

**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION 10  
SEATTLE, WASHINGTON**

**STATEMENT OF BASIS  
FOR DRAFT  
OUTER CONTINENTAL SHELF  
PERMIT TO CONSTRUCT AND TITLE V AIR QUALITY OPERATING  
PERMIT NO. R10OCS030000**

**SHELL OFFSHORE INC.  
CONICAL DRILLING UNIT KULLUK  
BEAUFORT SEA EXPLORATION DRILLING PROGRAM**

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Date of Permit: July 22, 2011

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## ABBREVIATIONS AND ACRONYMS

ASTM	American Society of Testing and Materials
BOEMRE	Bureau of Ocean Energy Management, Regulation and Enforcement
CAA	Clean Air Act
CCV	Closed Crankcase Ventilation
CFR	Code of Federal Regulations
CH <sub>4</sub>	Methane
CO	Carbon monoxide
CO <sub>2</sub>	Carbon Dioxide
CO <sub>2</sub> e	Carbon Dioxide Equivalent
COA	Corresponding Onshore Area
DOI	Department of Interior
EJ	Environmental Justice
EPA	United States Environmental Protection Agency
ESA	Endangered Species Act
Fed. Reg	Federal Register
GHG	Greenhouse Gas or Greenhouse Gases
HAP	Hazardous Air Pollutants
H <sub>2</sub> S	Hydrogen Sulfide
hp	Horsepower
HPU	Hydraulic Power Units
ICAS	Inupiat Community of the North Slope
kW-e	KiloWatts electric
lbs	Pounds
MLC	Mud Line Cellar
MMS	Minerals Management Services (now BOEMRE)
MMBtu	Million British thermal units
MSA	Magnuson-Stevens Act
NA	Not applicable
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NESHAP	National Emission Standards for Hazardous Air Pollutants
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NO <sub>x</sub>	Oxides of nitrogen
NO <sub>2</sub>	Nitrogen Dioxide
N <sub>2</sub> O	Nitrous Oxide
NSPS	New Source Performance Standards
NSR	New Source Review
OCS	Outer continental shelf
OCSLA	Outer Continental Shelf Lands Act
OSRV	Oil spill response vessel
Part 55	40 CFR Part 55
PM <sub>2.5</sub>	Particulate matter with an aerodynamic diameter less than 2.5 microns
PM <sub>10</sub>	Particulate matter with an aerodynamic diameter less than 10 microns
ppmv	Parts per million by volume
PSD	Prevention of Significant Deterioration
PTE	Potential to Emit
SCR	Selective Catalytic Reduction
SO <sub>2</sub>	Sulfur Dioxide
tpy	Tons per year
USCG	United States Coast Guard
ULSD	Ultra Low Sulfur Diesel
VOC	Volatile organic compound
wt%	Weight percent

# 1. INTRODUCTION, PROJECT DESCRIPTION, AND PUBLIC PARTICIPATION

## 1.1 Introduction

Shell Offshore Inc. (referred to hereinafter as Shell, facility, source, or permittee) proposes to operate the Kulluk conical drilling unit (Kulluk) and its associated fleet to conduct exploratory drilling on lease blocks located on the Outer Continental Shelf (OCS) in the Beaufort Sea off the North Slope of Alaska, as authorized by the Bureau of Ocean Energy Management, Regulation and Enforcement (BOEMRE). The leased areas are part of Lease Sales 186, 202, and 195, and are within and beyond 25 miles of Alaska’s seaward boundary.

The 1990 Clean Air Act (CAA or “the Act”) amendments transferred authority for implementation of the CAA for sources subject to the Outer Continental Shelf Lands Act (OCSLA) from the Mineral Management Service (now BOEMRE) to the Environmental Protection Agency (EPA). Section 328 of the Act directed EPA to establish requirements to control air pollution from OCS sources in order to attain and maintain federal and state ambient air quality standards and to comply with the provisions of Part C, Title I of the Act. EPA promulgated air quality regulations applicable to OCS Sources at Title 40 of the Code of Federal Regulations (CFR) Part 55 (Part 55).

