associated with the approval shall be met. Alternative response techniques shall require a test to determine if its use is feasible given environmental and oil conditions. If the event warrants the consideration of alternative methods, assets will be immediately mobilized to support operations. The efficiency of *in situ* burning decreases as the oil weathers, presenting a relatively narrow window of opportunity for use of *in situ* burn methods. On-site assets shall be deployed upon approval by the UC.

Key Combustion Processes

The following discussion summarizes the current state of understanding of the scientific principles and physical processes involved with *in situ* burning of oil on water and ice.

For an oil slick on water or ice to become ignited, the oil must be thick enough to insulate itself from the water beneath it. The igniter can heat the surface of thickened oil to the flash point temperature at which the oil produces sufficient vapors to ignite. The "rules of thumb" for minimum ignition thickness are listed in Table E-5.

Table E-5
Minimum Ignitable Oil Thickness on Water
(Adapted from Buist et al. 2003)

OIL TYPE	MINIMUM THICKNESS
Light Crude and Gasoline	1 mm (0.04 inches)
Weathered Crude and Middle-Distillate Fuel Oils (Diesel and Kerosene)	2 to 3 mm (0.08 to 0.12 inches)
Residual Fuel Oils and Emulsified Crude Oils	10 mm (0.4 inches).

The oil removal rate for *in situ* oil fires is a function of fire size (or diameter), slick thickness, oil type and ambient environmental conditions. For most large (greater than about 10 ft [3 m] diameter) fires of unemulsified crude oil on water, the rule of thumb is that the burning consumption rate is 3.5 mm/min. Lighter fuels burn faster while heavier oils and emulsions burn slower, as presented in Table E-6.

Table E-6
Burn Removal Rates for Large Fires on Water
(Adapted from Buist et al. 2003)

OIL TYPE/CONDITION	BURN/REMOVAL RATE
Gasoline >10 mm (0.4 inches) thick	4.5 mm/min (0.18 inches/min)
Distillate Fuels (diesel and kerosene) >10 mm (0.4 inches) thick	4.0 mm/min (0.16 inches/min)
Crude Oil >10 mm (0.4 inches) thick	3.5 mm/min (0.14 inches/min)
Heavy Residual Fuels >10 mm (0.4 inches) thick	2.0 mm/min (0.08 inches/min)
Slick 5 mm (0.2 inches) thick[1]	90% of rate stated above
Slick 2 mm (0.1 inches) thick[1]	50% of rate stated above
Emulsified oil (percent of water content)[2]	Slower than above rates by a factor equal to the water content percent
Estimates of burn/removal rate based on experimental burns and should be accurate to within ±20 percent.	

1. Thin slicks will naturally extinguish, so this reduction in burn rate only applies at the end of a burn.
2. If ignited, emulsions will burn at a slower rate almost proportional to their water content (a 25% water-in-crude-oil emulsion burns about 25% slower than the unemulsified crude).

Burn rate is also a function of the size of the fire. Crude oil burn rates increase from 1 mm/min (.04 inches/min) with 3-ft (0.9-m) diameter fires to 3.5 mm/min (0.14 inches/min) for 15-ft (4.6-m) diameter fires and greater. *In situ* burning on melt pools typically consumes oil at 1 mm/min (0.04 inches/min). For very large fires, on the order of 50 ft (15.2 m) in diameter and larger, burn rates may decrease slightly because there is insufficient air in the middle of the fire to support combustion at 3.5 mm/min (0.14 inches/min). As fire size grows to the 50-ft (15.2-m) range, oil type ceases to affect burn rate for the same reason.

An *in situ* oil fire extinguishes naturally when the slick burns down to a thickness that allows enough heat to pass through the slick to the water to cool the surface of the oil, below the temperature required for sustained combustion. The thickness at which an oil fire on water extinguishes is related to the type of oil and initial slick thickness (Table E-7). Other, secondary factors include environmental effects such as wind (winds greater than 20 knots preclude *in situ* burning in most cases), current herding of slicks against barriers, and oil weathering.

Table E-7
Fire Extinguishing Slick Thickness
(Adapted From Buist et al. 2003)

OIL TYPE/INITIAL SLICK THICKNESS	EXTINGUISHING THICKNESS
Crude Oil up to 20 mm (0.8 inches) thick	1 mm (0.04 inches)
Crude Oil 50 mm (2 inches) thick	2 to 3 mm (0.08 to 0.12 inches)
Distillate Fuels any thickness	1 mm (0.04 inches)

With an estimate of the initial thickness of a fully contained slick, or a measure of the burn time, an estimate for oil removal efficiency by burning can be made. If not all of the slick area is on fire; the calculations need to account for this.

Oil removal efficiency through burning may be summarized as a function of the following key factors:

- Initial thickness of the slick,
- Thickness of the residue remaining, and
- Amount of the slick surface that was on fire.

The water current maintains the oil thickness in the open-apex configuration of a fire-resistant boom under tow, or against an ice edge in wind. When burning in a current, the fire slowly decreases in area until it reaches a size that can no longer support combustion. This herding effect can increase overall burn efficiencies, but it extends the time required to complete each burn.

The residue from typical, efficient (greater than 85 percent removal) burning of crude oil 10 to 20 mm (0.4 to 0.8 inches) thick is a semi-solid, tar-like layer that has an appearance similar to the skin on an old can of latex paint that has gelled. For thicker slicks, typical of what might be expected in a towed fire boom [about 150 to 300 mm (6 to 12 inches)], the residue can be a solid. Burn residue is usually denser than the original pre-burn oil, and usually does not spread because of its increased viscosity or solid nature.

Most unburned oil or burn residue following combustion would be transported from the vicinity of the blowout by wind or currents; should any residue remain on the surface in the immediate area, it could be recovered by various means, including the use of booms in open water conditions downstream of the burn area, or by response personnel using nets, poles or other simple equipment over-the-side of small work boats, subject to safe working conditions, weather, and available time.

Compared to unemulsified slicks, emulsions are much more difficult to ignite and, once ignited, display reduced flame spreading and more sensitivity to wind and wave action. Stable emulsion water contents are typically in the 60 percent to 80 percent range with some up to 90 percent. The oil in the emulsion cannot reach a temperature higher than 212°F (100°C) until the water is either boiled off or removed. The heat from the igniter or from the adjacent burning oil is used first, mostly to boil the water rather than heat the oil.

While formation of stable water-in-oil emulsion may decrease burn efficiency, emulsion formation is slowed dramatically by high ice concentrations and may not be a significant operational factor in planning *in situ* burning of oil on solid ice or naturally contained in higher concentrations of broken ice.

In summary, *in situ* burning of oil is efficient and rapid in broken ice conditions under the following conditions:

- The spilled oil is thicker than the minimum required for ignition [a thickness of 2 to 3 mm (0.08 to 0.1 inches)] results in 50 to 66 percent removal efficiency: 10 mm (0.4 inches) thickness, a typical thickness for wind-herded slicks on melt ponds on ice, gives 90 percent removal efficiency;
- Larger areas can be ignited. A 100 sq ft (9.3 sq m) slick on a melt pool will burn at 3.5 boph; a 50 ft (15.2 m) diameter, 0.4 inches (10 mm) thick slick will burn at 300 boph; and a 100 ft (9.3 m) diameter slick will burn at 1,200 boph;
- The oil is not more than 25 percent emulsified; and
- Herding in a current and enlarging fire diameters can increase burning rates.

The potential for efficient oil spill response (with or without burning) is strongly tied to the nature and amount of ice present. The Appendix H addresses the seasonal ice conditions in Shell's area of interest in the Beaufort Sea during the proposed drilling season.

E.6 DECISION PROCESSES

There are several situations in which non-mechanical response techniques shall be considered. *In situ* burning is used as a supplemental technique to augment mechanical response methods (e.g., to treat slicks that escape containment and not readily accessible to mechanical response equipment, or slicks that are of imminent threat to sensitive resources). Additionally, when environmental conditions exceed the limitations of mechanical equipment or preclude its use, non-mechanical response methods are viable options.

The decision to use *in situ* burning will be based upon the following:

- Safety of Personnel.
- Incident-specific strategies to ensure mechanical recovery operations are not impeded through the implementation of alternative methods. It will be taken into consideration that the estimated daily recovery capacity will be impacted when assets are diverted from mechanical recovery operations to be used for *in situ* burn operations.

- Use of the technique results in a net benefit by reducing oil spill impacts to sensitive resources and shoreline.
- Method of efficacy monitoring shall be implemented as agreed upon by the FOSC or, as appropriate, the UC.

As covered in Shell Tactic OR-7 and ACS Tactics B-1 through B-7, burning may be used as a spill control measure once regulatory approval has been obtained. When mechanical recovery is not practicable or less effective, removing oil from the water through the use of *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 more quickly to the pre-spill state; and
- Provide the most effective means to remove oil from water prior to shoreline impacts in varying ice conditions, in remote or inaccessible areas, or when containment and storage facilities are overwhelmed.

E.7 APPROVAL PROCEDURES AND FORMS

In situ burning in the OCS waters is under the command of the FOSC, in this case, the USCG. Although the FOSC may have final authority within OCS waters, if a UC is established, application will be made through the IC. Shell will comply with Unified Plan requirements, including the use of Revision 1 of the *In Situ Burning Guidelines for Alaska* checklists (Figure E-1) prior to the use of burning (e.g., size of burn, use of fire boom, trained personnel, and ignition). Shell will comply with UC conditions of approval and is prepared to implement monitoring of efficacy and the SMART protocols as conditions allow.

Application for approval of the use of *in situ* burning will be made to the UC. The ARRT, comprised of federal, state, and local governmental agencies, will act as an advisory board to the FOSC.

The need for the use of *in situ* burning to augment mechanical recovery is determined and approved by the FOSCs and SOSCs within the UC. Input and considerations from local stakeholders and regulatory authorities shall be vetted through the On-Scene Coordinators and IC.

Application for the use of *in situ* burning will be coordinated with resource agencies within the IMT EU. Requests for approval shall be made consistent with procedure *In Situ Burning Guidelines for Alaska*, Revision 1, dated August 2008.

Figure E-1
Application and Burn Plan

Appendix 1: Application and Burn Plan

In Situ Burning Guidelines for Alaska

Incident Name: ______________________

Incident Location: ______________________

Incident Date: ______________________

Incident Time: ______________________

Date Prepared		Operational Period	
		Date	Time
Time Prepared	Start:		
	End:		

Title of Applicant: ______________________ Address: ______________________

Affiliation: ______________________ Phone: ______________ Fax: ______________

PART 1

Potential Burn Location______________

Site Description______________

Latitude______________

Longitude ______________

Type of Incident (check one):

______ Grounding
______ Transfer Operations
______ Explosion
______ Collision
______ Blowout
______ Other______________

Product Released (check one):

______ North Slope Crude
______ Cook Inlet Crude
______ Residual/Bunker Oil
______ Diesel #2
______ JP4
______ Other______________

Estimated Volume of Released Product:

______________ gallons, or
______________ BBL

Estimated Volume of Product That May Potentially be Released:

______________ gallons, or
______________ BBL

Release Status (check one):

______ Continuous
______ Intermittent
______ One time only, now stopped

If Continuous or Intermittent, estimated Rate of Release:

______________ gallons, or
______________ BBL

Estimated Surface Area Covered (square miles)
At Time of Application ______________

If inland, identify/describe:.

- Vegetative cover at burn site (e.g., wetlands, grasslands, shrublands, forest, tundra, non-vegetated)
- Fire danger rating at and near the burn site (see Appendix 6) Whether burn is on permafrost
- Any ignitable vegetation near the burn
- Any structures/buildings near the burn

Why is mechanical recovery alone **inadequate** for spill response?

Consider the spill size, forecasted weather and trajectories, amount of available equipment, time to deploy, and time to recover. ______________________

____

Will you use mechanical recovery in conjunction with in situ burning? ______________________ yes no

Have you evaluated dispersants? yes no

Will you use dispersants in conjunction with in situ burning? yes no

Why is in situ burning preferred? ______________________

____

____

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Figure E-1
Application and Burn Plan (Continued)

Appendix 1: APPLICATION AND BURN PLAN
In Situ Burning Guidelines for Alaska

PART 2

Did source burn? yes no

Is source still burning? yes no

Is product easily emulsified? yes no

Is product already emulsified? (check one)

______ No
______ Light emulsion (0-20%)
______ Moderate emulsion (21-50%)
______ Heavy emulsion (>50%)
______ Unknown

Estimated Percent Oil Naturally Dispersed and Evaporated Within First 24 Hours: ______________________

Check boxes and enter wind values in the following table:

	Current Conditions	12-hour Forecast	24-hour Forecast
Clear			
Partly cloudy			
Overcast			
Rain			
Snow			
Fog			
Wind Speed (kt)			
Wind Direction (from)			

Percentage Ice Coverage (check one):

______ No ice present
______ <10%
______ 11-30%
______ 31-50%
______ 51-100%

Tidal state at __________ o'clock (check one):

______ Slack tide
______ Incoming (flood)
______ Outgoing (ebb)

✓ **Attach a graph** with tidal information for three tidal cycles.

Dominant current (not drift):

Speed (knots)______________________

Direction (to)______________________

Current Speed (knots) Relative to the Containment Boom ______________________

Note: Current speed relative to the fire boom should be .75 knots or less to minimize entrainment.

Sea State (check one):

______ Calm
______ Choppy
______ Swell

Waves (estimate height in feet) __________

Does your site safety plan cover this in situ burn plan? yes no

Will response workers be briefed on the site safety plan before burning? yes no

Are the responders trained and equipped with safety gear? yes no

✓ **Attach an ICS 204 form, or similar document**. On it, list the following equipment you will use:

Vessels
Aircraft for ignition and aerial observation
Lengths of fire boom
Residue containment and removal equipment
Fire fighting equipment
Ignition systems
Burn promoters
Communications systems
Air/plume monitoring equipment.

______

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Figure E-1
Application and Burn Plan (Continued)

Appendix 1: APPLICATION AND BURN PLAN
In Situ Burning Guidelines for Alaska

Proposed Burn Date and Time ____________

Describe how you intend to carry out the burn.

____

____

Check one:

______ Ignition is away from source after containment and movement of the oil to safe location (i.e., controlled burn).

______ Ignition of uncontained slick(s) is at a safe distance from the source.

______ Ignition is at or near source without controls.

How will you ignite the oil? ______________________

____

Enter the volume of oil you expect to burn:

Fire No.	Oil Volume (BBL__ or Gal__)	Fire Duration (Hrs__ or Min__)
1		
2		
3		
4		
5		
Attach a list for more fires.		
Total Vol.:		

How many simultaneous burns are planned?

____

What distance will separate simultaneous burns?

____

Are you planning sequential or repeat (not simultaneous) burns?
yes no

Estimated area of oil in uncontrolled burn
(square feet)________________________________

Describe your ability and procedures to extinguish the burn if necessary or directed to do so.

Part 3

✓ **Attach a chart with a distance scale**. Show estimated spill trajectory and landfalls, with time. Show the location and distance of your proposed burns relative to the following features:

1. Source:

Location ______________________________________

Distance from Burn (miles)______________________

2. Ignitable slicks:

Location ______________________________________

Distance from Burn (miles)______________________

3. Nearest Land (burns on water) or
Non-Flat Terrain (burns on land):

Location ______________________________________

Distance from burn (miles) ______________________

Nearby Populated Areas (i.e., one or more non-spill-related people present):

Location ____________________________

Distance from Burn (miles)______________

Location ______________________________________

Distance from Burn (miles)______________________

Location ______________________________________

Distance from Burn (miles)______________________

For Inland Burns consider
- Ignitable vegetation
- Structures/buildings
- Areas with Fire Danger Rating of extreme, very high, or high
- Nearest airport
- Alaska Class I Area (see Appendix 4)

4. Attach a drawing showing your mechanical recovery and in situ burning equipment configurations.

6. For burns potentially impacting populated areas, provide an air monitoring plan in accordance with the SMART protocols.

7. Identify whether any Class 1 Areas (Appendix 4) will be impacted.

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Figure E-1
Application and Burn Plan (Continued)

Appendix 1: APPLICATION AND BURN PLAN
In Situ Burning Guidelines for Alaska

Part 4

How do you plan to collect burned oil residue?

____

____

How do you plan to store and dispose of burned oil residue?

____

____

For inland burns, how do you plan to address post- burn erosion if applicable?

Describe plan for eliminating risk (if any) of accidental (secondary) fires (e.g., structures/buildings and/or vegetation).

____

____

Will the burn affect visibility at downwind airports within 20 miles?

____

Signatures

____
Signature of Applicant

____
Printed name of Applicant

____
Date and Time Submitted to Federal and State On-Scene Coordinators

____

Prepared by: ______________ ICS Position: ______________ Phone: __________

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APPENDIX F

TRAINING AND DRILL INFORMATION [30 CFR 254.25]

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FIGURES

TABLES

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APPENDIX F TRAINING AND DRILL INFORMATION [30 CFR 254.29]

F.1 TRAINING AGENDA FOR MANAGERS OF SPILL RESPONSE TEAM AND QUALIFIED INDIVIDUAL

Shell will provide IMT training prior to deployment and during the active drilling season. This training will follow the NIMS-required training guidelines. NIMS training that will be conducted for Shell and ACS personnel include online courses and classroom training. In addition, Shell will sponsor IMT workshops that focus on the planning cycle for oil spill response. Examples of ICS training courses include but are not limited to:

1. ICS/100, ICS/200, and ICS/700 (online training);
2. ICS/300 as a two-day training event;
3. ICS/400 that will cover Command Staff and Section Chiefs' training; and
4. Shell QI / IC training.

Shell's training management system includes an in-house training database that is maintained for all personnel. The IC, Operations Section Chief, and Planning Section Chief, and their alternates will receive the following training on an annual basis:

1. The location, intended use, operational and logistical requirements as well as deployment strategies of primary equipment named in the OSRP;
2. Trajectory information; and
3. Regulatory agency notification requirements.

The rosters for the Shell's most recent IMT / QI and ICS 300 training, completed in January 2012, are depicted in Figures F-1 and F-2.

ACS also 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.

ACS coordinated spill response training includes:

- Federally mandated: HAZWOPER, HAZCOM
- Company-directed: Shell, Edison Chouest, Crowley, and others, which includes NSTC topics, first-aid, employee orientation, and specific oil spill and technical training (including fate and behavior of oil, site characterization, specialized equipment and tactics, non-mechanical response, and OSRP overview as listed in ACS Tactic A-4, Training Requirements for Response Personnel).

F.2 TRAINING AGENDA FOR SPILL RESPONSE TEAM MEMBERS

Shell and ACS 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. Shell and ACS provide training for HSSE programs for all employees. Spill response training is based on the NPREP guidelines (August 2002). ACS provides a wide variety of response-related training.

SRT members, other than those considered spill managers, will receive the following training on an annual basis:

1. Notification procedures
2. Communication systems used for notifications
3. Location / set up of Incident Command Post
4. Authority of incident commander
5. Organizational structure that will be used to manage the response actions
6. Responsibilities and duties of the SRT member within the organizational structure, in accordance with designated job responsibilities
7. Record keeping

ACS offers an ADEC-approved spill prevention and response training program available for Shell 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 H_2S Training. ACS holds contracts with other response action contractors and OSROs that will be able to provide additional trained and qualified spill responders. Some examples of general training courses offered by ACS (ACS 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
- Swiftwater First Responder

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

These training requirements will be met during the Shell annual spring training academy. The Shell training academy OSR component has been developed to ensure all personnel are current and recently familiar with all aspects of oil spill response management and operations. The training academy addresses regulatory-required, company-required, and hands-on field training involving response equipment familiarization, deployment, and operation. Only after attending the annual training academy are employees available for work assignments. This comprehensive pre-deployment training event ensures that all personnel documentation and competency criteria have been satisfied prior to arriving at the work site.

The annual spring training includes ACS training of the SRT members on dispersant application and use, including ACS Tactics DT-1, DT-2, DT-3 and Shell Tactics OR-8, OR-9A and OR-9B.

Also, SRT members receive ACS training on *in situ* burning methods and techniques including ACS Tactics B-1, B-2, B-3, B-4, B-5, B-6, B-7 and Shell Tactics OR-7 (listed in Table 2.7.9-2). ACS conducts *in situ* burning training and competency evaluations several times a year at different North Slope locations. Typically, courses involve classroom instruction and field exercises (Appendix E). Vessel-based SRT members are trained in use of *in situ* burning equipment and materials to implement SMART protocols.

The Shell spring training academy is in addition to training and qualification provided by contractors that provide a specialized service (e.g., vessel captains, pilots). These records are maintained by each individual contractor and can be made readily available for audit and verification purposes.

All required training for site personnel who will be participating in oil spill response activities will be completed prior to commencement of operations, and will include classroom as well as actual field deployment. All records of participants are maintained and made readily available immediately after the academy for audit and verification purposes at Shell's Anchorage offices. The date, location, and content of the academy depend on the defined scope for the season.

F.3 TRAINING RECORD STORAGE

Training records, certificates of completion, and attendance records for Shell IMT are maintained. These records will be maintained for a minimum of five years. Records are available in a timely manner upon request. Table F-1 provides the location and contact information for Shell training records.

Table F-1
Shell Training Records - Contacts and Location

LOCATION OF REQUIRED TRAINING RECORDS	
Contact	Curtis Wright
Company	Shell
Address	3601 C Street, Suite 1000, Anchorage, AK 99503
Telephone	907-538-1653

ACS also maintains 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. ACS training records, certificates of completion, and attendance records are stored at their offices (see Table F-2). Records are kept for a minimum of five years or for the duration of time that the employee or contractor is assigned responsibilities in this OSRP. Records are available in a timely manner upon request. Table F-2 provides the location and contact information for ACS training records.

Table F-2
ACS

LOCATION OF REQUIRED TRAINING RECORDS	
Contact	SRT Training Specialist / IMT Training Specialist
Company	ACS
Address	#1 Spine Road, Prudhoe Bay, AK 99734
Telephone	907-659-3226 / 907-659-3206

Table F-3 identifies the location for records and the contact information for MSRC training.

Table F-3
MSRC

LOCATION OF REQUIRED TRAINING RECORDS	
Company	MSRC
Street Address	220 Spring Street, Suite 500
City, State & Zip	Herndon, VA 20170
Telephone	703-326-5636

An overview of training is provided in Table F-4 for the IC, Operations Section Chief, Planning Section Chief and Source Control Section.

Table F-4
Training Records – IC, IMT

TRAINING RECORDS – IC, IMT Training is due annually and completed prior to drilling*				
Title	**Name**	**Location**	**Date**	**Type of Training**
IC	Sean Churchfield	Anchorage, AK	Spring 2012*	QI
	"	"	"	IC/IMT Training
Alternate	Susan Moore	Anchorage, AK	1/26/2012	QI
	"	"	"	IC/IMT Training
Alternate	Geoff Merrell	Anchorage, AK	1/26/2012	QI
	"	"	"	IC/IMT Training
Operations Section Chief	Geoff Merrell	Anchorage, AK	1/26/2012	IMT Training
Alternate	Curtis Wright	Anchorage, AK	1/26/2012	IMT Training
Planning Section Chief	Carol Thielen	Anchorage, AK	1/19-20/2012	IMT Training
	"	Anchorage, AK	1/26/2012	IMT Training
Alternate:	Darla Dare	Anchorage, AK	1/23-24/2012	IMT Training
	"		1/26/2012	IMT Training
Source Control Section	Mark Duplantis	Anchorage, AK	1/23-24/2012	IMT Training
	Jim Miller	Anchorage, AK	1/23-24/2012	IMT Training
	"	Anchorage, AK	1/26/2012	IMT Training

*Additional training to take place in Spring 2012, prior to drilling.

Additional training is planned specifically for countermeasures such as dispersant and *in situ* burning. This training will be completed prior to commencement of the drilling season and required annually.

Table F-5
IMT Dispersant Application / *In situ* Burning Training

IMT DISPERSANT APPLICATION / *IN SITU* BURNING TRAINING (Training is due annually with completion scheduled prior to drilling.)				
Title	**Name**	**Location**	**Date**	**Type of Training**
IC	Sean Churchfield	Anchorage, AK	Spring 2012*	Dispersant / *In Situ* Burning
Deputy IC	Susan Moore	Anchorage, AK	Spring 2012*	Dispersant / *In Situ* Burning
Operations Section Chief/ Deputy IC Alternate	Geoff Merrell	Anchorage, AK	Spring 2012*	Dispersant / *In Situ* Burning
Planning Section Chief	Carol Thielen	Anchorage, AK	Spring 2012*	Dispersant / *In Situ* Burning
Planning Section Chief Alternate	Darla Dare	Anchorage, AK	Spring 2012*	Dispersant / *In Situ* Burning
Logistics Section Chief	Karen Spring	Anchorage, AK	Spring 2012*	Dispersant / *In Situ* Burning
Safety Officer	Lucy Jean	Anchorage, AK	Spring 2012*	Dispersant / *In Situ* Burning
Safety Officer Alternate	Mike Corron	Anchorage, AK	Spring 2012*	Dispersant / *In Situ* Burning
Environmental Unit Leader	Michael Macrander	Anchorage, AK	Spring 2012*	Dispersant / *In Situ* Burning
Environmental Unit Leader Alternate	Erling Westlien	Anchorage, AK	Spring 2012*	Dispersant / *In Situ* Burning

*Training to take place in Spring 2012, prior to drilling.

MSRC would provide trained personnel to participate in dispersant application via aircraft. Training records for MSRC personnel are maintained at MSRC offices and can be made available for review upon request. Large / joint training exercises conducted by MSRC during 2011 are identified in Table F-6 below.

Table F-6
MSRC 2011 Dispersant Aircraft Flight / Training

LARGE / JOINT TRAINING EXERCISE - Dynamic Aviation, IAR, and MSRC (MINIMUM CRITERIA: ANNUALLY)		
TRAINING TYPE	LOCATION	DATE(S)
Dispersant Aircraft Flight / Training	Stennis, MS	9/27-28/2011
Dispersant Aircraft Flight / Training	San Diego, CA	10/18-19/2011

Figure F-1 Shell IMT / QI Training - January 2012

ICS 211p - Check-In List (Personnel)

Incident: IMT/QI Drill JAN.26.2012 WCD Day 1 w/MC | Prepared By: Hyder, Craig | at 1/26/2012 08:36

Period: Period 1 (9/2/2011 04:15 - 9/3/2011 04:15) | Version Name: Anchorage International

Check-In Location -- ☒ Command Post ☐ Staging Area ☐ Other - Anchorage International

Personnel Check-In Information

In/Out Status	Name (Last, First)	Contact # (Mobile Phone)	Company / Agency	Classification	Assigned Section	Assigned Position	Home State	Check-In Date/Time	Check-Out Date/Time
IN	Hyder, Craig	907-690-4322	ACS	Other	Truth/Control		AK	1/26/2012 08:45	
in	Bouracii, Kemal	517-420-0896	Shell		Contingency Response	Task Force leader		1-26-12	
in	Sorensen, Chad	907 252-4803	Shell		"	"		1-26-12	
in	Thurmond, Wesley	907 229-9039	Shell		Logistics	Section Chief		1-26-12	
in	Westlien, Erling	907 382 0449	Shell		ENVL	Lead		12612 0900	
in	Frances, Lucas	907 223-4814	Shell		"	"		0900	
IN	REEVE, KEVIN	907-223-4411	UMIAQ		CR	CONTINGENCY TRNG		0900	

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ICS 211p - Check-In List (Personnel)

Incident: IMT/QI Drill JAN.26.2012 WCD Day 1 w/MC | Prepared By: Hyder, Craig | at 1/26/2012 08:36

Period: Period 1 (9/2/2011 04:15 - 9/3/2011 04:15) | Version Name: Anchorage International

Check-In Location -- ☒ Command Post ☐ Staging Area ☐ Other - Anchorage International

Personnel Check-In Information

In/Out Status	Name (Last, First)	Contact # (Mobile Phone)	Company / Agency	Classification	Assigned Section	Assigned Position	Home State	Check-In Date/Time	Check-Out Date/Time
IN	Hyder, Craig	907-690-4322	ACS	Other	Truth/Control		AK	1/26/2012 08:45	
IN	Kelliher, Raegan	907-748-0690	Shell		Planning	Documentation Unit		1/26/12 08:45	
IN	Smyth, Carol	907-229-8366	Shell		Planning	Documentation		1/26/12 0845	
IN	Wright, Curtis	907-830-4060	Shell		QI, Ops	QI, Ops		1/26/12 08:45	
IN	HORAN, POPS D	907 2309138	SHELL		ON SCENE GROUP SUP.			" 0845	
IN	Maqueda, Carlos	865-296-0942	Shell		Logistics			1/26/12 0850	
IN	Leighty, Wayne	907-223-1684	Shell		Planning	Resource Unit Lead		1/26/12 08:22	
IN	Powell, SCOTT	281-744-7632	Superior		—	—		1-26-12 08:50	
IN	Dreckenstreets Tim	713.397.6559	Superior		—	—		1-26-12 08:50	
IN	Mike Noel	713-824-3991	Superior		Ops			1-26-12 08:50	
IN	Joe Lobrino	907 351 1591	AES RO		OPS Deputy			1-26 0851	
IN	Craig Blanchard	907-887-1790	Shell		OPS Deputy	Section Chief		1-26-08:50	
IN	Darla Dare		Shell		Planning Section	Deputy Section Chief		1-26-12 0855	

ICS 211p - Check-In List (Personnel) | © 1997-2012 dbSoft, Inc.

Figure F-1 Shell IMT / QI Training - January 2012 (continued)

ICS 211p - Check-In List (Personnel)

Incident: IMT/QI Drill JAN.26.2012 WCD Day 1 w/MC | Prepared By: Hyder, Craig | at 1/26/2012 08:36
Period: Period 1 (9/2/2011 04:15 - 9/3/2011 04:15) | Version Name: Anchorage International
Check-In Location -- ☒ Command Post ☐ Staging Area ☐ Other - Anchorage International

Personnel Check-In Information

In/Out Status	Name (Last, First)	Contact # (Mobile Phone)	Company / Agency	Classification	Assigned Section	Assigned Position	Home State	Check-In Date/Time	Check-Out Date/Time
IN	Hyder, Craig	907-690-4322	ACS	Other	Truth/Control		AK	1/26/2012 08:45	
	Travis McNair	907-952-1237	Shell		Contingency Response	Task Force leader	AK	1/26/2012 0857	
	Taylor, Jennifer	907-382-5974	Shell		JIC	PIO	AK	1/26/2012 0900	
	Ellsworth, Steve	907 382 1987	AES		Planning	[illegible]		1/26/2012 9:01	
	Child, Susan	907-301-5792	Shell		Deputy IC UC	Deputy IC	AK	1/26/12 9:00 am	
	Stoll, Ken	281 217 7552	Shell		Functions	CP		9am 26 Jan 2012	
	WONG, SILAS	907-341-9451	SHELL		OBSERVER	OBSERVER		9 am 1/26	

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ICS 211p - Check-In List (Personnel)

Incident: IMT/QI Drill JAN.26.2012 WCD Day 1 w/MC | Prepared By: Hyder, Craig | at 1/26/2012 08:36
Period: Period 1 (9/2/2011 04:15 - 9/3/2011 04:15) | Version Name: Anchorage International
Check-In Location -- ☒ Command Post ☐ Staging Area ☐ Other - Anchorage International

Personnel Check-In Information

In/Out Status	Name (Last, First)	Contact # (Mobile Phone)	Company / Agency	Classification	Assigned Section	Assigned Position	Home State	Check-In Date/Time	Check-Out Date/Time
IN	Hyder, Craig	907-690-4322	ACS	Other	Truth/Control		AK	1/26/2012 08:45	
IN	Macrander, Granger	907 306 7082	Shell		Log	Med Unit Lead		1/26/2012 8:55	
	Ptak, Heather	907-441-5063	Shell		Planning	Waste Coord.		1/26/2012 8:55	
IN	Laurie Brewer	907 223-9368	Shell		Logistics	Ldr.		8:57	
IN	Moore, Susan	907-382-5474	Shell		QI/IC	QI/IC		8:57am	
IN	Miller, Jim	7132533778	Shell		Source Cont.	"		1/26 0900	
In	Sears, Sandy	907 771-7203	Shell/UC		Disposal			9:00AM	
In	Sandel, Walt	907-230-9241	Shell		Sit U			9:00 am	
IN	Mike Coyler	872-796-6095	Shell		Ops Safety			9:00 Am	
✓	JEAN, LUCY	301-7614	✓		SOFR	SOFR		9 A	
IN	HORAN, D. POPS	907 230 9138	SHELL		OFFSHORE OPERATIONS GROUP SUP.			0900	

ICS 211p - Check-In List (Personnel) | © 1997-2012 dbSoft, Inc.

Figure F-1 Shell IMT / QI Training - January 2012 (continued)

ICS 211p - Check-In List (Personnel)

Incident: IMT/QI Drill JAN.26.2012 WCD Day 1 w/MC | Prepared By: Hyder, Craig | at 1/26/2012 08:36

Period: Period 1 (9/2/2011 04:15 - 9/3/2011 04:15) | Version Name: Anchorage International

Check-In Location -- ☒ Command Post ☐ Staging Area ☐ Other - Anchorage International

Personnel Check-In Information

In/Out Status	Name (Last, First)	Contact # (Mobile Phone)	Company / Agency	Classifi-cation	Assigned Section	Assigned Position	Home State	Check-In Date/Time	Check-Out Date/Time
IN	Hyder, Craig	907-690-4322	ACS	Other	Truth/Control		AK	1/26/2012 08:45	
iN	Theilen, Carol	713.504.9260	Shell		Planning	Planning Section Chief		1/26/2012 8:59	
IN	HIGGO DORRIS	907-352-2209	Shell		Liaison	LNO		1/26/2012 9:00	
IN	MARCUS ODER	~~967~~ X258	RDI		PLANNING/ GIS TECH			"	
IN	GEOFF MERRILL	306-8016	SHELL		OPS	OPS SECT. CHR. QI		1/26 0900	
IN	SPRING, Karen	907-306-6038	Shell		Logistics	Logistics		1/26/12 0900	

ICS 211p - Check-In List (Personnel) | © 1997-2012 dbSoft, Inc.

Figure F-2 Shell IMT / ICS 300 Training - January 2012

Attendance Training Roster

Print all information neatly. User form for all training conducted outside of Robert Training Center. Complete all sections. Send or fax to Asset Training Coordinator, Shell Alaska Venture, 907-646-7130 or email to Christine.Romero@shell.com

Course Title ICS 300	Training Location Shell Anchorage Frontier BLDG / CF 625	ATC (Name & signature) Geoff Murrell	Date 1/19-Jan/2012
Course Code HSSEMR000504	Instructor EMSI Shawn Essert	Supervisor (signature) required for all self-taught training Peter Velez	Duration of session 16 hr

Last Name	First Name	Gender	Contractor /Employing Company	Work Location	Shell and GI-D Contractors must include Computer User ID	Cost Code	Signature
Bouraoui	Kemal	M	Shell	Anch	00151790		[illegible]
Mercier	Matthew	M	Shell	Anch	729359		[illegible]
Reigle	Zachary	J	Shell	Anch.	55118		Zach Reigle
Theilen	Carol	F	Shell	ANC	10201080		Carol Theilen
Brzuz	Louis	M	Shell	Wck	726101		[illegible]
Velez	Peter	M	Shell	WCK	10172633		Peter Velez

Data Privacy Statement

The personal data you provide Managed Account Creation forms will be held and processed for the purpose of Shell Learning record keeping and management. The personal data will be controlled by (or on behalf of) your Shell Learning representative and the Shell Open University (the 'datacontroller(s).'' The information will be retained only for as long as is permitted by local legislation and then destroyed.

In order to process the personal data you provide on these Managed Account Creation forms for the purposes indicated, your personal data may be disclosed to/ transferred to internal Shell applications.

The datacontroller (s) will try to ensure that your personal data is protected adequately wherever possible, even where countries outside the European Union (EU) to which it is transferred may provide a different level of (legal) protection of personal data from that offered by legislation in the EU. Countries to which your application form and other personal data you have supplied have been transferred can be provided on request.

By signing and returning this application form, you (1) declare you have read, understood and accepted the statements set out in this data protection form and (2) give your consent to the processing of the information contained in the attached Managed Account Creation forms.

Attendance Training Roster

Print all information neatly. User form for all training conducted outside of Robert Training Center. Complete all sections. Send or fax to Asset Training Coordinator, Shell Alaska Venture, 907-646-7130 or email to Christine.Romero@shell.com

Course Title ICS 300	Training Location Shell Anchorage Frontier BLDG / CF 640	ATC (Name & signature) Geoff Merrell	Date 1/23-24/2012
Course Code HSSEMR000504	Instructor Shawn Essert-EMSI	Supervisor (signature) required for all self-taught training Peter Velez	Duration of session 16 hr

Last Name	First Name	Gender	Contractor /Employing Company	Work Location	Shell and GI-D Contractors must include Computer User ID	Cost Code	Signature
McNair	Travis	M	SHELL	ANC			[illegible]
Sorenson	Chad	M	Shell	ANC			Chad S
Romak	Michelle	F	Shell	ANC			Michelle Romak
Taylor	Jennifer	F	Shell	ANC			J Taylor
Craddock-Molin	Jeannette	F	Shell	ANC			J Craddock
Brown	Donald	M	Shell	ANC			D.D. Brown
Horan	Dennis Pops	M	Shell	ANC			D Pops Horan
Duplantis	Mark	M	Shell	ANC	158869		Mark Duplantis
Cameron	Gary	M	Shell	ANC			Gary Cameron
Stone	Marc	M	Shell	ANC			Marc Stone
Scott	Peter	M	Shell	ANC			Pete Scott
Moore	Susan	F	Shell	ANC	831329		S Moore

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By signing and returning this application form, you (1) declare you have read, understood and accepted the statements set out in this data protection form and (2) give your consent to the processing of the information contained in the attached Managed Account Creation forms.

Figure F-2 Shell ICS 300 / IMT Training - January 2012 (continued)

Attendance Training Roster

Print all information neatly. User form for all training conducted outside of Robert Training Center. Complete all sections. Send or fax to Asset Training Coordinator, Shell Alaska Venture, 907-646-7130 or email to Christine.Romero@shell.com

Course Title ICS 300	Training Location Shell Anchorage Frontier BLDG / CF 1046	ATC (Name & signature) Geoff Merrell	Date 1/23-24/2012
Course Code HSSEMR000504	Instructor Shawn Essert - EMSI	Supervisor (signature) required for all self-taught training Peter Velez	Duration of session 16 hr

Last Name	First Name	Gender	Contractor /Employing Company	Work Location	Shell and GI-D Contractors must include Computer User ID	Cost Code	Signature
Frantz	Herschel	M	Shell	ANC			[signature]
WESTLIEN	ERLING	M	Shell	ANC			[signature]
MILLER	JIM	M	Shell	ANC			[signature]
Magueda	Carlos	M	Shell	HOU			[signature]
JEAN	LUCY	F	✓	ACR	USWE9		[signature]
Dare	Darla	F	Shell	ANC			[signature]
Becker	Gary	M	SEPCo	ANC			[signature]
LoSciuto	Joseph	M	A&S Response Ops	ANC			[signature]
Pete Saily	Pete	M	Shell	ANC			[signature]
EDMONDSON	Jon	M	Shell	ANC	NLJED0		[signature]

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By signing and returning this application form, you (1) declare you have read, understood and accepted the statements set out in this data protection form and (2) give your consent to the processing of the information contained in the attached Managed Account Creation forms.

Attendance Training Roster

Print all information neatly. User form for all training conducted outside of Robert Training Center. Complete all sections. Send or fax to Asset Training Coordinator, Shell Alaska Venture, 907-646-7130 or email to Christine.Romero@shell.com

Course Title ICS 300	Training Location Shell Anchorage Frontier BLDG / CF 1040	ATC (Name & signature) Geoff Merrell	Date 1/23-24/2012
Course Code HSSEMR000504	Instructor Shawn Essert-EMSI	Supervisor (signature) required for all self-taught training Peter Velez	Duration of session 16 hr

Last Name	First Name	Gender	Contractor /Employing Company	Work Location	Shell and GI-D Contractors must include Computer User ID	Cost Code	Signature
Childs	SUSAN						
↓	↓	F	Shell	Anc	—	—	[signature]
BECWAR	LAURIE	F	SEPCO	ACR	—	—	[signature]
Macrander	A. Michael	M	Shell	Anc	—	—	[signature]
MERRELL	GEOFF	M	SHELL	ANC	–	–	[signature]

Data Privacy Statement

The personal data you provide Managed Account Creation forms will be held and processed for the purpose of Shell Learning record keeping and management. The personal data will be controlled by (or on behalf of) your Shell Learning representative and the Shell Open University (the 'datacontroller(s)." The information will be retained only for as long as is permitted by local legislation and then destroyed.

In order to process the personal data you provide on these Managed Account Creation forms for the purposes indicated, your personal data may be disclosed to/ transferred to internal Shell applications.

The datacontroller (s) will try to ensure that your personal data is protected adequately wherever possible, even where countries outside the European Union (EU) to which it is transferred may provide a different level of (legal) protection of personal data from that offered by legislation in the EU. Countries to which your application form and other personal data you have supplied have been transferred can be provided on request.

By signing and returning this application form, you (1) declare you have read, understood and accepted the statements set out in this data protection form and (2) give your consent to the processing of the information contained in the attached Managed Account Creation forms.

A summary of 2011 ICS drills and training completed by key Shell IMT personnel in 2011 is provided in Table F-7. This was a non-drilling year.

Table F-7
Shell 2011 IMT Training

2011 IMT TRAINING	
Training Type	Date
ICS Training	Jan-19-2011
Tabletop Exercise - Exercise scenario was a MMPD well release from the Sivulliq N well location. Exercised ICS staff incorporating ICS Training	Jan-20-2011
ICS/IAP Training to target individuals assigned to make preparation for, and execute the Tactics meeting	Mar-23-2011
Tabletop Exercise - WCD with medical response	Mar-24-2011
ICS Planning Section Workshop	Apr-27-2011
ICS Planning Section Training with TRG	Jun-01-2011
ICS Exercise - Source Control and Containment	Jun-02-2011
QI Training	Jun-06-2011
IMT / CMT Joint Exercise	Aug-16-2011
IMT Exercise - Exercise scenario and objectives: Exercise WCD / well control event in Beaufort Sea; Prepare Day 3 IAP using proactive planning process; Exercise 213R requisition process.	Aug-30-2011
ICS Exercise	Sep-29-2011
ICS Drill - WCD with security event	Nov-03-2011
ICS Drill - WCD with security event	Nov-11-2011
WCD Spill Response Workshop with ADEC and USCG	Dec-08-2011

F.4 OTHER TRAINING

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:

- Shell Tactics Manual, Tactics S-1 through S-4;
- ACS Technical Manual, Tactics S-1 through S-8, which include site entry procedures, site safety plan development, and personnel protection procedures;
- Shell Contractor Safety Handbook; and
- Shell's HSSE Policy Statement and HSSE 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.

F.5 NATIONAL PREPAREDNESS FOR RESPONSE EXERCISE PROGRAM

Shell will notify the BSEE Alaska Region OSRD Unit 30 days in advance of any exercises that meet the requirements of 30 CFR 254.42(b)(2) or (4).

The NPREP guidelines (August 2002) is the basis for Shell's spill response exercises. Section 6 of these guidelines describes the expected participants, scope, and objectives of exercises for Offshore Facilities.

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.
- Periodic IMT tabletop exercises will also be conducted during active drilling seasons.

Additional drills, both scheduled and unscheduled, may be conducted at the request of BSEE or other authorities. Spill response exercises will take one of three forms as described in Table F-8.

Table F-8
NPREP Spill Response Exercises

SPILL RESPONSE EXERCISES		
Notification Exercise	Shell will conduct IC Notification Exercises at all offshore facilities manned 24 hours per day. Field personnel initiating the drill will document who was called, the time and date of the notification, and any phone number changes necessary as a result of the exercise. These drills will be documented.	Annually
Incident Management Team Tabletop Exercise	IMT tabletop exercises will be held in order to test the Team's knowledge of the OSRP, and the individual roles on the team. The exercise will be announced; however the scenario will remain unannounced. Fifteen components of PREP will be tested in a three year period. The drill will be documented. Lessons learned will be discussed.	Annually
Equipment Deployment Exercise	Shell will verify that the major equipment providers identified in this plan participate in annual equipment deployment either as a result of an actual spill, training, or an exercise. Deployment will include a representative example of equipment as outlined in PREP.	Annually

As a member of mutual aid through ACS, Shell may be called upon to participate in a MAD to be conducted once a year as per NPREP guidelines. The MAD exercise may satisfy the NPREP requirements to exercise all aspects of the response plan at least every three years. To demonstrate Shell's procedures for ensuring a response plan is exercised, and the IMT organization, communication and decision-making is acceptable for managing a response compliance, the spill response drill history for 2011 is presented below. Frequency and content are similar each year, except for inclusion of field drills when personnel and assets are conducting operations at a work site. Some drills and exercises are internal for Shell employee training purposes, and some are for regulatory invitation and evaluation. Drills that are hosted for regulatory participation include sufficient notice to allow regulatory participants to plan and coordinate their attendance.

F.6 RECORD OF EXERCISES

Exercise completion records (see example Internal Exercise Documentation Form) for Shell IMT training are kept at Shell's offices. These records will be maintained for a minimum of five years. Exercise completion records are maintained and stored at Shell's Anchorage offices and are available in a timely manner upon request. Drill/Exercise completion certificates and attendance records are maintained at Shell's offices at 3601 C Street, Suite 1000, Anchorage, AK 99503.

ACS maintains a database as a record of the courses taken and exercises successfully completed by each employee and contractor. The course/exercise 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 five years or for the duration of time that the employee or contractor is assigned responsibilities in this OSRP. Records are available in a timely manner upon request.

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PREP: INTERNAL EXERCISE DOCUMENTATION FORM - NOTIFICATION EXERCISE
(SHELL PERSONNEL MAY USE THE SPILL REPORT FORM FOR QI NOTIFICATION EXERCISE)

1) Date Performed:
2) Exercise or Actual Response:
3) Facility Initiating Exercise:
4) Name of Person Notified: Is this person identified in your response plan as qualified individual or designee? ____.
5) Time initiated: Time in which qualified individual or designee responded:____.
6) Method used to contact: Telephone:________________Pager:_______________Radio:__________________. Other:____. ____.
7) Description of notification procedure: _________________________________. ____. ____.
Certifying Signature: (Certification is the act of confirming that an exercise (1) was completed; (2) was conducted in accordance with the PREP guidelines, meeting all objectives listed; and (3) was evaluated using a mechanism that appraised the effectiveness of the response of contingency plan.)

Note: Retention of exercise documentation is required for 5 years.

NPREP: Internal Exercise Documentation Form
Incident Management Team Tabletop Exercise

1) Date(s) performed: ______________________________

2) Actual response: ☐ or:
   Exercise: ☐ Announced: ☐ or Unannounced: ☐

3) Location: ______________________________

4) Time started: ______________ Time completed: ______________

5) Response plan scenario used (check one):
   Average Most Probable Discharge: ☐
   Maximum Most Probable Discharge: ☐
   Worst Case Discharge: ☐
   Size of (simulated) spill: ______________________________

6) Describe how the following objectives were exercised:
   a) Spill management team's knowledge of oil-spill response plan:
   ____
   ____
   b) Proper notifications:
   ____
   ____
   c) Communications system:
   ____
   ____
   d) IMT's ability to access contracted Oil Spill Removal Organizations (OSROs):
   ____
   ____
   ____
   e) IMT's ability to coordinate spill response with On-Scene Coordinator, state, and applicable agencies:
   ____
   ____
   ____
   ____
   f) IMT's ability to access sensitive site and resource information in the Area Contingency Plan:
   ____
   ____
   ____
   ____

Identify which of the fifteen (15) core components of your response plan were exercised during this particular exercise:

	YES	NO
A Organizational Design		
1. Notifications	☐	☐
2. Staff mobilization	☐	☐
3. Ability to operate with the response management system described in the plan	☐	☐
B Operational Design		
4. Discharge control	☐	☐
5. Assessment of discharge	☐	☐
6. Containment of discharge	☐	☐
7. Recovery of spilled material	☐	☐
8. Protection of sensitive areas	☐	☐
9. Disposal of recovered material and contaminated debris	☐	☐
C Response Support		
10. Communications	☐	☐
11. Transportation	☐	☐
12. Personnel Support	☐	☐
13. Equipment Support	☐	☐
14. Procurement	☐	☐
15. Documentation	☐	☐

7) Description of lesson(s) learned and person(s) responsible for follow-up of corrective measures:

Lessons Learned	Person responsible for Follow-Up and Corrective Measures

____

Certifying Signature*

Retain this form for a minimum of five (5) years.

*Certification – is the act of confirming that an exercise (1) was completed, (2) was conducted in accordance with NPREP guidelines, meeting all objectives listed, and (3) was evaluated using a mechanism that appraised the effectiveness of the response or contingency plan.

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APPENDIX G

LOGISTICAL SUPPORT SERVICES AND SUPPLIES

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APPENDIX G LOGISTICAL SUPPORT SERVICES AND SUPPLIES

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. Primary logistical support for spill response is provided through response contractors.

Additional personnel and equipment resources may be accessed via ACS's APICOM mutual aid agreement as described in ACS Tactic L-10. APICOM has a mutual aid agreement to provide equipment and personnel to members on an as-available basis. Other qualified staff can be mobilized from within the Royal Dutch Shell Group in the U.S. and abroad. For notification and mobilization of additional Royal Dutch Shell Group staff, the Shell MOSAG / SART telephone contact is 713-241-2532. Through the MOSAG link, access to as many as 2,000 Shell employees is available. ACS has implemented a number of master services agreements with a variety of contractors for services that may be required in a spill response. These are described in ACS Tactic L-9. Table G-1 presents a list of vendors in Alaska that Shell may call upon to support spill response operations. Additionally, Shell maintains a fleet of logistics vessels as described in the EP to provide ocean freight service during the drilling season. In the unlikely event of emergency, Shell will have access to additional fire boom through contracts with other OSROs like MSRC, Clean Gulf Associates, and OSRL. Shell Logistics maintains call-off contracts with a variety of marine, road, aviation, expediting and logistics management service providers world-wide to support operations. This robust logistics support network is Shell-managed and available on short notice. Much of the heavy-lift capability, either marine or air based, would be consolidated in staging yards at either Dutch Harbor (marine) or the Anchorage airport (aviation) vicinity and forwarded to the operating areas as previously described.

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.

There are a variety of billeting options within the Greater Prudhoe Bay region and Deadhorse, AK. Private secure lodging is available within the oil field areas and commercial facilities are available in Deadhorse. See Facilities section in Table G-1, Logistical Support Contractors for details.

Out-of-Region Resource Mobilization

In the unlikely event that out-of-region resources are requested to supplement the response, additional personnel or equipment may be mobilized (from other stockpiles) via Shell-chartered or commercial aircraft. Personnel and equipment would first be flown to the Anchorage airport for assignment and deployment. The city of Anchorage has sufficient accommodations and storage areas for these resources until they are assigned or pre-staged on site. Tier III assets will be alerted and placed on stand-by status in the unlikely event that additional assets may be required. Resources may be requested, loaded, and flown from anywhere in the U.S. to the Anchorage airport in less than 24 hours. Equipment can arrive in Anchorage from most international locations in less than 72 hours.

Aviation support is available from current Shell Alaska Venture contracts, as depicted in Table G-1 and through ACS Tactic L-4, or through Shell Canada and Shell in the lower 48 states (Houston and New Orleans). Anchorage International Airport (Anchorage airport) is designated as the primary hub for initial distribution of personnel and equipment. The Anchorage airport can handle all heavy lift operations to received recourses arriving from around the world. Examples of aircraft operating limitations are presented in Appendix A.

During a Tier II or III incident, air operations would primarily be conducted from the Shell hangar at the Barrow airport and from Deadhorse airport. Each airport has IFR (Instrument Flight Rules) capability with 200-ft ceiling and ½ mile restrictions. Jet A fuel is available at both airports. Aviation fuel may also be delivered to remote areas via chartered fixed-wing air services. Specific runway composition and lengths are listed in the Shell Landing Locations (Figures G-1 and G-2). Flight times vary depending on type of aircraft; however, Figure G-2 provides distance and times to pre-identified staging areas.

Barrow and Deadhorse are controlled public airports that can handle heavy air traffic. Wainwright, Point Hope and some other North Slope Villages are uncontrolled but have maintained runways. All airports and associated communities have sufficient support contractors and lay down areas for preliminary staging of resources. Shell could supplement Deadhorse housing with a two-hundred (200) man camp provided by Taiga Ventures. This well-equipped facility is transportable via air, and can be fully-functional within five (5) days.

Mobile Command Post

In the event that a forward command post is deemed necessary, Shell may activate command posts at existing facilities, or activate the Mobile Response Center available through ACS (Tactic L-4). Command posts at existing facilities are located in Barrow and Deadhorse at Shell hangers at the respective airports. The Mobile Response Center may be deployed to other forward locations as dictated by the UC. The amount of equipment to outfit the command post will be determined by the size of the response, but in general the following should be considered in addition to equipment identified ACS Tactic L-4:

- Telephones and telephone books
- Appropriate number of copy and facsimile machines and computer printers
- Desktop and portable computers with printers and fax/modem capability
- Internet and email access
- Office furniture
- Portable radios and marine communications base station
- Cameras and video recording/playback capability
- Office supplies (pens, pencils, paper, flash drives, blank CDs and DVDs, etc.)
- Chart paper with easels and status boards (dry-write)
- Overhead and computer projectors
- Applicable ESI maps
- Applicable MESA maps
- Copies of the Shell Chukchi Sea Regional Exploration Program Oil Spill Response Plan
- Copies of any appropriate local emergency response plans
- Copies of the Unified Plan and the North Slope Subarea Contingency Plans
- Copies of the Shell Upstream Americas Incident Management Handbook

Table G-1
Logistical Support Contractors

COMPANY	SERVICES	CONTACT
TRANSPORTATION		
Era Helicopters 6160 Carl Brady Drive Anchorage, AK 99502	Rotary-wing Passenger Transport, Medevac, Small Cargo, Aerial Ignition	907-248-4422 907-550-8600
Frontier Flying Service 5245 Airport Industrial Road Fairbanks, AK 99709	Fixed-wing Passenger Transport, Cargo Transport, Medevac	907-450-7250 800-478-6779
Peninsula Airways, Inc. 6100 Boeing Avenue Anchorage, AK 99502	Fixed-wing Passenger Transport, Cargo Transport, Medevac	907-243-2485
Cook Inlet Tug & Barge, Inc. 812 Delaney St Anchorage, AK 99501	Marine Transportation, Tugs, Deck Barge	907-277-7611
Crowley-Alaska 201 Arctic Slope Ave Anchorage, AK 99518	Marine Transportation, Tugs, Barges, Petroleum Transport	907-777-5505
Cruz Marine, LLC 7000 E Palmer-Wasilla Highway Palmer, AK 99645	Marine Transportation, Tugs, Deck Barges	907-746-3144
Dunlap Towing Company 617 North First Street La Conner, WA 98257	Marine Transportation, Tugs, Barges	425-259-4163
Foss Maritime 660 W Ewing St Seattle, WA 98109	Marine Transportation, Tugs, Barges, Petroleum Transport, Lighterage	206-281-3800 800-426-2885
Harley Marine 910 SW Spokane St. Seattle, WA 98134	Marine Transportation, Tugs, Petroleum Transport	206-628-0051
K-Sea Transportation 2700 W Commodore Way Seattle, WA 98199	Marine Transportation, Tugs, Tank Barges	206-443-9418
Carlile Transportation Systems 1800 E. First Avenue Anchorage AK 99501	Ground Transportation	907-276-7797 800-478-1853
Lynden Transport 3027 Rampart Drive Anchorage, AK 99501	Ground Transportation	907-276-4800 800-326-5702

Table G-1 (Continued)
Logistical Support Contractors

COMPANY	SERVICES	CONTACT
COMMUNICATIONS		
Alaska Telecom 6623 Brayton Drive Anchorage, AK 999507	Remote Site Systems, Microwave/Satellite Radio Systems, VHF/UHF handheld radios, satellite and cellular telephones	907-344-1223
ASTAC 4300 B Street, Suite 500 Anchorage, AK 99503	Local & long-distance telephone service, Internet service (DSL, dial, wireless) cellular service	907-563-3989
AT&T Alascom 505 E. Bluff Drive Anchorage, AK 99501	Long-distance telephone service, Internet service, and WAN connectivity within AK and lower 48 states	800-620-6520
GCI 2550 Denali Street, Suite 1000 Anchorage, AK 99503	Cellular Services, Local and Long-distance telephone service, WAN connectivity within AK and lower 48 states. Internet service (dial, DSL, T1)	907-265-5600
North Slope Telecom 2020 E. Dowling #3 Anchorage, AK 99507	Telecommunications Services Feasibility Studies & System Design Operations and Maintenance Services Aviation, Marine, & Power Systems	907-562-4693
ProComm Alaska, LLC 4831 Old Seward Hwy, Suite 111 Anchorage, AK 99503	Radio Communications Motorola Service Wireless	907-563-1176
Ukpik, LLC 6700 Arctic Spur Road Anchorage, AK 99518	Communications, Data & Electrical	907-563-2240

Table G-1 (Continued)
Logistical Support Contractors

COMPANY	SERVICES	CONTACT
FACILITIES		
Arctic Structures 9312 Vanguard Dr. Anchorage, AK 99507	Planning, Design, and Construction of Remote Camps Metal and Modular buildings.	907-522-2425
Bering Marine 6441 S. Airpark Place Anchorage, AK 99502	Barge Camps	907-248-7646
Doyon Universal Services, LLC 701 W. Eighth Ave, Suite 500 Anchorage, AK 99501	Camps and Catering	907-522-1300
Marsh Creek LLC 2000 E. 88th Avenue, Suite 100 Anchorage, AK 99507	Housekeeping and Catering	907-258-0050
PacificRim Logistics 737 W. Fifth Ave, Suite 209 Anchorage, AK 99501	Remote Logistics Transportation Services	907-277-5191
Olgoonik Corporation P.O. Box 29 Wainwright, Alaska 99782	Wainwright Hotel and Man Camps	907-763-2514
Taiga Ventures 2700 S. Cushman St. Fairbanks, AK 99701	Remote Camps Camp Services Drilling Supplies	907-452-6631
LODGING FACILITIES		
Prudhoe Bay Hotel Pouch 340004 Prudhoe Bay, AK 99734	Commercially Operated Lodging 180 rooms available	907-659-2449
Aurora Hotel Purdhoe Bay, AK 99734	Commercially Operated Lodging 400+ rooms available	907-670-0600
Arctic Oilfield Hotel Prudhoe Bay, AK 99734	Lodging Available to Oil and Gas Contractors 391 rooms available	907-659-2614
Alutiiq Express Prudhoe Bay, AK 99734	Commercially Operated Lodging 82 rooms available	907-222-9501
PBOC GPB Eastern Operating Area (inside security)	Industrial Facility Lodging 300+ rooms available	907-659-5635 (Eastern Operating Area Billeting Office)
BOC GPB Western Operating Area (inside security)	Industrial Facility Lodging 300+ rooms available	907-659-4415 (Western Operating Area Billeting Office)
MCC GPB Eastern Operating Area (inside security)	Industrial Facility Lodging 300+ rooms available	907-659-5635 (Eastern Operating Area Billeting Office)

Table G-2
Primary Logistical Airfields

CITY	FAA LOCATION ID	REGION	AIRPORT NAME	TYPE	RUNWAY INFORMATION					MANNED	LANDING AIDS
					LENGTH (FT)	WIDTH (FT)	SURFACE	NUMBER AND ORIENTATION			
Anchorage	ANC	Southcentral	Ted Stevens Anchorage International	Primary	11,584	150	Asphalt	1	6/24	Continuous	dusk-dawn lights; VOR; NDB; ODALS; ALSF2; MALSR
Deadhorse	SCC	North Slope Borough	Deadhorse	Primary	6,500	150	Asphalt	4	1/19	0700-1730	dusk-dawn lights; VOR; NSB; MALSR
Fairbanks*	FAI	Interior	Fairbanks International	Primary	11,800	150	Asphalt	2	9/27; 17/35	Continuous	dusk-dawn lights; VOR; NDB; ALSF2 & MALSR

*Backup Staging Location

Figure G-1 Primary and Secondary North Slope Airfields

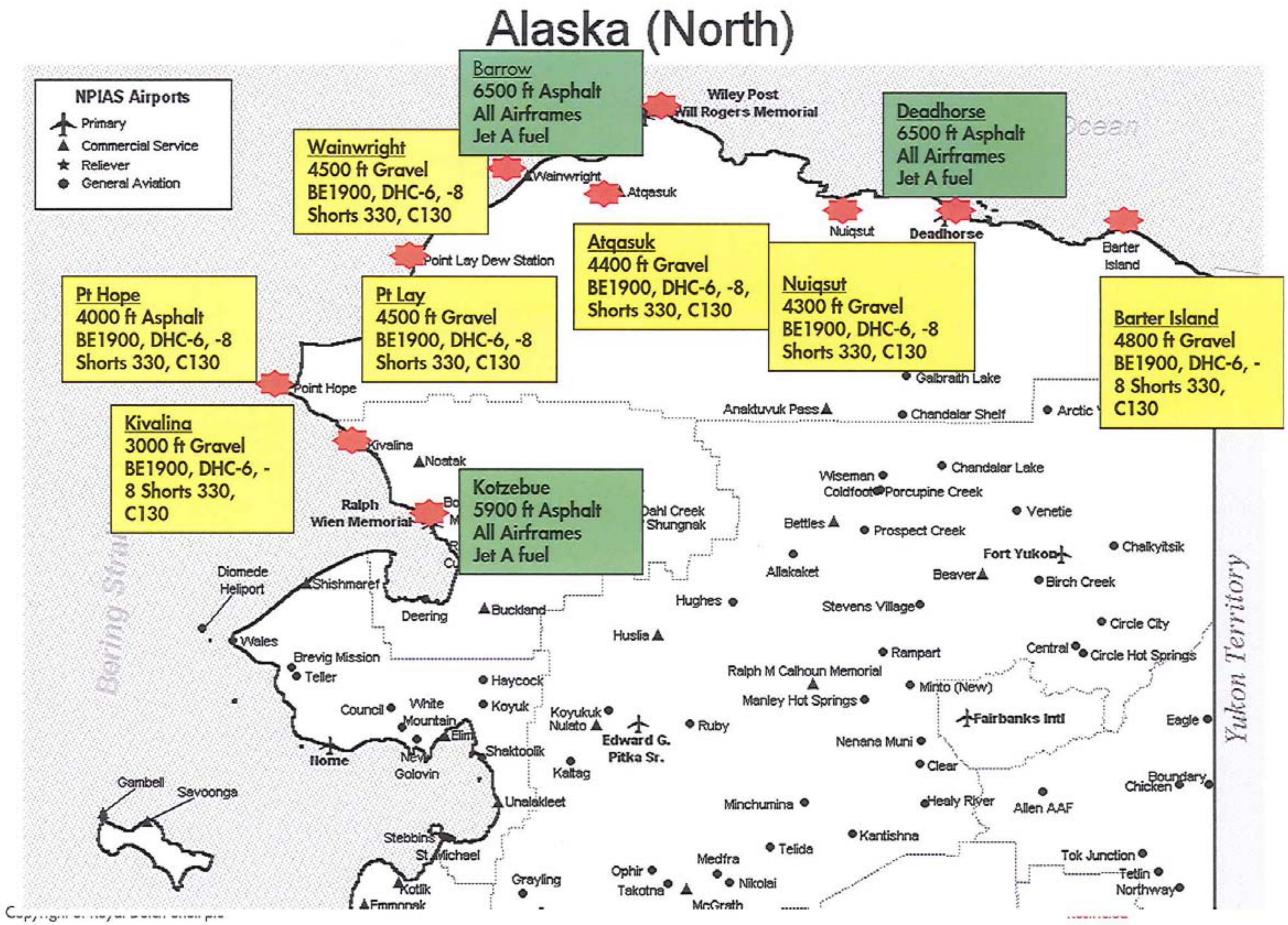
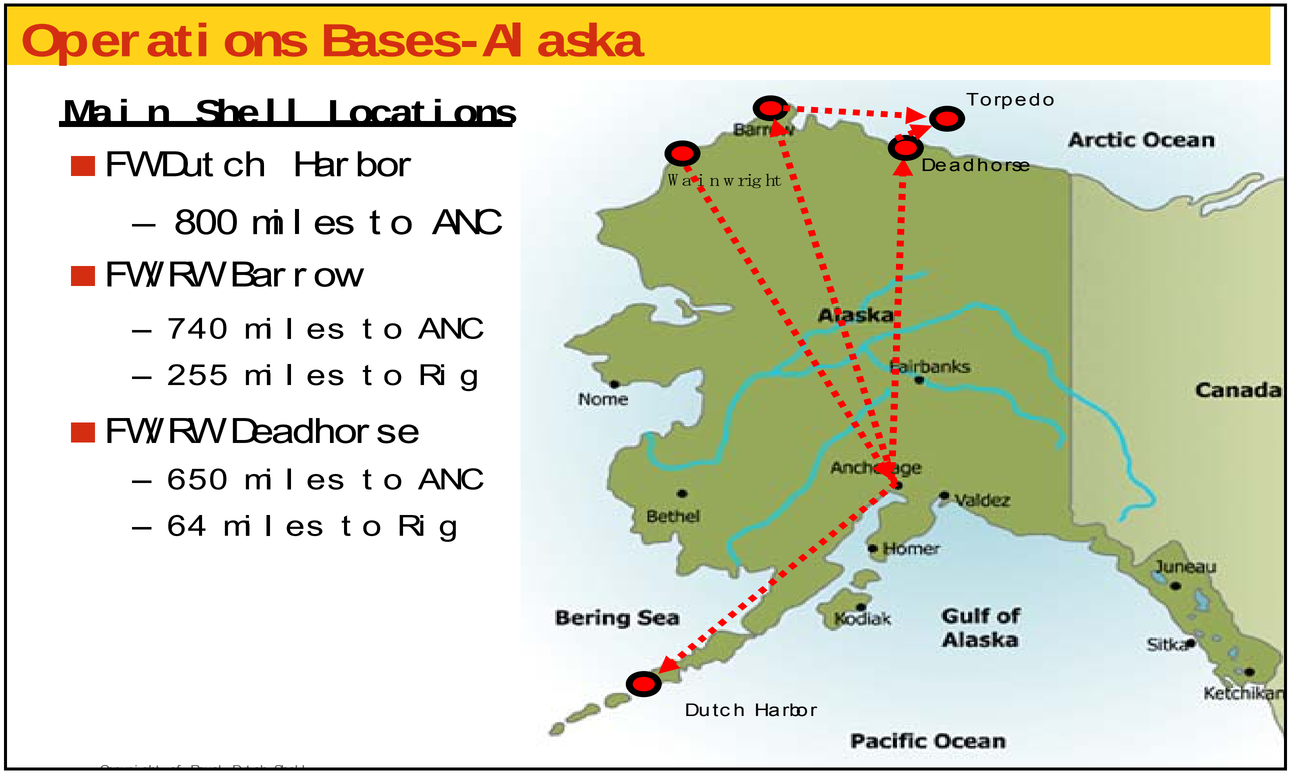


Figure G-2 Main Shell Locations and Transit Times



Transportation Mode	Anchorage to Deadhorse	Deadhorse to Drill Site
Light-Transport Fixed Wing (150 mph)	4.3 hr	0.43 hr
Heavy Transport Fixed Wing (300 mph)	2.2 hr	0.21 hr
Helicopter (100 mph)	6.5 hr	0.64 hr
Vessel-Based Transport (5 knots)	--	11 hr
Vessel-Based Transport (10 knots)	--	≈ 5.6 hr

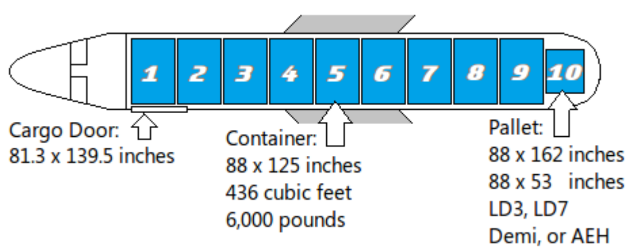
Commercially available air transportation service providers and the specifcations for their aircraft capacities and runway requirements are detailed below.

Alaska Air Cargo

Alaska Air Cargo has stations in Anchorage, Fairbanks, Barrow, Deadhorse and Kotzebue which provide shipment handling and tracking services. Alaska Airlines typically uses either a Boeing 737-400 Combi (Passenger and Freight) or a Boeing 737-400 Freighter (freight only). There are several cargo options available depending on delivery schedule and shipment weight or dimensions. Gold Streak service is a small package service booked on the next available flight. General and Priority Freight services are for heavier shipments with time-sensitive shipments sent Priority.

ULDs, typically referred to as “igloos” are also available and are more economical for frequent shipments. Igloo dimensions are 125 inches long by 88 inches wide by 77.5 inches high and are provided by Alaska Airlines to shippers for self-loading. Each igloo has a maximum payload of 6,000 lbs. Alaska Airlines sets customer service rates for igloos based on total weight of shipments over a period of time.

Alaska Airlines 737-400 Combi Aircraft in Barrow, Alaska



Alaska Airlines Boeing 737-400 Freighter Load Configuration

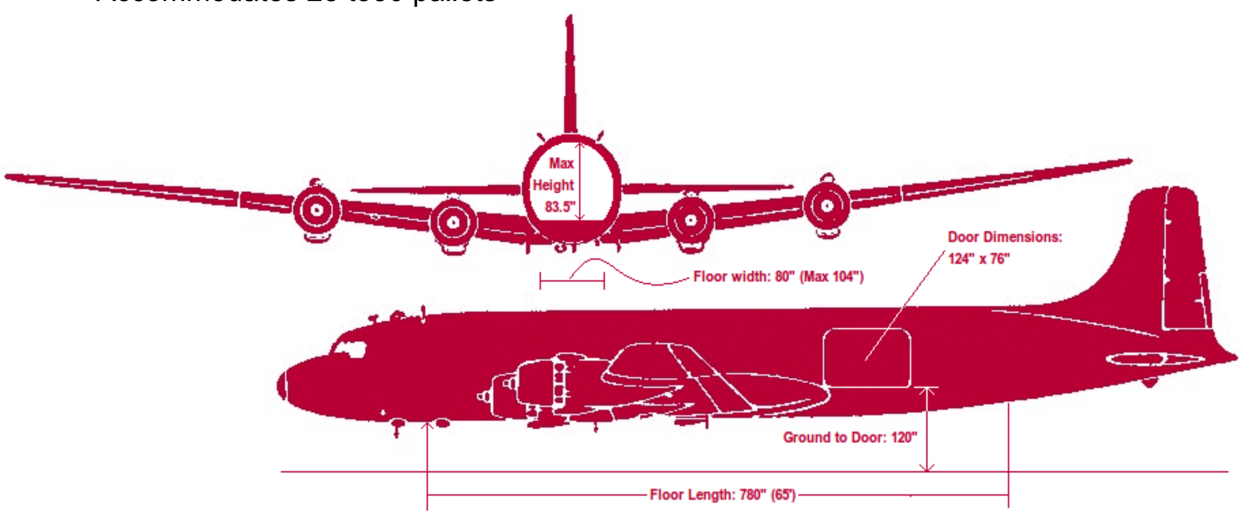
Everts Air Cargo

Everts headquarters are located in Fairbanks, Alaska. Everts mainly focuses on business within interior Alaska, but provides charter and flagstop service to Barrow, Deadhorse and Wainwright and scheduled service to Kotzebue. Flagstop service is for shipments too small for a charter. Delivery to the final destination is provided through a second air carrier with smaller aircraft suited for rural Alaska runways. Everts offers small-package, general and priority service for scheduled and flagstop destinations. Shipments from Anchorage to Fairbanks are trucked into Fairbanks and then loaded onto outbound flights. Everts also offers bulk fuel service on a charter basis.

Everts only operates DC-6 and C-46 aircraft. The DC-6 can land on paved, gravel and ice airstrips with a minimum runway length of 3,500 feet. The C-46 has similar specifications to the DC-6.

DC-6 Specifications

- All cargo configuration including oversize and Hazmat
- Payload capacity up to 28,000 lbs
- 4,200 to 4,400 cu ft capacity
- Loading door dimensions = 76 inches by 124 inches
- Interior floor dimensions = 65 ft long by 80 inches wide by 83.5 inches high
- Accommodates 28 to30 pallets



DC-6 Diagram

Lynden Air Cargo

The Lynden family of companies provides freight transportation via land, water or air or any combination thereof. Lynden's capabilities include truckload and less-than-truckload transportation, scheduled and charter barges, rail barges, intermodal bulk chemical hauls, scheduled and chartered air freighters, domestic and international air forwarding, international ocean forwarding, customs brokerage, trade show shipping, remote site construction, sanitary bulk commodities hauling, and multi-modal logistics.

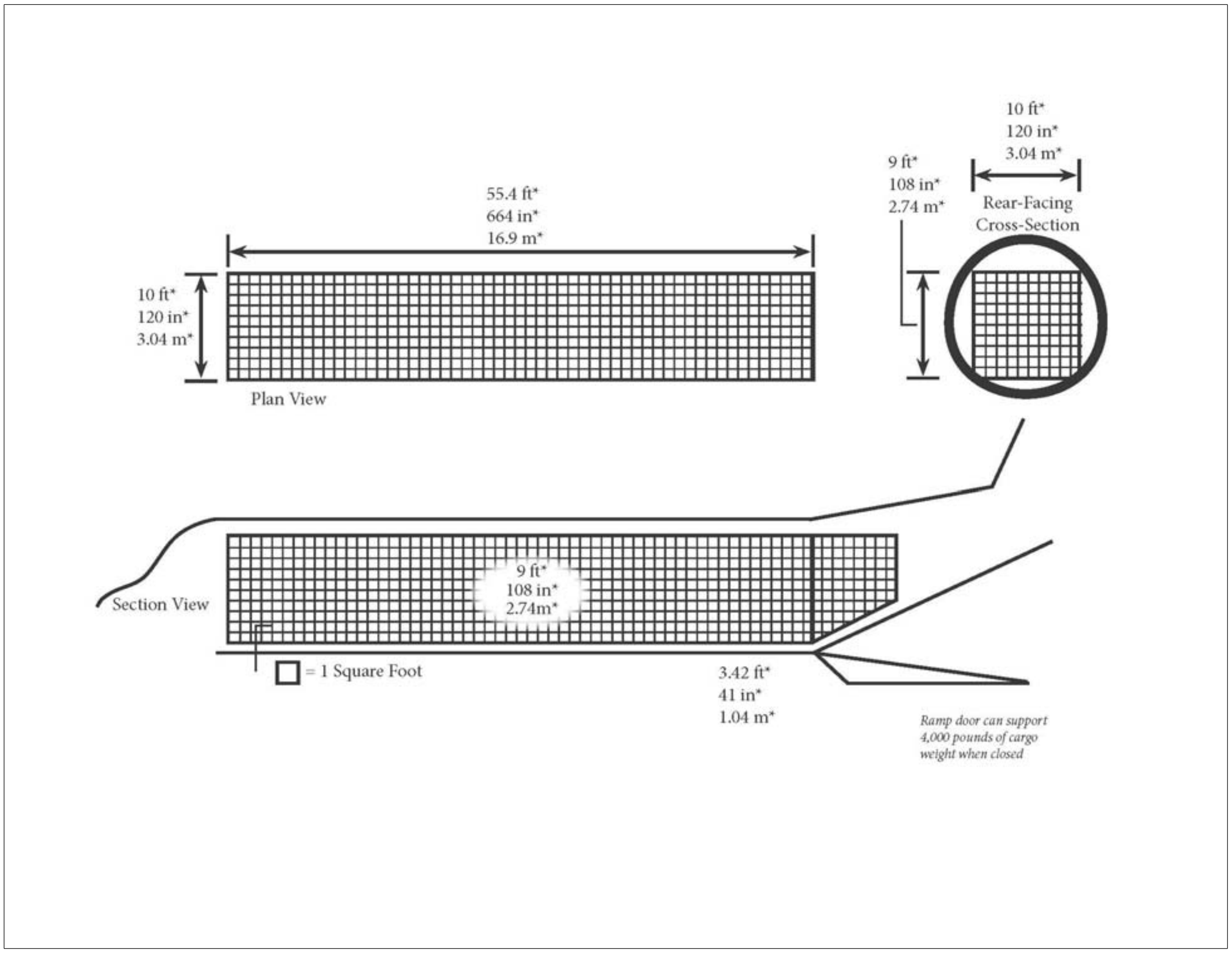
Lynden Air Cargo headquarters are located in Anchorage, Alaska. Lynden offers charter and flagstop service to most locations including Barrow, Deadhorse and Wainwright. Scheduled service is limited, but is provided for Kotzebue. Lynden offers small package, general and priority service for scheduled and flagstop destinations.

Lynden operates the L-382 Hercules, capable of landing on packed earth, gravel, ice or short runways.

L-382 Hercules (Photo provided by Lynden)

L-382 Hercules Specifications

- Payload capacity up to 48,000 lbs
- 6,057 cu ft capacity
- Cargo hold of 54 ft long by 10 ft wide by 9 ft
- Bonus space over rear door with 4,000 lb load capacity
- Accommodates
  - five standard 88 inch by 125 inch pallets
  - a combination of 8 ft by 8 ft intermodal containers
  - oversize shipments equivalent to the cargo hold
- Straight-in loading through the rear-cargo ramp door
- Integrated winch and adjustable roller system for quick loading.



L-382 Hercules Load Planner Schematic

Northern Air Cargo

NAC, along with Totem Ocean Trailer Express and FOSS, are the Saltchuk Alaska-based companies providing both domestic and international multi-modal freight transportation. Similar to Lynden, the family of companies offers a broad range of freight services.

NAC has offices in Anchorage and Fairbanks with NAC agents available in Barrow, Kotzebue and Deadhorse. NAC provides scheduled service to Barrow, Deadhorse, Fairbanks and Kotzebue. Chartered service is available at most locations through the use of sister companies with smaller aircraft suitable for rural Alaska runways. NAC offers small package, general and priority service for scheduled and flagstop destinations.

NAC operates Boeing 737-200 jets that require state-maintained, paved runways over 5,000 ft for safe operations. The large cargo door permits oversized freight to be transported on scheduled flights.

Boeing 737-200 Specifications

- All cargo configuration for freight including oversize and hazmat
- Roller deck flooring
- Payloads up to 30,000 lbs
- Accommodates pallets of 88 inches by 108 inches; and 88 inch by 125 inches
- Door dimensions = 81 inches by 134 inches
- Maximum floor length of 60 ft
- Floor width = 137 inches
- Maximum floor load intensity of 100 lbs/sq ft
- 4,000 cu ft capacity

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APPENDIX H

RESPONSE OPERATING CONDITIONS AND LIMITATIONS

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APPENDIX H RESPONSE OPERATING CONDITIONS AND LIMITATIONS

H.1 OPERATIONS

Operations in the Beaufort Sea would begin with the drillship traveling to the Beaufort Sea accompanied by support vessels, including the OSR vessels. The vessels may arrive at the project location after July 1. The movement and positioning of the fleet is dependent on the timing and extent of breakup of the arctic sea ice. Project activities will commence after July 1 and continue into freezeup.

H.2 METEOROLOGICAL CONDITIONS

In general, meteorological and oceanographic conditions at the project location are moderate during the summer months. Winds are predominately from the east-northeast June through November with occasional low-pressure systems moving into the area from the western Pacific through the Bering Strait bringing warm air and moisture. Wet conditions producing fog and rain can result in periods of low visibility on the open ocean. Storms are more common during the winter months than the summer. The frequency of storms and associated high winds increase with the transition of open water season into the fall freezeup time frame. Severe storms generally originate from the SW, progress swiftly into the area, and last a relatively short time, although rough weather will on occasion persist for many days.