The 1990 CAA amendments also established a comprehensive air quality permit program under the authority of Title V of the Act. EPA regulations implementing Title V are promulgated at 40 CFR Part 71 (for permits issued by EPA) and 40 CFR Part 70 (for permits issued by states). The Title V air quality operating permit, or Title V permit, is an enforceable compilation of all air pollution requirements that are applicable to an air emission source. A Title V permit is developed in a public process, sets forth enforceable terms, conditions, and limitations, and is valid for five years but may be renewed.

The operation of the Kulluk and associated fleet on and above the OCS is subject to Section 328 of the CAA, Part 55, and Alaska corresponding onshore area requirements. To comply with these requirements, which are discussed in more detail in Section 2 of this Statement of Basis (SOB), Shell submitted applications to EPA Region 10 (Region 10) for three permits to cover air pollution from its exploratory drilling operations on current OCS lease blocks in the Beaufort Sea: an OCS/Title V permit under Parts 55 and 71 for operations beyond 25 miles of Alaska’s seaward boundary; a minor permit for air quality protection under 18 Alaska Administrative Code (AAC) 50.502 and for owner requested limitations under 18 AAC 50.508 to make Prevention of Significant Deterioration (PSD) review unnecessary for operations within 25 miles of Alaska’s seaward boundary; and a Title V permit under 18 AAC 50.326 for operations within 25 miles of Alaska’s seaward boundary. Shell requested that the three permits be consolidated into a single permit (hereinafter “OCS/Title V permit” or “draft permit”).

In support of its permit application, Shell provided analyses that showed its pre-permit potential to emit (PTE) for carbon monoxide (CO), sulfur dioxide (SO<sub>2</sub>), and nitrogen oxides (NO<sub>x</sub>) would exceed the applicable major source threshold of 250 tons per year (tpy). In addition, the project’s pre-permit PTE for greenhouse gas (GHG) emissions would exceed 100,000 tpy carbon dioxide equivalent (CO<sub>2</sub>e), the threshold established in EPA’s recent PSD “Tailoring Rule” defining when new sources of GHGs are subject to regulation for purposes of PSD. 75 Fed. Reg.

31,514 (June 3, 2010). As a major source operating on the OCS, Shell would be subject to the PSD requirements of Part C, Title I of the CAA.

In its permit application, however, Shell requested that its OCS/Title V permit contain federally enforceable restrictions that would limit its PTE of CO, SO<sub>2</sub>, and NO<sub>x</sub> to below PSD major source thresholds and its PTE for GHGs below the level at which GHGs become “subject to regulation” under the Tailoring Rule.<sup>1</sup> If finalized, the draft OCS/Title V permit will allow Shell to operate the Kulluk and Associated Fleet subject to the terms and conditions of the permit. Title V permits are issued for a duration of five years from the effective date of the permit.

This SOB describes the derivation of the permit conditions and the reasons for them, as well as the legal and factual basis for the permit conditions as provided in 40 CFR §§ 71.7(a)(5) and 71.11(b). The SOB addresses issues including the emitting processes associated with the operation of the Kulluk and associated fleet, air emissions, permitting history, the CAA statutory or regulatory provisions that relate to such operations, and steps taken to provide opportunities for public review of the permit. Note that it is the final OCS/Title V permit, not the SOB, which is legally enforceable. Any errors or omissions in the summaries provided herein do not excuse Shell from complying with the requirements of its OCS/Title V permit. Furthermore, the proposed exploratory drilling operations described in this SOB are also subject to oversight and approval by BOEMRE, including the issuance of a permit to drill.