H.3 PHYSICAL OCEANOGRAPHY

Shell's lease area lies on the federal OCS within the Beaufort Sea approximately 20 nautical miles or more off the north coast of Alaska within the Beaufort Sea Shelf. The waters of the Beaufort Sea begin at Point Barrow and extend east to Canada's Arctic Islands. Prevailing winds are from the northeast across the Beaufort Sea shelf. This produces a westward wind-driven flow over the shelf and a westward drift of first-and multi-year sea ice from the basin onto the shelf. However, the wind direction is not consistent in the westward direction as southern and easterly winds may occur during the October to April, winter timeframe, due to the barrier of the Brooks Range south of the coast. This phenomenon occurs approximately 20% of the time during the October to April period (Kozo, 1984).

The Beaufort Sea has a long ice season extending from November through mid July. The ice free or broken ice season is typically fairly short, extending from mid-late July/early August through to November. However, some portions of the Beaufort Sea are affected by sea ice all year, containing both seasonal first year ice and thicker multiyear arctic pack ice. Several fresh water rivers including the Colville, Kuparuk, and Sagavanirktok Rivers empty into the Beaufort Sea. Annually, the waters of the Arctic go through variations in salinity. In the summer, waters are less saline than in the winter because of river inflow and ice melt. In winter, salinity increases as a result of reduced fresh water inflow from river freeze-up and brine rejection during ice formation.

The timing of the Beaufort Sea ice breakup is variable, ranging from mid to late July to Mid August. Breakup tends to initially occur first at the mouths of the North Slope rivers then the near shore shelf areas. The sea ice may cover the area the entire year, although in recent years most of the shelf has been ice-free from late July through early October. This does not preclude drifting ice from occurring over the shelf area and the drilling locations during the July to October period.

The predominant sea current in the Beaufort Sea shelf (landward of about the 50-m isobaths) flows westward with a wind driven component, especially in the summer months. Average currents are generally 10 centimeters per second (cm/sec) in summer, though storms create short-lived currents that approach 100 cm/sec (MBC Applied Environmental Sciences 2003). Storm events can rapidly drive multiyear floes at rates exceeding 7.5 mi/day (12 km/day). The fleet, consisting of the drilling vessel and support vessels, would exit the exploration sites through the open water pathway before winter ensues and sea ice and land fast ice freeze up occurs.

Tides in the Beaufort Sea are mixed semidiurnal with a very small range, about 6 to 12 inches. Fetch distances are significantly less than the Chukchi Sea and wave energy levels are consequently less. This is dependent on wind direction as the occasional east or southerly wind has considerable fetch distance.

H.4 DISCUSSION REGARDING OPERATIONAL LIMITATIONS FOR RESPONSE EQUIPMENT

The following provides a general discussion of the spill response limitations in the OCS waters of the Beaufort Sea.

Certain environmental conditions can sometimes limit the options for response and their overall effectiveness. Some limitations are based on safety and health, and others concern equipment effectiveness or access. The realistic response operating limitations are described in the ACS 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 such as reduced visibility, available daylight and cold temperatures. 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). That analysis considers weather, sea conditions, ice, daylight hours, and other environmental conditions that might influence the efficiency of the oil spill response in the Beaufort Sea nearshore zone where landfast ice is always present during the winter period. The timing and characteristics of ice conditions at Shell's drilling locations differ in a number of respects from the descriptions and dates presented in ACS Tactic L-7, for example: break-up dates, summer season duration, and the lack of landfast ice for most of the year. Additional information on seasonal ice conditions in both nearshore and offshore areas is provided in Section H.9.

Generally, response effectiveness is not determined by any one single environmental factor or threshold. Environmental factors interact to compound response operating challenges. Operational efficiency also may be affected from these combined environmental factors. This complicates the task of setting distinct operational limits for each potential environmental factor. To achieve the most effective response, an assessment of on-site environmental conditions by trained response personnel is necessary to determine the operational strategy and tactics appropriate for the actual conditions encountered in the field. Personnel safety would always receive top priority during any spill response.

- Environmental conditions that challenge the effectiveness of response operations may also impact drilling operations. Shell's Beaufort Sea COCP and IMP identify drilling restrictions during adverse weather that serve as prevention measures. Included in the *Beaufort Sea Ice Management 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. Shell, consistent with the COCP, would evaluate the need to suspend operations during periods of adverse ice, weather, or sea states that significantly increase the likelihood of a release or severely hamper the ability to contain or control a release. Should it become necessary to cease critical operations, methods will be followed for securing the well and the drillship, ceasing drilling operations and hanging off the drillpipe. Critical operations will not recommence until it is deemed safe by the appropriate personnel. As part of that decision, the Shell Drilling 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; and
- availability of emergency equipment.

The procedures for ice management include identifying the alert status and conditions of ice movement and the site-specific procedures for the support vessels. See Table H.4-1 (Ice Alert Levels) and Table H.4-2 (Ice Alert Roles and Responsibilities).

For discussion and details on response equipment operating in varying ice conditions refer to Appendix C (Worst Case Discharge), the Shell Tactics Manual (Tactics OR-2C, OR-2D, OR-4A, OR-4B, OR-5A, OR-5B, OR-7), and the ACS Technical Manual (Tactic L-7).

Timing and characteristics of the environmental conditions at Shell's Beaufort drill sites differ in a number of respects from the descriptions and dates under which many of the North Slope Operators function (as detailed in ACS Tactic L-7.) For example, this would include weather, sea conditions, ice, daylight hrs, and other environmental conditions. Additional information on seasonal ice conditions in both nearshore and offshore areas is provided in Section H.6.

Table H.4-1
Ice Alert Levels

ALERT LEVEL	TIME CALCULATION	ACTION
Green	(HT – T-Time) is greater than 24 hrs	Normal operations
Yellow	(HT – T-Time) is greater than 12 hrs but less than 24 hrs	Heightened awareness
Orange	(HT – T-Time) is greater than 6 hrs but less than 12 hrs	Limited well operations in line with COCP, possibly commence securing well
Red	(HT – MT) is less than 6 hrs	Secure well, disconnect riser and commence mooring recovery operations
Black	HT is less than 1 hr	Move drilling vessel to a safe location

Definitions:

Ice Alert Level: The Ice Alert Level is a color-coded hazard category that depends on the time necessary to secure the well and to prepare the drillship to move to a place of safety in event of a confirmed hazardous ice incursion.

Hazard Time (HT): HT is the estimated arrival time, in hours, of hazardous ice at the drill site.

Secure Time (ST): ST is the time, in hours, required to cease drilling operations and temporarily abandon the well in a way that prevents leakage and make ready for departure of the drilling vessel from location.

Move Off Time (MT): MT is the time, in hours, to disconnect from the subsea BOP, recover the riser, lower the marine riser package, safely store all items aboard the vessel, recover the moorings, and make the drilling vessel ready to evacuate the site. The move off time varies depending on the method of anchor recovery, which in turn depends on changing environmental conditions. A very short MT can be achieved in an emergency by actuating the rig anchor releases (RARs) or by simply running the anchor lines off the winches, dropping the entire mooring system on the seafloor for later recovery.

Total Time (T-Time): T-Time is the sum of MT and ST, and represents the total time required to terminate drilling operations, safely secure the well and move the drilling vessel off the drill site.

Hazardous Ice: Hazardous ice is any ice considered to be a threat to the continued safe operation of the rig. Hazardous ice is commonly moving multi-year ice that is larger than 500 m across, or ridge remnants, or unusual thickness first-year ice, or any combination of these that could exceed the ability of the drilling vessel or ice management vessels to withstand the impact of the ice feature.

Table H.4-2
Ice Alert Roles and Responsibilities

Alert	Condition	Shell Drilling Foreman	Noble OIM	Marine Superintendent	Ice Advisor	Ice Pilot/ Ice Management Vessel Captains
Green	Hazardous ice is not expected to arrive at location within T-Time plus >24 hrs	Establishes potential well ST in conjunction with the VMT. Advises OIM and Noble Drilling Supt. regarding any critical operations and curtailment plans. Approves Ice Alert Level.	Monitors ice reports and forecasts, directs ice management operations. Determines Ice Alert Level in conjunction with VMT	Establishes potential MT	Monitors ice conditions and predictions, reports HT to the OIM and VMT, provides link to Ice Pilots for ice management vessel deployment and recon.	Conducts ice recon as directed by OIM through the IA, or designate, and reports to IA and IWC.
Yellow	Hazardous ice is not expected to arrive at location within T-Time plus >12 but <24 hrs	Monitors well operations relative to ice forecast. Establishes potential well ST in conjunction with the VMT. Advises OIM and Noble Drilling Superintendent regarding any critical operations and curtailment plans. Approves Ice Alert Level.	Monitors ice reports and forecasts, directs ice management operations. Determines Ice Alert Level in conjunction with VMT	Establishes MT	Monitors ice conditions and predictions, reports HT to the OIM and VMT, provides link to Ice Pilots for ice management vessel deployment, recon and ice management operations.	Conducts ice recon as directed by OIM, or designate, reports potential hazardous ice conditions and location to IA and IWC. Provides ops link from OIM to vessel Captain
Orange	Hazardous ice is not expected to arrive at location within T-Time plus >6 to <12 hrs	Approves Ice Alert Level. Establishes potential well ST and, if required, initiates well secure operations.	Determines Ice Alert Level with VMT. Monitors and controls ice operations.	Continuously updates all the potential MT. Ensures anchor handling and RAR capability.	Monitors ice conditions and predictions, reports HT to the OIM and VMT, provides link to Ice Pilots for ice management operations.	Supports ice management operations. Continues to provide ice data to IA and IWC. Assists in predicting HT.
Red	Hazardous ice is expected to arrive at location within MT plus < 6 hrs	Approves Ice Alert Level. Manages well secure operations and updates OIM on well status. Establishes availability of additional support for site departure operations.	Monitors ice conditions and directs ice management operations for return to drill site. Confers with the Drilling Foreman on course of action to be taken	Manages mooring recovery operations	Monitors ice conditions and predictions, reports HT to the OIM and VMT, provides link to Ice Pilots for ice management operations.	Supports ice management and anchor handling operations.
Black	Hazardous ice is expected to arrive at location within 1 hour	Approves Ice Alert Level. Confers with OIM and monitors ice conditions for return to drilling location. Prepares well reentry prognosis with Drilling Engineers, and reviews with BSEE Field Representative.	Monitors conditions for return. Confers with Drilling Foreman on the return Ice Alert Level and tentative timing.	Safely clears drilling location with the drilling vessel. Prepares for return	Continues to monitor ice conditions, prepares new estimates of HT for any hazardous ice features, assist in establishing time to return to drill site.	Supports ice management, anchor handling, and towing operations. Conducts ice recon as directed, assists in estimating return time.

HT = Hazard Time
IA = Ice Advisor
IWC = Ice and Weather Information Center
MT = Move Off Time
OIM = Offshore Installation Manager
RAR = Rig Anchor Release
ST = Secure Time
VMT = Vessel Management Team

H.5 ADVERSE WEATHER CONDITIONS

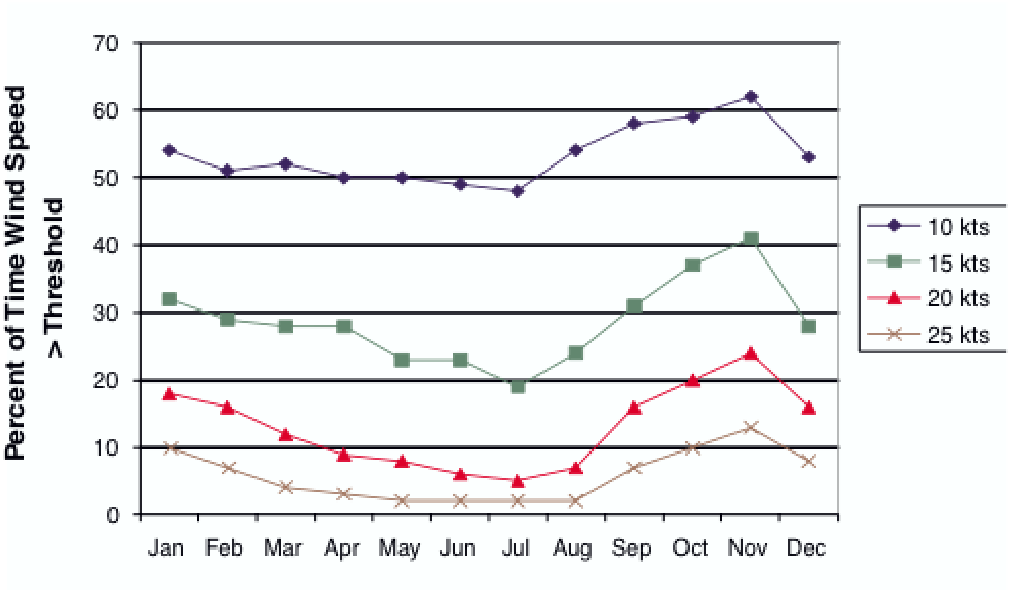
BSEE regulations (30 CFR 254.23 and 30 CFR 254.26(d)) for an Oil Spill Response Plan require consideration of how a spill response would be managed during adverse weather conditions. The effectiveness of mechanical containment and response equipment and tactics may be impacted by extreme weather conditions. Activities at the drill site may be curtailed due to safety considerations. Temperatures below -35º F may cause failures in hydraulic equipment. Winds above 15 knots with 30-knot gusts are strong enough to make hoists and lifts unsafe 10 to 20 ft (3 to 6 m) above ground, with whiteouts restricting visibility to a few feet. Drill site activity may also be curtailed if crucial materials or supplies cannot be delivered. 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 Shell Drilling Foreman will lead a risk assessment with the participation of the Toolpusher, location personnel and Shell Management. A joint decision is made by the vessel management team as to the level of risk in accordance with Shell's Beaufort Sea Ice Management Plan.

In general, meteorological and oceanographic conditions at the project location are moderate during the summer months of June through August. Winds are predominately from the ENE June through November with occasional low-pressure systems moving into the area from the western Pacific bringing warm air and moisture. Wet conditions producing fog and rain can result in periods of low visibility on the open ocean. Storms are more common during the winter months than the summer. The frequency of storms and associated high winds increase with the transition of open water season into the fall freezeup time frame. Severe storms generally originate from the SW, progress swiftly into the area, and last a relatively short time, although rough weather may on occasion persist for many days.

H.5.1 High Winds

Deployment of oil spill response equipment in the Beaufort Sea would not normally be limited soley by high winds. In general, winds in the area are considered gentle to moderate and generally from the east-northeast (predominant at 40 to 60 percent of the time) or west-southwest (20 to 40 percent of the time). Northerly or southerly winds occur less than 7 percent of the time. The strongest winds (and storm winds) tend to be westerly. In terms of wind speed, a moderate breeze of 15 knots or more can be expected in the range of 24 percent of the time in August to 37 percent in October. Gale force winds in the range of 34 to 40 knots (Beaufort Force 8) are extremely rare, occurring less than 2 percent of the time in the windiest months (September to February) and less than 1 percent of the time for the rest of the year. Figure H.5-1 shows the monthly wind speed exceedance based on data presented by Vaudrey (2000).

Figure H.5-1. Monthly Wind Speed



Wind can impact mechanical response operations by hampering the ability of vessels to maintain position, limiting the ability of the crews to work on deck, impeding equipment and work boat deployment and retrieval, and may limit containment of oil within the boom.

Mechanical spill response equipment for the Beaufort Sea was selected for the variable conditions that may be encountered. The offshore/coastal boom and the skimmer systems may be deployed and operated in sea states associated with up to Beaufort Wind Force 6. The corresponding wind speeds for these sea states are up to 22 knots. Alternative countermeasures would be considered to extend response operations beyond these wind speeds.

Response efficiencies may also be dependent upon other compounding variables (e.g., temperature, sea state, or visibility) that may make the specific wind speed problematic. The wind-chill factor addresses safety concerns for personnel. Heavy clothing, while being the primary means of protecting personnel from the effects of wind chill, may also hinder the ability of personnel to work quickly and efficiently in cold weather.

H.5.2 Temperature

Lower temperatures affecting response efficiencies are compounded by several factors including: sustained (long-term) cold temperatures and wind-chill factor; icing on vessels and barge decks (structural icing); safety and efficiency of personnel; effectiveness of iced response equipment; and oil viscosity. Personnel safety is priority. Response operations will provide for personnel safety based upon the *Threshold Limit Values, Chemical Substances and Physical Agents and Biological Exposure Indices* (American Conference of Governmental Industrial Hygienists, Inc. 1994-1995) as per ACS Tactic L-7).

Considering temperature alone and based upon the number of average monthly temperatures below -20°F, response capabilities begin to be affected in November through April. Workers in temperatures below -25°F must take more breaks with time indoors. At temperatures below -45°F, all non-emergency work will stop. Table H.5-2 lists the percentage of days per month when the average monthly temperature falls below -20°F and response effectiveness may be reduced solely due to temperature.

Table H.5-2
Percentages of Days per Month that
Temperature Could Reduce Response Effectiveness
for Worker Threshold Limit Values

JAN	FEB	MAR	APRIL	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
50%	**64%**	**58%**	**17%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**17%**	**42%**

Based upon the averaged monthly minimum temperature data for Barrow, AK from http://climate.gi.alaska.edu/climate/

Temperature also affects the viscosity of oil, complicating recovery efforts. Shell is fully aware of the challenges of responding to spills during freezing temperatures and has selected equipment that addresses a wide range of variable operating conditions. This equipment is capable of recovering oil of typical viscosities as well as highly viscous, waxy, or emulsified oils.

H.6 SEA STATES, TIDES AND CURRENTS

H.6.1 Sea State

Rough seas may affect the ability to deploy equipment, boom and skimmer efficiencies, the ability of vessels to maintain position, the ability of crews to work on a vessel, and the ability to track and encounter oil.

Consideration must be given to both wave height and wave period when evaluating sea state and the effectiveness of spill response options. Short-period waves or chop has a greater effect than long-period swells. While personnel safety is the primary consideration, a response that is ongoing and working may continue to be effective in long-period swells up to a Sea State 5 up to about 10 ft (3 m) in height correlated to a Beaufort Wind Force 6 (22 to 27 knots). The effects wind speed and open water fetch on sea state are dampened with the onset of ice in November. Table H.6-1 summarizes the relationship between the Beaufort Wind Force, sea state, and wind and wave conditions.

The compounding influence of other environmental factors together with sea state can only be evaluated on a case-by-case basis. Alternative response methods, from both aerial and vessel-based platforms, may continue to be used beyond this sea state.

Table H.6-1
Beaufort Wind Force and Sea State
Relationship Between Wind and Wave Conditions in Fully Developed Seas

BEAUFORT NUMBER	WIND SPEED KNOTS	MPH	KPH	WIND FORCE	SEA SURFACE	SEA STATE	HEIGHT (M)
0	< 1	< 1	< 1	Calm	Calm	0	0
1	1-3	1-3	1-5	Light air	Ripples with the appearance of scales; no foam crests.	0	0
2	4-6	4-7	6-11	Light Breeze	Small wavelets; crests of glassy appearance, not breaking.	1	0-0.1
3	7-10	8-12	12-19	Gentle Breeze	Large wavelets; crests begin to break; scattered whitecaps.	2	0.1-0.5
4	11-16	13-18	20-28	Moderate Breeze	Small waves, becoming longer; numerous whitecaps.	3	0.5-1.25
5	17-21	19-24	29-38	Fresh Breeze	Moderate waves, taking longer form; many whitecaps; some spray.	4	1.25-2.5
6	22-27	25-31	39-49	Strong Breeze	Larger waves forming; whitecaps everywhere; more spray.	5	2.5-4
7	28-33	32-38	50-61	Near Gale	Sea heaps up; white foam from breaking waves begins to blow in streaks.	6	4-6

Adapted: (http://www.psych.usyd.edu.au/vbb/woronora/maritime/beaufort.html)
kph = kilometers per hour

Storm surges are coastal phenomena and can depend not only upon the storm characteristics, but also on the topography onshore and bathymetry offshore. The characteristics of a storm that affect the surge height include atmospheric pressure, wind speed and direction, as well as the storm's direction and speed. Storm surges are greater when air temperature is colder than the water and the sea has little ice cover, providing a long fetch to generate waves and swells.

Storm surges in themselves are not expected to affect offshore drilling or response operations. However, the high winds and sea states associated with these storms may hamper offshore response operations. Shell, consistent with the COCP, will evaluate the need to suspend operations during these conditions.

H.6.2 Tides and Currents

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 generated predominantly during the open-water season. For much of the summer period (July to August), the close proximity of sea ice will effectively prevent sea states from developing to an extent predicted from the Beaufort wind scale and sea state standard relationship (http://www.srh.noaa.gov/). The appearance of new ice in October will rapidly diminish the wave heights within a few weeks after initial freeze-up along the coast. Potential sea states during the period of maximum open water (mid-August to mid-October) can be estimated from this standard relationship. For example a moderate breeze of 11 to 16 knots (Force 4) will result in a wave height of 3.5 to 5 feet, a condition which would be exceeded approximately 30 percent of the time in September (Figure H.5-1.) – the month with the maximum extent of open water off the Alaskan Beaufort Sea coast.

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

Schematics of the Beaufort Sea currents may be found on the Unified Plan, Subarea Plan Web site at http://www.asgdc.state.ak.us/maps/cplans/base/AK-Circ.pdf.

H.7 STRUCTURAL ICING

The primary concern for structural icing in the Beaufort Sea is from sea spray. Structural icing of ships or drilling facilities is a concern in open water and coastal areas. Icing may cause hazards to personnel (e.g., slippery work surfaces such as decks or railings, moveable parts become inoperable because of icing). Environmental conditions that may cause significant spray icing are water temperatures less than 46°F, winds of 25 knots or more, and air temperatures less than 28°F. From December to June in the Shell lease area, structural icing has a very unlikely possibility of impacting response operations because of a fairly complete sea ice cover. Structural icing becomes a concern as breakup occurs in June. By July, the air temperature has warmed enough that only light to moderate superstructure icing is a concern. By August the temperatures begin to cool and the possibility of icing increases.

Based upon Shell's accumulated wind data for the months of June through November, winds recorded over 25 knots or more occurred just under 3 percent of the time. This same value may be extrapolated to the possibility of structural ice occurrence for the months of June through November. However, this value does not reflect the amount of time that structural icing will result in unsafe ice accumulations that could affect both drilling or response operations. Vessels may take evasive action to avoid the accumulation of an excessive amount of ice by either heading directly into the wind or heading downwind (Brower et al. 1988). Ice accumulations may also be mitigated by mechanical removal. Drilling operations shall be managed under the provisions of the COCP.

H.8 HOURS OF DAYLIGHT AND VISIBILITY

H.8.1 Hours of Daylight

Visibility can be hampered by several environmental factors including fog, snow, heavy precipitation, or low clouds. If wind, sea state, temperature, visibility and/or precipitation result in the reduction of response efficiencies, the additional factor of darkness may further complicate efforts to track and encounter oil and may limit flight operations.

In Barrow, the sun does not set between May 10 and August 2 in summer, and does not rise between November 18 and January 24 in winter. From January 24 to May 10, daylight increases each day by not less than 9 minutes. By May 10 daylight has increased to 24 hrs/day. The sun remains visible from that time to August 2, when it again sets for 1 hour and 25 minutes. By September 1 there is just over 15 hours of daylight and by October 7 there is just 10 hours of daylight. Daylight hours decrease at the same rate as the increase (http://climate.gi.alaska.edu/Stations/Arctic/Barrow.html). Hours of daylight are close to their greatest extent during break-up in August (21 hours average for the month) and reduce through the summer to average 11 hours in October. In practice, twilight increases the available operational time beyond the strict definition of daylight (sunrise to sunset). Strict adherence to the Ice Management Plan and continuous risk assessment allows for the safety of both equipment and personnel.

As the daylight hours diminish, visual aids shall be employed to continue open water response. Operations will continue by using lighting on booms, skimmers, and vessels. Buoy tracking systems, strobe lights, and infrared systems will be used to track oil in open water recovery efforts. On land, the use of portable lighting or infrared will be used to locate oil and assist recovery operations during periods of darkness.

H.8.2 Visibility

The increase of daylight also parallels the occurrence of cloudiness, precipitation, and heavy fog. All three build up to a maximum concurrent with the increased hours of daylight. Annual precipitation is light, averaging 5 inches (12 cm) (http://climate.gi.alaska.edu/Stations/Arctic/Barrow.html), and summer season pressure patterns are variable. In the Prudhoe Bay area, the break-up period in July and August has the highest probability of low visibility conditions (approximately 25 percent cumulative probability less than one mile). In contrast, the freeze-up period in October is characterized by a lower probability of low visibility (17 percent less than one mile).

For booming and skimming vessels, the visibility limitation varies between 0.125 and 0.5 n mi (200 to 800 m), depending upon temperature, sea state, wind, and precipitation. The operational limitation for visibility depends upon whether response vessels are already recovering oil. For vessels actively booming and skimming oil, the operating limits would be set by the master of the vessel based on safety and operational efficiency. When vessels require aircraft assistance to locate recoverable slicks, the limitations would likely be for the aircraft. A realistic maximum response operation, based solely on hours of daylight, could only be determined on a case-by-case basis. Depending on other environmental factors, the visibility of less than 0.5 n mi (800 m) presents challenges for vessels tracking oil. Response efforts would continue below this level using the same tools that are employed for nighttime operations (e.g., lighting on booms, skimmers, and vessels) as long as it is safe to do so. Buoy tracking systems, strobe lights, and infrared systems will be also used to track oil in open water recovery efforts.

In the event of adverse weather, flight limitations caused by adverse ceiling and visibility combinations may restrict offshore operations and response. For example, Shell's company policy on visual flight rules (VFR) sets the lower limits at 500-foot cloud ceiling and/or one mile forward visibility. Customary North Slope standards for flight surveillance operations, based on VFR for rotary- and fixed-wing aircraft are:

- 500-ft (152-m) ceiling and 1 mi (1.6 km) visibility if in sight of land, or
- 500-ft (152-m) ceiling and 3 mi (4.8 km) visibility if over open water and land is not in sight.

H.9 SEASONAL ICE CONDITIONS

Sea ice can present a significant challenge for encountering oil with mechanical recovery equipment; however, ice also can provide natural containment of oil, and cold water temperatures can inhibit evaporation and weathering, thus extending the window of opportunity for mechanical recovery and *in situ* burning when the oil becomes accessible as the ice concentration or cover lessens.

The start of on-site project activities will begin July 10, which coincides with the retreat of the ice in recent years (mid July to early August). The duration of open water (≤1/10 ice concentration) in the Beaufort Sea is approximately 7.5 weeks, with the most contiuous open water beginning mid-August to mid to late October. However, the range of open water is variable from year to year and ice could be present at the drill site. An Ice Management Plan will be implemented to ensure safe operations at all times. Exploration drilling will conclude by October 31. Other project activities will conclude with freezeup, which historically varies from late October to mid-December.

H 9.1 Breakup

The following general description of the ice environment applies to the nearshore and offshore marine environments in the Alaskan Beaufort Sea, from shore out to the approximate 100-foot isobath representative of Shell's drilling locations. Descriptions cover typical conditions and the variability in ice coverage and timing of the seasonal ice cycles. The focus is on a chronology most applicable to Shell's exploration program, starting with the first evidence of ice melt and clearing along the coast, and ending with the establishment of a stable fast ice cover nearshore and very close pack (9/10 or more) offshore in the November/December period. A brief description of the overall morphology and dynamics of winter ice conditions offshore is provided for completeness. See Dickins and Oasis (2006), Vaudrey (2000), and Atwater (1991) for further details.

May

The major river systems (Colville, Kuparuk, Sagavanirktok, and Colville) overflood the nearshore sea ice between mid-May and early June (average last week in May), based on 16 years of analysis presented in Atwater (1991). In any given year, the different rivers tend to flood within three to four days of each other. The maximum seaward extent of the floodwater reaches the 20-foot isobath between Stump Island and Northstar and the 10-foot isobath off Endicott and Niakuk.

The ice overflood along the coast triggers a rapid progression of local ice decay and break-up, fanning out in shallow water east and west from the major river deltas and eventually leading to an almost continuous open corridor from Harrison Bay to Camden Bay (see June below).

Ice concentrations in the offshore area (outside of the fast ice zone) in May are classified as very close pack ice of 9 to 9.5/10 (90 to 95 percent ice coverage). Recent analysis for the period 1996-2004 by Eicken et al. (2006) shows water depths at the fast ice edge in May off Flaxman Island ranging from 56 feet to more than 150 feet (averaging 98 feet). At this time, a broad open flaw lead often separates the fast ice inshore from the mobile pack ice offshore. This lead is highly variable in width and east/west extent and tends to become much less prevalent towards the end of May, and into June and July.

June

June 1 to July 15: Within the overflood zones, previously bottomfast (grounded) ice in shallow water (less than 6-foot depth) lifts off the seabed and rapidly melts in place. The sea ice overflood often peaks at this time curtailing routine ice road operations. The influx of relatively warm water discharge into the inshore lagoons leads to early opening along shore in June, several weeks ahead of break-up offshore. First open water appears offshore of the Sagavanirktok and Kuparuk rivers in the period June 6 to June 13 and expands to include the lagoon side of West Dock (PM1) by June 17 on average. Fast ice beyond the overflood zones and outside the Barrier Islands is still intact at this time and often more than 5 feet thick in the first half of the month. Melt ponds usually cover less than 10 percent of the floating fast ice.

June 15 to July 25: Nearshore lagoon areas between Oliktok and West Dock, and in shallow waters off the Sagavanirktok delta, are mostly free of ice, and ice is starting to fracture and open south of the Endicott causeway. Further to the east, the initial clearing associated with flooding from the Staines and West Canning rivers expands around Brownlow Point to become contiguous with the much larger clearing off the Canning delta. This connection generally occurs by late June.

The fast ice, still intact outside of the Barrier Islands gradually melts but is typically still 4 to 5 feet thick in many areas. The soft ice surface at this time is often 25 percent covered by meltwater pools that are rapidly deepening and expanding, with visible cracks and fractures. Ice deterioration is accelerated in areas where the surface is contaminated with dirt either left from drainage of overflood waters, or windblown off the nearby land (Vaudrey 2000).

Air temperatures at this time of year average 35°F and range from 20 to 40°F. The wind is variable, but blows 60 percent of the time from the east and northeast, averaging 10 knots.

The fast ice can still support heavy equipment and low ground-pressure response vehicles up to the third week of June. The ability to achieve continued mobility on deteriorating sea ice with specific equipment is illustrated in ACS *Technical Manual,* Tactic L-7, based on field trials by Coastal Frontiers (2001).

The offshore area (100-foot water depth and beyond) still experiences 9/10th or greater ice concentration until the last week of June in most years.

July

July 1: By the beginning of July, the open-water areas that originated from the Colville and the Kuparuk rivers typically join to form a continuous band of open water stretching from the south shore of Atigaru Point in Harrison Bay to West Dock (Dickins and Oasis, 2006). By this time, the open water areas, which initially formed off the Shaviovik, Kadleroshik, and Sagavanirktok rivers further west, have also joined to become a continuous coastal pathway of open water. The last nearshore area to clear (one to two weeks later) tends to be the coastal section between Point Thomson and Bullen Point (a coastal area not directly impacted by river overflood). The fast ice at this time is broken and mobile with drifting thick floes of variable concentration out to approximately 5 miles from shore.

In deeper water (Northstar vicinity or 30-foot water depths and beyond), the fast ice is still intact but badly deteriorated and vulnerable to break-up and fracturing by wind action. The ice at this time can still be 3 to 4 feet thick with many visible cracks and approximately 40 to 50 percent of the surface covered by meltwater pools and holes.

July 1 to July 7 (Typical): Break-up begins with fracturing and movement in the remaining floating landfast ice outside the Barrier Islands. The onset of break-up with fast ice in a severely weakened state is usually triggered by a wind event acting on parts of the sheet separated by natural lines of weakness indicated by a series of deep melt ponds or old thermal or stress cracks (Vaudrey in Dickins et al. 2000).

Pack ice concentrations in deeper water offshore (100 feet and vicinity) are typically in the range of 7-8/10th, a 20-percent reduction from the full winter concentration.

July 8 to July 12: Remaining fast ice remnants outside the Barrier Islands, off the Sagavanirktok River delta and in Prudhoe Bay, survive as drifting floes in less than 7/10th concentration. As the winds shift direction, the broken ice floes and pans move back and forth in belts and patches of varying concentrations, all the while melting with a reduction in average floe size. First-year ice continues to deteriorate and break into smaller floes, creating large, highly variable openings in the remaining ice cover (Dickins *et al*. 2000).

July 15 to July 30: Ice-free water exists from shore out to Northstar and sites in equivalent water depths off the Endicott causeway and further east into Mikkelsen Bay. Ice invasions in the nearshore areas after this date are possible, but unlikely (Vaudrey, 2000). Ice concentrations in deeper water steadily diminish through melting and wave and floe interactions over a period of two to three weeks. Remaining broken ice at this time moves back and forth in response to wind shifts, in belts and patches of varying concentrations. By the end of July or the first week of August, the study area typically becomes open water (defined as less than 1/10th ice concentration) out to water depths in the 40- to 65-foot range. Nearshore ice floe diameters rapidly shrink as the remaining fast ice decays and clears, starting out at 500 to 1,000 feet in the early stages and becoming ice cakes 30 to 40 feet in diameter by the third week in July.

Conditions in deeper water sites in the last half of July are highly variable, ranging from open water in unusually mild years (two years in ten) to a more typical condition of 7 to 8/10th thick first-year ice with floe sizes in the medium to big category (300 to 1,500 feet and 1,500 to 6,500 feet). Periods of intermediate concentrations (4 to 6/10th) can occur in mid- to late July, but these conditions tend to be short lived.

<u>August to September</u>

Offshore, the first half of August typically encompasses the last stages of break-up, with open drift ice concentrations ranging from 2 to 6/10th. Extreme years can see variable patches of close pack ice in high concentrations during this period. Floe sizes range from small to medium for the predominantly first-year ice (60 to 300 feet and 300 to 1,500 feet). Multi-year ice is often present in trace amounts (a few percent in coverage or much less than 1/10th) and rarely occurs in significant concentrations in the vicinity of Shell's drilling locations at this time of year (maximum reported 4/10th in two of the last ten years; Source: Canadian Ice Service charts). Summer multi-year floe sizes tend to be larger than the surviving first-year pack (up to thousands of feet in diameter).

The nearshore area previously covered in stable ice, the winter fast ice zone, is completely open by the beginning of August in most years. Once established, open-water conditions in the coastal nearshore lagoon areas and adjacent to the Barrier Islands (typically in less than 10-foot water depths) generally prevail until freeze-up (see below). For example, there are no reported instances of drift ice entering the lagoon areas between Brownlow Point and Bullen Point during the summer months of August or September. The median duration of open water in the lagoon areas is 12 weeks, with a variability of up to two weeks representing summers better or worse than average in terms of break-up and freeze-up (Dickins, 1984). Immediately outside of the Barrier Islands (out to approximately the 50-foot water depth), the duration of open water drops by about two weeks, and in some summers can be further reduced by several weeks through temporary pack ice invasions.

In the vicinity of the Shell's drilling locations, the average duration of open water (defined as 1/10th or less pack ice) is 7.5 weeks, with the most consistent period of continuous open water beginning mid-August and ending with first complete coverage of new ice in deep water in mid- to late October (based on a review of historical ice charts from 1997 to 2006).

Air temperatures average 40 °F in July and August, dropping to 30 °F in September. Wind blows from the east and northeast 50 percent of the time, and west and southwest 20 percent of the time, averaging 13 knots.

October

Freeze-up begins along shore in shallow water on October 4, ±8 days (Vaudrey, 2000). Ice becomes fast for the season within one week following freeze-up in the nearshore lagoons and at coastal locations such as Point McIntyre 2 and Niakuk. In deeper water north of the Barrier Islands (10 to 50 feet), the first continuous sheet forms on average by October 15 (Dickins and Oasis, 2006). By late October, ice movements inshore of the 30-foot water depth are infrequent, and the sheet is considered relatively stable. Air temperatures at freeze-up range from 5°F to 15°F. Daylight in October is typically 9 to 10 hours per day (longer if twilight is included).

Additional time is required for the young fast ice sheet to gain sufficient thickness and stability to be judged safe for over-ice operations. Depending on location, the total time from initial freeze-up to being able to commence on-ice operations with response equipment ranges on average from 40 to 43 days at coastal or nearshore locations such as Niakuk and Endicott, to 55 days at the Northstar Production Island (Vaudrey, 2000).

November to December

An expanding fast ice zone, increasing in stability as the ice grows, characterizes this period. The young floating fast ice sheet outside the Barrier Islands is still vulnerable to break-up by storm events and positive surges in water levels until December in extreme years. At the nilas stage (defined as new ice less than 10 centimeters thick) a moderate storm with winds over 20 knots can quickly break up the entire ice sheet.

For grey and grey-white ice between 4 and 12 inches, there is potential for break-up and/or substantial deformation and movement in strong winds over 27 knots. Storms of this severity in October and November are uncommon, on the order of two events during a ten-year period (Vaudrey, 2000).

The risk of substantial ice movements decreases sharply once the ice is greater than 12 inches. Extreme cases have been documented where portions of the land-fast ice have experienced substantial movement in early winter, but these are considered rare events. Vaudrey (2000) recounts only one year in 12 when a 20-inch thick ice sheet (a condition reached by late November in most years) moved 100 to 200 feet in the vicinity of Northstar. Movements of this magnitude would not result in visible open water, with the ice motion being absorbed by ridging and rubble formation.

During December when the floating fast ice reaches between 1.5 to 3 feet thick, ice motions are reduced to a range of 10 to 15 feet, based on measurements in 20 feet of water off the Barrier Islands to the west of Prudhoe Bay (Vaudrey, 1996).

The fast ice edge in early winter expands seaward from an average water depth of 15 feet in October and November, to 40 to 45 feet in December (Eicken et al., 2006 based on data at 146 deg W Long).

Beyond the fast ice edge and active shear zone, the pack ice can be divided into a highly active, often constantly deforming transition zone (seasonal pack) comprised of mostly first-year ice of highly variable age and thickness, and a more homogeneous polar pack with predominantly old (multi-year) ice. The polar pack edge (50 percent or greater coverage of multi-year ice) occurs in much deeper water well north of all of the proposed drilling locations.

In the early winter period (November to December) the transitional pack ice zone in the vicinity of the 100-foot water depth is comprised almost totally of first-year ice. No multi-year ice beyond trace amounts (much less than 10 percent coverage) was reported in the October to December time frame over the past ten years (1997-2006). The early winter pack ice consists of a mix of ice ages, from young ice less than 12 inches thick to thin first-year ice up to 27 inches. Once the ice begins to raft and rubble in November, level ice becomes the exception and much of the ice surface will represent some form of deformation process including the active formation of pressure ridges in December.

Pack ice moves in a meandering, net westerly drift in response to wind and currents. As the winter progresses and the pack becomes thicker and more consolidated, there are periods when little or no ice movement occurs in deep water. For example, a long-term ice drift record over seven seasons shows that the monthly incidence of no ice motion typically increases from around 20 percent in November to between 30 and 40 percent in December (Melling and Reidel, 2004). During these periods of static offshore ice, the boundary between the fast ice and pack ice zones can become blurred and indistinct. In these situations, mapping the boundary becomes a matter of interpreting the significance of a particular lead or crack.

When the pack ice is in its more typical dynamic drift mode, the fast ice boundary is clearly defined by a zone of massive shear and compression ridges stretching for hundreds of miles off the Alaskan North Coast. Many of these ridges can be grounded in water depths out to 80 feet with dramatic surface elevations up to 50 feet in some cases. The most active shear zone of severe ice deformation tends to be fairly narrow and concentrated between about 50 and 70 feet of water with no distinct east/west trends in severity (in some years it can extend into greater depths). In some areas a string of known shoals (e.g. Stamukhi off Oliktok) act to nucleate islands of grounded ice with dramatic fields of severe ridges and rubble (Kovacs, 1976; Reimnitz, 1984).

<u>January to April</u>

During the winter period of active ice growth, the fast ice continues to expand seaward reaching beyond 70 feet of water by February. The maximum fast ice extent occurs during the months of March to May when the water depths at the average edge position (off Flaxman Island) reach 100 feet, much deeper than the 60 feet boundary often discussed in earlier references (Eicken et al., 2006).

During the winter, east/west oriented leads (shore following) are common within the seasonal pack ice zone in water depths from 100 to 150 feet. Many of these leads will have widths ranging from hundreds of meters to miles and continue without blockage for long distances. In one study (Dickins, 1979), over half of all satellite images collected in the March to May time period showed distinct leads in this zone, becoming more frequent from west to east. Eicken et al. (2006) provides an extensive analysis of lead distributions, orientations, and dimensions within the pack ice zone.

The net mid-winter pack ice drift off the North Slope is to the west. On an hourly basis, pack ice motion tends to be episodic and meandering. In general, ice speeds are at a maximum (5 to 7 nm per day) with large expanses of young ice offshore in November and December, and decrease as the ice pack thickens and becomes more consolidated through January and February. Average pack ice drift speeds reach their minimum in March and April with typical values of 1.5 to 2.7 nm per day (Melling and Riedel, 2004). Four buoys were deployed by the USCG in the Beaufort nearshore between 1980 and 1985 in the winter period with high ice concentrations. Most of the buoy drift tracks of interest fell between 142°W and 150°W longitude in water depths from 60 to 200 feet. Results are summarized in Dickins (1984). The general movement trend and net drift was predominantly to the northwest, but there were also substantial periods when the buoys moved in other directions. For 40 to 60 percent of the recorded periods, the ice appeared to move without a persistent sense of direction (wallowing, meandering, or static). Vaudrey (2000) summarized the available historical ice movement data from a range of sources utilizing satellite drifter buoys from 1975 to 1996. Table 9-1 shows daily averages for longer-term ice movements. Short-term ice drift speeds (over periods of 2 to 6 hours) can be significantly higher, in the range of 1 to 2 knots using 4 to 5 percent of the wind speed, as a rule of thumb.

Table H.9-1
Exceedance Probability Distributions of Ice Drift Speeds

	PERCENT > NET DAILY ICE MOVEMENT RATE (knots)							AVERAGE SPEED (knots)
SEASON	>0.2	>0.4	>0.6	>0.8	>1.0	>1.5	>2.0	
Freeze-Up	50.0	17.7	8.1	3.8	1.9	0.4	0.3	0.3
Break-Up	34.0	14.4	6.2	2.8	0.8	0	0	0.2

H.9.2 Response in Broken Ice

Ice may serve to reduce oil spreading and concentrate oil into thicker pools for more effective recovery or use of *in situ* burning or dispersant countermeasures. Recovery techniques in broken ice conditions would be similar to those employed during an open water response, such as locating pockets of oil contained by ice for skimming or burning. As freezeup begins and ice concentrations beyond 10 percent develop, various techniques and equipment that can be used to respond include managing drift ice by deflection to sustain or create open water pockets for skimming, releasing ice accumulations within containment boom, strategically recovering oil that concentrates in pockets between ice floes, and the potential to use alternative countermeasures such as *in situ* burning to augment mechanical response techniques when ice concentrations limit or preclude recovery options.

As offshore ice becomes too concentrated or dynamic to mount any significant mid-winter on-ice recovery operations, mechanical response options become more targeted. The response scenario (Appendix C, WCD Scenario) illustrates the recovery and treatment methods that can be used when conditions preclude the use of conventional boom for capturing oil and directing it to a skimming devise. Tracking buoys and satellite monitoring are employed to track the movement of potentially oiled ice. As ice encapsulates oil, the location can be marked and tracked for removal when the ice is safe to work on, or the oil could be tracked until spring. During breakup the following spring, response efforts continue.

H.9.3 Effectiveness of *In Situ* Burning in Open Water and in Ice

The consensus of research regarding *in situ* burning of oil on open water and with ice is that burning is an effective technique with removal rates of 85 to 95 percent in most situations (Shell et al. 1983; S.L. Ross 1983; S.L. Ross and D.F. Dickins 1987; Allen 1990; Allen 1991; Allen and Ferek 1993; Singsaas et al. 1994). Results of considerable research have demonstrated the success of *in situ* burning in broken ice. The research includes several smaller-scale field and tank tests (S.L. Ross et al. 2003; Shell et al. 1983; Brown and Goodman 1986; Buist and Dickins 1987; Smith and Diaz 1987; Bech et al. 1993; Guénette and Wighus 1996) and one large-field test (Singsaas et al. 1994). Most of the tests involved large volumes of oil placed in a static test field of broken ice resulting in substantial slick thicknesses for ignition. Tests in unrestricted ice fields or in moving ice have indicated that the efficacy of *in situ* burning is sensitive to ice concentration and dynamics and thus the tendency for the ice floes to naturally contain the oil, the thickness (or coverage) of oil in leads between floes, and the presence or absence of brash or frazil ice which can absorb the oil.

The following information addresses the practicality of burning in open water and with varying concentrations of ice while recognizing the effect that current (primarily wind-driven) could have upon the distribution of oil and, therefore, the feasibility of collecting and igniting the oil.

H.9.4 Open Water with Current

The initial distribution of the surfacing oil droplets in open water could involve a surface area with a diameter of several hundred meters. The outer reaches of this area would involve a relatively small percentage of the total blowout release as the largest droplets would surface more quickly near the center and the smallest droplets would rise more slowly, riding with the induced currents to the outer regions of the slick. Depending on the current moving over the blowout, the oil droplets could surface into a clean (or relatively clear) water surface, where their initial spread would result in slicks that are too thin to support combustion (likely on the order of a tenth of a millimeter). Under these conditions (open water with current), combustion could effectively consume the free gas surfacing at the blowout; however, the relatively thin slicks would not support sustained combustion of the oil (typically requiring a 2 to 3 mm layer thickness). Authorization for ignition of the gas cloud directly over the blowout would normally be requested as early as possible to avoid any risk of exposure to personnel on location and any accidental ignition that could expose personnel and equipment to fire.

Burning of the oil in this situation would require containment or deflection with boom to concentrate and thicken the oil while it is relatively fresh without emulsification. Towed open-apex boom configurations could be used downstream of the blowout to thicken and release concentrated bands of oil into fire boom being towed in a U-configuration. Once such fire booms reach their holding capacity, they could be moved a safe distance from the open-apex, where ignition and sustained combustion could be quite successful. While burning the contained oil, a second fire boom could be positioned downstream of the open-apex to collect oil for a second burn. The elimination of oil at the first boom could easily be completed in time to relieve the second collection effort before the fire boom reaches its holding capacity.

H.9.5 Open Water with Little or No Current

Should oil and gas be released from the seabed with little or no current, it is likely that authorization would have been secured (as in the previous scenario) to ignite the free gas directly over the blowout to avoid harmful exposures to personnel and any accidental ignition of the gas plume. Without current to carry surfaced oil away from the blowout, there would be an accumulation of oil droplets at the surface allowing for the build-up and recoalescence of those droplets into a layer that could support combustion. In this case, it is likely that the heat generated by the burning of free gas would be sufficient to ignite vapors from the surfacing oil, thereby enlarging the burn area and removing a substantial portion of the blowout.

However, the efficiency of removal by burning could be improved if it was safe to deploy fire boom in a U-configuration at and immediately downstream of the surfacing oil and gas. The positioning of fire boom in this mode could be carried out safely if there was at least a light wind and/or a slight current that could carry the burning oil back into the apex of the U-configuration. Two boom-towing boats could be positioned well upstream of the surfacing oil and gas (using longer than normal tow lines) at a distance that would preclude any unsafe exposure to heat and smoke from the fire. Effective burning could be conducted without personnel, boats and boom when the surfacing oil is held naturally at and near the spill source. In fact, the heated air rising above the blowout would produce a thermally induced wind along the surface working radially inward toward the fire. Even a very light breeze of this kind could help reduce spreading of the oil and maintain oil thickness for improved combustion. If currents less than 1 knot and/or light winds were available to move the burning oil away from the source, boom-tending boats could work at a safe distance from the burning source, and substantially improve the efficiency of burn.

H.9.6 Low to Moderate Ice Concentrations (With and Without Current)

Even at relatively low ice concentrations (≤ 2/10), the effectiveness of conventional or fire booms may be reduced (depending upon the size and distribution of the ice pieces) for the collection of oil. If the distribution of ice is such that ice could not be avoided or deflected away from the opening of a boom configuration, then ice could accumulate in high concentrations within the boom. However, low ice concentrations are often present as discontinuous wind-consolidated strips separated by broad open water areas that limit use of boom to capture oil. In more scattered ice concentrations, responders could access oil at low speeds and encounter rates between ice floes. At such low ice concentrations, there are times when burning could be conducted with fire boom.

Should broken ice (from as little as 2/10 to 3/10th to as high as 7/10 to 8/10th concentrations) move into and over the blowout, the ice could actually help in a number of ways. The ice would tend to dampen waves, reduce surface spreading radially over the blowout, and promote recoalescence of the surfacing oil droplets in the reduced water surface between ice cakes or floes. Under these conditions there would be an increased potential for the accumulation of oil on water at thicknesses that could support sustained combustion.

As long as the ice concentrations do not become excessive (greater than 8/10 to 9/10th) and/or the ice comes under pressure, there should remain sufficient oil-on-water area to support combustion. Also, as in the previous open water scenarios, if water movement over the blowout drops to little or no current, the increased accumulation of oil between ice floes would only enhance the overall efficiency of burning. Induced radial currents over, and adjacent to the blowout may prevent much of the oil from sticking to the underside of ice cakes and small floes. Therefore, most oil would be exposed for combustion while it is fresh and relatively free of emulsification. Should the natural floes be large enough to entrap some of the oil beneath them and keep the oil from surfacing, efforts could be initiated with ice management vessels at a safe distance upstream of the blowout to break such ice into smaller pieces or deflect large floes away from the blowout.

Ice management is a proven technique that can completely modify the composition of the ice moving over a drilling location. For example, a 2004 coring program at 88°N saw two ice management vessels successfully work to maintain a drillship on location in high concentrations of 7 to 9 ft (2.1 to 2.7 m) ice thickness. Floes drifting towards the drill site were over 3,000 ft (914 m) in diameter. By the time they arrived the ice management vessels had reduced the average ice piece size to between 35 and 43 ft (10.6 to 13.1 m) (Keinonen et al. 2006). In addition to managing the floe sizes, oil could be dislodged from the underside of ice (before it becomes encapsulated within the ice) using prop-wash from vessels on location.

Another approach that could enhance combustion of oil with moving ice concentrations involves the use of large ice-deflection barriers such as a barge with tug assist or a vessel with dynamic positioning. Shell has conducted extensive mathematical and ice-tank modeling efforts to show that such large-scale deflection of ice appears safe and feasible for the creation of a relatively ice-free surface downstream of the deflection operation. Pending the results of full-scale trials with ice, it is likely that moving broken ice and early freezeup ice (new ice, nilas) could be deflected with a barge or vessel positioned sideways to the current/ice flow. Temporary paths of relatively open water several hundred feet wide could be created downstream of the deflection system to facilitate the use of conventional containment and recovery tactics and/or the use of fire boom in a conventional burn mode.

H.9.7 High Ice Concentrations and Continuous Layers of New Ice in Early Winter

The movement of a continuous layer of new ice or very high ice concentrations over a subsea blowout could reduce the effective use of *in situ* burning. There could be a reduction in the air/water surface area to accumulate oil and allow for efficient sustained combustion. This could be remedied in two ways: one involving the natural processes, and the other involving ice management. Experience has shown that large gas accumulations beneath ice will accumulate and rupture continuous ice layers (Dickins and Buist 1981) during early freezeup. The ice would likely break up, move out and away from the blowout, rafting and accumulating to create a natural barrier within which burning of the oil and free gas could take place. The other remedy involves the use of large ice-deflection systems upstream of the blowout as described above. Such deflection would provide an opening for burning on ice until prevented by excessive ice thickness. If the ice was continuous [even at relatively thin layers such as 3 to 6 inches (7.2 to 15 cm)] tank-test results suggest that it would be necessary to use ice management vessels forward of the deflection system. As long as the ice could be broken, and not too thick or pressured, it is possible that a relatively ice-free path could be opened just forward (or upstream) of the blowout. Oil (even widely scattered particles) surfacing within the cleared path downstream of the deflection system would soon be trapped within the downstream opening bounded on each side by ice. Even if bounded by broken ice and slush, these “walls of ice” would help contain and limit the spread of oil. The ice boundaries would provide considerable natural containment for the oil and enhance the potential and efficiency of elimination by burning.

As the ice boundaries continue to collapse inward on the cleared path of nearly open water, any contained oil would build in thickness, improving its condition for sustained and efficient combustion. Burning could occur in that ice-contained pocket as it moves away from the blowout. If the blowout was sufficient in flow rate and/or the currents were low, the buildup of oil at and immediately downstream of the blowout could be thick enough to support an ongoing efficient elimination of oil.

If conditions made it impossible or impractical to use the ice-deflection system, oil could surface beneath the continuous or solidly packed ice field where it would quickly become immobilized at the ice/water interface. If left undisturbed, new ice growth would soon provide a "lip" around the oil (typically within hours to a day, depending upon air temperature and ice thickness) further ensuring that the oil would not migrate out over a larger area. Typically within a day or two, new ice would completely surround the oil, encapsulating, immobilizing and preserving the condition of the oil. The ice-encapsulated oil can be marked and tracked for removal when the ice is safe to work on, or the oil could be tracked until spring. At that time the oil would become exposed at the surface through brine-channel migration or through surface melt down to the small entrapped oil droplets. The location and "mining" of oil from solid ice continues to be tested and enhanced; and, as long as it is safe to access the oiled ice by helicopter, these tactics could be implemented throughout most of the winter months. Of equal importance is the success with which oil has been burned after surfacing into melt pools in the spring. The elimination of evaporation, emulsification and other weathering phenomena while the oil is frozen within the ice, makes it possible to burn the exposed oil safely and efficiently using well-established aerial ignition techniques.

Still another tactic during this early freezeup phase involves the use of vessels to break the newly formed ice with oil under it, or about to be encapsulated within it. By breaking the ice and using the vessel's prop-wash to dislodge oil from below the ice, oil can be flushed to the surface and trapped on or between pieces of ice. If there is sufficient oil present, the oil could be ignited and burned.

H.9.8 Very Close Winter Pack Ice (Greater Than 9/10 Concentration)

There is the possibility that an incursion of older, multiyear ice could move in over a subsea blowout, and that a blowout could continue into the winter months exposing it to mix of growing first-year and multiyear ice. While highly unlikely, this scenario could involve the deposition of oil and gas beneath the closely packed ice floes. Depending upon the ice thickness and the volume of gas released with the blowout, the ice cover could fracture, thereby exposing both oil and gas at the surface. Depending upon the current and the rate of ice transport over the blowout, the rupturing of the ice could provide sufficient oil/gas exposure to support combustion. Previous studies of the possible effects of gas bubbles under the ice concluded that ice rupturing and gas/oil venting was likely with ice sheets up to three feet thick (Dickins and Buist 1981).

In this situation, it might be possible to keep some of the larger ice management vessels on location until it is no longer feasible to physically break the ice forward and/or downstream of the blowout. Between natural rupturing of the ice (gas lift) and deliberate breakup with ice management vessels, every effort would be made to entrap oil at or near the surface for immediate combustion or for enhanced combustion later during breakup.

As in the previous scenario with high ice concentrations, mid-winter response could (if it is safe to access the oiled ice) involve the location and recovery of oil using on-ice "mining" techniques. Promising results of tests with Ground Penetrating Radar and other remote-sensing systems could lead to the development and refinement of detection and tracking techniques for oil that is trapped deep within a thick ice layer (Dickins et al. 2006). Should the location and removal of oil be impractical during the winter months, oil deposited beneath and trapped within the ice in this way could be dealt with (as described above) when it becomes naturally exposed in the spring/summer period.

APPENDIX I

WILDLIFE RESPONSE PLAN

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APPENDIX I WILDLIFE RESPONSE PLAN

I.1 INTRODUCTION

This WRP has been developed by Shell in order to provide for coordinated, immediate, and effective protection, rescue, and rehabilitation of (and minimization of risk of injury to) wildlife resources present in the Beaufort Sea region during Shell's Beaufort Sea Exploration Drilling Program. The WRP includes general planning considerations, response strategies, specific protocols, and key resources to guide oil spill response operations in providing protective measures for migratory birds (including waterfowl, seabirds, shorebirds, and raptors), marine mammals, and terrestrial mammals. Species lists for migratory birds, marine mammals, and terrestrial mammals provide population densities for species commonly found in the Beaufort Sea or at onshore locations. The plan incorporates standards established by ACS in their Technical Manual and the ARRT Unified Plan, Annex G – Wildlife Protection Guidelines for Alaska. These plans serve as the foundation for Shell's WRP and are referenced throughout this document.

Shell's principal wildlife response objectives are to:

- Provide best achievable protection to wildlife and habitats from releases;
- Minimize injuries to wildlife and habitats from releases;
- Minimize injuries to wildlife from the cleanup operations;
- Provide best achievable care for injured wildlife;
- Document adverse effects that result from the release and cleanup; and
- Prevent injuries to responders and the public.

In addition, techniques will be used to specifically prevent: (1) unnecessary or illegal disturbance to sensitive species and habitats such as marine mammal haulouts; (2) potential injury and/or disturbance of bears by spill-related response personnel; (3) illegal collection of wildlife parts by spill-response personnel; and (4) wildlife contacts with spill response treatments. Although the precise techniques need to be identified on a spill-specific basis, general suggestions to minimize adverse effects to wildlife from response activities are provided in Sections 301.B.1 and 302.B.1 of the Wildlife Protection Guidelines for Alaska.

As presented in this WRP, these objectives are achieved through the implementation of primary, secondary, and tertiary response strategies. During oil spill response operations that have the potential to affect migratory birds and marine mammals, the primary response strategy is to control the release and spread of spilled oil at the source to reduce impacts to wildlife and their habitats. In addition, the primary response strategy includes the removal of oiled debris, particularly contaminated food sources (such as dead wildlife carcasses) both in water and on land. With the approval of the appropriate wildlife resource agency and FOSC, and consideration of the welfare of the animal, secondary response techniques (e.g., such as herding and deterring) would be employed to prevent the oiling of animals. The tertiary response during response operations is to attempt to capture and treat oiled birds and mammals.

Response actions concerning the protection, identification, rescue, processing and rehabilitation of oiled wildlife or wildlife at risk will be performed by the Wildlife Branch (sometimes referred to as Wildlife Operations), a branch in the Operations Section within the ICS. Shell maintains a Wildlife Response Contact List (see Attachment I-1) which is updated on a regular basis.

I.2 WILDLIFE RESPONSE PLANNING MEASURES

Wildlife response activities are conducted within four main categories: (1) Wildlife Risk Assessment, (2) Wildlife Reconnaissance, (3) Wildlife Hazing, and (4) Wildlife Recovery and Care. The planning measures associated with these activities are discussed below. These activities are fully integrated with Shell's OSRP.

I.2.1 Wildlife Risk Assessment

A comprehensive Wildlife Risk Assessment will be critical to a successful wildlife response, and will help determine the magnitude and nature of staffing and equipment needs. A Wildlife Risk Assessment includes a variety of wildlife resource information including potentially affected species, estimated species distribution, habitat types, spill trajectory, and preliminary hazing or treatment options.

The Wildlife Risk Assessment is best performed by trained biologists with support from locals with Traditional Knowledge of the species affected, such as subsistence hunters. Because wildlife concentration areas may change based on weather and season, this input may require direct reconnaissance by trained biologists (see Section I.2.2). Although objectives and strategies are clearly identified in this plan, priority actions and tactics must be decided on the basis of an incident-specific Wildlife Assessment.

I.2.2 Wildlife Reconnaissance

Baseline information on the status and distribution of wildlife and sensitive habitats are important in assessing Resources at Risk and developing appropriate response actions. This information is available during a spill response from the Environmental Unit of the Planning Section (Resources at Risk Specialist). However, variations from historic baseline conditions, due to daily and seasonal movements of birds and mammals, necessitates rapid, real-time reconnaissance of wildlife concentrations in the spill area. Depending upon the size and type of the spill and the habitats involved, real-time data will be collected using aircraft, boat, and/or ground surveys. Reconnaissance activities should begin immediately, as appropriate, upon notification of a spill event.

The main objectives of wildlife reconnaissance surveys are to evaluate the numbers, species, and locations of animals that could be or have been impacted by a spill. This information will be used to help direct wildlife hazing and/or recovery efforts, will be used by the Planning Section to develop response strategies that minimize adverse effects on wildlife, and will keep the UC informed regarding potential impacts.

Experienced personnel are essential for effective wildlife reconnaissance. Observers should be able to identify species, behavioral characteristics, and be knowledgeable about local ecological factors. At a minimum, personnel conducting wildlife reconnaissance should be experienced at identifying species of marine mammals and birds and be able to determine at a distance whether a live animal is oiled.

<u>Vessel-based Marine Mammal Observation</u>

During a response operation, MMOs positioned on vessels to monitor for marine mammals could be a resource to provide professional guidance in species identification. The MMOs have been trained in the identification of marine mammals, estimating the number of animals in a group, and general distance calculations. MMOs have been provided with a handbook that contains overview descriptions of marine mammals, Incidental Harassment authorizations from NMFS and USFWS.

Aerial Surveys

In addition to the MMOs trained in performing vessel-based surveys, additional personnel trained in aerial survey procedures could be available during a response operation. General methodologies to ensure personnel safety and prevent the disturbance of marine mammals, specifically bowhead whales, have been established. The aircraft are generally flown at 120 knots ground speed and usually at an altitude of 1,000 ft.

I.2.3 Wildlife Hazing

Wildlife hazing is intended to minimize injuries to wildlife by attempting to keep animals away from oil and/or cleanup operations. Hazing activities must take place only under the authority and oversight of wildlife resource (trustee) agencies, in coordination with the UC. Any recommendation to haze or deter wildlife is made to the UC. The recommendation will be guided by site-specific and species-specific factors present at the time of the spill, and availability of proven hazing techniques.

Hazing contractors (or other hazing personnel) must be properly trained in the use of hazing equipment, and must use appropriate PPE and other safety precautions. For guidelines regarding hazing strategies, refer to Wildlife Response Strategies in this WRP and the Wildlife Protection Guidelines for Alaska.

Permit Requirements

Permits are required for secondary and tertiary wildlife response activities. The permits relate to the jurisdiction and resource protection interests of each agency. There are three federal laws for the protection of wildlife that are relevant to spill response: the MBTA, the MMPA, and the ESA. In addition, the Bald Eagle Protection Act protects Bald Eagles and Golden Eagles, but would rarely be relevant to spill response activities.

Migratory Bird Treaty Act

The MBTA prohibits anyone without a permit from pursuing, hunting, killing, possessing, or transporting (or attempting to do any of these things) most native birds in the United States. The MBTA applies to live and dead birds, and active nests (nests with eggs or chicks). The trustee agency overseeing the MBTA is the USFWS.

Marine Mammal Protection Act

The MMPA prohibits the “take” of marine mammals (including pinnipeds, cetaceans, and sea otters). Take is defined under the MMPA as: “to harass, hunt, capture, kill or collect, or attempt to harass, hunt, capture, kill or collect." Under Section 109(h) of the MMPA, federal, state and local government officials, or designees of the relevant Secretaries of the Departments of the Interior and Commerce, may take marine mammals during the course of official response duties if such taking is for the protection or welfare of the mammal, the protection of public health and welfare, or the non-lethal removal of nuisance animals. Other exemptions to the take prohibition that are relevant to oil spill response include activities conducted under a permit or agreement issues by NMFS.

Endangered Species Act

The ESA prohibits take of species listed as Threatened or Endangered under the Act. “Take” under the ESA is defined as “to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct." The USFWS oversees permitting authorization issues for the allowed take of listed terrestrial species, non-marine fish, birds, and sea otters. NMFS oversees permitting authorization of the allowable take of other marine mammals, sea turtles (in water), and marine and anadromous fishes.

In 2001, the USFWS and other federal agencies signed a MOU regarding oil spill planning and response activities related to the ESA. This MOU recognized that oil spill response is a federal action, and thus is subject to Section 7 of the ESA, which involves inter-agency consultations regarding Threatened and Endangered Species. The MOU includes guidelines for pre-spill planning (including protocols for listed species, as included in this WRP) and guidelines for emergency Section 7 consultations during and after spill response.

The MMPA of 1972 granted NMFS responsibility for the management and conservation of all cetaceans (whales) and pinnipeds (seals and sea lions), except walrus. NMFS is also responsible for the administration of the ESA as applied to its trust species. The USFWS has responsibility for managing and protecting walrus, polar bears, terrestrial mammals and migratory bird species. USFWS is also responsible for the administration of the ESA as applied to its trust species. USFWS has joint statutory responsibility with ADF&G for management of wildlife on all federal lands in Alaska.

The UC can apply for permits during a response using the checklists and permit applications provided in the ARRT Annex G in the Wildlife Protection Guidelines of the Unified Plan for Alaska (see Attachment I-2). Permits for the hazing, capture, and holding of live animals are summarized in Table I.2-1, as adapted from ACS Tactic W-1.

Table I.2-1
State and Federal Permits and/or Authorizations Required for Hazing, Collecting, or Holding Live Animals

SPECIES	ADF&G		USFWS		NMFS	
	COLLECT AND HOLD	HAZE	COLLECT AND HOLD	HAZE	COLLECT AND HOLD	HAZE
Migratory birds	No	Yes	Yes	No	No	No
Walrus and polar bears	No	No	Yes	Yes	No	No
Whales, porpoises, and seals	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. Confirm the current listing status at the time of the response operations.

I.2.4 Wildlife Recovery and Care

Recovery of oiled wildlife involves collecting dead and capturing live animals and transporting them to processing and rehabilitation centers. Wildlife recovery and care by any agency or organization must be conducted under the direction of the UC (see below and Attachment I-2). Wildlife recovery and care activities must comply with agreements and permits from the appropriate management agencies as discussed under Wildlife Hazing. Recovery efforts are typically based at the Field Stabilization facility or other staging area. This staging site will act as a check-in and check-out site for staff, a staging area for capture equipment, and a site for personnel decontamination. Recovery personnel are drawn from state and federal trustee agencies and approved contractors. Wildlife recovery may be integrated with wildlife reconnaissance operations.

It is important that dead animals are collected, documented, and held until disposal is approved by the trustees. The prompt removal of dead oiled animals from the environment can be critical to minimize the effects of secondary oiling such as poisoning of predators and scavengers. While conducting beach surveys and/or capturing wildlife during a response, it is not always feasible, reliable, or practical to attempt to discriminate between spill-related and non-spill-related casualties; thus all dead animals should be collected.

Although the standard method for recovery of birds is capture on the ground or on the water with long-handled nets, various other techniques may be considered depending on conditions. Standard protocols will be used to capture/collect marine mammals, in coordination with the NMFS Marine Mammal Stranding Network Coordinator. For guidelines regarding recovery strategies, refer to Wildlife Response Strategies in this WRP.

Wildlife care involves field stabilization, treatment, and processing:

- Field stabilization provides triage in the field prior to transportation to a primary care facility;
- Care ensures that wildlife exposed to petroleum products receive the best achievable care by providing access to veterinary services and to rehabilitation centers; and
- Processing ensures oiled animals are fully evaluated and data are captured, so the UC can obtain oiled wildlife statistics used for a variety of purposes, such as response strategy development and media updates.

<u>Establishing Wildlife Collection Programs and Treatment Facilities</u>

The decision to establish a capture and treatment program for oiled birds and/or marine and terrestrial mammals can only be made by the federal OSC based on recommendations of representatives of appropriate wildlife resource agencies.

The following factors will be considered when determining when to begin and end a wildlife capture and treatment program. The resulting information will be documented by Shell and the appropriate wildlife resource agencies.

- Appearance of species in Migratory Birds species, Marine Mammal species, or Terrestrial Mammal species.
- Wildlife Response Team safety considerations.
- Legal status of the species affected (e.g., special management concern, threatened, endangered).

- Population status of the species affected (e.g., international, national, and regional significance).
- Estimated percentage of the population affected.
- Use of the species as a subsistence resource.
- Logistical constraints in treating oiled animals (e.g., airports/runways and equipment availability).
- Anticipated success in effectively treating oiled animals (i.e., expected survival rate of treated wildlife).
- Public concern.
- Projected cost of treatment program and funding availability.
- Whether adequate treatment facilities exist (i.e., facilities must maintain wildlife in an environment that has low risk of disease).
- Whether capture and treatment program and subsequent release poses any risk (due to disease, social disruption, or mortality) to wild animal populations.
- Whether sufficient facilities exist for keeping wildlife in captivity that cannot be released back into the wild.
- Whether wildlife resource agencies are able to assume lead responsibility for all components of a wildlife capture and treatment program.

In the event that a wildlife capture and treatment program is initiated, Shell, through appropriate contractors and organizations, will take the lead for the following:

- Contracting with the appropriate organizations and/or individuals for wildlife collection, transportation, and treatment.
- Obtaining necessary equipment and materials for wildlife collection, transportation, and treatment.
- Acquiring appropriate size and number of treatment facilities.
- Capturing oiled wildlife and transporting them to treatment facilities.
- Treating oiled wildlife.
- Transporting, in coordination with USFWS and NMFS, treated wildlife to release sites or securing space in appropriate marine aquariums or zoos.
- Ensuring that people involved in the collection, handling, or transportation of wildlife have appropriate training.
- Ensuring that necessary permits are requested expeditiously.
- Ensuring that appropriate and accurate data are recorded regarding the numbers, condition, and location of all wildlife collected or observed by response personnel.
- Ensuring that necropsies are performed, when necessary, by federal and/or state pathologists or a pathologist approved by appropriate wildlife resource agencies, and that all results from necropsies are provided to appropriate wildlife resource agencies and treatment workers in a timely manner.

- Ensuring responsible handling, care and humane treatment of wildlife at all facilities.
- Controlling and limiting public access to all wildlife facilities.

As specified in the Wildlife Protection Guidelines for Alaska, USFWS and NMFS (as appropriate) will take the lead for the following:

- Ensuring that necessary permits (with clauses regarding capturing, holding, cleaning, treating, euthanizing, and releasing wildlife) are issued expeditiously to appropriate individuals and/or organizations.
- Providing personnel and/or the names of specially trained personnel to Shell when marine or terrestrial mammals are involved.
- Providing agency oversight for each treatment facility to ensure that wildlife are handled properly by contracted individuals or organizations.
- Ensuring that wildlife receives humane and appropriate treatment from their point of capture through their release to the wild or into marine aquariums or zoos.
- Approving releases to the natural habitat or transfers of wildlife to marine aquariums or zoos.

Staffing and Equipment

Wildlife response staffing and procurement of equipment resources should be tailored specifically to meet the needs of each incident. Number of personnel needed may vary from a few personnel necessary to implement a Wildlife Branch under the Operations Section to hundreds of personnel for a very large oil spill. Primary personnel include Branch Director, Deputy Director, GIS Specialist, Data Manager, Unit Leaders, Rehabilitation Specialists (veterinarians and pathologists), and various field team leaders. Primary personnel to conduct wildlife response operations typically come from wildlife resource agencies and approved contractors. The largest staffing needs are for recovery and care operations (tertiary responses). However, in the event of a very large oil spill or a spill affecting an exceptionally sensitive area, many additional staff may be needed.

Mobilization of equipment is highly dependent on the situation, and the level of activation for equipment must be determined on a case-by-case basis by the Wildlife Branch and the Environmental Unit in consultation with the UC. Entities in Alaska with equipment and materials stockpiled for deterring unoiled wildlife and capturing and treating oiled wildlife are provided in Attachment I-2. Specialized equipment needs and activation protocols are also specified in greater detail as part of Shell's Regional OSRP.

Wildlife Experts/Contractors

There are a number of wildlife experts and contractors that can assist with Wildlife Response operations (e.g., for wildlife reconnaissance). Included in this category are staff of other wildlife resource (trustee) agencies, including the USFWS, National Park Service, NOAA/NMFS, ADF&G, and other local agencies (e.g., NSB Department of Wildlife). Shell maintains a Wildlife Response Contact List (see Attachment I-1) which is updated on a regular basis.

The following provides a general overview of resources available:

- Local residents possessing Traditional Knowledge
    - whaling captains and crews
    - AEWC

  - Village elders and leaders
  - MMOs
  - Subsistence Advisors

- Agency personnel
  - NSB Department of Wildlife Management
  - ADF&G
  - ADNR
  - USFWS
  - NMFS

- Trained biologists and scientists with wildlife response expertise
  - Polaris Applied Sciences, Inc.
  - Cardno ENTRIX
  - AES-RTS personnel
  - ABR, Inc. Environmental Research & Services
  - LGL Alaska Ecological Research

- Alaska Clean Seas
  - ACS permits for birds and terrestrial mammals (ACS Tactic W-1)
  - Master Service Agreement with International Bird Rescue and Rehabilitation Center (IBRRC)
  - ACS Mobile Wildlife Stabilization Center

- Wildlife response contractors
  - IBRRC, including IBRRC's network of subcontractors
  - Tri-State Bird Rescue and Research, Inc.
  - Alaska SeaLife Center, Seward, Alaska
  - The Alaska Zoo, Anchorage, Alaska

<u>Safety Considerations</u>

Worker safety must be considered before any wildlife reconnaissance, protection or retrieval effort is conducted. If a wildlife response cannot be conducted safely, it should not be attempted. An incident-specific Site Safety Plan can be modified to address specific Wildlife Response needs.

Safety hazards that may confront Wildlife Response personnel include, but are not limited to: toxic vapors, fire hazard, hazardous weather and seas, unsafe footing, diseases or injuries inflicted by wild animals, and fatigue. Therefore, all Wildlife Response activities must conform to the Site Safety Plan for the response, and all personnel involved in Wildlife Response operations must have appropriate job-specific safety training for the tasks to be performed. They must be adequately protected with the appropriate PPE. Those people involved with animal handling should be trained in techniques that ensure worker safety and present the least amount of stress to wildlife.

I.3 WILDLIFE RESPONSE STRATEGIES

Strategies for the protection of migratory birds and wildlife during a response operation are readily available. The ACS Technical Manual and the ARRT Wildlife Protection Guidelines for Alaska, for example, provide in-depth guidance specific to birds and wildlife determent, hazing, capture, transportation, stabilization, and treatment protocols. Numerous other federal and state plans have also been developed that contain guidelines and protocols for different response strategies. At the national level, the USFWS has prepared two related plans, the Best Practices for Migratory Bird Care During Oil Spill Response and the Fish and Wildlife Service National Oil Spill Contingency Plan. Both USFWS plans can be viewed at: http://www.fws.gov/contaminants/. NMFS's Marine Mammal Health and Stranding Response Program has developed Marine Mammal Oil Spill Response Guidelines, available at:http://www.nmfs.noaa.gov/pr/pdfs/health/eis_appendixl.pdf. This WRP is compatible with those plans.

This section provides detailed response strategies for migratory birds, marine mammals, and terrestrial mammals. Although objectives and strategies are clearly identified in this WRP, priority actions and tactics must be decided on the basis of incident-specific information. As indicated repeatedly, responders must either be pre-authorized or receive authorization from the appropriate wildlife resource (trustee) agency (e.g., USFWS, NMFS, and ADF&G) during any response activity involving birds and other wildlife.

I.4 MIGRATORY BIRDS

A variety of migratory birds may be present during a response operation on the Beaufort Sea. Various categories to differentiate migratory bird species have been developed (see Table I.4-1). The major group to which each migratory bird 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 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 ESA.

While the behavior of birds varies with species and season, general sensitive locations can be identified for their biological importance. The areas that should be prioritized during response operations include migration stopovers, such as lagoons along the Beaufort Sea coastline, seabird colonies that may include large on-water flocks, major feeding areas, wintering areas, and coastal habitats.

Strategies for protecting migratory birds from oil include containing the oil before it reaches the birds, hazing them from oiled areas, and capturing and treating oiled birds. Information on the feasibility of applying various response strategies to migratory bird species (including waterfowl) is provided in Appendix 6 of Wildlife Protection Guidelines for Alaska. This information includes their relative sensitivity to oiling, their relative sensitivity to disturbance during critical periods of their life cycles, and general recommendations for minimizing adverse effects during an oil-spill response. Citations for deterrent, capture, and treatment techniques are also included.

Any response activity involving migratory birds must have the approval of the appropriate wildlife resource agency and the FOSC.

Table I.4-1
Migratory Birds

SPECIES OF CONCERN	POPULATION DENSITY CODE	SPECIES OF CONCERN	POPULATION DENSITY CODE
Loon (DB)	P/S	American golden plover (SH)	P
Grebe (DB)	A	Semipalmated plover (SH)	U
Tundra swan (WF)	P/S	Aleutian tern (SE)	A
Greater white-fronted goose (WF)	P/S	Arctic tern (SE)	U
Snow goose (WF)	P/S	Gulls (SE)	P/S
Emperor goose (WF)	R/S	Murres (SE)	P/S
Black brant (WF)	P/S	Guillemots (SE)	U
Canada goose (WF)	P/S	Murrelets (SE)	R
Oldsquaw (WF)	P/S	Kittlitz's murrelet (SE)(SMC)	R
Greater scaup (WF)	U/S	Puffins (SE)	R
Red-breasted merganser (WF)	R/S	Scoter (WF)	U/S
Northern pintail (WF)	P/S	Mallard (WF)	R/S
Bufflehead (WF)	A	Bald eagle (RA)	A
Goldeneye (WF)	A	Osprey (RA)(SMC)	A
Canvasback (WF)	A	Arctic peregrine falcon (RA)	P
Northern shoveler (WF)	R	Snowy owl (RA)	U/S
Spectacled eider (WF)(TS)	U/S	Sandhill crane (SH)	U/S
Steller's eider (WF)(TS)	U/S	Wandering tattler (SH)	A
King eider (WF)	P/S	Bristle-thighed curlew (SH)(SMC)	R
Common eider (WF)	P/S	Northern fulmar (SE)	R
Harlequin duck (WF)(SMC)	R	Black-legged kittiwake (SE)	P
American widgeon (WF)	U/S	Cormorant (SE)	R
Green-winged teal (WF)	U/S	Ptarmigan (UB)	P/S
Wandering tattler (SH)	A	Semipalmated plover (SH)	U
Bristle-thighed curlew (SH)(SMC)	R	Aleutian tern (SE)	A

A = Casual/Accidental
O = Pelagic (well offshore)
P = Present
R = Rare
S = Subsistence Species
U = Uncommon

Primary Response Strategy

The primary strategy for protecting migratory birds during a response operation is preventing birds from contacting oil by containing the oil before it reaches their location. This can be accomplished by using either booms and skimmers or, where environmental considerations allow, using chemical dispersants and/or *in situ* burning. Booms and skimmers and *in situ* burning are preferable near concentrations of birds because dispersants, being detergents, reduce the insulating value of their plumage and therefore may cause mortality to some birds. If possible, spraying dispersants directly into large concentrations of birds should be avoided. After dispersants have mixed with water, their danger to birds is reduced, although not eliminated. In addition, oiled debris (particularly contaminated food sources) should be removed from the environment as soon as possible to prevent scavenging by birds, which results in secondary effects due to the ingestion of oil.

Birds concentrate in various areas, depending on the species and season. If possible, the following types of areas where birds concentrate should be protected following an oil spill:

1) Migration stopovers ("staging areas"): Some migratory birds form immense flocks during spring and fall migrations. Shorebirds and waterfowl gather at lagoons and estuaries to feed. Critical areas include lagoons of the Beaufort Sea coast.

2) Seabird colonies: Many seabirds nest in colonies that range from a few dozen to several million birds. Birds are vulnerable to oil contamination when they are in large flocks on the water near the colony. Highest priority should be given to colonies containing rare species, the largest colonies in a region, and those with many species.

3) Major feeding areas of seabirds: Most seabirds obtain their food at sea away, from land. While they may feed in areas that are close to land or more than 100 miles offshore, they are often concentrated in small areas. As a result, the presence of oil in some feeding areas could disable the majority of seabirds in the region. Feeding areas shift with the tides and seasons, so the position of large flocks fluttering over or sitting on the water should be carefully noted during reconnaissance flights and avoided, if possible, when applying dispersants.

Secondary Response Strategy

Any secondary response activities must have the approval of the appropriate wildlife resource agency and the FOSC.