**Permit Application Chronology<sup>2</sup>: February 2011 to July 2011**

Submission Date	Document Description
February 28, 2011	Kulluk operating permit applications with supplemental report
March 1, 2011	Revision to page one of supplemental report
March 7, 2011	Air quality impact modeling files
March 9, 2011	Meteorological files and COARE program
March 18, 2011	Additional air quality impact modeling files
March 28, 2011	Shell response to questions submitted by Region 10 on March 25, 2011
March 29, 2011	Revision to application forms and application appendices
April 7, 2011	Detailed Beaufort Sea lease map, description of mooring process, and sensitivity limits to mixing height
April 18, 2011	Draft pre-permitted potential to emit

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<sup>1</sup> As explained in more detail in Sections 2 and 3 of the Statement of Basis, Shell’s project is being permitted as a “synthetic minor” source, with federally enforceable limits restricting its PTE to below PSD major source thresholds, as well as its PTE for GHGs to below the threshold at which GHG’s become subject to regulation under the Tailoring Rule.

<sup>2</sup> The Administrative Record also contains numerous emails and correspondence between Shell and its consultants and EPA clarifying various aspects of the application.

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 Shell Kulluk – Beaufort Sea Exploration Drilling Program

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<b>Submission Date</b>	<b>Document Description</b>
April 19, 2011	Electronic copies of Kulluk impact analysis
April 22, 2011	Maps depicting lease blocks, monitoring methods matrix, allowable emission inventory, and summary of applicable regulations
April 27, 2011	Copy of check and fee filing form
April 29, 2011	Additional application information including nearby source/cumulative impact analysis, update to owner requested limits form, clarification on engine replacement, compliance monitoring plan and matrix, and summary of applicable regulations
May 4, 2011	Updates to air quality analysis, air quality impact modeling files, Tier 2 emission standards, and two missing pages for April 29, 2011 submission
May 5, 2011	Email explaining Attachment 5 of April 29, 2011 submission
May 6, 2011	Shell Discoverer Stack Test Reports
May 8, 2011	Shell Discoverer Associated Fleet Stack Test Reports
May 9, 2011	NSPS Subpart III applicability flow chart for MCL HPU engines and compressor engines
May 10, 2011	Kulluk application references
May 13, 2011	Draft example of Kulluk emission inventory
May 18, 2011	Withdrawal of request to employ existing main generators as emergency backup generators on Kulluk and clarification of engine replacement
May 19, 2011	Clarification of Shells engine replacement plan and drilling mud degassing methane emission calculations
May 21, 2011	Engine information
May 31, 2011	Seldom-used engines, cranes and shallow gas diverter system
June 16, 2011	Calculation of emission factors used for Kulluk permit application
June 22, 2011	Impact estimates with anchor handler in open water
June 29, 2011	Resubmission of complete permit application and supplemental information
July 5, 2011	Compilation of previously submitted application materials
July 7, 2011	Fuel Monitoring Information
July 13, 2011	Icebreaker No. 1 additional modeling results and files on hard drive
July 19, 2011	EPA application completeness determination

## 1.2 Project Description

The exploratory drilling program proposed by Shell will be conducted in the Beaufort Sea between July and November over a maximum of 120 days and is expected to start in July 2012. The drilling season generally occurs in the summer and fall of each year, during periods of open water, but it is likely that environmental conditions (ice and sea states) will limit drilling to less than 120 days. During the drilling season, Shell will have the flexibility to drill one or more wells, or parts of wells, in any of the lease blocks authorized under the terms of its OCS/Title V permit. The following lease blocks from Lease Sales 186, 195 and 202 are covered by the OCS/Title V permit:

### OPD NR05-04 (Harrison Bay)

Lease Sale 186: 6369, 6370, 6419, 6420, 6421BC  
Lease Sale 195: 6173, 6222, 6223, 6272, 6273, 6320, 6321, 6322, 6323, 6371, 6372, 6373, 6374BC, 6424C, 6418, 6422B, 6423B, 6468, 6469B, 6518B, 6519A  
Lease Sale 202: 6221, 6274, 6319, 6324, 6367, 6368, 6470, 6471