The secondary response strategy to protect birds is to deter them from a slick or contaminated shoreline using established deterrent methods: visual, auditory, and combinations of visual and auditory. A deterrent may be used to discourage birds from landing in or near an oil-contaminated area. In many cases, birds must be deterred from contaminated areas repeatedly and frequently. Often the techniques require frightening birds to keep them away. While the selection of the appropriate technique may be determined by the availability of technology and the specific situation, general selection methods include:

- In situations where waterfowl, shorebirds, and raptors are dominant, use exploders to disperse birds, unless the birds are flightless. Young and molting birds may need to be herded with boats and/or vehicles.

- In situations where diving birds are dominant, underwater sound (if effective) should be used. Some birds, such as auklets, are attracted to lights while other species, such as loons and grebes, may be repelled.

Additional visual and auditory methods are provided in the ARRT Wildlife Protection Guidelines for Alaska and in the ACS Tactics W-1 through W-6.

Tertiary Response Strategy

Any tertiary response activities must have the approval of the appropriate wildlife resource agency and the FOSC.

The tertiary response to protect birds during response operations is to attempt to capture and treat oiled birds. Capturing and treating oiled birds is the protection method of last resort. Although methods for cleaning birds are well established, only a small proportion of birds can be saved once their plumage has become oiled.

Refer to Section I.2.4 of this WRP (Establishing Wildlife Collection Programs and Treatment Facilities) for a description of Shell and regulatory agency responsibilities in a bird capture and treatment program.

Response contractors that handle bird operations and agency contacts for the USFWS and ADF&G for operations involving birds are available. For example, ACS maintains a service agreement with IBRRC and maintains a Mobile Wildlife Stabilization Center located on the North Slope but that can be transported to other locations if necessary.

Equipment and Material

Information on equipment and materials for deterring unoiled migratory birds and capturing and treating oiled migratory birds is presented in Appendices 17, 18, and 19 of Wildlife Protection Guidelines for Alaska. In addition, Appendix 21 (see Attachment I-2) provides a list of entities in Alaska with equipment and materials stockpiled for deterring unoiled wildlife and capturing and treating oiled wildlife, including migratory birds.

I.5 MARINE AND TERRESTRIAL MAMMALS

During response operations a variety of marine and terrestrial species may be encountered. A list of species and density descriptions are provided for marine mammals (see Table I.5-1) and terrestrial mammals (see Table I.5-2).

The sensitivity of marine and terrestrial mammals to spilled oil is highly variable. It appears to be most directly related to the relative importance of fur and blubber to thermoregulation. Cetaceans are the least sensitive of marine mammals to spilled oil. Direct exposure to oil also can result in reversible conjunctivitis; ingestion of oil can result in digestive tract bleeding and liver and kidney damage. Ingestion of oil is of greater concern for species that groom themselves with their mouth, such as polar bears. Inhalation of hydrocarbon volatiles can result in nerve damage and behavioral abnormalities.

Wildlife response options for marine mammals in the Arctic Ocean and terrestrial mammals remain limited due to regulatory restrictions and the practicality of capturing and handling large animals for treatment. Primary response strategies that involve either removing the oil threat from the animal or its habitat or removing the animal from the threat are most important and effective.

Secondary response options are available and can be effective for certain terrestrial mammals. However, hazing large marine is difficult and success has been varied. In addition, 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 options need to be biologically founded and sensitive to local concerns and knowledge. While specific tertiary response guidelines have been established for birds, methods to capture and clean oiled marine mammals have not been standardized. Procedures that have been developed for sea otters and polar bears may be adapted to other small species of marine mammals such as smaller pinnipeds.

Information on the feasibility of various response strategies for each marine mammal species or group of species is provided in Appendix 7 of the Wildlife Protection Guidelines for Alaska. This information includes population status, their relative sensitivity to oiling, their relative sensitivity to disturbance during critical periods of their life cycles, and general recommendations for minimizing adverse effects during an oil-spill response. Citations for deterrent, capture, and treatment techniques are included.

Information on the feasibility of various response strategies for each terrestrial mammal species or group of species is provided in Appendix 8 of the Wildlife Protections Guidelines for Alaska. This information includes their relative sensitivity to oiling and disturbance, and general recommendations for minimizing adverse effects during an oil-spill response. In addition, citations for deterrent, capture, and treatment techniques are included.

Given the potential to encounter polar bears during a response operation, Attachment I-3 (Polar Bear Interaction Measures) provides response strategies, mitigation measures, and notification procedures to minimize the risk of injury to personnel and disturbance to bears.

Primary Response Strategy

In response operations that involve marine and terrestrial mammals, the primary response strategy is to control the release and spread of spilled oil at the source to reduce impacts to species and their habitats. In prioritizing response operations for marine mammal habitats, emphasis should be placed on protecting pinniped-haulout beaches.

A primary response should also include the removal of oiled carrion to prevent marine and terrestrial mammals, such as polar bears and grizzly bears, from ingesting oil as they scavenge for food. All primary response operations should be conducted as far from marine and terrestrial mammals as operations allow.

Secondary Response Strategy

With the approval of the appropriate wildlife resource agency and FOSC and the consideration of the welfare of the animal, secondary response techniques such as herding and deterring would be employed to prevent the oiling of animals. These options are most feasible for pinnipeds at haulout and rookery areas during the period when territorial bonding is weakest. It may be possible to deter polar bears when they are swimming. It may also be possible to deter grizzly bears and other terrestrial mammals from impacted beaches.

Tertiary Response Strategy

Any tertiary response of attempting to capture and treat oiled animals must have the approval of the appropriate wildlife resource agency and the FOSC. These activities should be performed by people with the experience in capturing and handling the subject species. Trained professionals are available within Alaska to respond should a tertiary response be necessary (see Attachment I-1). The Alaska SeaLife Center located in Seward, Alaska maintains statewide permits for the handling and transport of stranded animals, and retains a veterinarian trained in responding to oiled animals. The Alaska Zoo also provides handling and transport capability for terrestrial mammals.

Table I.5-1
Marine Mammals

SPECIES OF CONCERN	POPULATION DENSITY CODE	SPECIES OF CONCERN	POPULATION DENSITY CODE
Polar bear	P/S	Killer whale	P
Ringed seal	P/S	Fin Whale	U
Spotted seal	P/S		
Bearded seal	P/S		
Pacific walrus	P/S		
Ribbon seal	P(pack ice)/S		
Bowhead whale (ES)	P/S		
Gray whale	P		
Minke whale	U		
Beluga whale (SMC)	P/S		
Harbor porpoise	P/S		

ES = Endangered Species, O = Pelagic (well offshore), P = Present, R = Rare,
SMC = Special Management Concern, S = Subsistence Species, TS = Threatened Species, U = Uncommon

Table I.5-2
Terrestrial Mammals

SPECIES OF CONCERN	POPULATION DENSITY CODE	SPECIES OF CONCERN	POPULATION DENSITY CODE
Brown Bear	P/S/SMC	Red Fox	P/S
Black Bear	P/S	Aquatic Furbearers	P/S
Caribou/Reindeer	P/S		
Moose	P/S		
Muskoxen	P/S		
Dall Sheep	P/S		
Wolf	P/S		
Arctic Fox	P		

ES = Endangered Species, O = Pelagic (well offshore), P = Present, R = Rare,
SMC = Special Management Concern, S = Subsistence Species, TS = Threatened Species, U = Uncommon

Equipment and Material

Information on equipment and materials for deterring unoiled mammals and capturing and treating oiled mammals is located in Appendices 20, 23, 24, 25 of Wildlife Protection Guidelines for Alaska. In addition, Appendix 21 (see Attachment I-2) provides a list of entities in Alaska with equipment and materials stockpiled for deterring unoiled wildlife and capturing and treating oiled wildlife, including mammals.

Attachment I-1
Wildlife Response Contact List

TITLE	NAME	EMAIL	MOBILE	OFFICE	OTHER
USFWS Spill Response Coordinator	Catherine Berg	Catherine_berg@fws.gov	907-244-1529	907-271-1630	907-694-7379
USFWS Alternate	Philip Johnson	Philip_johnson@fws.gov	907-242-6893	907-786-3487	907-345-0300
USFWS Walrus Hazing Advisor	Joel Garlich-Miller, USFWS	Joel_GarlicMiller@fws.gov		907-786-3820	
USFWS Polar Bear Hazing Advisor	Craig Perham, USFWS	Craig_Perham@fws.gov		907-786-3810	
USFWS Endangered Species	Ted Swem	Ted_Swem@fws.gov		907-456-0441	
USFWS Wildlife Advisor	Richard Voss	richard_voss@fws.gov		907-456-0250	
USFWS Wildlife Advisor	Tevis Underwood	tevis_underwood@fws.gov		907-456-0512	
USFWS Supervisor	Rosa Meehan			907-786-3800	
USFWS Chief Waterfowl Mgmt.	Eric Taylor			907-786-3446	907-786-3443
USFWS Chief Fisheries	Doug McBride			907-271-2871	
NMFS Field Office Supervisor	Brad Smith	Brad.smith@noaa.gov		907-271-5006	907-248-4211
NMFS Alternate	Matt Eagleton	Matthew.eagleton@noaa.gov		907-271-6354	
NMFS Marine Scientist	Robin Angliss, NMFS	robyn.angliss@noaa.gov		206-526-4032	
ADF&G Spill Response Coordinator	Mark Fink	markf@fishgame.state.ak.us		907-267-2388	907-337-7933
ADF&G Alternate	Jack Winters	jwinters@fishgame.state.ak.us		907-459-7285	907-479-2320
Alaska Clean Seas	Lee Majors/ Ken Linderman	Planning@alaskacleanseas.org	907-659-0812	907-659-3207	
Polaris Applied Sciences	Greg Challenger (Polaris)	gchallenger@polarisappliedsciences.com	206-369-5686	206-842-5667	Pager 800-659-7243 pin#20690
Alaska SeaLife Center	Tim Lebling (Alaska SeaLife Center)	timl@alaskasealife.org		907-224-6399	888-774-7325
Alaska SeaLife Center	Pam Tuomi (Alaska SeaLife Center)	pam_tuomi@alaskasealife.org		907-224-6340	888-774-7325
Valdez SERVS	Duty Officer			907-834-6901	
IBRRC	Barbara Callahan	ibrrcbarb@aol.com	907-230-2492	907-562-1326	
NSB Wildlife Biologist	J. Craig George, NSB	Craig.George@north-slope.org		907-852-0350	
NSB Wildlife Biologist	Robert Suydam, NSB	Robert.Suydam@north-slope.org		907-852-0350	
Alyeska Pipeline Service Company	Kate Montgomery	MontgomeryKA@alyeska-pipeline.com	907-659-2437	907-787-4185	
Alaska Chadux Corporation	Robert Heavilin	bheavilin@chadux.com	907-278-3365		
Shell Environmental Unit Leader	Michael Macrander	a.macrander@shell.com	907-317-9314	907-646-7123	
Shell Technical Specialist	Victoria Broje	victoria.broje@shell.com	281-660-4353	281-544-7437	

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Attachment I-2
Facilities and Permit Applications

ARRT Annex G Wildlife Protection Guidelines for Alaska

(Appendices 21, 24, and 25)

Appendix 21

Entities in Alaska with Equipment and Materials Stockpiled for Deterring Unoiled Wildlife and Capturing and Treating Oiled Wildlife

Appendix 24

Oil Spill Response Checklist: Wildlife Hazing

Appendix 25

Oil Spill Response Checklist: Wildlife Capture, Transportation, Stabilization, and Treatment

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APPENDIX 21

ENTITIES IN ALASKA WITH EQUIPMENT AND MATERIALS STOCKPILED FOR DETERRING UNOILED WILDLIFE AND CAPTURING AND TREATING OILED WILDLIFE[2]

LOCATION IN ALASKA	RESPONSE ACTION	AMOUNT OF SUPPLIES	TOTAL ANIMALS TO BE ASSISTED WITH SUPPLIES	SUPPLY OWNER/CONTACT PERSON/24-HOUR CONTACT NUMBER
Deadhorse	Bird hazing Bird capture/field stabilization Bird stabilization center Bear stabilization and treatment Small animal capture Bird deterrent buoys	11 kits 10 kits 1 module[3] 1 unit 3 cages 10 buoys	Birds at multiple locations 100 birds 350 birds 5 polar bears Small animals Seabirds	**Lee Majors** Alaska Clean Seas 659-3207 (ph) 659-2616 (fax) Email: planning@alaskacleanseas.org
Pump Station #1 (Prudhoe Bay)	Bird hazing Bird stabilization Bird capture	2 kits 2 kits 5 kits	Birds at 2 onshore locations 150 birds 50 birds	**Kate Montgomery** or **Cathy Girard** Alyeska Pipeline Service Company 787-4185 (ph) 659-2437(24 hr ph) 787-4134 (fax) Email: MontgomeryKA@alyeska-pipeline.com Email:GirardCA@alyeska-pipeline.com

[2]Information in this appendix was provided by representatives of the oil industry and their wildlife response contractors. The information has not been verified by wildlife trustee resource agencies. The appearance of wildlife response information in this appendix does not constitute compliance by oil spill contingency plan holders with state oil spill contingency planning requirements.

[3]Module may be transported by Hercules L-100 or C-130 aircraft.

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APPENDIX 21, CONT.

LOCATION IN ALASKA	RESPONSE ACTION	AMOUNT OF SUPPLIES	TOTAL ANIMALS TO BE ASSISTED WITH SUPPLIES	SUPPLY OWNER/CONTACT PERSON/24-HOUR CONTACT NUMBER
Pump Station #8 (Mile 34, Richardson Highway, Johnson Road)	Bird hazing Bird stabilization Bird capture Bird stabilization	2 kits 2 kits 5 kits 1 module[2]	Birds at 2 onshore locations 150 50 Pass-through facility	**Hillary Schaefer** or **Jim Lawlor** Alyeska Pipeline Service Company 787-7682 (ph) 450-5707(24 hr ph) 450-5534 (fax) Email: SchaeferH@alyeska-pipeline.com Email: LawlorJG@alyeska-pipeline.com
Valdez (SERVS Annex)	Bird hazing Breco hazing buoy Bird stabilization Bird stabilization Bird capture Sea otter capture Sea otter stabilization Sea otter treatment	4 kits 1 buoy 4 kits 1 module[2] 40 kits 4 kits 2 modules 1 complete facility	Birds at 4 onshore locations Seabirds 500 birds Pass-through facility 400 birds 40 sea otters 100 sea otters 100 sea otters, initially and up to 20 otters per day maximum	**SERVS Duty Officer** Alyeska Pipeline Service Company 834-6901 (ph)

APPENDIX 21, CONT.

LOCATION IN ALASKA	RESPONSE ACTION	AMOUNT OF SUPPLIES	TOTAL ANIMALS TO BE ASSISTED WITH SUPPLIES	SUPPLY OWNER/CONTACT PERSON/24-HOUR CONTACT NUMBER
Anchorage	Bird treatment	Complete facility	500 birds	**Barbara Callahan** International Bird Rescue Research Center (IBRRC) 562-1326 (ph) 230-2492 (24hr ph) (707) 207-0380 (CA-emergency) (907) 562-2441 (fax-AK) (707) 207-0395 (fax-CA) Email: ibrrcbarb@aol.com
Anchorage	Bird treatment Bird capture and stabilization Bird hazing	1 mobile trailer pass through facility[2] 5 kits 3 kits	150 birds 50 birds Birds at 3 onshore locations	**Robert E. Heavilin** Alaska Chadux Corporation 278-3365 (24 hr ph) 278-3330 (fax) Email: bheavilin@chadux.com [Chadux has a retainer with IBRRC]
Anchorage	Bird stabilization	2 stabilization kits	100 birds	**Gary Stock** Navy Supsalv 348-2968 (ph) 229-8859 (24 hr ph) 384-2969 (fax) Email: stockgj@essm.navy.mil

APPENDIX 21, CONT.

LOCATION IN ALASKA	RESPONSE ACTION	AMOUNT OF SUPPLIES	TOTAL ANIMALS TO BE ASSISTED WITH SUPPLIES	SUPPLY OWNER/CONTACT PERSON/24-HOUR CONTACT NUMBER
Anchorage	Sea otter capture Sea otter holding	3 capture kits 3 transportable floating pens	30 sea otters (capture and holding)[4] 30 sea otters	**Robert E. Heavilin** Alaska Chadux Corporation 278-3365 (24 hr ph) 278-3330 (fax) Email: bheavilin@chadux.com [Chadux has a retainer with IBRRC]
Anchorage	Sea otter capture Sea otter holding	2 capture kits 2 transportable floating pens	26 sea otters (capture and holding)[3] 26 sea otters	**Gary Stock** Navy Supsalv 348-2968 (ph) 229-8859 (24 hr ph) 384-2969 (fax) Email: stockgj@essm.navy.mil
Homer	Bird hazing Bird capture Bird stabilization	3 kits 5 kits 1 center	Birds at 3 onshore locations 250 birds 250 birds	**Charlotte Adamson** Marine Wildlife Rescue 235-2700 (ph) 299-2430 (24hr ph) Email: charlot@ptialaska.net

[4]Additional sea otters could be captured in a pre-emptive capture and release program.

APPENDIX 21, CONT.

LOCATION IN ALASKA	RESPONSE ACTION	AMOUNT OF SUPPLIES	TOTAL ANIMALS TO BE ASSISTED WITH SUPPLIES	SUPPLY OWNER/CONTACT PERSON/24-HOUR CONTACT NUMBER
Nikiski (Mile 26.5 North Spur Road)	Bird hazing Bird capture Sea otter capture Sea otter holding Sea otter treatment	3 kits 5 kits 4 kits 4 transportable floating pens and 6 capture pens Complete transportable facility	Birds at 3 onshore locations 250 birds 52 sea otters (capture and holding)[3] 52 sea otters 120 sea otters	**Doug Lentsch** Cook Inlet Spill Prevention and Response, Inc. 776-7401 (ph) 776-5129 (24 hr ph) 776-2190 (fax) Email: dlentsch@cispri.com or **Jim Styers** (sea otters) Wildlife Rapid Response Team 800-204-5686 (pager)
Ketchikan, Sitka, Juneau, Petersburg, Skagway, Craig/Klawock	Bird hazing	1 kit per each location	Birds at onshore locations	**Cheryl Fultz** Southeast Alaska Petroleum Resource Organization 225-7002 (ph) 723-6471 (24 hr ph) 247-1117 (fax) Email: cheryl@seapro.org
Sitka	Bird capture and field stabilization	1 kit (located in Ketchikan until triage container is completed in 2002)	25-50 birds	**Elizabeth Whealy** Alaska Raptor Center 747-8662 (ph) 747-1349 (24 hr ph) 747-8397 (fax) Email: lwhealy@eagle.ptialaska.net

APPENDIX 21, CONT.

LOCATION IN ALASKA	RESPONSE ACTION	AMOUNT OF SUPPLIES	TOTAL ANIMALS TO BE ASSISTED WITH SUPPLIES	SUPPLY OWNER/CONTACT PERSON/24-HOUR CONTACT NUMBER
Ketchikan	Bird Capture and field stabilization Bird capture (migratory birds and raptors)	3 kits 1 kit	75-150 birds 25 birds	**Cheryl Fultz** Southeast Alaska Petroleum Resource Organization 225-7002 (ph) 723-6471 (24 hr ph) 247-1117 (fax) Email: cheryl@seapro.org
Nikiski, Dutch Harbor, Kodiak, Naknek, Bethel, Nome (and Prudhoe Bay in 2003)	Bird hazing	1 kit per each location	Sustained bird hazing at onshore locations	**Robert E. Heavilin** Alaska Chadux Corporation 278-3365 (24 hr ph) 278-3330 (fax) Email: bheavilin@chadux.com [Chadux has a retainer with IBRRC]

APPENDIX 24

OIL SPILL RESPONSE CHECKLIST: WILDLIFE HAZING

Responders who do not have pre-authorization to haze wildlife as part of a spill response must receive authorization from the Federal On-Scene Coordinator (OSC) and appropriate wildlife resource agencies; i.e., Fish and Wildlife Service, National Marine Fisheries Service, and Alaska Department of Fish and Game prior to initiating hazing activities. Responders may apply for authorization to haze wildlife by completing Sections I-V of this form and submitting it to the Federal OSC and appropriate wildlife resource agency representatives.

Responders who do not have pre-authorization to haze wildlife should note that completing the requested information on this checklist does not satisfy wildlife resource agencies permitting requirements. However, the information contained in the completed checklist should provide wildlife resource agencies with the necessary information for determining whether or not it is appropriate to issue requested permits.

Responders who have pre-authorization to conduct wildlife hazing and who choose to initiate a hazing program should (1) follow the terms of their permit, and (2) complete Sections I-V of this checklist and submit it to the Federal OSC and appropriate wildlife resource agency representatives within 24-hours following the initiation of a wildlife hazing program.

I. SPILL DATA	
A.	Name of incident:
B.	Date of incident:
C.	Spill location: ____________________ latitude: _________ longitude: _________
D.	Spill location: land _________; water _________; land and water _________
E.	Distance to nearest water body, if on land: km/mi
F.	Product released: North Slope Crude __________; Diesel #2 __________; Cook Inlet Crude __________; Chevron Residual __________; JP4 __________; Other __________
G.	Estimated volume of product released: ____________ gals/bbls
H.	Release status: Stopped ________; Continuing ________; Unknown ________
I.	Is spill: Contained _________; Spreading _________; Unknown _________
J.	Estimated volume of product potentially released: _________ gals/bbls

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APPENDIX 24, CONT.

II. WILDLIFE DATA	
SPECIES/SPECIES GROUPS	ESTIMATED NUMBERS OF WILDLIFE AND LOCATION RELATIVE TO SPILL RELEASE
e.g., Waterfowl	e.g., 100 eiders 1 mile from leading edge of spill

APPENDIX 24, CONT.

III. PRIMARY RESPONSE ACTIONS
Describe any response actions underway or previously taken: (1) to protect wildlife and/or wildlife habitat, and (2) that may affect proposed hazing activities.

APPENDIX 24, CONT.

IV. SECONDARY RESPONSE ACTIONS: HAZING	
A.	Describe hazing plan for each species or species group identified in Section II, including objectives, procedures, equipment, number of persons, and location(s):
B.	Information on Person in Charge of Hazing Name: Affiliation: Address: Qualifications: Telephone number: Fax number: Permit holder:

APPENDIX 24, CONT.

V. REQUESTOR SIGN-OFF
Signature of requestor:
Printed name of requestor:
Title of requestor:
Requestor affiliation:
Requestor representing:
Time and Date Request Submitted to Federal On-Scene Coordinator:

NOTE: SECTIONS I-V NEED TO BE SUBMITTED TO THE FEDERAL ON-SCENE COORDINATOR AND APPROPRIATE WILDLIFE RESOURCE AGENCY REPRESENTATIVES LISTED IN APPENDIX 26

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APPENDIX 24, CONT.

VI. WILDLIFE RESOURCE AGENCY RESPONSE TO REQUEST

A. Date and time request received by wildlife resource agency representative(s):

Alaska Department of Fish and Game (ADF&G)
Name: ______________________________ Date: ____________ Time: ________ Phone #: __________

Fish and Wildlife Service (FWS)
Name: ______________________________ Date: ____________ Time: ________ Phone #: __________

National Marine Fisheries Service (NMFS)
Name: ______________________________ Date: ____________ Time: ________ Phone #: __________

B. **ADF&G Recommendation/Decision**:

____ Approve requested program(s) as proposed
____ Approve requested program(s) with the following conditions:
____ Deny requested program(s)

Signature: ______________________________ Time: ______

Date:_____

C. **FWS Recommendation/Decision**:

____ Approve requested program(s) as proposed
____ Approve requested program(s) with the following conditions:
____ Deny requested program(s)

Signature: ______________________________ Time: ______

Date:_____

D. **NMFS Recommendation/Decision**:

____ Approve requested program(s) as proposed
____ Approve requested program(s) with the following conditions:
____ Deny requested program(s)

Signature: ______________________________ Time: ______

Date:_____

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APPENDIX 24, CONT.

VII. FEDERAL AND STATE ON-SCENE COORDINATOR RESPONSE TO REQUEST

A. State On-Scene Coordinator's decision regarding wildlife response program:

Request received by State On-Scene Coordinator:

Time: _______________ Date: __________________

____ Concur with wildlife resource agencies

____ Concur with attached conditions

____ Do not concur

Signature: ______________________________ Time: ______

Date:_____

B. Federal On-Scene Coordinator's decision regarding response program:

Request received by Federal On-Scene Coordinator:

Time: _______________ Date: __________________

____ Concur with wildlife resource agencies

____ Concur with attached conditions

____ Do not concur

Signature: ______________________________ Time: ______

Date:_____

APPENDIX 25

OIL SPILL RESPONSE CHECKLIST: WILDLIFE CAPTURE, TRANSPORTATION, STABILIZATION, AND TREATMENT

Responders who do not have pre-authorization to capture, transport, stabilize, or treat wildlife as part of a spill response must receive authorization from the Federal On-Scene Coordinator (OSC) and appropriate wildlife resource agencies; i.e., Fish and Wildlife Service, National Marine Fisheries Service, and Alaska Department of Fish and Game prior to initiating those activities. Responders may apply for authorization to capture, transport, stabilize, and/or treat oiled wildlife by completing Sections I-VIII of this form and submitting it to the Federal OSC and appropriate wildlife resource agency representatives.

Responders who do not have pre-authorization for wildlife capture, transportation, stabilization, or treatment should note that completing the requested information on this checklist does not satisfy wildlife resource agencies permitting requirements. However, the information contained in the completed checklist should provide wildlife resource agencies with the necessary information for determining whether or not it is appropriate to issue requested permits.

Responders who have pre-authorization for wildlife capture, transportation, stabilization, or treatment and who choose to initiate one or more of those activities should (1) follow the terms of their permit, and (2) complete Sections I-VIII of this checklist and submit it to the Federal OSC and appropriate wildlife resource agency representatives within 24-hours following the initiation of those activities.

I. SPILL DATA	
A.	Name of incident:
B.	Date of incident:
C.	Spill location: _______________ latitude: _______________ longitude: ___________
D.	Spill location: land _______; water ________; land and water ___________
E.	Distance to nearest water body, if on land: ______________ km/mi
F.	Product released: North Slope Crude ______; Diesel #2 ______; Cook Inlet Crude _____; Chevron Residual ________; JP4 ________; Other ________
G.	Estimated volume of product released: _______ gals/bbls
H.	Release status: Stopped _________; Continuing ________; Unknown ________
I.	Is spill: Contained _________; Spreading _________; Unknown ___________
J.	Estimated volume of product potentially released: _________ gals/bbls

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APPENDIX 25, CONT.

II. WILDLIFE DATA	
SPECIES/SPECIES GROUPS	ESTIMATED NUMBERS OF WILDLIFE AND LOCATION RELATIVE TO SPILL RELEASE
e.g., Waterfowl	e.g., 100 eiders 1 mile from leading edge of spill

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APPENDIX 25, CONT.

III. PRIMARY RESPONSE ACTIONS
Describe any response actions underway or previously taken: (1) to protect wildlife and/or wildlife habitat, and (2) that may affect proposed capture, transport, stabilization, or wildlife treatment activities.

APPENDIX 25, CONT.

IV. SECONDARY RESPONSE ACTIONS: PRE-EMPTIVE CAPTURE

A. Describe pre-emptive capture plan for each species or species group identified in Section II, including objectives, procedures, equipment, number of persons, and location(s):

B. Information on Person in Charge of Pre-emptive Capture

Name:

Affiliation:

Address:

Qualifications:

Telephone number:

Fax number:

Permit holder:

APPENDIX 25, CONT.

V. TERTIARY RESPONSE ACTIONS: CAPTURE, TRANSPORTATION, STABILIZATION AND TREATMENT
A. Describe capture, transportation, stabilization, and treatment plan for each species or species group identified in Section II, including objectives, procedures, equipment, number of persons, and location(s):

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APPENDIX 25, CONT.

V. TERTIARY RESPONSE ACTIONS: CAPTURE, TRANSPORTATION, STABILIZATION AND TREATMENT, CONT.

B. Information on Stabilization Facility

Address:

Specific location (if not discernible from address):

Telephone number:

Fax number:

C. Information on Treatment Facility

Address:

Specific location (if not discernible from address):

Telephone number:

Fax number:

D. Information on Person in Charge

Name:

Affiliation:

Address:

Qualifications:

Telephone number:

Fax number:

Permit holder(s):

APPENDIX 25, CONT.

VI. REQUESTOR SIGN-OFF
Signature of requestor:
Printed name of requestor:
Title of requestor:
Requestor affiliation:
Requestor representing:
Time and Date Request Submitted to Federal On-Scene Coordinator:

NOTE: SECTIONS I-VI NEED TO BE SUBMITTED TO THE FEDERAL ON-SCENE COORDINATOR AND APPROPRIATE WILDLIFE RESOURCE AGENCY REPRESENTATIVES LISTED IN APPENDIX 26

APPENDIX 25, CONT.

VII. WILDLIFE RESOURCE AGENCY RESPONSE TO REQUEST

A. Date and time request received by wildlife resource agency representative(s):

Alaska Department of Fish and Game (ADF&G)
Name: ____________________
Date: __________ Time: ________ Phone #: __________

Fish and Wildlife Service (FWS)
Name: ____________________
Date: __________ Time: ________ Phone #: __________

National Marine Fisheries Service (NMFS)
Name: ____________________
Date: __________ Time: ________ Phone #: __________

B. **ADF&G Recommendation/Decision**:

____ Approve requested program(s) as proposed
____ Approve requested program(s) with the following conditions:
____ Deny requested program(s)

Signature: ____________________ Time: ______
Date:_____

C. **FWS Recommendation/Decision**:

____ Approve requested program(s) as proposed
____ Approve requested program(s) with the following conditions:
____ Deny requested program(s)

Signature: ____________________ Time: ______
Date:_____

D. **NMFS Recommendation/Decision**:

____ Approve requested program(s) as proposed
____ Approve requested program(s) with the following conditions:
____ Deny requested program(s)

Signature: ____________________ Time: ______
Date:_____

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APPENDIX 25, CONT.

VIII. FEDERAL AND STATE ON-SCENE COORDINATOR RESPONSE TO REQUEST

A. State On-Scene Coordinator's decision regarding wildlife response program:

Request received by State On-Scene Coordinator:

Time: ______________ Date: _________________

____ Concur with wildlife resource agencies

____ Concur with attached conditions

____ Do not concur

Signature: ______________________________ Time: _____

Date:_____

B. Federal On-Scene Coordinator's decision regarding response program:

Request received by Federal On-Scene Coordinator:

Time: ______________ Date: _________________

____ Concur with wildlife resource agencies

____ Concur with attached conditions

____ Do not concur

Signature: ______________________________ Time: _____

Date:_____

Attachment I-3
Polar Bear Interaction Measures

This Attachment to the WRP provides applicable information and measures specific to polar bear interactions. The information is based on Shell's *Polar Bear, Pacific Walrus, and Grizzly Bear Avoidance and Human Encounter/Interaction Plan* available in the Revised Outer Continental Shelf Lease Exploration Plans.

The following three forms are located at the end of this Attachment: Notification Flow Chart, Polar Bear Sighting Report, and Grizzly Bear Observation Form.

General Objectives

The barrier islands and the adjacent coastline are considered important habitat for polar bears. Response activities occurring along the barrier islands in the Beaufort Sea will necessitate a plan that includes the potential for interactions with polar bears and provides measures to mitigate the risks associated with bear encounters. No single critical period has been established for polar bears; however, bears are most sensitive during denning which begins in late November with family groups emerging during late March and early April.

An avoidance and interaction plan particular to interacting with polar bears has been established by Shell. This plan provides the following objectives:

- preventing the association of humans and facilities with food;
- preventing human-bear interactions;
- protecting workers and bears;
- reporting protocol;
- safety and communication;
- risk assessment;
- take actions; and
- plan of cooperation.

Polar Bear Response Strategies

Primary Response

The primary response strategy of preventing the oiling of polar bears should be emphasized; however, disturbing a den during operations could result in the death of a cub and sow. Areas with dens should be avoided by personnel.

Secondary Response

With the approval of the USFWS and FOSC, effective secondary methods include propane cannons and other firearms, and herding polar bears with vehicles, boats, and aircraft. As animals may habituate to the noise of the cannon or firearm, the auditory method may be limited to a short-term deterrence method.

Tertiary Response

Tertiary responses including the capturing and handling of polar bears should give priority to pregnant females and sows with cubs, and should consider the added handling stress and potential for spreading disease. Severely oiled animals should be euthanized and the carcasses disposed of in an approved manner that prevents the impacts to scavengers. Any handling and treatment of individual polar bears must receive authorization from the USFWS prior to the action. Agency contacts are provided in Attachment I-1 of this WRP – Wildlife Response Contacts List.

Polar Bear Avoidance and Encounter Procedures

During response operations, the safety of personnel is the first priority. In preventing human-bear interactions, early detection of bears can avert conflict situations. To ensure the safety of response operation personnel, specific polar bear avoidance and encounter procedures include:

- Survey the response operations area to ensure that bears will not have the opportunity to enter the area without being detected. Personnel should become familiar with the local environment.
- Avoid maternal denning locations during winter work and travel. In the past, dens have been identified in the project area based on the USFWS radio collar-tracking program, suitable habitat exists and caution must be practiced. The purpose is to avoid any disturbance that may cause a sow to abandon her den and expose her cubs to possible harm.
- Assign a designated “bear watch” to ensure continuous monitoring of polar bear activity.
- Check behind doors prior to exiting facilities and be cautious when passing structures that may hide bears.
- Conduct periodic safety sessions to address and elevate awareness of bear avoidance techniques and activities. When applicable, maintain illumination during hours of darkness if workers are present. Be especially alert in dark conditions and areas of poor visibility.
- Alert personnel in the area to alter or stop work activities to avoid interactions. Personnel will be contacted by the designated representative (bear watch) whenever a bear is sighted. Depending on the distance between the bear and the activities, this may mean retreating to the safety of vehicles, emergency shelter, temporary buildings, or other appropriate places of refuge.
- If work assignment requires you to be outside of areas that are secure from bears (e.g., buildings, heavy equipment cabs.) check directly with your supervisor for the latest report from the designated representative bear watcher to find out whether bears or bear sign were reported. Potential at-risk situations include walking between enclosed structures at drill pads, outside vehicles and at various work locations.
- Arrange with your crew foreman to maintain radio or visual contact with the designated bear watch person so that you can be alerted immediately to select a secure place if a bear is sighted. Plan the best route in advance to reach safe locations from your work area.

- Do not approach or crowd bears. Give bears plenty of room. Every bear has a “personal space” – the distance in which they feel threatened. The more distance between personnel and the bear, the better for conflict avoidance.
- Personnel should use the buddy system during response operations. In areas of poor visibility, loud noise should be made prior to walking into the area.
- Never feed bears or any other wildlife. Separate trash to ensure that no food-associated waste is placed in an inappropriate container. Do not take food with you. Consume food and beverages in enclosed areas when possible, and place food-associated waste in dedicated bear-proof trash containers. Do not leave food in unoccupied areas or other unsecured areas.
- Contact the appropriate individual when bear hazing activities are necessary. Individuals should not attempt hazing activities without the appropriate authority.
- Report all bear sightings (including sign, tracks) immediately to the designated Shell representative when you are in a secure location. Do not expose yourself to look at the bear. Do not try to photograph a bear unless you are in a secure location. Early bear detection is essential to limit human/bear encounters.
- Use the Notification Flow Chart, USFWS Polar Bear Sighting Report form, and Oilfield Grizzly Observation Form at the end of this Attachment to report bear sightings.

At-Risk Locations

At-risk locations that may increase the risk of either encountering or attracting a polar bear include:

- access roads;
- coastal bluffs;
- food consumption areas;
- blind areas that are obscured by facilities, equipment, or other obstacles; and
- exits from facilities or structures.

At-Risk Situations and Activities

At-risk situations and activities that may increase the risk of either encountering or attracting a polar bear include:

- response operations;
- field support;
- dark/unlit and visually obscured area; and
- activities associated with odor.

Take Actions

Early detection and personnel awareness will reduce chance encounters with a polar bear. If a bear remains on site for an extended period of time, consult the USFWS contact (Craig Perham) or ADF&G contact (Dick Shideler) for advice. Firearms with rubber bullets, cracker shells and other noisemakers will be available to provide deliberate and intentional harassment of bears to ensure worker safety. Prior to any hazing activity, ensure that the appropriate agency authorization has been obtained.

Despite preventive actions, if a “take” occurs to protect a human life the following information must be recorded and actions taken. A designated and trained bear watch is responsible for completing the following measures:

1. Record all details of the event including time, exact location, behavior of bear, preventive measures followed, and other details provided on the report form;

2. Record all witness statements; and

3. Immediately notify Craig Perham with USFWS at (907) 786-3810 [Alternate office number (907) 786-3800]. If there is a lethal “take”, transport the entire animal carcass to Deadhorse for sealing and processing under the direction of a responsible USFWS agent designee. USFWS will determine disposition of useable meat (e.g., donation to a Native village).

SHELL

BEAR AVOIDANCE AND INTERACTION PLAN

NOTIFICATION FLOW CHART

BEAR SIGHTED

Report to a Designated Bear Watch

Complete Bear Sighting Report

GRIZZLY BEAR PERSISTENT & LETHAL TAKE

Primary Contact
Dick Shideler
907-459-7283
ADF&G

or

Alternate Contact
Bob Stephenson
907-459-7236
ADF&G

Transport Carcass to Deadhorse as Directed by ADF&G

POLAR BEAR PERSISTENT AND REPEATED VISITS PREVENTION ON ICE ACTIVITIES

Contact
Craig Perham
USFWS
Work: 907-786-3810
Home: 907-622-3214

or

Scott Schliebe
USFWS
Work: 907-786-3812
Alternate: 907-786-3800

for
Advice on Appropriate Deterrent
and/or
Actions

Record Recommendation and Action on Sighting Report Including if Deterrent was Successful

Notify

Shell
of Actions Taken
Work: 907-770-3700

LETHAL TAKE OF POLAR BEAR

Contact
Craig Perham
USFWS
Work: 907-786-3810
Home: 907-622-3214

or

Scott Schliebe
USFWS
Work: 907-786-3812
Alternate: 907-786-3800

Immediately Notify

Shell

Record All Details

Record Witness Statement

Protect Entire Carcass from Disturbance by Workers or Scavengers

Transport Carcass to Deadhorse as Directed by USFWS

United States Department of the Interior

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

POLAR BEAR SIGHTING REPORT

Date:__________ Observer name:________________________________
Time:__________ Contact number/email:___________________________

Location: ____
____
Latitude:____________________ Longitude______________ Datum:_________

Weather conditions: Fog_____ Snow_____ Rain_____ Clear_____ Temperature______F/C

Wind speed______mph/kts Wind direction__________ Visibility: Poor
Fair
Good
Excellent

Number of bears:

_____ Adult M/F
_____ Sub-adult
_____ Unknown
________ Sow/cub(s)
________ Sow/yearling(s)
________ Sow/2YO(s)

Estimated distance of bear(s) from personnel_____ (meters) and facility:___ (meters)

Possible attractants present:____

Bear behavior: Curious_____ Aggressive_____ Predatory_____ Passing through ____ Other____

Description of encounter:____
____
____
____

Duration of encounter:____

Deterrents used/distance:

____Vehicle
____Crackershell
____Rubber bullet
____Bean bag
____Horn/siren
____Spotlight/Headlight
____Other

Agency Contacts

USFWS Craig Perham Time_______ Date _______
Phone (907) 786-3810
Fax (907) 786-3816

ADF&G Dick Shideler Time_______ Date _______
Phone (907) 459-7283
Fax (907) 456-3091

Bear ID #: _____ (ADF&G Only)

OILFIELD GRIZZLY OBSERVATION FORM

OBSERVER: ______________________ COMPANY/AGENCY: ______________________

OBSERVATION DATE ______________________ TIME: Start ____________ Stop ____________

OBSERVATION FROM: ☐ Vehicle ☐ Ground ☐ Building ☐ Other: ______________________

Observer's distance from bear: ____________ Meters

GENERAL LOCATION: ☐ Deadhorse ☐ PB East ☐ PB West ☐ Kuparuk ☐ Endicott ☐ Milne Point

☐ Lisburne ☐ Point McIntyre ☐ TAPS (MP #): ______________________

Other (latitude/longitude if known): ______________________

SPECIFIC LOCATION (Example: 500 meters North of Spine Road at Put R):

__________ meters __________ (direction) of ______________________ (facility name)

Dumpster present: ☐ Yes ☐ No ☐ Unknown

WEATHER: ______ ºF Direction of wind: ______________ at ______________ mph

☐ Clear/Partly Cloudy ☐ Rain ☐ Fog ☐ Snow

BEAR IDENTIFICATION: Earflag Color (Note: "Right" and "left" of bear, not observer.)

Right __________ Left __________ Natural markings (scars, torn ears, etc.): ______________

____

OTHER BEARS PRESENT: ☐ None ☐ Cubs # of cubs _____ # of yearlings _____ # of other _____

BEAR ACTIVITY: When first seen, the bear was: ☐ Resting ☐ Feeding (natural food) ☐ Feeding (garbage)

☐ Feeding/Traveling ☐ Traveling ☐ Other: ______________________

BEAR'S REACTION TO OBSERVER: ☐ Ignore ☐ Approach ☐ Avoid

Were other people in the area (i.e., not with observer)? ☐ Yes ☐ No ☐ Unknown

Bear's reaction to other people: ☐ Ignore ☐ Approach ☐ Avoid

COMMENTS: ____

DETERENCE ACTION TAKEN? ☐ Yes ☐ No

If yes, did you use ☐ Horn ☐ Siren ☐ Plastic Slugs ☐ Cracker Shell ☐ Firecracker

☐ Birdshot ☐ Other (describe): ______________________

____

Bears reaction: ☐ Ignore ☐ Approach ☐ Withdraw

ADDITIONAL REMARKS: ____

Please return to:

Dick Shideler, Alaska Department of Fish and Game, 1300 College Road, Fairbanks, Alaska 99701, Oilfield Security or Environment

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APPENDIX J

FORMS

TABLE OF CONTENTS

The ICS forms above constitute the initial IAP. As the incident progresses into a project phase, additional ICS forms will be used as appropriate.

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APPENDIX J FORMS

WEATHER REPORT

Purpose: The Weather Report form provides the IC (the Command and General Staffs assuming command of the incident) with basic information regarding current incident specific weather conditions, forecast for the next 24 and 48 hr period. Personnel or responders at the incident location should provide real time current weather data. It also serves as a permanent record of the initial response to the incident.

Preparation: The Planning Section prepares the briefing from data gathered from NOAA's National Weather Service and other sources. The information will be provided to the Situation Unit Leader so he may maintain the information on his static display.

Distribution: After the initial briefing of the IC and General Staff members, the Incident Briefing is duplicated and distributed to the Command Staff, Section Chiefs, Branch Directors, Division/Group Supervisors, and appropriate Planning and Logistics Section Unit Leaders.

ITEM	ITEM TITLE	INSTRUCTIONS
1.	Incident Name	Enter the name assigned to the incident.
2.	Date/Time Prepared	Enter date & time prepared (e.g. 09/17/1996 1500 hrs.).
3.	Operational Period	Enter the date and time interval for which the form applies (e.g. 0600 09/17/2000 to 0600 09/18/2000).
4.	Prepared By	Enter the name of the person completing the form.
5.	Wind Speed	Enter wind speed. (Indicate either knots or mph)
6.	Wind Direction	Enter the direction from which the wind is blowing.
7.	Air Temperature	Enter on the air temperature in °F.
8.	Barometric Pressure	Enter current barometric pressure in inches.
9.	Humidity	Enter current humidity in percent.
10.	Visibility	Enter visibility in miles. (Use data from surveillance aircraft)
11.	Ceiling	Enter ceiling in feet. (Use data from surveillance aircraft)
12.	High Tide (time)	Enter time for next high tide for current operational period (24 hr).
13.	High Tide (height)	Enter height of next high tide for current operational period (feet).
14.	Sunrise	Enter time of sunrise for current operational period.
15.	Wave Height (feet)	Enter the wave height in feet (e.g., 1-3 feet).
16.	Wave Direction	Enter the direction, which the waves are moving.
17.	Swell Height	Enter the swell height. (feet)
18.	Swell Interval	Enter the swell interval (seconds)
19.	Current Speed	Enter the speed of water current (Indicate either kts or mph).
20.	Current Direction	Enter the direction which the water current is moving
21.	Water Temperature	Enter the water temperature in °F
22.	Low Tide (time)	Enter time for next low tide for current operational period (24 hr).
23.	Low Tide (height)	Enter height of next low tide for current operational period (feet).
24.	Sunset	Enter time of sunset for current operational period.
25.	Notes	Enter notes (e.g. thunderstorm activity, wind shift, front movement) about weather data current operational period.

Weather Report

Incident:	Prepared:
Period: ____/___/__ ___:___ to ____/___/__ ___:___	Version Name:

Present Conditions

Wind Speed:		Wave Height:	
Wind Direction From The:		Wave Direction:	
Air Temperature:		Swell Height:	
Barometric Pressure:		Swell Interval:	
Humidity:		Current Speed:	
Visibility:		Current Direction Toward:	
Ceiling:		Water Temperature:	
Next High Tide (Time):		Next Low Tide (Time):	
Next High Tide (Height):		Next Low Tide (Height):	
Sunrise:		Sunset:	

Notes:

24-Hour Forecast

Sunrise:		Sunset:	
High Tide (Time):		High Tide (Time):	
High Tide (Height):		High Tide (Height):	
Low Tide (Time):		Low Tide (Time):	
Low Tide (Height):		Low Tide (Height):	

Notes:

48-Hour Forecast

Sunrise:		Sunset:	
High Tide (Time):		High Tide (Time):	
High Tide (Height):		High Tide (Height):	
Low Tide (Time):		Low Tide (Time):	
Low Tide (Height):		Low Tide (Height):	

Notes:

NOTIFICATION REPORT

Purpose: The Notification Report is used to document each Government and NGO notified and briefed on the incident.

Preparation: The company representative or the Liaison Officer in the Command Staff prepares the Notification Report.

Distribution: The Notification Report is a critical part of the incident briefing and the IAP. When updated, the Situation Unit Leader will post/update the Situation Display in the Command Post.

ITEM	ITEM TITLE	INSTRUCTIONS
1.	Incident	Enter the name assigned to the incident.
2.	Version Name	
3.	Period	Enter the Operational Period date and time.
4.	Prepared By	Enter name and title of the person preparing the form and date/time (Military Time).
5.	Organization Notified	Enter the name of the Organization notified.
6.	Phone Number	Enter the phone number of the Organization notified.
7.	Date/Time	Enter the date and time the notification is made.
8.	Person Contacted	Enter the name of the person notified.
9.	Person Contacted Email	Enter the email address of the person notified.
10.	Case Number	Enter the Case Number where applicable (e.g. NRC Case Number).
11.	Follow Up	Circle Yes or No if follow up is required.
12.	ETA On Site	Enter the estimated time of arrival of the organization if applicable.
13.	Notified By	Enter the name of the person making the notification.

Notification Status Report

Incident:	**Prepared by:** **at:**
Period: ____/___/__ ___:___ to ____/___/__ ___:___	**Version Name:**

Organization Notified	Phone	Date /Time Notified	Person Contacted	Person Contacted Email	Case No.	Follow Up	ETA On Site	Notified By
Notes:								
Notes:								
Notes:								
Notes:								
Notes:								
Notes:								

INCIDENT BRIEFING (ICS FORM 201)

Purpose: The Incident Briefing form provides the IC, the Command Staff and General Staff assuming command of the incident with basic information regarding the incident situation and the resources allocated to the incident. It also serves as a permanent record of the initial response to the incident.

Preparation: The Initial IC prepares the briefing form for presentation to the relieving IC along with a more detailed oral briefing.

Distribution: After the initial briefing of the IC and General Staff members, the Incident Briefing is duplicated and distributed to the Command Staff, Section Chiefs, Branch Directors, Division/Group Supervisors, and appropriate Planning and Logistics Section Unit Leaders. The sketch map and summary of current action portions of the briefing form are given to the Situation Unit while the Current Organization and Resources Summary portion are given to the Resources Unit.

ITEM	ITEM TITLE	INSTRUCTIONS
1.	Incident	Enter the name assigned to the incident.
2.	Prepared By	Enter name of person completing form and the date & time prepared (e.g. 09/17/1996 1500 hrs.).
3.	Period	Enter the date and time interval of the operational period for which the form applies (e.g. 0600 09/17/2000 to 0600 09/18/2000).
4.	Version Name	
5.	ICS 201-1 Map Sketch	Show the Areas of Operations, the incident site, overflight results, trajectories, impacted shorelines, or other graphics depicting situation and response status on a sketch or attached map.
6.	ICS 201-2 Summary of Current Actions	Brief paragraph on: 1. What, when, and how the incident occurred 2. Surveillance & weather information 3. Overall initial response objectives 4. Timeline of major events or actions that have taken place.
7.	ICS 201-3 Current Organization	Enter on the organization chart the names of the individuals assigned to each position. Modify the chart as necessary.
8.	ICS 201-4 Resources Summary	Track the following information about the resources allocated to the incident. Name of supplier providing the resource 2. Resource Type (e.g. fire truck, boom, skimmer) 3. Description (e.g. size, name, capacity) 4. Quantity or amount of resource(s) 5. Area of Operation – destination of the resource (e.g. staging area, division, group, task force) 6. Status of each resource (e.g. Standby, En-route with Estimated time of arrival, At Staging, Assigned, & Out of Service).

ICS 201-1 – Incident Briefing Map/Sketch	
Incident:	**Prepared by:** **at:**
Period: ____/___/__ ___:___ to ____/___/__ ___:___	**Version Name:**

ICS 201-2 – Summary of Current Actions

Incident:	**Prepared by:** **at:**
Period: ____/___/__ ___:___ to ____/___/__ ___:___	**Version Name:**

Incident Information

Initial Incident Objectives

Summary of Current Actions

Date/Time	Action/Note

ICS 201-3 –Current Organization

Incident:	**Prepared by:** **at:**
Period: ____/___/__ ___:___ to ____/___/__ ___:___	**Version Name:**

Unified Command

Federal ______________________
State ______________________
Incident Commander ______________________
__________ ______________________
__________ ______________________
__________ ______________________
Safety Officer ______________________
Liaison Officer ______________________
Information Officer ______________________

OPS Section Chief

Branch/Div./Grp/TF

Branch/Div./Grp/TF

Branch/Div./Grp/TF

Branch/Div./Grp/TF

Branch/Div./Grp/TF

Planning Section Chief

Situation Unit Leader

Resource Unit Leader

Documentation Unit

Environmental Unit

Logistics Section Chief

Finance Section Chief

ICS 201-4 – Resource Summary								
Incident:			**Period:** ____/___/__ ___:___ to ____/___/__ ___:___					
			Prepared by:			**at:**		
ID	**Supplier**	**Resource Type**	**Description**	**Quantity**	**Size**	**Area of Operation**	**Status**	**Status Date/Time**

RESPONSE OBJECTIVES FORM (ICS FORM 202)

Purpose: The Response Objectives Form describes the basic incident strategy, control objectives, and safety considerations for use during the next operational period.

Preparation: The Response Objectives Form is completed by the Planning Section Chief following each formal Planning Meeting conducted in preparation for the IAP.

Distribution: The Response Objectives Form will be reproduced with the IAP and given to all supervisory personnel at the Section, Branch, Division/Group and Unit leader levels. NOTE: ICS 202, Response Objectives, serves as part of the IAP, which is not considered complete until attachments are included.

ITEM	ITEM TITLE	INSTRUCTIONS
1.	Incident	Enter the name assigned to the incident.
2.	Version Name	
3.	Period	Enter the date and time interval of the operational period for which the form applies (e.g. 0600 09/17/2000 to 0600 09/18/2000).
4.	Prepared By	Enter the name of the Planning Section Chief or person completing the form and the date & time prepared (e.g. 09/17/1996 1500 hrs).
5.	Overall Incident Objective(s)	What you plan to do in priority order. Enter short, clear and concise statements of the objectives for managing the response. The overall incident objectives usually apply for the duration of the incident. (e.g. Contain and Recover Spilled Material).
6.	Tactical Objectives for specific Operational Period	How you plan to accomplish objectives. Enter short, clear and concise statements of the objectives for the incident response for this operational period. Include alternatives. (e.g. Deploy containment boom at appropriate collection areas).
7.	Safety Messages for the specified Operational Period	Enter information such as known safety hazards and specific precautions to be observed during this operational period. If available, a safety message should be referenced and attached.

ICS 202 – General Response Objectives		
Incident:	**Prepared by:** **at:**	
Period: ____/___/__ ___:___ to ____/___/__ ___:___	**Version Name:**	

Overall and Tactical Objectives		
	Assigned to:	**Status**
1. Ensure the Safety of Citizens and Response Personnel		
☐ 1a. Identify hazard(s) of spilled material		
☐ 1b. Establish site control (hot zone, warm zone, cold zone, & security)		
☐ 1c. Consider evacuations if needed		
☐ 1d. Establish vessel and/or aircraft restrictions		
☐ 1e. Monitor air in impacted areas		
☐ 1f. Develop site safety plan for personnel & ensure safety briefings are conducted		
2. Control the Soruce of the Spill		
☐ 2a. Complete emergency shutdown		
☐ 2b. Conduct firefighting		
☐ 2c. Initiate temporary repairs		
☐ 2d. Transfer and/or lighter product		
☐ 2e. Conduct salvage operations, as necessary		
3. Manage a Coordinated Response Effort		
☐ 3a. Complete or confirm notifications		
☐ 3b. Establish a unified command organization and facilities (command post, etc.)		
☐ 3c. Ensure local and tribal officials are included in response organizations		
☐ 3d. Initiate spill response IAP		
☐ 3e. Ensure mobilization & tracking of resources & account for personnel & equipment		
☐ 3f. Complete documentation		
4. Maximize Protection of Environmentally-Sensitive Areas		
☐ 4a. Implement pre-designated response strategies		
☐ 4b. Identify resources at risk in spill vicinity		
☐ 4c. Track oil movement and develop spill trajectories		
☐ 4d. Conduct visual assessments (e.g., overflights)		
☐ 4e. Development/implement appropriate protection tactics		

SITE SAFETY AND HEALTH PLAN (ICS FORM 208)

Purpose: The SSHP is a site-specific document required by state and federal OSHA regulations and specified in the Area Contingency Plan. The SSHP, at minimum addresses, includes, or contains the following elements: health and safety hazard analysis for each site task or operation, comprehensive operations work plan, personnel training requirements, PPE selection criteria, site-specific medical monitoring requirements, air monitoring plan, site control measures, confined space entry procedures (if needed), pre-entry briefings (tailgate meetings), pre-operations commencement health and safety briefings for all incident participants, and quality assurance of SSHP effectiveness,

Preparation: The Safety Officer prepares the SSHP with input from the Industrial Hygienist and Medical Unit Leader.

Distribution: The SSHP is distributed to the Operations Section Chief for implementation and promulgation to all operational groups and responding agencies. A copy is provided to the IC, the Command Staff, and the General Staff.

ICS 208 – Site Safety Plan

Incident:	**Prepared by:** **at:**
Period: ____/___/__ ___:___ to ____/___/__ ___:___	**Version Name:**
Revision:	
Applies To Site:	
Products:	**(Attach MSDS)**

SITE CHARACTERIZATION

Water: ______________
Wave Height: ______________ Wave Direction: ______________
Current Speed: ______________ Current Direction: ______________
Land: ______________ Use: ______________
Weather: ______________ Temp: ______________
Wind Speed: ______________ Wind Direction: ______________

Pathways for Dispersion:

Site Hazards

☐ Boat Safety	☐ Fire, explosion, in-situ burning	☐ Pump hose
☐ Chemical hazards	☐ Heat stress	☐ Slips, trips, and falls
☐ Cold Stress	☐ Helicopter operations	☐ Steam and hot water
☐ Confined Spaces	☐ Lifting	☐ Trenching/Excavation
☐ Drum handling	☐ Motor vehicles	☐ UV Radiation
☐ Equipment operations	☐ Noise	☐ Visibility
☐ Electrical operations	☐ Overhead/buried utilities	☐ Weather
☐ Fatigue	☐ Plants/wildlife	☐ Work near water
☐ Other	☐ Other	☐ Other
______________	______________	______________

Air Monitoring

%O_2: ______________ **% LEL:** ______________ **ppm Benzene:**______________
ppm H_2S: ______________ **Other (Specify):**______________

CONTROL MEASURES

Engineering Controls

☐ Source of release secured	☐ Valve(s) closed	☐ Energy source locked/tagged out
☐ Site secured	☐ Facility shut down	☐ Other ______________

Personal Protective Equipment

☐ Impervious suit		☐ Respirators
☐ Inner gloves		☐ Eye protection
☐ Outer gloves		☐ Personal floatation
☐ Flame resistance clothing	☐ Boots	
☐ Hard hats	☐ Other ______________	

Additional Control Measures

☐ Decontamination	☐ Stations established
☐ Sanitation	☐ Facilities provided – OSHA 29 CFR 1910.120n
☐ Illumination	☐ Facilities provided – OSHA 29 CFR 1910.120m
☐ Medical Surveillance	☐ Provided – OSHA 29 CFR 1910.120fq

ICS 208 – Site Safety Plan

Incident:	**Prepared by:** **at:**
Period: ____/___/__ ___:___ to ____/___/__ ___:___	**Version Name:**

WORK PLAN

☐ Booming ☐ Skimming ☐ Vac trucks ☐ Pumping ☐ Excavation
☐ Heavy equipment ☐ Sorbent pads ☐ Patching ☐ Hot work ☐ Appropriate permits used
☐ Other

TRAINING

☐ Verified site workers trained per OSHA 29 CFR 1920.120

ORGANIZATION

Title	Name	Telephone/Radio
Incident Commander:		
Deputy Incident Commander:		
Safety Officer:		
Public Affairs Officer:		
Other:		

EMERGENCY PLAN

☐ Alarm system: ______________________
☐ Evacuation plan: ______________________
☐ First aid location ______________________

Notified

☐ Hospital		Phone:	
☐ Ambulance		Phone:	
☐ Air ambulance		Phone:	
☐ Fire		Phone:	
☐ Law enforcement		Phone:	
☐ Emergency response/rescue		Phone:	

PRE-ENTRY BRIEFING

☐ Initial briefing prepared for each site

INCLUDING ATTACHMENTS/APPENDICES

Attachments

☐ Site Map
☐ Hazardous Substance Information Sheets
☐ Site Hazards
☐ Monitoring Program
☐ Training Program
☐ Confined Space Entry Procedure
☐ Safe Work Practices for Boats
☐ PPE Description
☐ Decontamination
☐ Communication and Organization
☐ Site Emergency Response Plan

Appendices

☐ Site Safety Program Evaluation Checklist
☐ Confined Space Entry Checklist
☐ Heat Stress Consideration
☐ Cold Stress and Hypothermia Consideration
☐ First Aid for Bites, Stings, and Poisonous Plant Contact
☐ Safe Work Practice for Oily Bird Rehabilitation
☐ SIPI Site Pre-Entry Briefing
☐ Personnel Tracking System

INDIVIDUAL LOG (ICS FORM 214A)

ICS 214a – Individual Log	
Incident:	**Prepared by:** **at:**
Period: ____/___/__ ___:___ to ____/___/__ ___:___	**Version Name:**
Activity Log	
Date/Time	**Events/Notes**

NOTES

APPENDIX K

OIL AND DEBRIS DISPOSAL PROCEDURES

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FIGURES

TABLES

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APPENDIX K OIL AND DEBRIS DISPOSAL PROCEDURES

K.1 INTRODUCTION

Shell's waste management procedures for oil and debris that would be generated during an oil spill response are described in this Appendix.

At the time of the spill response, the Operations Section Chief and EU Leader will jointly determine the reuse, recycling, or disposal method(s) 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. This includes review, approval, and signature by the Unified Command, prior to implementation.

Temporary storage of oil, oily waste, and debris recovered during a spill response may be provided by tanks located on the OSR vessel, VOSS and (or) OSR barge. 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.

Recovered fluids stored onboard the OST (TF-4) will be disposed of either at Shell Group refineries or other third-party processors, in accordance with Shell environmental policy, and relevant local laws and regulations.

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

Disposal and processing of recovered fluids transported to Prudhoe Bay will be in accordance with ACS Tactics D1 through D5. In the event these fluids are taken to Prudhoe Bay, recovered fluids would be handled in accordance with Ballot Agreements.

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. Waste generated from an oil spill response will be collected and staged at the Prudhoe Bay West Dock facility, and will then be transported to an EPA-approved processing facility where Shell has active Ballot Agreements in place. All waste will be handled in accordance with the requirements of the EPA, ADEC, and AOGCC regulations and policy guidelines. 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 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 normally 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 IAP) is provided in Figure K-1. If an oil spill occurs during Shell's Beaufort Sea exploration operations, wastes may be generated offshore, near shore, and onshore.

K.2 WASTE CATEGORIES

Oil spill response operations may generate several types of wastes including those listed below. Waste categories are also described in Figure K-1, Shell Waste Management Plan Template.

- **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.

K.3 COLLECTION AND SEGREGATION OF RECOVERED OIL

- Oil and emulsion generated from offshore oil recovery will be transferred from skimmer vessels with storage tanks to the OST for storage and ultimate disposal.

- Oil and emulsion from nearshore oil recovery will be collected with shallow draft vessels and/or mini-barges. Mini-barge(s) 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 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.

K.4 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.

Table K-1 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.

K.5 TEMPORARY STORAGE OF RECOVERED OIL AND WASTE

Table K-2 depicts the temporary storage methods for recovered oil/water/debris for onshore or offshore operations.

- 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 IMT Liaison Officer prior to decanting.

- Recovered fluids stored onboard the OST will be disposed of at a Shell Group refinery or a third-party 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 areas 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-gal drums, bladders, or empty fuel storage tanks. Such tanks permit decanting of water from the oil. Pits should be lined with plastic sheeting to prevent oil leakage and subsequent soil penetration.

- Contaminated gravel from cleanup operations would be temporarily stored on site and later transported by vessel or aircraft to off site designated waste treatment or disposal facility(ies).

K.6 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 EPA, ADEC, and AOGCC 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 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 and 263, the DOT Hazardous Materials Regulations in 49 CFR 171 through 178, and applicable ADEC regulations. Shell will ensure shipments of waste collected during spill response operations are transported in appropriate containers to eliminate secondary releases during transport. If the nature of the waste precludes packaging in the required container, the IC 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.

K.7 DISPOSAL TRANSPORTATION AND DESIGNATED SITES

- Transportation of oil and oily waste at sea may be accomplished via barge, OSV, 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. A list of these authorized sites is maintained by Shell HSE. Liquid waste generated as a result of the spill response may be disposed of at a Shell Group refinery. Liquid wastes, not disposed of at Shell facilities, and solid wastes will be disposed of at site(s) and by the same transportation method(s) as specified in Table 13.d-1 of the revised Beaufort Sea EP, which includes both Shell- and EPA-approved disposal sites(s). Shell will only send recovered waste to disposal facilities that have been audited by Shell and are in Shell's approved list. Because Shell continually checks these facilities, the list is updated regularly and is available to the IMT members.

Table K.7-1 (from Beaufort Sea EP) Onshore Waste Disposal Facilities, Waste Type, Amount, Rate, and Disposal Method

Name/Location of Disposal Facilities	Disposal Method
Waste Management Inc. Columbia Ridge Recycling & Landfill, Arlington, OR - or	Land-farmed and/or incinerated
Dutch Harbor Municipal Landfill Dutch Harbor, AK	
Waste Management Inc. Columbia Ridge Recycling & Landfill, Arlington, OR - or	Hazardous waste disposal in Class 1 injection well or approved treatment/ disposal site
Emerald Alaska, Anchorage - to Emerald Services, Seattle, WA or Clean Harbor Environmental Services, Aragonite, UT	
Waste Management Inc. Columbia Ridge Recycling & Landfill, Arlington, OR - or	Land-farmed and/or incinerated
Emerald Alaska, Anchorage - to Emerald Services, Seattle, WA or Clean Harbor Environmental Services, Aragonite, UT	

Figure K-1
Shell Waste Management Plan Template

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 K-1 (Continued)
Shell Waste Management Plan Template

D. TYPE OF WASTE GENERATED FROM RESPONSE OPERATIONS

Wastes generated during oil spill response operations may be categorized as indicated in Table K-1. Table K-1 should be used to categorize wastestreams to determine handling, storage and ultimately disposal methods and locations. 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.	

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 DOT requirements before shipment. All hazardous waste must be transported immediately to the nearest shore base for continued storage.

Figure K-1 (Continued)
Shell Waste Management Plan Template

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, TELEPHONE NUMBER	CONTACT (COMPLETE WHEN CALLED)	TYPE WASTE APPROVED FOR

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 DOT 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,TELEPHONE NUMBER	CONTACT (COMPLETE WHEN CALLED)	TYPE WASTE APPROVED FOR

Figure K-1 (Continued)
Shell Waste Management Plan Template

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 K-1 (Continued)
Shell Waste Management Plan Template

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 = ____________

Unified Command Review and Approval ______________________________

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.

Table K-1
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

Table K-2
Temporary Storage Methods

CONTAINER	ONSHORE	OFFSHORE	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 – 21,000 gal
Frac Tanks	✓	✓	✓	✓	Portable, can be deployed anywhere.

APPENDIX L

BIBLIOGRAPHY

APPENDIX L BIBLIOGRAPHY

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APPENDIX M

U.S. COAST GUARD SUPPLEMENT

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TABLES

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APPENDIX M USCG SUPPLEMENT

M.1 CROSS REFERENCE TO USCG AND DEPARTMENT OF HOMELAND SECURITY [33 CFR 154]

Table M.1-1
Cross Reference to USCG and Department of Homeland Security Response Plans for Oil Facilities Transferring Oil or Hazardous Material in Bulk

REGULATION SECTION (33 CFR 154)	SECTION TITLE	OSRP SECTION
1035(a)	Introduction, Plan Contents, and Cross Index	This document
(a)(1)	Facility name, address, telephone and fax numbers, mailing address	Section 1.1
(a)(2)	Facility's geographic location	Section 1.1
(a)(3)	24-hr procedure for contacting facility owner	Section 2.1 and 2.2
(a)(4)	Table of Contents	Table of Contents of the OSRP
(a)(5)	Cross index	This document
(a)(6)	Record of Changes	Section 1.2
(b)	Emergency Response Action Plan	Part 2
(b)(1)	Notification procedures	Sections 2.1, 2.2 and 2.7.1
(b)(1)(i)(A)	List of response personnel (include QI)	Section 2.1 and Section 2.2
(b)(1)(i)(B)	Government agencies	Section 2.7.1
(b)(1)(ii)	Notification form	Figure 2.7.1-2
(b)(2)(i)(A)	Average most probable discharge	The document, Section M.2
(b)(2)(i)(B)	Maximum most probable discharge	This document, Section M.2
(b)(2)(i)(C)	Worst case discharge	This document, Section M.2
(b)(2)(i)(D)	Worst case discharge from non-MTR portion	Not applicable
(b)(2)(ii)(A)	Failure of manifold, loading arm, hoses, other	This document , Section M.3
(b)(2)(ii)(B)	Tank overfill	This document, Section M.4
(b)(2)(ii)(C)	Tank failure	Not applicable
(b)(2)(ii)(D)	Piping rupture	Not applicable
(b)(2)(ii)(E)	Piping leak	Not applicable
(b)(2)(ii)(F)	Explosion or fire	This document, Section M.3
(b)(2)(ii)(G)	Equipment failure (e.g. pumping system failure, relief valve failure, or other general equipment relevant to operational activities associated with internal or external facility transfers.)	Shell Tactic LE-1 and ACS Tactic L-6 ; specific to *Kulluk* or *Discoverer* refer to Appendix N (N.4, Prevention Plan)
(b)(2)(iii)	List of equipment and responsibilities for mitigation of average most probable discharge	This document, Section M.3

Table M-1.1 (Continued)
Cross Reference to USCG and Department of Homeland Security Response Plans for Oil Facilities Transferring Oil or Hazardous Material in Bulk

REGULATION SECTION (33 CFR 154)	SECTION TITLE	OSRP SECTION
(b)(3)(i)	Facility's personnel responsibilities This subsection must contain a description of the facility personnel's responsibilities to initiate a response and supervise response resources pending the arrival of the qualified individual	Section 2.2
(b)(3)(ii)	QI's responsibility and authorities	Sections 2.1 and 2.2
(b)(3)(iii)	Personnel to manage response actions	Section 2.2
(b)(3)(iv)(A)	OSRO and spill management team capabilities	Section 2
(b)(3)(iv)(A)(1)	Provide equipment and supplies for the average most probable discharge	This document, Section M.3
(b)(3)(iv)(A)(2)	Trained personnel for 7 days per week	Section 2.3
(b)(4)(i)	Sensitive areas	This document, Section M.3 NOAA ESI Maps ESI 3-5 Map Atlas Sheets 80, 83, 85-87, 89-91, 93, 100-104. http://www.asgdc.state.ak.us/maps/cplans/subareas.html#northslope
(b)(4)(ii)	Worst case discharge	This document, Section M.2 http://www.asgdc.state.ak.us/maps/cplans/subareas.html#northslope
(b)(4)(ii)(A)	List of sensitive areas	This document, Section M.3 NOAA ESI Maps ESI 3-5 Map Atlas Sheets 80, 83, 85-87, 89-91, 93, 100-104 http://www.asgdc.state.ak.us/maps/cplans/subareas.html#northslope
(b)(4)(ii)(B)	Procedures to protect sensitive areas	This document, Section M.3 NOAA ESI Maps ESI 3-5 Map Atlas Sheets 80, 83, 85-87, 89-91, 93, 100-104 http://www.asgdc.state.ak.us/maps/cplans/subareas.html#northslope
(b)(4)(ii)(C)	Depict response actions on map	ACS Map Atlas and Part 2 of OSRP
(b)(4)(iii)(A)	Personnel and equipment to protect sensitive areas	Section 2.7
(b)(4)(iii)(B)(1), (2)	Persistent oils: distance traveled	Section 2.7
(b)(4)(iii)(B)(3)	Distance spill reaches in 24 hr at maximum current for discharge to non-tidal waters	Not applicable; no discharge possible to streams
(b)(4)(iii)(B)(4)	Distance spill reaches in tidal waters	Section 2.7.2
(b)(4)(iii)(B)(5)	Trajectory model	Section 2.7.2

**Table M-1.1 (Continued)
Cross Reference to USCG and Department of Homeland Security
Response Plans for Oil Facilities Transferring Oil
or Hazardous Material in Bulk**

REGULATION SECTION (33 CFR 154)	SECTION TITLE	OSRP SECTION
(b)(4)(iii)(B)(6)	Additional areas	Sections 2.7.2 and 2.7.3
(c)(1)	Training procedures	Appendix F
(c)(2)	Drill procedures	Appendix F
(d)	Plan review and update procedures	Section 1.3
(e)(1)(i)	Physical description of facility	Section 1.1
(e)(1)(ii)	Vessels transferring at facility to *identify the sizes, types, and number of vessels that the facility can transfer oil to or from simultaneously.*	This document, Section M.4
(e)(1)(iii)	Location of first valve in secondary containment	Not applicable
(e)(1)(iv)	Information on oil	This document , Section M.5
(e)(2)(i)	24-hr contact for QI and alternate	Section 2.1
(e)(2)(ii)	24-hr contact for OSRO	Section 2.7.1
(e)(2)(iii)	24-hr contact for agencies	Section 2.7.1
(e)(3)(i)	Equipment and personnel for average most probable discharge. A list of equipment and facility personnel required to respond to an average most probable discharge, as defined in §154.1020. The appendix must also list the location of the equipment.	This document, Section M.3
(e)(3)(ii) & (iii)	Other equipment information	Appendix A
(e)(4)	Communications Plan	Section 2.5.2
(e)(5)	Site-specific Health and Safety Plan	Appendix F
(e)(6)	List of acronyms and definitions	Section 1.4

M.2 POTENTIAL DISCHARGES

M.2.1 Average Most Probable Discharge

The average most probable discharge is calculated as approximately 0.5 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 WCD.

M.2.2 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).

M.2.3 Worst Case Discharge

The WCD (for the purposes of the USCG) is 2,000 gal (48 bbl), as calculated 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 gpm (based on representative fuel transfer pumps on the oil spill response vessel = 7.6 bbl/min
- *Total Line Drainage Volume:* 163 gal [premising 4-inch by 820-ft marine hose between the pump manifold on the fuel 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 characteristics described in this Appendix, Section M.5)
Cause:	Hose flange cracks and/or hose ruptures during diesel fuel transfer operations to the *Kulluk* or *Discoverer*
Environmental conditions:	Winds 10 knots NE (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 WNW.

M.3 RESPONSE STRAGEGY – FUEL TRANSFER RELEASE DURING SUMMER MONTHS

M.3.1 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 exploration 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 drilling vessel. 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 bbl) of diesel. Approximately 10 percent of the spill is contained on the deck of the drilling vessel, and 90 percent of the spilled diesel enters the water. The maximum targeted recovery volume is 3,132 gallons (75 bbl). This volume includes an emulsion factor of 1.54 and a free-water recovery at 20 percent 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 WNW. The sea conditions are assumed to be typical 1½ to 2 feet wave height.

Table M.3-1
Fuel Transfer Release during Summer
Response Strategy

ADEC REQUIREMENT	RESPONSE STRATEGY	ACS / SHELL TACTIC
(i) Stopping Discharge at Source	The fuel barge is positioned adjacent to the drilling vessel to conduct a fuel transfer. The fuel transfer is monitored by a dedicated response team equipped with an OSR barge and two Kvichak workboats. A pre-transfer conference is conducted between the fuel vessel, the drilling vessel, 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 drilling vessel remain in both visual and radio contact. Additionally, the response team pre-deploys containment boom downcurrent of the fueling operation. During the fuel transfer, the fuel hose close to the deck rail of the drilling vessel 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 the role of IC. The IC activates the drilling vessel response team. The response team lifts a section of hose onto the deck from the drilling vessel, 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 standby.	This document Fuel Transfer Procedures M.4 Section 2.7.1 ACS 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.	Shell S-1 through S-4 ACS 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 drilling vessel, 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 FLIR or alternative aircraft with SAR is put on standby.	Shell TS-1, TS-2
(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 ESI maps, ACS Map Atlas, 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 ESI Maps ESI 3-5 Map Atlas Sheets 80, 83, 85-87, 89-91, 93, 100-104 http://www.asgdc.state.ak.us/maps/cplans/subareas.html#northslope

Table M-3.1 (Continued)
Fuel Transfer Release during Summer
Response Strategy

ADEC REQUIREMENT	RESPONSE STRATEGY	ACS / SHELL TACTIC
(vi and vii) Spill Containment, Control, and Recovery Procedures	**<u>Task Force (TF) Descriptions:</u>** **TF-1:** Primary response is provided by personnel and equipment stationed near the drilling vessel. This equipment includes an OSR barge with two Lamor brush skimmers;; three 34-foot Kvichak workboats; a vertical rope mop skimmer; a mini-brush skimmer; a 100-barrel storage bladder; and containment and fire boom. **TF-2:** 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 IC, 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 drilling vessel and fuel barge detach and separate. Recovery operations begin. Sorbents are used to clean the deck of the drilling vessel. **T= 20 Minutes.** The workboats position the boom to contain the spilled fuel, and then proceed to the OSRB for recovery. The OSRB utilizes either a mini-brush skimmer or rope mop to collect the contained diesel. Recovered fuel/water mixture is stored in the OSRB. **End of Day 1.** Recovery operations have stopped. Approximately 75 barrels of liquid (fuel/water) is collected and stored in the OSRB.	Shell OR-2A to 2D Shell OR-5A to 5B Shell SR-4 Shell OR-3A Appendix K of this plan
(viii) Lightering Procedures	On a non-emergency basis the recovered diesel is lightered to a 249-barrel barge mobilized from Deadhorse by ACS.	ACS R-28 Shell OR-3A or OR-6
(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	ACS R-28 Shell OR-3A or OR-6
(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 either using available injection wells or by re-processing in available production facilities as discussed in Section 1.6.10.	ACS D-1 ACS D-2 ACS D-3 Appendix K of this plan
(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.	ACS W-1 ACS W-2, W-2B, ACS L-6
(xii) Shoreline Cleanup Plan	Not Applicable. Fuel dissipates prior to encountering any shoreline.	

M.4 FUEL TRANSFER PROCEDURES

M.4.1 Introduction

At exploration sites, the following types of fuel transfers will be conducted:

- Fuel transfers to or from the drilling vessel, including transfers from the drilling vessel to other supporting vessels (e.g., anchor handler) or helicopters.

- Fuel transfers to or from the OSR vessel, including transfers from these vessels to other supporting vessels such as work boats.

Fuel Transfer Procedures for the OSR vessels and for the *Kulluk* or *Discoverer* are described in this document.

The drilling vessel *Kulluk* or *Discoverer* incorporates fuel transfer facilities for helicopter support, fuel barge, and other support vessels.

Fuel transfers will be performed in accordance with:

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

Drilling vessel-specific procedures governing fuel transfers, including emergency shutdown, will be strictly followed by marine personnel. The procedure manuals will be onboard the drilling vessel. If a spill of any size is detected, immediate action will be taken to stop the source, prevent any spill going overboard, and initiate containment and recovery actions. The drilling vessel has shipboard oil pollution emergency plans that personnel adhere to, including immediate contact of the supervisor and reporting to the appropriate authorities.

M.4.2 Drilling Vessel Internal Fuel Transfers

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

- cold-start compressor,
- emergency generator day tank,
- incinerator day tank,
- deck cranes,
- crude oil tank, and
- mud pits.

The emergency generator day tank and the incinerator day tank are fitted with overflow pipes that return excess fuel back to the inner hull storage tanks. These transfers generally will occur twice daily, once per shift, and are performed by marine 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 will be conducted during high-risk situations such as bad weather or alarm status.

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

M.4.3 Helicopter Fuel Transfer

Helicopter fuel transfers include storage, filtering, and transfer of fuel from the fuel pods located on the drilling vessel deck through pumps and filters to the delivery skid on the heli-deck. Emergency shutdown controls are located at the heli-deck and the forward port exit ladder from the heli-deck. 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;
- Proper alignment of fueling facilities (including valves, motor, pump, and coalescing filter); and
- Electrical bonding or grounding of the helicopter to the vessel.

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

M.4.4 Drilling Vessel Fuel Transfers

No fuel transfers will occur during emergency weather conditions or alarms without the direct approval of the OIM. Safety of diesel fuel transfer to the drilling vessel will rely on direct communication between drilling vessel and fuel supply vessel personnel responsible for the transfer procedures. Preventive measures for ensuring safe transfer will rely on pre-transfer procedures. Prior to transfer, the fuel-handling personnel will identify:

- 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.

Fuel transfers will include the use of pre-deployed boom, visual inspection, and open communication between the personnel of the fueling facility and the drilling vessel personnel. Continuous communication is the best preventive measure for avoiding an emergency situation. If radios are used for communication, they will be tested and ensured to be intrinsically safe as required by 46 CFR 110.15 through 46 CFR 110.100 and 46 CFR 11.80.

Once a fuel transfer is complete, fill valves will be closed and visual inspection of valves, flanges, pumps, and connection facilities will be conducted to ensure there is no discharge.

M.4.5 Fuel Transport Vessel

In normal operation, the fuel transport vessel will receive diesel fuel delivered from a drilling support vessel or third-party fuel barge. The vessel may also serve as a fuel lightering vessel transporting fuel from a drilling support vessel or third-party barge to the drilling vessel. 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 USCG-approved Vessel Response Plan submitted by each vessel owner) or the similar procedures in place at the drilling vessel.

The fuel transport vessel may also at times be used to provide diesel bunkering for OSR-related work boats (34-foot work boats), in which case the transfer would always be conducted under the fuel transfer procedures described in Section M.4.6 of this Appendix M (*Kulluk* or *Discoverer* Fuel Transfer Procedures).

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 Shell.

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

M.4.6 *Kulluk* or *Discoverer* Fuel Transfer Procedures

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 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 PA 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, collect a sample. (Check the sample with the senior watchkeeper. If okay, continue bunkering operations)
20. Collect a sample in the middle of the operation. (Check sample with senior watchkeeper. If okay, 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.

M.4.7 Oil Spill Response Vessel and Barge Fuel Transfer Procedures

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

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.

FUEL OIL TRANSFER PROCEDURES

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.