### OPD NR06-03 (Beechey Point)

Lease Sale 186: 6352, 6402A, 6403B  
Lease Sale 195: 6152, 6202, 6203, 6204, 6251A, 6301B, 6252, 6253, 6254, 6255, 6256, 6302, 6303, 6304, 6305, 6306, 6307, 6308, 6309, 6351AB, 6401C, 6353, 6354, 6355, 6356, 6358, 6359, 6360, 6404A, 6405B, 6406B, 6409B, 6410, 6411, 6412  
Lease Sale 202: 6009, 6010, 6011, 6012, 6058, 6059, 6060, 6061, 6062, 6063, 6064, 6065, 6066, 6067, 6068, 6114, 6115, 6116, 6117, 6118, 6324

### OPD NR06-04 (Flaxman Island)

Lease Sale 195: 6657, 6658, 6659, 6707, 6708, 6709, 6712, 6713, 6757, 6758, 6764, 6773, 6774, 6814, 6815, 6822, 6823, 6824, 6873, 6874  
Lease Sale 202: 6251, 6252, 6259, 6301, 6302, 6303, 6304, 6305, 6308, 6309, 6310, 6351, 6352, 6353, 6354, 6355, 6356, 6357, 6358, 6359, 6401, 6402, 6403, 6404, 6405, 6406, 6407, 6408, 6409, 6410, 6453, 6454, 6455, 6456, 6457, 6458, 6459, 6460, 6461, 6504, 6505, 6506, 6508, 6510, 6511, 6512, 6554, 6555, 6558, 6559, 6560, 6561, 6562, 6609, 6610, 6611, 6612, 6660, 6662

### OPD NR07-03 (Barter Island):

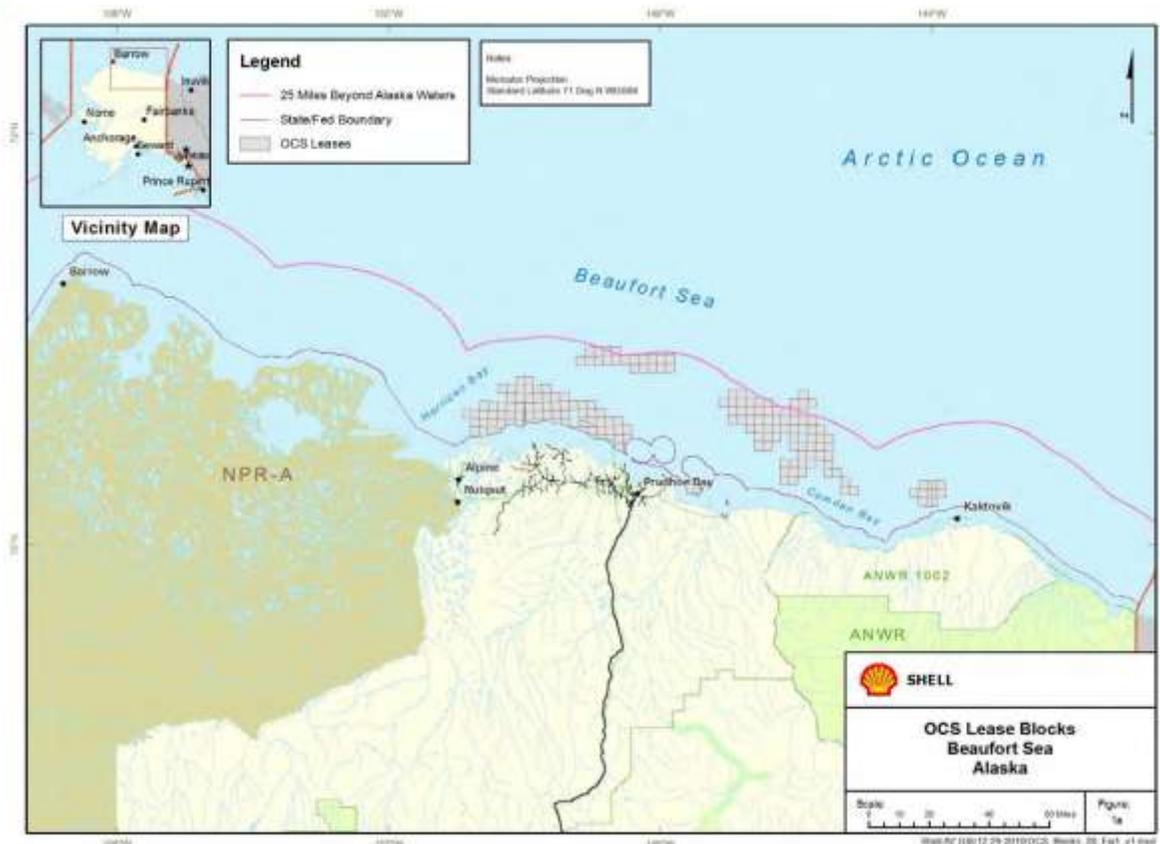
Lease Sale 195: 6751, 6752, 6801, 6802, 6851