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FUEL OIL TRANSFER PROCEDURES

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).

FUEL OIL TRANSFER PROCEDURES

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).

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(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

<u>Duties of Person in Charge</u>

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 **NATIONAL RESPONSE CENTER 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.

M.5 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

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APPENDIX N

ADEC SUPPLEMENT

APPENDIX N

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APPENDIX N ADEC SUPPLEMENT

N.1 ADEC-SPECIFIC SCENARIO RESPONSE PLANNING STANDARD DISCHARGE UNCONTROLLED SUB-SEA WELL RELEASE DURING SUMMER MONTHS

N.1.1 Introduction

ADEC regulations (18 AAC 75.434) establish the RPS for an exploration facility to be 5,500 bopd, or best producing well data, for the duration of 15 days. For planning purposes, the ADEC RPS is presented using BSEE's WCD volume, 16,000 bopd for 15 days totaling 240,000 bbl. Based upon ADEC guidance, the RPS storage capacity requirements consider the emulsification factor of 1.54 and free water additions (20 percent) for a total storage volume of 417,600 bbl.

N.1.2 Response Scenario Parameters

This RPS scenario was developed to specifically describe a response that addresses each of the ADEC-compliant regulations of 18 AAC 75.425. The following RPS scenario is provided at the specific request of ADEC. This scenario is not a guarantee of performance. Rather, it is an illustration of the spill and response conditions that could be expected in the event of a loss of primary well control. The scenario makes certain assumptions about spill conditions and describes equipment, personnel and strategies that would be used to respond to a RPS volume spill.

In the unlikely event primary well control was lost, the well would be secured and physically shut-in in less than three minutes. This scenario and response timeline are presented for the purposes of demonstrating Shell's response capabilities and meeting contingency planning requirements only. In a real event, spill response decisions depend on a host of considerations including: safety, weather and other environmental conditions. It is the discretion of the IC and PICs of the spill response to select any sequence or take as much time as necessary to employ an effective response without jeopardizing personnel safety. As in any incident, personnel safety is the highest priority.

Simulated weather and sea conditions, oil characteristics, aerial deposition, oil trajectory modeling and resources of importance are as described in Appendix C of this OSRP (WCD Scenario). The difference between this ADEC-Specific Scenario and the WCD Scenario is the ADEC-Specified Scenario duration is 15 days (instead of 30 days for the WCD Scenario).

All other parameters for the ADEC-Specific Scenario are as described in Appendix C of the OSRP (WCD Scenario).

ADEC RPS SCENARIO

UNCONTROLLED SUB-SEA WELL RELEASE DURING SUMMER MONTHS

SCENARIO 2 SECNARIO PARAMETERS

This scenario was developed to specifically describe a response that addresses each of the ADEC-compliant regulations of 18 AAC 75.425. Although Section 1.6.13, Scenario 1, of this plan provides a state-compliant blowout scenario, the following is provided at the specific request of ADEC to address the requirements of AS 46.04.030 subsections (k)(2) and (r)(3). This scenario is not a guarantee of performance. Rather, it is an illustration of the spill and response conditions that could be expected in the event of a loss of primary well control. The scenario makes certain assumptions about spill conditions and describes equipment, personnel and strategies that would be used to respond to a WCD.

The response timelines are for illustration only. In fact, in the unlikely event primary well control was lost, the well would be secured and physically shut-in in less than three minutes. The extended response timeline described has been manufactured to meet contingency planning requirements. Additionally, spill response decisions depend on a host of considerations, including safety, weather, and other environmental conditions. It is the discretion of the IC 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. As in any incident, personnel safety is the highest priority.

Simulated weather and sea conditions, oil characteristics, aerial deposition, oil trajectory modeling and resources of importance are as described in Scenario 1. The difference between this response scenario and Scenario 1 is that the scenario duration is 15 days instead of 30 days and includes State of Alaska allowances for recovered oil emulsification and free water. All other parameters are as described in Scenario 1 (see Table 1-13).

Table N.1-1
Uncontrolled Sub-Sea Well Release during Summer Months

ADEC REQUIREMENT	RESPONSE STRATEGY	ACS/REGIONAL TACTICS MANUAL
(i) Stopping Discharge at Source	As soon as the well kicks, subsurface well control, such as increasing the drilling mud weight, is initiated. Initial actions, including the attempted closing of the blowout preventer (BOP) rams fail. Other well control attempts are unsuccessful, and the Torpedo exploration well is now classified as an “unobstructed” well release (T= 00 hours). The well has a continuous flow rate that will deposit at the surface a total of 16,000 bopd.	ACS Volume 3
	The On-site Shell Drilling Foreman notifies ACS and personnel on the OSR barge collocated with the drilling ship. Notifications to appropriate state and federal agencies are performed. The NRC is notified and the IMT is activated as outlined in Shell’s Blowout Contingency Plan.	ICS Regional LE-2 Table 1-1, Section 1 of this Plan
	An oil storage tanker located between 25 nm and 200 nm from the drilling location is also notified and immediately deployed to within a few miles of the uncontrolled well.	
	Safety analyzed the situation and initiates equipment and personnel mobilization on the drilling vessel. Well control is discussed in Section 1.6.3 of this plan. The decision is made to move the drilling vessel away from the area of the surfacing well release.	ACS 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 drilling vessel from the well release. Once the drilling vessel has been moved, the FOSC approves the ignition of the surfacing plume for safety reasons	ACS S-1 through S-6
(iii) Well Control Plan	Well control is as described in Scenario 1. The Blowout Contingency Plan is initiated, of which relief well drilling is one sub-component.	Section 1.6.3 of this plan
	Although available on site, for planning purposes, specialty equipment and personnel required for secondary well control arrive at the drilling vessel at T=4 days. Plans are to close the blind shear rams, located on the BOP stack, remotely using a remotely operated vehicle (ROV) to activate the sub-sea control panel. Hypothetically, on arrival, it is discovered the ROV was damaged in shipping. Repair parts for the ROV are ordered, but the ETA is several days. Other options are considered, including a diver and diver support requirements.	
	T=5 days. The diver option is rejected due to safety concerns.	
	T=7 days. ROV repair parts arrive in Deadhorse, but due to a clerical error, the parts are not transferred to an awaiting vessel at West Dock.	
	T=8 days. ROV repair parts arrive at the drilling vessel, and the ROV is repaired.	
	T=9 days. ROV successfully activates the sub-sea BOP control panel and activates the blind shear rams on the BOP stack. The wellbore is secured and the discharge is stopped.	
(iv) Surveillance and tracking of Oil	Oil movement is tracked using a combination of visual observations and remote sensing techniques. Within the first hours of initial notification of the well release, a FLIR-equipped aircraft 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.	ACS T-4 ACS T-5
	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.	ACS T-5

Table N.1-1 (Continued)
Uncontrolled Sub-Sea Well Release during Summer Months

ADEC REQUIREMENT	RESPONSE STRATEGY	ACS/REGIONAL TACTICS MANUAL
(v) Exclusion Procedures; Protection of Sensitive Resources	The Environmental Unit's Cultural Resource Specialist and State Historic Preservation Officer issue an advisory. The NOAA ESI maps, ACS Map Atlas, and the *North Slope Sub-Area Contingency Plan* are used to identify areas of major concern.	NOAA ESI Maps ESI 3-5 Map Atlas Sheets 80, 83,85-87, 89-91, 93, 100-104, and 184-188
	A shoreline cleanup plan is approved by the Unified Command and the State Historic Preservation Officer. 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
	Based on trajectory calculations and oil tracking, there is no indication of oil impacting the shoreline; nonetheless, barrier islands are identified as the first area to be potentially impacted by oil. There are two areas near the projected trajectory with priority protection sites - Cross Island and Kadleroshilik River.	http://www.asgdc.state.ak.us/maps/cplans/subareas.html#northslope
	T=1 day. There are no individual priority protection sites on Cross Island; however, all of Cross Island is considered a priority protection area. ACS Shoreline Protection Task Forces are mobilized to deploy deflection and exclusion booms at selected sites on Cross Island Two teams, traveling by small workboats and airboats from Prudhoe Bay, each place boom in the quantities described in ACS *Technical Manual* Map Atlas.	ACS C-13, C-14
	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 deploy exclusion boom.	ACS C-14
(vi and vii) Spill Contain, Control and Recovery Procedures	**<u>Task Force (TF) Descriptions:</u>** **TF1.** Primary response is provided by equipment stationed near the drilling vessel This equipment includes an OSRB with two Lamor brush skimmers, three 34-foot workboats, and containment and fire boom.	Regional OR-2A to 2D ACS R-20
	TF2: Additional primary response is provided by *Hull 247* (or similar),equipped with a Transrec 150 skimmer. TF-2 has a planned storage capacity of 13,000 bbl.	Regional OR-1A to 1D
	TF3: Additional primary response is provided by Harvey Spirit (or similar), equipped with a Transrec 150 skimmer. TF-3 has a planned storage capacity of 8,000 bbl.	
	TF4. An approximately 513,000-barrel tanker located between 25 nm and 200 nm from the drilling location is deployed immediately. It arrives within 20 hours. Decanting (if required) follows FOSC plan and USCG approval. TF-4 provides oil storage capacity for recovery TFs 1-3, and 5. **TF5.** Secondary response is provided by *Klamath* (or similar) from the Beaufort Sea, equipped with two Transrec 150 skimmers and utilizes the boom and boom towing boats from TF-1. TF-5 has a planned storage capacity of 79,600 bbl. **TF-8**. 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-8 is to prevent oil from entering priority sites. TF-8 does not recover discharged oil. **TF-7.** ACS nearshore recovery teams mobilize from Prudhoe Bay to recover oil that has escaped containment from the offshore task forces. Teams utilize skimmer boats with LORI LSC skimmers and mini-barges for storage.	Regional OR-4A to 5B ACS R-28 Regional OR-2B, ACS R-19 ACS C-14 ACS R-32A, R-32B ACS R-16

Table N.1-1 (Continued)
Uncontrolled Sub-Sea Well Release during Summer Months

ADEC REQUIREMENT	RESPONSE STRATEGY	ACS/REGIONAL TACTICS MANUAL
(vi and vii) Spill Contain, Control and Recovery Procedures (continued)	**Recovery Timeline:** **T = 1 hour.** TF-1 is deployed immediately and locates to a safe distance from the well release. A vessel-based boom-skimmer system deploys downwind/downcurrent 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 location. While the burning of the well would likely eliminate some of the surfacing oil, it is assumed for planning purposes that the full WCD of 16,000 bopd (667 bbl/hr) continues to flow from the well.	Regional OR-2B
	TF-1 deploys two workboats that tow boom in a U-shape, open-apex formation that allows oil to filter through to the OSRB at the apex of the boom. The U-shaped formation remains in a static location situated a safe operating distance from the well release at the thickest portion of the oil plume. The two brush skimmers on the OSRB have a combined total derated recovery of 516 bbl/ hr (see Table 1-15). **T=3 Hours**. TF-2 begins recover operations at 151 bbl/hr.	Regional OR-10, Option 2 ACS R-20
	T = 20 hours. TF-4 (the oil storage tanker) arrives. At this time TF-1 stops skimming and begins the process of lightering to TF-4. TF-1 has storage capacity to handle over 20 hours of oil recovery operations; consequently, lightering to TF-4 occurs before the recovery vessel reaches full capacity. Lightering procedures are detailed in Section 1.6.8. **TF-**3 maneuvers into position and assists TF-2 with free oil recovery at 500 bbl/hr utilizing the last small boat from TF-1.The volume of recovered liquids exceeds the volume of discharged oil (with emulsification).	ACS R-28
	T=24 hours. Currents and prevailing winds continue to move the oil that is not contained and recovered to the west. TF-9 is mobilized from Prudhoe Bay to install boom in a hook configuration with a Vikoma skimmer in the recovery area of the boom. Each task force can deploy and maintain one team at up to ten locations for this configuration.	
	From this time forward, TF-1,TF-2, and TF-3 alternate recovery operations, so that one task force is always skimming at 500 bbl/hr and another at 167 bbl/hr. Two workboats continuously tow boom in a U-shape, open-apex formation that allows oil to filter through the apex. The other two workboats work with either TF-2 or TF-3 to create a J-configuration for oil recovery. Recovery rates of TF-1, TF-2, and TF-3 are detailed in Table 1-22. As long as two of these task forces are recovering oil, the recovery capacity rates exceed the rate at which oil is released from the well. Oil that is not contained and recovered by TF-1, TF-2, and TF-3 is transported westward by the ocean currents and prevailing winds. TF-7 is deployed from Prudhoe Bay to recover oil that is often encountered in windrows and linear slicks. TF-7 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.	ACS R-17, R-20
	T = 42 hours. TF- 5 arrives from the Beaufort Sea. TF-5 relieves TFs 1, 2, and 3 of primary oil recovery operations. TF-5 includes two Transrec 150 skimmers that possess de-rated recovery capacity in excess of the well release rate. During the time TF-5 operates, TFs 2 and 3 lighter recovered oil to TF-4. From here on out, TFs 1, 2, and 3 rotate oil recovery operations with TF-5 every 24 hours for the duration of the well release. TF- 3 provides additional backup capacity. **T=5 days.** Oil trajectory modeling predicts WNW movement of oil. Oil recovery vessels adjust positioning accordingly. **T=11 days.** The volume of released oil is recovered.	ACS R-28

Table N.1-1 (Continued)
Uncontrolled Sub-Sea Well Release during Summer Months

ADEC REQUIREMENT	RESPONSE STRATEGY	ACS/REGIONAL TACTICS MANUAL
(vii) Lightering Procedures	Decanting, if required, follows FOSC plan approval. Stored liquids are offloaded from the OSRBs to the tanker. Typical vessel offloading times are presented in Table 1-15.	ACS R-28 Regional OR-3A and OR-6
(ix) Transfer and storage of Recovered Oil/Water; Volume Estimating Procedure	Stored liquids are offloaded from the OSRBs 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 or transferred to the OSRBs. Liquids recovered by the shoreline recovery task forces are stored in Fastanks 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.	ACS R-28 Regional OR-3A and OR-6
(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 wastes, and (3) submit a plan to ADEC for waste management.	ACS D-1
	Non-liquid oily wastes are classified and disposed of according to classification.	ACS D-2
	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).	ACS 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.	ACS W-1, W-2, W-2B L-9, W-3, W-4 W-5
(xii) Shoreline Cleanup Plan	Shoreline impact is not expected with the current trajectory; however, for planning purposes, a percentage of the oil is projected to reach the nearshore environment as detailed in Section 1.6.7. 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.	ACS SH-1
(xii) Shoreline Cleanup Plan (continued)	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 are manually removed, and • Natural recovery for those areas where residual staining may remain, but further recovery would cause more harm than good.	ACS B-2 ACS SH-3 ACS SH-2

N.2 RECOVERY STRATEGIES

Recovery strategies are discussed in the scenarios (Section N.1 of this Appendix; Appendix C – WCD Scenario; and Appendix N – USCG Supplement), the Shell Tactics Manual, and the ACS Technical Manual.

Because of 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 PPE requirements. Access to the blowout site is carefully controlled. Monitoring protocol is established by the On-scene Safety Officer to ensure personnel protection. Should a subsea blowout result in the release of large quantities of free gas and volatiles from the evaporation of surfacing oil, a rapid assessment will be made of deliberate ignition of those vapors. If authorized by the UC, such deliberate and controlled ignition will reduce the risks of an accidental ignition and the potential exposure of personnel and vessels downwind.

Primary response is provided by equipment stationed in the vicinity of the drilling vessel. This equipment includes TF-1 which consists of a dedicated on-site OSR vessel with a 12,000 bbl storage capacity (11,400 bbl at 95 percent capacity); two (2) brush skimmers; three (3) 34-ft work boats; and open-ocean containment boom and fire boom. TF-2 consists of OSR barge with 76,900 bbl of onboard storage capacity and two (2) high-capacity weir skimmers to relieve the OSR vessel for its transit and offload to the OST. Ten (10) knots is a realistic average transit speed for planning purposes for each of these response vessels and the OST. Transiting at this speed, TF-1 would be positioned to arrive at the spill site within one hr (i.e., would be positioned within 10 n mi of the drilling vessel). TF-2 will be approximately 25 n mi of the drilling vessel and available to assist TF-1 at Hour 3. The OST (TF-4) would arrive at the recovery site within 24 hr of departure from its staging area off the Beaufort Sea coast. The tactics used for the positioning of oil recovery vessels at the blowout site are described in the scenarios (as referenced above).

The time needed to fill the OSR vessels is estimated by assuming that all of the oil released can be contained and recovered. For planning purposes, the "Time-to-Fill" is based on the largest volume flow rate of oil that could conceivably reach the skimming vessel.

TF-4 (minimum storage capacity of 513,000 bbl) will be located not more than 240 n mi from the drilling location and immediately mobilize in the event of a spill. The tanker would arrive at the blowout and be ready to accept recovered liquids within 24 hrs.

For planning purposes, the scenario assumes that 10 percent of the 16,000-bopd discharge escapes the primary offshore recovery efforts at the blowout. This unrecovered 1,600 bopd is assumed to drift toward the mainland, driven by winds out of the WNW. This wind direction was used for planning purposes and does not correspond to the prevailing E, NE, and ENE wind directions of summer months. TF-6, consisting of a large, mobile OSR barge and tug, will be mobilized from its staging location in Beaufort Sea and arrive within 96 hr in the nearshore zone of the Beaufort Sea in order to best intercept and recover oil potentially threatening the coast, as water depth, weather, sea conditions and other circumstances allow. TF-6 would be capable of transit speeds of 5 knots, ensuring arrival by Hour 96. In the unlikely event strong, sustained winds develop out of the WNW, trajectory modeling estimates that six days is the earliest possible time oil could reach shore, even if no containment and recovery operations were conducted. From this location, it can be mobilized into the nearshore zone well ahead of the predicted timeframe that oil would reach shorelines for oil recovery and support of the shoreline protection task force. TF-6 would be dispatched as needed to intercept the oil as described in the scenario. It is assumed that half of the oil reaching the nearshore environment is recovered by the skimming systems dispatched from the TF-6. The remaining 800 bopd are assumed to migrate toward the shoreline where ACS would mobilize personnel and equipment to intercept the oil and deploy boom for shoreline protection. TF-6 possesses 18,636 bbl of fluid storage capacity for oil recovered from the nearshore operations. For planning purposes, 17,000 bbl is used as the nominal capacity of the Nearshore OSR barge for recovered fluids.

Shoreline recovery operations are staffed by ACS personnel supplemented with NSSRT, ACRT, and VRT responders as needed. Shoreline protection and recovery task forces set up and maintain multiple teams along the shoreline to recover oil. For planning purposes, each task force maintains a minimum of six teams that deploy boom to intercept oil moving along the shoreline, a small skimmer, and Fastanks or bladders set up on the beach to hold the recovered liquids or oily waste and debris. The shoreline response teams have access to numerous storage containers (e.g., Fastanks) for oily waste storage along the shoreline. Additional temporary storage will be provided as needed using lined pits, drums, bladders and other storage containers flown in by helicopter or transported to the areas of need with landing craft. Authorization would be sought for the burning of oily solids (e.g., wood, vegetation and other combustible materials) at approved onshore burn sites after careful assessment of the risks and benefits of various controlled burns.

N.3 SURFACE CONTROL AND SUBSEA CAPPING AND CONTAINMENT CAPABILITY

N.3.1 Introduction

Shell has taken significant precautions to minimize the potential for a loss of well control. Section N.4.1.8 (under "Drilling Assurance") describes the four layers of preventive and recovery measures used to minimize spill potential during drilling operations. Layer I consists of proper well pre-planning, risk identification, personnel training, and routine tests and drills on the drillshipdrilling vessel. Layer II includes early kick detection, implementation of kick response procedures and continuous monitoring of downhole conditions. Layer III involves the use of mechanical barriers, such as the BOP, casing, and cement. Layer IV represents dynamic techniques to regain well control, including relief well drilling.

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, Inc. (Wild Well Control) for the intervention and resolution of a well control emergency.

N.3.2 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. Refer to Section N.4 of this Appendix (Prevention Plan) for a more detailed discussion on well control options and methods.

In the event of uncontrolled flow, 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 control methods used will depend on the situation, potential 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; and
- Application of BOP.

N.3.3 Subsea Capping and Subsea Containment Capability

Containment capability, in the unlikely event of a loss of well control, would be provided by a combination of subsea capping, subsea containment and surface separation equipment installed on a containment vessel.

Surface intervention involves work performed on the wellhead of a subsea well. Surface intervention in the OCS involves subsea devices used on the top of the well or some device connected thereto (e.g., the BOP stack or wellhead).

A set of subsea devices would be assembled to provide direct surface intervention capability with the following priorities:

1. Attaching a device or series of devices to the well to affect a seal capable of withstanding the MAWP and closing the assembly to completely seal the well against further flows (commonly called “capping and killing”).
2. Attaching a device or series of devices to the well and diverting flow to surface vessel(s) equipped for separation and disposal of hydrocarbons (commonly called “capping and diverting”).

These devices form what is generally known as a capping stack. The devices include: ram-type BOP bodies equipped with blind and/or pipe rams, spacer spools, flow crosses (or mud crosses for pumping kill weight fluid into the well or for flowing the well in a controlled manner through piping to the surface) and connectors to attach to the upper H4 connector mandrel. This equipment will be ready for use and stored onboard a designated vessel in Alaska. It is anticipated that surface intervention efforts will successfully stop the flow from a blowout in less time than is required to drill a relief well.

Should capping fail to completely stop oil leaking from the well, one or more subsea devices will be deployed to capture low-flow rate leaks. Oil and associated gas collected from these devices would be piped to separation equipment on the containment vessel. The separation equipment includes a series of gas/water and oil/water separators, knock-out drums pumps and pre-heaters. Gas would be diverted to a flare and the oil would be disposed of either by storing and shipping from the scene or incinerating in a flare. By capturing the oil below the water surface, interference by surface environmental conditions, including inclement weather or ice, is avoided and surface oil spill recovery efforts are simplified. Surface oil spill response equipment will remain on station in the immediate area to capture any fugitive oil that escapes the subsea collection dome(s).

All of the separation equipment on the containment vessel will be designed for conditions in the Arctic including ice and cold temperatures. This equipment will also be designed for reliability, ease of operation, flexibility and robustness so it could be used for a variety of emergency situations. Capping stacks, subsea collection devices, separation equipment and the containment vessel will be tested prior to the drilling season. The capping system, containment system and the associated processing equipment is being designed and assembled to accommodate the WCD oil and gas volumes expected from wells in this region. The capping system, sub-surface containment system and the barge containing the processing equipment will be installed on fleet vessels and located as described in the revised Beaufort Sea Exploration Plan.

N.4 PREVENTION PLAN [18 AAC 75.425(e)(2)]

N.4.1 Prevention, Inspection, and Maintenance Programs [18 AAC 75.425(e)(2)(A)]

N.4.1.1 Prevention Training Programs [18 AAC 75.020]

Personnel involved in spill response or cleanup activities are thoroughly trained and are expected to be knowledgeable of safety, health, and environmental requirements, so they fully understand the safety and health risks associated with their job, and 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 Appendix F (Training and Drill Information) for additional training information.

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

- HAZWOPER 24-hour
- Shell OSRP 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 ISB operations

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. non-exempt, and hazardous vs. non-hazardous materials, and the associated practices in managing the material in accordance with standard operating procedures.

Shell Drill Foreman and Contractor Toolpushers, Drillers, and Assistant Drillers are required to have formal well control training in accordance with 30 CFR 250 Subpart O requirements for well control and production safety training. In addition, BSEE requires weekly pit- and trip-drill exercises designed to keep drill crew personnel alert to well control contingencies. The BOP is regularly pressure- and function-tested, again under BSEE 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.

N.4.1.2 Substance Abuse Programs [18 AAC 75.007(e)]

The Shell drug policy is 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 conduct random drug testing, as well as drug testing for cause.

Beyond these requirements, operators of designated critical equipment (such as company drivers, crane operators, and 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.

N.4.1.3 Medical Monitoring [18 AAC 75.007(e)]

Shell has a systematic approach to medical monitoring designed to pursue Shell's international goal of safe working conditions and continuous performance improvement. Shell employees and contractor employees are required to have medical evaluations for FTW, based on job classification and responsibilities, as outlined in the Shell Exploration and Production Company's FTW policy.

Shell employees receive medical evaluations at the onset of employment and periodically as specified in the FTW policy. Contract employees who perform drilling, navigational towline, security, maintenance, fuel transfer or response duties are required to have a medical evaluation of FTW based upon their job responsibilities. Where a Shell protocol exists for a specific job or task, at a minimum the protocol shall be included in the contractor's medical evaluation for FTW. In addition, employees shall be included in applicable medical surveillance programs.

N.4.1.4 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 Logistical Support Base facility or other company-established logistical base. Security services may be provided through coded badges or a professional security company for Shell's Logistical Support Base and other support facilities.

Access to the drilling vessel is either by helicopter or by vessel. Personnel will be 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. Shell anticipates helicopter operations will be conducted from Barrow, and vessel operations will be conducted from Wainwright; each facility will have security controls in place.

Vessels will arrive in the Beaufort Sea fully outfitted and supplied. A mid-season resupply consisting primarily of drilling mud, 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 that 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, vessels, rolligons or aircraft may be used for supplemental transportation of equipment, personnel, and supplies in support of the ACS shoreline recovery effort and, in all likelihood, temporary camps would be mobilized to suitable areas 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 vessel will be limited to authorized personnel only.

For further information regarding on-site security and regulations, see the Security Plan for the respective drilling vessel.

N.4.1.5 Fuel Transfer Procedures [18 AAC 75.025]

Each vessel has its own fuel transfer procedure as part of the company's HSSE or operations management system. At exploration sites, the following types of fuel transfers will be conducted:

- Fuel transfers to or from the drilling vessel, including transfers from the to other supporting vessels (e.g., anchor handler) or helicopters.
- Fuel transfers to or from the OSR vessel, including transfers from these vessels to other supporting vessels such as work boats.

Fuel Transfer Procedures for the OSR vessel, the *Discoverer* and the *Kulluk* are in Appendix M (USCG Supplement).

The drilling vessel, *Discoverer* and *Kulluk,* incorporates fuel transfer facilities for helicopter support, fuel barge, and other support vessels.

Fuel transfers will be performed in accordance with:

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

Drilling vessel specific procedures governing fuel transfers, including emergency shutdown, will be strictly followed by marine personnel. The procedure manuals will be onboard the drilling vessel. If a spill of any size is detected, immediate action will be taken to stop the source, prevent any spill going overboard, and initiate containment and recovery actions. The drilling vessel has shipboard oil pollution emergency plans that personnel adhere to, including immediate contact of the supervisor and reporting to the appropriate authorities.

Drillship Internal Fuel Transfers

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

- 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 inner hull storage tanks. These transfers generally will occur twice daily, once per shift, and are performed by marine 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 will be conducted during high-risk situations such as bad weather or alarm status.

If an alarm occurs, an emergency shutdown system at the pumps will close any valve in use and stop 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 the drillshipdrilling vessel deck through pumps and filters to the delivery skid on the heli-deck. Emergency shutdown controls are located at the heli-deck and the forward port exit ladder from the heli-deck. 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;
- Proper alignment of fueling facilities (including valves, motor, pump, and coalescing filter); and
- Electrical bonding or grounding of the helicopter to the vessel.

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 Drilling Vessels

No fuel transfers will occur during emergency weather conditions or alarms without the direct approval of the OIM. Safety of diesel fuel transfer to the drilling vessel will rely on direct communication between drilling vessel and fuel supply vessel personnel responsible for the transfer procedures. Preventive measures for ensuring safe transfer will rely on pre-transfer procedures. Prior to transfer, the fuel-handling personnel will identify:

- 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 M (USCG Supplement) for the fuel transfer procedures for 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. 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. drilling vessel.

Fuel transfers will include the use of pre-deployed boom, visual inspection, and open communication between the personnel of the fueling facility and the drilling vessel personnel. Continuous communication is the best preventive measure for avoiding an emergency situation. If radios are used for communication, they will be tested and ensured to be intrinsically safe as required by 46 CFR 110.15 through 46 CFR 110.100 and 46 CFR 11.80.

Once a fuel transfer is complete, fill valves will be closed and visual inspection of valves, flanges, pumps, and connection facilities will be conducted to ensure there is no discharge.

Fuel Oil Transfer to/from the OSR

In normal operation, the fuel transport vessel will receive diesel fuel delivered from a drilling support vessel or third-party fuel barge. The vessel may also serve as a fuel lightering vessel transporting fuel from a drilling support vessel or third-party barge to the drilling vessel. 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 USCG-approved Vessel Response Plan submitted by each vessel owner) or the similar procedures in place at the drilling vessel.

Refer to Appendix M (USCG Supplement) for the fuel transfer procedures to be implemented by the fuel transport vessel.

The fuel transport vessel may also at times be used to provide diesel bunkering for OSR-related work boats (34-foot work boats), in which case the transfer would always be conducted under the fuel transfer procedures in Appendix M (USCG Supplement).

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 Shell.

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

N.4.1.6 Maintenance Programs

Operations of the *Discoverer* and the *Kulluk* drilling vessels include 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 drillshipdrilling vessel is upheld through the planned maintenance program initiated following drilling unit 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 BOP gantry crane hydraulic system, which receives only sporadic use, is inspected weekly.

N.4.1.7 Operating Requirements for Exploration [18 AAC 75.045]

Drilling Vessel 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 floor drains around the drilling deck to stop minor spills from flowing off the deck. Supplemental one-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 contaminants are shipped ashore for proper disposal. Each sump is equipped with level-sensing alarms. *The Discoverer* floor drains flow to a holding tank. From the holding tank, the spilled liquid is sent through the oil-water separator. After separation, water is routed overboard and contaminants are stored until shipped ashore for proper disposal.

N.4.1.8 Blowout Prevention and Emergency Shutdown [18 AAC 75.425(e)(1)(I)]

Drilling Assurance

Well control is the process of maintaining positive pressures in the drilled wellbore so that pressures in the geologic formations do not cause gas or fluids from the formations to escape in an uncontrolled manner. This section provides information on the measures taken to maintain well control and prevent a blowout during drilling operations. Recovery measures used to regain well control in the event of lost control are discussed in Section N.3. The potential for discharge is discussed in Section N.4.3.

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 practice drills on the drilling vessel which build a strong prevention and response foundation. Examples of Layer I would include BOP tests, pit drills, and trip drills.
- Layer II includes early kick detection and timely implementation of kick response procedures. Continuous monitoring including the use of Shell's RTOC (see subsection 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, BOP, casing, and cement. Testing and inspections are performed to ensure integrity is maintained at all times.
- 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 for drilling a relief well.

Well Control During Planning and Preparation

The primary methods of well control are 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 planned wells and the wells have been designed to handle the expected pressures. See Figure N.4-1 for an example of this process.

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, and 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 drilling vessel site personnel;
- Risk identification and mitigation, including writing Shell's 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.

- On-site 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, in Robert, LA.

- Shell foreman, Shell engineers, contractor supervisors, and contracted drilling vessel skilled positions (e.g., drillers and assistant drillers) are trained for prospect-specific well control situations.
- Weekly pit drills and trip drills.
- Secure well drills performed when applicable.
- Training on the COCP 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.

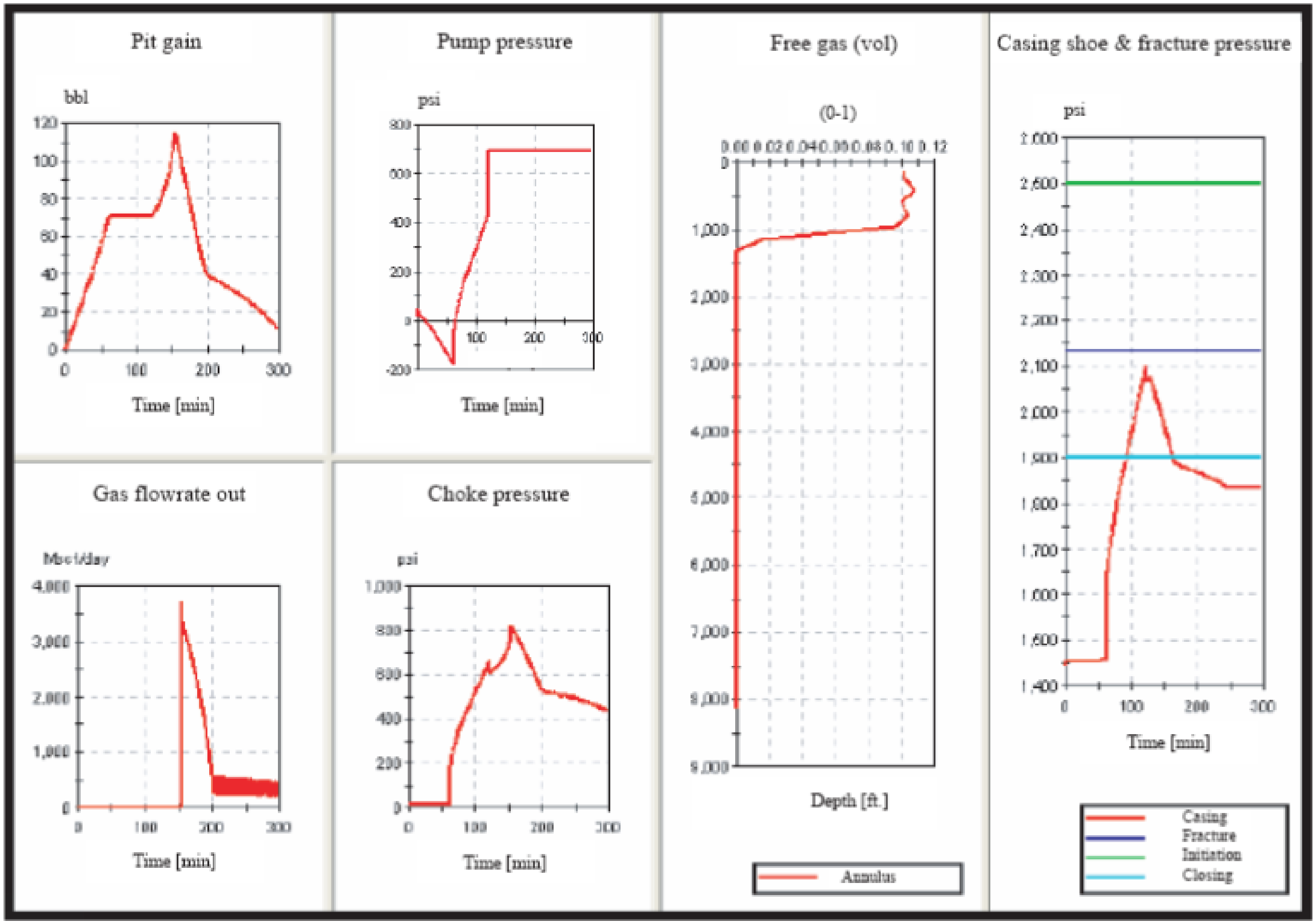
Available data from seismic operations and neighboring exploration wells, such as rock types and subsurface pressure profiles, are interpreted to ensure a design that permits effective control of the well. Drilling engineers predict downhole pressures and interpret existing datasets to design a safe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

Shell performs a site-specific hazardous operations analysis for each prospect (Figure N.4-1). In addition, Shell conducts a DWOP exercise for each prospect which involves a collaborative effort of drilling engineers, operations and HSSE personnel, as wells as service providers, to analyze all phases of the planned drilling program. 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 HSSE risks and associated mitigation opportunities; and then 3) use this information to develop the optimum drilling program. Shallow hazards 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.

Figure N.4-1
Models for Site-Specific Well Control



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

- Site-specific well control modeling for anticipated hydrocarbon intervals;
- Site-specific dynamic well control modeling for any prospects with possible shallow gas or hydrate 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 MWD and 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 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 drilling vessel to the RTOC in real-time (see Figure N.4-2). This service augments the mud-logging capabilities at the drilling vessel and allows Shell to easily make available trained and experienced staff to support the drilling operation.

Figure N.4-2
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 BOP 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; therefore, no spill of oil would be expected at the surface. However, such an incident would be critical from a worker safety standpoint. In order to minimize this risk, Shell would conduct a site clearance and shallow hazards survey prior to conducting drilling operations using high resolution profiling systems. This survey would evaluate conditions at and below the seafloor, which could affect the safety of operations including the presence of shallow gas.

If a shallow gas blowout would 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 drilling unit floor using a diverter valve and diverter line.

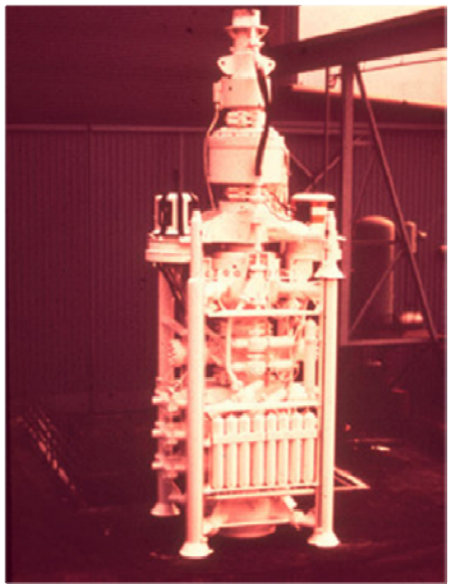
Free gas accumulations in shallow permafrost have been encountered in the course of drilling permafrost intervals. To avoid release of this gas and the potential loss of structural integrity of the wellbore, the drilling fluid is cooled to ensure that the wellbore remains frozen, with the gas trapped, 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, the BOP provides a mechanical barrier to loss of well control, key to the third layer of protection. See Figure N.4-3 for an example of a BOP and Figure N.4-4 for a diagram of the BOP to be used with the *Kulluk* and the *Discoverer* drilling vessels. 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 BOP can be used to safely halt an uncontrolled flow from the wellbore.

Figure N.4-3
Example of a BOP



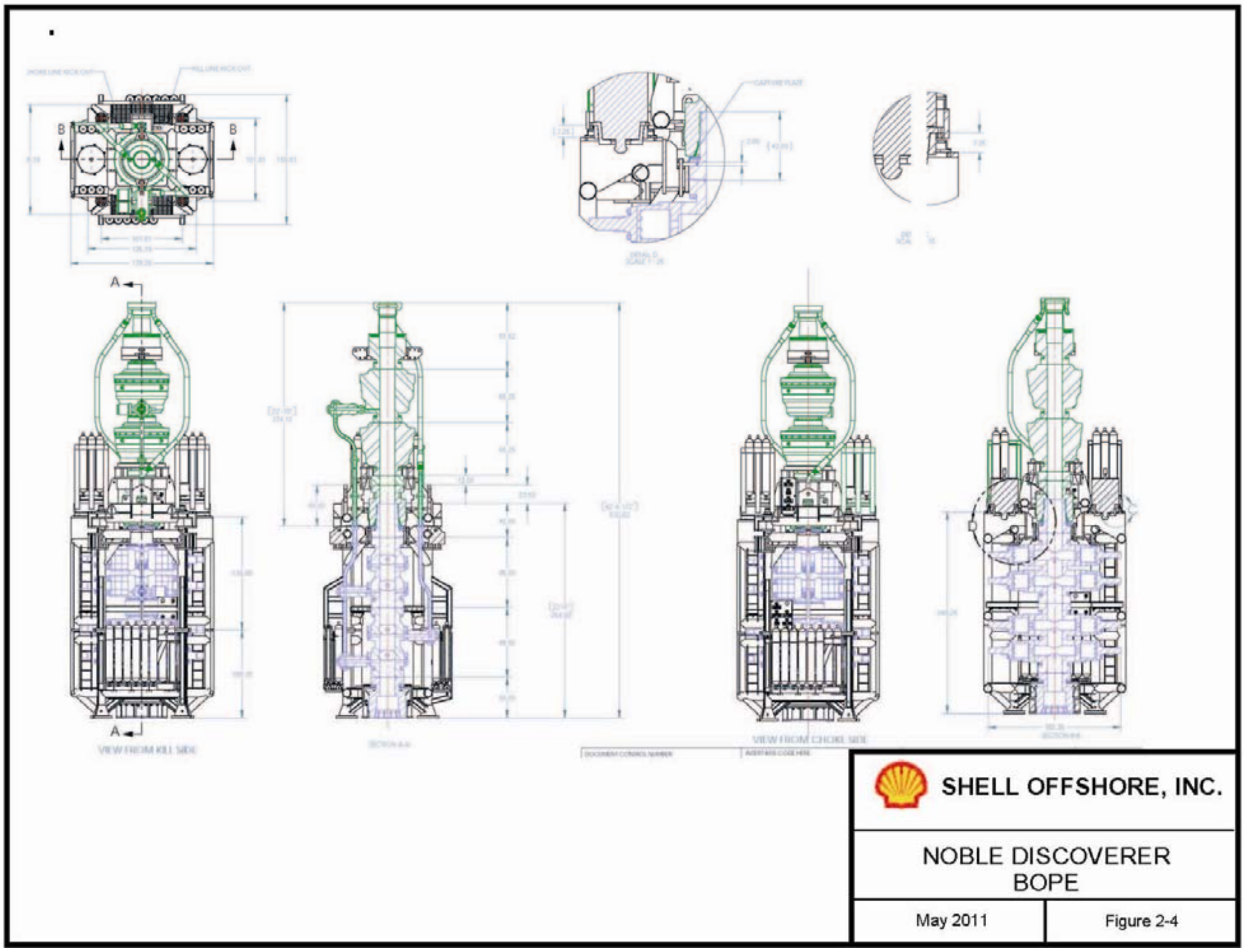
In the event the well kicks, the BOP will be immediately used to shut in the well and confine the pressure within a closed system. The casing program will be designed so that any anticipated formation pressure can be shut-in at the subsea BOP without rupturing the casing. Shell representatives assigned to the drilling unit have BSEE-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 BSEE and Shell.

The BOP for the *Discoverer* consists of:

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

For a diagram of the BOP for the *Discoverer*, refer to Figure N.4-4.

Figure N.4-4
Discoverer **Drilling Vessel Blowout Prevention Equipment System**



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 5,000 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 N.4-5.

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

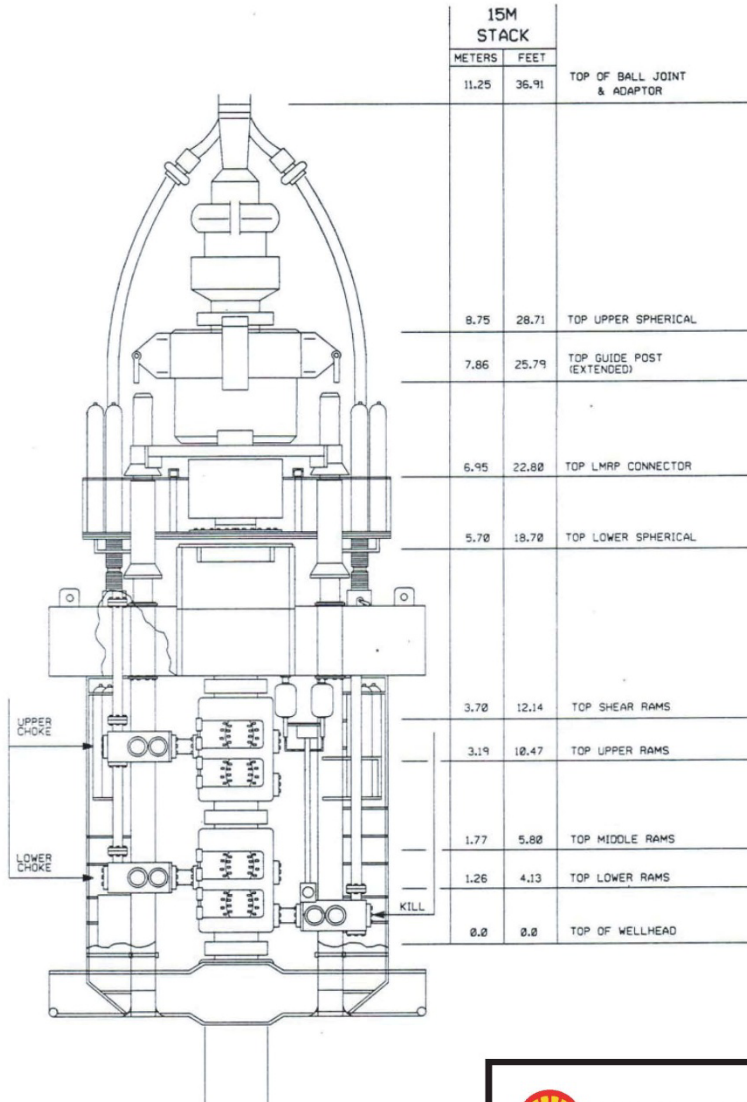
Well Suspension or Abandonment

Upon completion of drilling operations, the well will be properly plugged and abandoned following BSEE 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 BSEE.

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 BSEE regulations. Blowout preventers will be pressure-tested every 14 days and function-tested every seven days. In addition, drilling personnel are BSEE-certified in well control, and weekly pit/trip drills will be conducted.

Figure N.4-5
Kulluk BOPE



SHELL OFFSHORE, INC.

KULLUK BOPE

December 2006	Figure N.4-5

N.4.1.9 Oil Storage Tanks [18 AAC 75.065]

Part 1 of this OSRP contains information about the major tank facilities on the drilling vessel. During drilling, a visual inspection and soundings of the major tanks will be conducted at least once daily for leakage or damage detection, and to identify any 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 OIM in charge of the 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 drilling vessels (*Kulluk* and *Discoverer*) which will undertake the drilling program. Neither the *Discoverer* contains non-integral bulk storage oil tanks equal to or greater than 10,000 gal, which are regulated under 18 AAC 75.065.

The largest non-integral tanks on the *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 bowers that are 600 gallons each.

Inspection Records [18 AAC 75.065(d)]

Inspection records are maintained by the drilling vessel contractor.

Repair or Alteration [18 AAC 75.065(e)]

Shell will notify BSEE of any major repair or alteration.

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

See Section N.4.5.

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

Overfill protection is primarily through visual observation and mechanical and remote soundings during transfer operations. Containment save-all is in place around the fuel tank vent outlet.

The onboard 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* drilling vessel. 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 *Discoverer* fuel tanks are integral to the vessel's 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 drilling vessel 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)]

Drill floor drainage will be routed to an oil-water separation tank. The *Discoverer* is equipped with two oil-water separators for handling bilge and waste oil. The separation process will be inspected to ensure that separated oily water may safely be disposed. The deck is furnished with scuppers that can be plugged to manage deck drainage.

N.4.1.10 Emergency Tow and Escort Vessels Program

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

N.4.2 Discharge History (>55 Gal) [18 AAC 75.425(e)(2)(B)]

Not applicable.

N.4.3 Analysis of Potential Discharges [18 AAC 75.425(e)(2)(C)]

This section contains a summary of potential discharges and their impact. The spill history of previous exploration drilling in the Beaufort Sea demonstrates the low probability of an event causing oil to enter into an open water environment. Table N.4-1 summarizes maximum discharges of liquid hydrocarbons that potentially could occur from various sources.

A response scenario addresses the potential immediate release of crude oil to the environment by a loss of well control during drilling operations in conditions typically encountered during the drilling season. 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 16,000 bopd for the duration of the event.

N.4.3.1 Potential Areas for Discharge

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.

Table N.4-1
Summary of Potential Discharges

TYPE	CAUSE	PRODUCT	SIZE	DURATION	ACTIONS TAKEN TO PREVENT POTENTIAL DISCHARGE
Transfer from fuel barge to drilling vessel	Hose rupture	Diesel	Approximately 48 bbl (2,000 gal) (Appendix M – USCG Supplement)	5.5 min (Appendix M – USCG Supplement)	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 the 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	480,000 bbl	30 days (Appendix C – WCD Scenario)	BOP and related procedures for well control.

Blowouts

Since 1940, oil and gas exploration and production have been conducted in federal waters. Given the use of modern prevention and control techniques, actual blowouts are extremely rare and of relatively short duration. Often used interchangeably, the term "blowout" is also known as a "loss of well control," and often does not result in a release to water. As currently defined by BSEE, loss of well control includes:

- Uncontrolled flow of formation or other fluids. The flow may be to an exposed formation (an underground blowout) or at the surface (a surface blowout).
- Flow through a diverter.
- Uncontrolled flow resulting from a failure of surface equipment or procedures.

From 1971 to 2005, 276 exploration and development well blowouts occurred on the OCS while drilling approximately 34,000 wells. Thirty-three of those 276 blowouts resulted in oil spills of crude or condensate with the amount of oil spilled ranging from <1 bbl to 350 bbl. The total volume spilled from those 33 blowouts is approximately 1,600 bbl.

Table N.4-2 provides a summary of the potential discharge volumes associated with exploration and production plans that were proposed in Alaska's OCS and state waters since 1997. This summary includes the maximum potential spill volumes for either well blowouts or other WCDs. Although unlikely to occur, Shell has developed strategies to respond to a WCD of an uncontrolled release of oil during a blowout or any other spill. These strategies are discussed in Appendix C (WCD Scenario), and Sections N.1 and N.2 of this Appendix.

Table N.4-2
Potential Discharge for Alaska Offshore Drilling (1997 to 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)	BSEE 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	ConocoPhillips Alaska, Inc. (CPAI)	7,500 (January 2004)	7,500 (August 2004)	N/A
Thomson Gas Cycling	Exploration	ExxonMobil	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)
Oooguruk 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)

N.4.4 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 (See Appendix H – Response Operating Conditions and Limitations). Drilling operations will be conducted utilizing key precautionary measures documented in the COCP to minimize both the likelihood and consequence of an oil spill incident from offshore drilling in the Beaufort Sea. Conditions specific to Shell's Beaufort Sea operations that potentially elevate 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. Excessive heat may cause gases to expand and increase the likelihood of discharge. Drilling operations conducted in the Arctic are exposed to 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 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.

N.4.4.1 Severe Weather

In general, meteorological and oceanographic conditions at the project location are moderate during the summer months (Appendix H – Response Operating Conditions and Limitations). Winds are predominately from the ENE June through November with occasional low-pressure systems moving into the area from the western Pacific through the Bering Strait bringing warm air and moisture. Wet conditions producing fog and rain can result in periods of low visibility on the open ocean. Storms are more common during the winter months than the summer. The frequency of storms and associated high winds increase with the transition of open water season into the fall freezeup time frame. Severe storms generally originate from the southwest, progress swiftly into the area, and last a relatively short time, although rough weather will on occasion persist for many days.

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.

Because heavy weather will clearly influence vessel response, environmental conditions will be regularly monitored at the drilling vessel 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-hr/day basis.

Shell has developed a COCP, 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 onboard, minimize the risk of damage to equipment, and minimize the chance of a discharge attributable to the severe weather conditions (see Section N.4.4.4 below for more information on this document).

Once on location, the drilling vessel and key personnel monitor weather conditions continually using a variety of data including aerial ice reconnaissance, third-party forecasts from weather services, and onboard weather surveillance and motion monitoring. Critical operations will be managed in accordance with the COCP, which prescribes allowable operating parameters based upon the “T-time” value. T-time is defined as the estimated (total) time to secure the well and leave the location. The T-time value is updated at least daily by operations and marine personnel. The value is based upon the time required to trip or recover the drillpipe 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 drillpipe is hung off the blowout prevention stack, and the drilling unit crew prepares to recover anchoring equipment. If weather and sea conditions continue to deteriorate, the lower marine riser package is disconnected and anchoring equipment is recovered (or released if necessary). If weather severity reaches specified levels, the drilling vessel moves off location and is positioned to ride out the storm.

N.4.4.2 Ice Conditions

On-site project activities will begin after July 1. The retreat of the ice typically occurs in most years from early June to late July. The duration of open water (≤1/10 ice concentration) in the central Beaufort Sea has lengthened by up to four weeks over the past 30 years to a summer average of 17 weeks. However, the range of open water is variable from year to year and ice could be present at the drill site. An IMP is in place to ensure safe operations at all times. Exploration drilling will not be conducted after October 31. Other project activities may continue until the onset of freezeup, which historically varies from late October to late November.

Shell’s ice management system combines ice monitoring and forecasting techniques, along with icebreaking operations. Ice monitoring techniques include satellite-based SAR, airborne and icebreaker reconnaissance, ice forecasting, and weather forecasting. Forecasting incorporates data from the federal services of Canadian Ice Service and NOAA. Shell also intends to use specialized software to integrate ice speed and direction data from vessel radar, aerial reconnaissance, and satellite imagery to predict individual ice floe movement; therefore, 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 ice management vessels will accompany each drilling vessel unit. Typically, one ice management vessel may deflect or break up large ice floes farther away by circling updrift or upwind (“upstream”) in the flowing sea ice, while the other protects the drilling vessel by further breaking closer ice floes into smaller pieces so that the drilling vessel is able to maintain position.

Shell has developed two sets of protocols for responding to potentially hazardous ice conditions: one set of protocols for typical summer drilling when ice driven by wind and currents can move into the area; and another set of protocols to address winter freezeup conditions. 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 drillpipe when hazardous ice conditions are anticipated within the T-time plus four hours. If the ice management strategy is not capable of preventing a large ice floe from impacting the drilling vessel or reducing ice buildup, then the drilling vessel begins preparing in stages to secure the well and disconnect from the lower marine riser package, recover anchoring equipment, and vacate the drilling location.

The Ice Alert Procedures spell out specific responsibilities for personnel onboard the drilling vessel and onboard 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 for safely and efficiently stopping current operations so that the riser can be disconnected and the anchors retrieved or disconnected to move off location." All estimates of operational 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."

N.4.4.3 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 superstructure will be thickest on windward surfaces between 33 to 164 ft (10 to 50 m) above the water surface. 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 *Discoverer* has been Arctic strengthened. Both vessels have pre-established ice load limits. If icing for either drilling vessel 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 *Discoverer* will, upon conversion, incorporate features to minimize the accumulation of spray ice, such as enclosed work spaces and enclosed or heat-traced piping.

The *Discoverer* has been arctic-strengthened and has pre-established ice load limits. If icing on the drilling vessel approaches the allowable amount, raising the allowed vertical center of gravity, critical operations will be curtailed until sufficient ice has been removed and the loading is acceptable. The *Discoverer* incorporates 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 it will be removed. Removal onboard the vessel will be accomplished by means of portable heaters, steam hoses, steam lances, wooden ice bats, and picks.

N.4.4.4 Critical Operations and Curtailment Plan

BSEE requires that offshore operators in the Alaska OCS Region develop procedures and maintain an BSEE-approved COCP. 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 be either 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 drill 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, on-site 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 drilling vessel's performance in ambient conditions is obtained from a performance-monitoring system installed onboard. An alert status system has been established onboard the drilling vessel to anticipate hazardous ice and weather events and to assign pre-determined responses for all responsible personnel.

The COCP describes the comprehensive effort that Shell and the drilling vessel contractors provide 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 BSEE. The COCP is also readily available onboard the drilling vessel and in Shell's offices.

The COCP defines standards and guidelines for the conduct of operations on the drilling vessel to minimize any hazard to personnel or the environment. In the 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 potentially forcing the drilling vessel off location in an uncontrolled fashion.

N.4.4.5 Hours of Light at 70°N Latitude

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.

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

N.4.5 Discharge Detection [18 AAC 75.425(e)(2)(E)]

N.4.5.1 Drilling Operations

Visual surveillance is used for discharge detection. Visual inspections are an important component of leak and spill detection because automated systems may not detect small leaks and spills. The drilling vessel and fuel-transfer operations will be closely monitored at all times (see Section N.4.1.6). Operations will be staffed 24 hr/day by drilling personnel. Once per 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 continually monitor the drilling equipment and will stop drilling if unsafe conditions are observed.

N.4.5.2 Automated Methods

The drillshipdrilling vessel 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.

Several independent ESD Systems limit the scope of any single failure. An ESD can be initiated by process conditions outside pre-set limits or manually initiated by operators at the instrument/control panels. Manually-actuated ESDs (punch-button panels) are also strategically placed throughout 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 *Discoverer* Drilling Vessel Discharge Detection

The *Discoverer* drilling vessel 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 drilling vessel'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.

N.4.6 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 OSRP (See Appendix A – Response Equipment) substantially exceeds the mechanical recovery capability needed to contain the WCD (see Appendix C – WCD Scenario, and Sections N.1 and N.2 of this Appendix).

N.4.7 Compliance Schedule [18 AAC 75.425(e)(2)(G)]

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

N.5 BEST AVAILABLE TECHNOLOGY [18 AAC 75.425(e)(4)]

This section discusses the BAT requirements contained in 18 AAC 75.425(e)(4)(A), (B), and (C) to address technologies not subject to RPS 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 used is BAT.

Additional information about BAT is also provided in the ACS Technical Manual, Volume I, Tactics L-11A through C.

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 Appendix N of the OSRP.

- 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 BAT for conditions commonly found in the Beaufort Sea. Brief descriptions of these systems follow:

- Transrec 150 weir skimmer is a well-proven recovery system and selected by major response organizations, including SERVS, MSRC, and the NOFO, as the primary open-ocean-skimming device. NOFO has performed extensive field tests of the Transrec skimmer both in actual spill events and open ocean trials using free crude oil. Shell's OSR assets include four (4) Transrec 150 weir skimmers. The offshore OSR barge is equipped with two (2) skimmer units mounted near the stern of the vessel, port and starboard. The two VOSS, staged within 42 hr of the drill site, are each equipped with one skimmer unit mounted near the stern of the vessel. This configuration permits the self-propelled, floating skimmer heads attached to a 312-ft (95-m) umbilical hose to be maneuvered into the thickest oil layers within the apex of the containment boom for optimum recovery. Each Transrec 150 has a name-plate recovery capacity up to approximately 2,516 bbl/hr (400 cu m/hr), giving Shell's OSR skimming capability a combined total capacity up to 10,064 bbl/hr (1,600 cu m/hr).

- Lamor-Lori brush skimmers, each consisting of five parallel, stiff-brush chains, were selected as proven systems for conducting recovery operations. Shell's OSR vessel and Nearshore OSR barge are each equipped with two of these over-the-side skimming packages, yielding a total name-plate recovery capacity of approximately 2,580 bbl/hr or 410 cu m/hr for each vessel. 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 percent free water.
- Lamor-Lori brush skimmers were selected as the primary recovery system for Shell's 47-ft, self-propelled skimmer that will be stored on, and launched from the OSR barge. 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 approximately 516 bbl/hr (82 cu m/hr) gives this system a total potential recovery of approximately 1,032 bbl/hr (164 cu m/hr). 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 consists of eight continuous loops of oleophilic fiber mops with a combined name-plate capacity of approximately 503 bb/hr (80 cu m/hr). Stored onboard the OSR vessel, two of these skimmers provide an additional 1,006 bbl/hr (160 cu m/hr) 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 Duplex Disc/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 disc/brush skimmers, each rated at approximately 88 bbl/hr (14 cu m/hr), will be located onboard the primary OSR vessel, giving flexibility for the recovery of oil from isolated pools. Their combined recovery potential represents another approximately 176 bbl/hr (28 cu m/hr).
- RubberMax 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 m (656 ft) of boom. The height of the boom is 67 inches (170 cm) with a freeboard of 24 inches (60 cm) and a draft of 43 inches (110 cm). Eight of these systems will be available on site for use in multiple configurations such as a large open-apex deflection system; deflection booms secured to an OSR vessel, providing deflection for an OSR vessel; and as independent U-boom configurations for the collection of oil.
- Three water-cooled, Hydro-Fireboom packages, each with 500 ft (152 m) of inflatable boom [with 14-inch (36 cm) floatation and 18-inch (46 cm) skirt] are stored on Shell's OSR vessel and OSR barge. 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 contained 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 bopd. This boom has undergone rigorous testing with pit burns and in large tanks (Ohmsett Facility in New Jersey).

N.5.1 Communications [18 AAC 75.425(e)(4)(A)(i)]

The communications system for use in a spill response at proposed locations is described in the ACS Tactics L-5 and L-11A, Shell Tactic LE-1, and in Section 2.4 of this OSRP. As described in Section 2.4 of the OSRP, satellite communications systems will be used to maintain compatibility with communication systems of Shell, ACS, all North Slope operators, and the worldwide telephone network. Specifically, the drilling vessel will be equipped with 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.

N.5.2 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 the drilling vessel. In addition to the narrative contained in these sections, loss of well control (i.e., a blowout) is also addressed in Section N.3 and Section N.4.1.8 of this Appendix, 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.

N.5.2.1 Well Source Control

This BAT analysis for well source control (Table N.5-1) 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 is the assumption that the first three layers of prevention (see Section N.4.1.8 of this Appendix) have failed or have not been sufficient to control the well. The assumptions for this BAT analysis are that the following planned layers of prevention have failed:

- 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); and
- A mechanical barrier (e.g., the BOP, casing, or cement) failed (Layer III).

Operations are also monitored by Shell's RTOC, which assists in monitoring operations, analyzing penetrated formations, and analyzing pressure trends. The Houston RTOC supplements the mud-logging capabilities of the drilling vessel.

Surface Control Measures

Dynamic surface control is accepted by industry and government as a BAT method for source control of a blowout from an offshore well with a subsea BOP. Dynamic surface control is the process of pumping fluid down the drill string or casing, and circulating the fluid up the pipe by hole annulus at a sufficient rate to create fluid friction that will: a) match or exceed reservoir bottomhole pressure to stop the flow, b) flush hydrocarbons from the annulus, and, c) prevent annular plugging by friable formation flow (e.g., sand) that would cause the drill string or casing to become stuck in the hole. It is for this reason that an 8 ½-inch pilot hole is drilled below the 30-inch casing and opened to 26-inch to accept the 20-inch casing, another 8 ½-inch pilot hole is drilled below the 20-inch casing and opened to 17 ½-inch to accept the 13 3/8-inch casing and so on. In each hole segment, the smaller diameter pilot hole reduces the rate from an uncontrolled formation flow due to a limited area provided in the annulus between the drill string and the hole and it provides the optimum condition for killing the flow via the dynamic surface pumping technique. This same technique is used when intersecting a blowing well with a relief well. Fluid is pumped down the relief well and up the blowout well at a rate sufficient to kill the flow by creating fluid friction in what is commonly called a dynamic kill. This is not the same as Layer II of well control as described in Section N.4.1.8 which involves early kick detection and kick control, usually shutting in the well rapidly. Dynamic Surface Pumping is a technique used to control a flow after it begins. Kick circulation is normally done at slower pump rates where fluid friction in the annulus is not needed as a control mechanism.

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

- BOP 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. Factors that would make this method infeasible include:

- Any situation where the BOP 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 drilling equipment was damaged to an extent to make it ineffective; or
- The vessel had to move off the location for safety and/or vessel stability reasons.

Concurrent with implementing surface control techniques, Shell would be preparing to mobilize and drill a relief well as a contingency.

Well Capping

Subsea well capping capability has recently been developed that will secure a blowout by installing a purpose-built capping stack directly onto the top of the wellhead or a component of the original BOP stack. These techniques have been utilized and proven effective in dealing with several wells in the Gulf of Mexico following storm damage to platforms that initiated a well control event. Additionally, well capping was successfully employed to stop the flow from the Macondo well blowout in deep water. When compared to the time required for drilling a relief well, well capping can be more rapidly implemented to reduce or stop flow of oil escaping into the water column thereby reducing associated environmental impacts.

Table N.5-1
Best Available Technology Analysis
Well Blowout Source Control

BEST AVAILABLE TECHNOLOGY (BAT) EVALUATION CRITERIA	PROPOSED METHOD: DYNAMIC SURFACE CONTROL	ALTERNATE METHOD: WELL CAPPING	ALTERNATE METHOD: RELIEF WELL DRILLING
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.	Subsea capping capability has recently been developed that will allow a blowout to be secured by installed a purpose-built capping stack directly onto the top of the wellhead or a component of the original BOP stack. By closing valves on this capping stack, flow can quickly be halted. In the alternative, kill fluids can be pumped from a surface vessel into the flowing well to stop the flow.	Relief well drilling equipment (drilling unit downhole tools, etc.) are widely available aside from equipment required from a few specialty providers (e.g., ranging services).
TRANSFERABILITY: Whether each technology is transferable to applicant's operations	Technique is directly transferable, and equipment is the same as is used on the drilling vessel during normal operations.	This technique is directly transferrable to Shell's operations in the Beaufort Sea. There are several capping systems now available commercially, although Shell's arctic capping stack was designed for exploration wells in the Beaufort Sea.	Relief well drilling is directly transferable and can be performed by the drilling vessel in use by Shell in the Beaufort Sea.
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 the best opportunity for minimizing pollution impacts because most blowout wells are controlled with dynamic surface controls while other methods are being mobilized. Technique would not be effective if BOP had failed, and a safe work environment could not be ensured in the event of extensive drilling vessel or equipment damage, or if the drilling vessel had to move from the location.	Capping has proven to be effective in dealing with several wells in shallow water in the Gulf of Mexico following storm damage to platforms that initiated a well control event. Capping was most recently used to stop the flow from the BP Macondo well after a subsea blowout in deep water in the GOM.	Technique is generally understood to be effective in a wide range of situations.
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 drilling vessel is available to kill the well and consumables such as drilling fluids and cement are readily available.	Cost for capping equipment are relatively low compared with other drilling costs and the cost of drilling a relief well and extending the time required for surface cleanup operations. The capping equipment will be available for deployment from one of the surface support vessels at or near the drill site.	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.

Table N.5-1 (Continued)
Best Available Technology Analysis
Well Blowout Source Control

BEST AVAILABLE TECHNOLOGY (BAT) EVALUATION CRITERIA	PROPOSED METHOD: DYNAMIC SURFACE CONTROL	ALTERNATE METHOD: WELL CAPPING	ALTERNATE METHOD: RELIEF WELL DRILLING
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 drilling vessel during normal operations.	Capping equipment is compatible with the wellheads, BOP stacks and connections available thereto. The capping stack involves components that are similar to those found in subsea blowout preventers used in normal exploration drilling operations.	The age and condition of the drilling vessel and associated equipment available for a relief well are appropriate for the operation.
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 drilling vessel during normal operations.	Capping equipment is compatible with the wellheads, BOP stacks and connections available thereto. The capping stack involves components that are similar to those found in subsea blowout preventers used in normal exploration drilling operations.	Technology is compatible. The drilling vessel has comparable equipment 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 BOP had failed. Applied at the surface, the technology is not sensitive to well type. Demonstrated success in historical well control efforts.	Capping technology is both feasible and operationally viable. Recent engineering designs have proven to be effective and will are expected to provide blowout control even in the event of a failed blowout preventer.	Method feasibility is contingent upon geographical access near area of blowout. Seasonal ice conditions (e.g., offshore Beaufort) limit application to the drilling season.
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.	Deployment and rapid blowout shutoff will reduce the volume of oil escaping into the water column from a subsea flow thereby reducing environmental impacts when compared to the time required for drilling a relief well. No additional impacts would results from, say, mooring the relief well drilling vessel, constructing a mudline cellar or discharging waste streams into the sea. In short, capping is the leading concept for shallow water blowout control in the Beaufort Sea.	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.

Relief Well Drilling

A relief well would be drilled by the on-site drilling vessel in the Beaufort Sea (Section N.3 of this Appendix and Appendix C). In the event of a blowout, the drilling vessel would be redeployed to a suitable location to initiate a relief well.

Relief well drilling in a blowout zone can be a time-consuming and costly process. The lead-time involved drilling a relief well necessitates early planning. Within Shell's exploration, it is estimated that once on location, a relief well can be drilled within 30 days for TVD up to 12,000 ft (2,348 m) in the Beaufort Sea. 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 and ice and water conditions. Statistically, it is more than likely that the blowout well would kill itself before the need to mobilize the drilling vessel.

Relief well drilling technology is compatible with drilling operations in the Beaufort, although it may be sensitive to both the well location and well type. Downhole and surface equipment (e.g., tubulars, wellheads, or similar equipment) is readily available to support relief well drilling operations.

Relief well drilling has been attempted only once on the North Slope as a mitigation measure to control a blowout. The 1992 incident was a natural gas blowout while drilling the ARCO Cirque exploration well. Control of the well was regained in approximately two weeks through the application of surface well capping techniques assisted by natural bridging.

Because Shell's plans for the Beaufort Sea do not include extended reach wells, relief well operations would 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 MLC for the relief well;
- There is no open-hole logging on wireline at casing points for relief well; and
- The use of ranging services to specifically locate the original wellbore.

Relief well drilling in the Beaufort Sea would be 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.

N.5.2.2 Tank Source Control

Drilling vessel tanks are inspected in accordance with API 653 by the BSEE and USCG as part of the drilling vessel 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 hrs/day. 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.

N.5.3 Trajectory Analyses [18 AAC 75.425(e)(4)(A)(i)]

As exploration drilling utilizes a subsea BOP, oil associated with a blowout WCD is presumed to reach the mud-water interface (i.e., seabed) almost immediately. Various techniques for monitoring the spill trajectory include the use of the established oil spill trajectory models (e.g., GNOME, OILMAP) and use of aerial reconnaissance.

Computer-based trajectory analyses (see Appendix C – WCD Scenario) 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 2.7 of the OSRP).

N.5.4 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 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 the Shell WRP (Appendix I).

The *Discoverer* drilling vessel will have MMOs onboard at all times. This is considered the BAT for wildlife monitoring.

N.5.5 Cathodic Protection [18 AAC 75.076(h)(4)(A)(ii)]

Not applicable.

N.5.6 Leak Detection Tanks [18 AAC 75.425(e)(4)(A)(ii)]

Visual inspection is BAT for the detection of leaks from drilling vessel tanks. The drilling vessel will be staffed 24 hrs/day during operations and closely monitored at all times for leaks. Standard operating procedures and BMPs provide for daily inspections of fuel tanks. Personnel will visually inspect tankage, sumps and drains at a minimum once per day for indications of leakage. Daily visual inspections, as outlined in Section N.4.5, provide the most reliable, feasible, and cost-effective means to detect leaks.

Prior to exploration operations, drilling vessel tanks are inspected in accordance with American Petroleum Institute (API) 653 by the BSEE and USCG as part of the drilling vessel inspection to ensure the structural integrity of all components.

These inspections are evaluated in Table N.5-2 in accordance with the criteria set forth in 18 AAC 75.445(k)(3) and ACS Tactic L-11.

N.5.7 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. 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 presented in Appendix M (USCG Supplement).

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 (BAT). BMPs indicate two operators present, in direct line of sight of each other, and 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 wireline unit and the crane fuel tanks.

The *Discoverer's* major integral tanks are sounded at least once per day to verify liquid levels. Tank levels also are manually measured prior to any fuel transfer to determine their volume and remaining capacity. Strict procedures are observed for fuel transfer and discharge prevention. Fuel transfers between internal tanks and onboard equipment are made regularly, depending on equipment and usage. Fuel transfers 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. Overflow from the temporary or deck equipment fuel tanks are 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.

Tank liquid level determination systems are evaluated in Table N.5-3. These visual and manual methods, together with adhere to strict procedures, are a proven BAT method for monitoring tank levels. These methods are as good as or better than the alternative methods presented in this document (Section N.5), and provide the most reliable, feasible, and cost-effective alternative.

Table N.5-2
Best Available Technology Analysis
Leak Detection for Tank

BEST AVAILABLE TECHNOLOGY (BAT) EVALUATION CRITERIA	CURRENT METHOD: VISUAL INSPECTIONS
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 drilling vessels 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-hr 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-hr operations on the drilling vessel, 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 N.5-3
Best Available Technology Analysis
Tank Liquid Level Determination System

BEST AVAILABLE TECHNOLOGY (BAT) EVALUATION CRITERIA	PROPOSED METHOD: VISUAL INSPECTION AND MANUAL GAUGING	ALTERNATIVE 1: SIGHT GLASS WITH BALL CHECK VALVE CONTROL SYSTEM	ALTERNATIVE 2: FLOAT LEVEL GAUGE (VAREC) CONTROL SYSTEM
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
TRANSFERABILITY: Whether each technology is transferable to applicant's operations	Transferable.	Undetermined.	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 and manual measurement. 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.
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.
AGE AND CONDITION: The age and condition of technology in use by the applicant	Procedures have been in place at North Slope facilities since 1993 for visual fuel transfer operations and tank strapping devices have been in use for 50 years.	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.
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 breakage potential is a concern.	Compatible and used in the industry on tanks in Alaska.
FEASIBILITY: The practical feasibility of each technology in terms of engineering and other operational aspects	Feasible and preferred due to reliability in conjunction with BMP and monitoring procedures.	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.
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.

N.5.8 Maintenance Procedures for Buried Steel Piping [18 AAC 75.425(e)(4)(A)(ii)]

Not Applicable.

N.5.9 Protective Wrapping or Coating for Tanks and Pipeline [18 AAC 75.425(e)(4)(A)(ii)]

Not Applicable.

N.5.10 Corrosion Surveys for an Existing Installation

Not Applicable.

N.5.11 Pipeline Leak Detection

Not Applicable.

N.6 RESPONSE PLANNING STANDARDS [18 AAC 75.425(e)(5)]

This section discusses the applicable RPS used in this plan, as set forth in 18 AAC 75.430 through 18 AAC 75.440 and 18 AAC 75.442.

N.6.1 Well Blowout

ADEC's regulations, 18 AAC 75.434, establish that an RPS volume for an exploration facility to be 5,500 bopd, or best producing well data, for the duration of 15 days (18 AAC 75.434). For planning purposes, the total RPS volume in the ADEC-Specific Scenario is based upon the WCD volume of 16,000 bopd for the duration of 15-day time period (16,000 x 15 = 240,000 bbl) (Section N.1 and N.2 of this Appendix). See Appendix C 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 240,000 bbl [(240,000 x 1.54 = 369,600) + (240,000 x 0.20 = 48,000) = 417,600] for a total storage volume of 417,600 bbl.

N.6.2 Fuel Transfer Strategy [18 AAC 75.025]

The WCD for the fuel transfer strategy prepared for this OSRP is based on the definition contained in 33 CFR 154.1029(b)(2), using the following values:

- maximum time to discover release: 5 min
- maximum time to shutdown pumping: 0.5 min (30 sec)
- maximum transfer rate: 320 gpm (based on representative fuel transfer pumps = 7.6 bbl/min)
- total line drainage volume: 163 gal [premising 4 inch by 820 ft (10 cm by 250 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

N.6.3 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 OSRP (refer to Table N.6-1 and Appendix A – Response Equipment) substantially exceed the mechanical recovery capability needed to contain the RPS. The recovery of offshore oil meets the State of Alaska RPS as it accounts for the assumption that 10 percent of the 16,000-bopd discharge escapes the primary offshore recovery efforts at the blowout. For planning purposes, Shell's conservative approach to the development of their OSR program was based upon the need to ensure adequate response capability and to scale the potential shoreline response assets needed to protect sensitive areas.

As required by 18 AAC 75.425, the recovery rates in Table N.6-1 also account for each asset's need to manage on-water storage limitations and time to offload interim storage to the OST. The State of Alaska's standards and evaluation criteria include demonstration of capability by time and equipment de-rated recovery capacities. Shell's offshore skimming capability meets the recovery needs within the required timeframe.

There are several inherent differences in presentation of recovery capability information between the State of Alaska and that required by 30 CFR 254. BSEE evaluates the effective daily recovery capacities per 30 CFR 254.44 criteria (Table C-3). Based upon the respective calculations, Shell's response capability in the Beaufort Sea meets the federal and state standards for demonstrating sufficient recovery capacity.

Table N.6-1
Well Blowout in Summer
Derated Potential Recovery Capability

A	B	C	D	E	F	G	H	I	J	K	L
								24 HR OPERATING PERIODS			48 HR OPERATING PERIODS
SHELL / ACS SPILL RECOVERY TACTIC	RECOVERY SYSTEM	NUMBER OF SYSTEMS	DERATED RECOVERY CAPACITY PER SKIMMER[1, 2] (BBL/HR)	SCENARIO RECOVERY RATE[3, 4] (BBL/HR)	MOBILIZATION AND TRANSIT TIME TO SITE (TIME)	OPERATING TIME ON DAY 1 (HR/DAY)	DERATED RECOVERY CAPACITY ON DAY 1[5] [BBL/DAY] (C X D X G)	DERATED RECOVERY CAPACITY ON DAY 2[5,6] (C X D X 24 HR)	DERATED RECOVERY CAPACITY ON DAY 3[5,6] (C X D X 24 HR)	DERATED RECOVERY CAPACITY ON DAY 4[5,6] (C X D X 24 HR)	DERATED RECOVERY CAPACITY AFTER DAY 4[7] (C X D X 24 HR)
OFFSHORE RECOVERY											
TF -1: Shell OR-2A, OR-2B	Lamor LSC-5	2	258	938	<1 hr	23	11,868	0	12,384	0	12,384
TF-2: Shell OR-2B	Transrec 150	2	503	938	3 hr	21	21,126	24,144	0	24,144	24,144
TF-4: Shell OR-10	Transrec 150	1	503	938	42 hr	0	0	0	12,072	0	12,072
TF-5: Shell OR-10	Transrec 150	1	503	938	42 hr	0	0	3,018	0	12,072	12,072
NEAR SHORE / SHORELINE RECOVERY											
TF-6 Shell OR-1A, OR-1B	Lamor LSC-5	2	258	104	96 hr	0	0	0	0	0	12,384
TF-6: Shell OR-4A, OR-4B	Lamor LORS-2C	2	103	104	96 hr	0	0	0	0	0	4,944
TF-8: ACS R-16	Hook boom configuration with oleophilic skimmer	10	10	104	96 hr	0	0	0	0	0	2,400
TOTAL BBLS OF RECOVERED LIQUIDS/DAY							32,994[8]	27,162[8]	24,456[8]	36,216[8]	80,400[8]

Table N.6-1
Well Blowout in Summer
Derated Potential Recovery Capability (Continued)

1. Pumps are derated to 20% per 30 CFR 254.44 (a) and (b).
2 Pump performance calculations assume one (1) cu m equals 6.29 bbl (U.S. oil).
3. The offshore scenario recovery rate is based upon the planning assumption that of 1,042 bbl/hr of oil released per hour a 90% fraction of the release volume (938 bbl/hr) remains offshore for recovery and a 10% fraction (104 bbl/hr) may escape the primary offshore recovery operations and drift toward the nearshore and shorelines. The derated recovery capacity of the listed operating skimmers exceeds the estimated quantity of oil available for recovery within a 24 hr period.
4. The nearshore recovery rate is based upon the planning assumption that a 10% fraction of the daily release volume (104 bbl/hr) may escape the primary offshore recovery operations and drift toward the nearshore and shorelines. Based upon trajectory modeling, oil would reach the nearshore at the earliest after Day 6 and only in the unlikely event of sustained winds from the W or WNW. The scenario trajectory developed using historical winds and the BOEM Beaufort current model shows that oil has a low probability of shoreline contact by Day 28.
5. The scenario recovery rate of 938 bbl/hr is assumed to be shared between recovery systems. The combined systems have sufficient recovery and storage capacity to operate for the 24 hr period.
6. After Hour 42, recovery calculations assume that operations go into a 24-hr rotation with TF2 and TF-5 alternating with TF-1 and TF-4 as skimming platforms to maintain recovery operations. TF-2 and TF 5 recovers for 24 hr at a time using the Transrec 150 while TF-2 and TF-5 lighters to the OST. During the next 24-hr cycle TF-2 and TF-5 recovers using the Lamor side collectors and Transrec 150 skimmers while TF-1 and TF-4 lighter to the OST For purposes of calculating total recovery, 24 hr of recovery per day is used for the skimming systems.
7. Beyond Day 4, a 48-hr operating period is used to calculate recovery. TF-1, TF-2, TF-3 and TF-4 operate on 24-hr rotation cycles while TF-6, TF-7 and TF-8 operate based upon a 12 hr shift per day or two shifts per 48 hr.
8. Skimming capacity exceeds the daily offshore recovery rate of 1,042 bbl/hr (938 bbl/hr offshore and the 104 bbl/hr assumed to drift toward the nearshore).

N.7 RENEWAL REQUIREMENTS

Per 18 AAC 75.415, a state ODPCP must be renewed by the ADEC every five years from the date of approval or when changes are made that diminish the ability to respond.

Shell will notify ADEC, via plan amendment, of specific and applicable update information to this OSRP prior to commencing drilling activities. Amendment or updates to the OSRP 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 hard copies 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 OSRP holder to incorporate amendments or updates into the OSRP.