The proposed permit would authorize the mobilization and operation of the Kulluk and its associated fleet to any lease block listed above at yet-to-be-determined drill sites in the Beaufort Sea OCS off the North Slope of Alaska for the purpose of conducting exploratory oil and gas drilling. While Shell has a working interest in most of these lease blocks, it does not have a working interest in all of them. The group of lease blocks authorized under this permit is located within 25 miles and beyond 25 miles from Alaska's seaward boundary. In some instances, lease blocks are both within and beyond 25 miles from Alaska's seaward boundary. For purpose of the SOB and the proposed permit, the portion of the OCS which is 25 miles or more from the State's seaward boundary is referred to as the "Outer OCS." The portion of the OCS that is within 25 miles of the State's seaward boundary is referred to as the "Inner OCS."

Figure 1-1 shows the location of all current leases in the Beaufort Sea, and Figure 1-2 shows the location of the subset of current leases within which Shell is not seeking EPA authorization to

use the Kulluk. Note the two contour lines in Figure 1-1 that run parallel to the coastline. One contour line is the state’s seaward boundary which generally lies 3 miles from the coast. The other marks the border between the Inner and Outer OCS. As clearly illustrated in Figure 1-1, nearly all current OCS lease blocks lie within the Inner OCS.

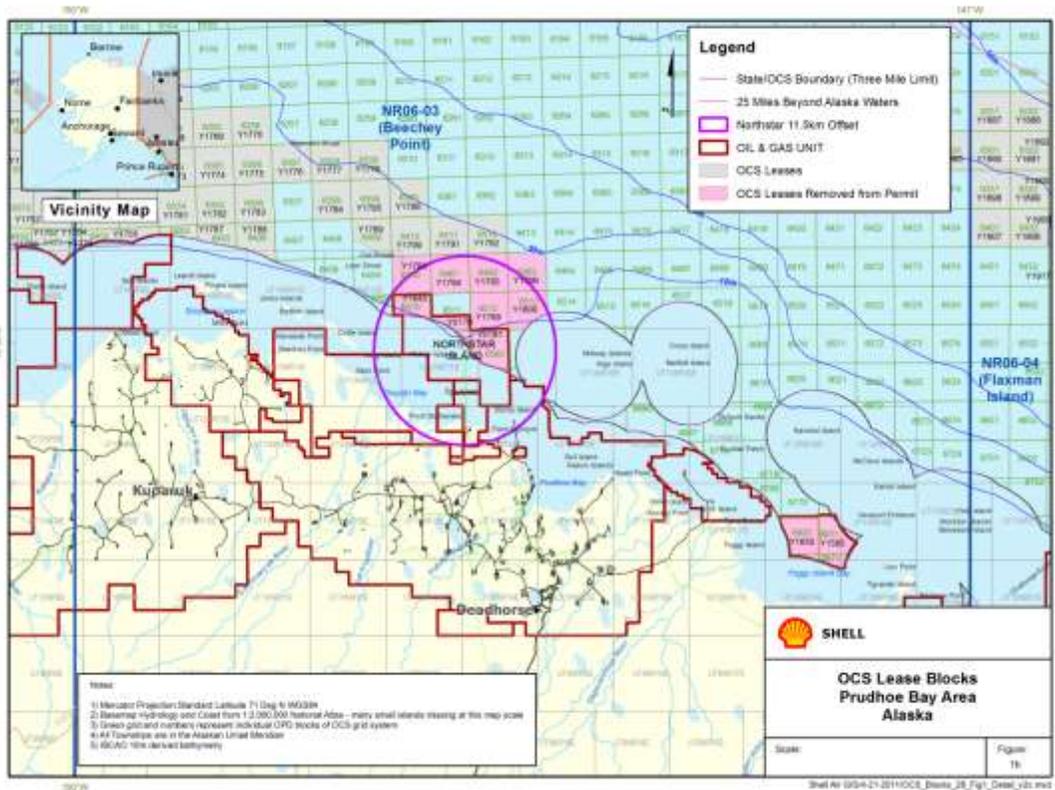
**Figure 1-1: Current Beaufort Sea OCS Lease Blocks**



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To get a relative sense of scale of the two figures, note that Figure 1-1 displays the 400-mile northern Alaska coastline between Barrow (to the west) and Canada (to the east). Figure 1-2 presents a vicinity map of the Prudhoe Bay area which lies roughly midway between Barrow and the Canadian border. Shell has elected not to request authorization to use the Kulluk in current lease blocks in the vicinity of Northstar Island. A few lease blocks in Foggy Island Bay to the southwest of Northstar Island have also been removed from Shell’s original February 28, 2011 authorization request. See purple-shaded lease blocks in Figure 1-2.

**Figure 1-2: Current Beaufort Sea OCS Lease Blocks Within Which Shell is Not Seeking Authorization to Employ the Kulluk (purple-shaded lease blocks)**



Shell Additional Application Information 04/29/11, Attachment A

The Kulluk is a conical drilling unit without its own propulsion power that is designed to operate in the arctic environment. The primary emission source on the Kulluk is internal combustion engines that consume diesel fuel. A waste incinerator along with boilers and heaters also emit pollution but to a far lesser extent. The largest diesel engines drive generators which generate electricity primarily to power drilling motors. Other diesel engines power other drilling-related equipment including hydraulic pumps, air compressors, cranes, and emergency equipment. All emission units on the Kulluk are identified in Table 1-1 and discussed in greater detail in Section 1.4 of this SOB. A photograph of the Kulluk is provided in Figure 1-3.

The Kulluk's operations will be supported by an associated fleet of vessels that includes a primary ice breaker, an anchor handler with the dual purpose of operating as a secondary ice breaker, an oil spill response vessel carrying and managing smaller work boats, and resupply vessels (such support vessels to be referred to hereinafter as the "Associated Fleet"). The vessels comprising the Associated Fleet will be described in more detail in Section 1.4 of this SOB.

**Figure 1-3: Photograph of the Kulluk**



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## **1.3 Public Participation**

### **1.3.1 Opportunity for Public Comment**

Title V permits issued to OCS sources operating within and beyond 25 miles of a state's seaward boundary are issued under Part 71 and are therefore subject to the procedural requirements of Part 71. See 40 CFR § 71.4(d).

Region 10 is seeking public comment on the draft permit. The public comment period runs from July 22, 2011 to September 6, 2011. All written comments must be postmarked by no later than September 6, 2011.

If you believe any condition of this draft permit is inappropriate or that Region 10's decision to prepare a draft permit is inappropriate, you must comment on the draft permit and raise all reasonably ascertainable issues and submit all reasonably ascertainable arguments supporting

your position by the end of the comment period. Any documents supporting your comments must be included in full and may not be incorporated by reference unless they are already part of the administrative record for this permit or consist of state or federal statutes or regulations, EPA documents of general applicability, or other generally available referenced materials. See 40 CFR § 124.13.

Written comments may be submitted by mail or email. Oral comments may be submitted during the public hearings in Barrow and Anchorage, Alaska. Oral comments may also be recorded on cassette tape or CD, and submitted by mail. Region 10 recommends that all comments, including those submitted by email, cassette tape, or CD, include the commenter’s contact information so that we may provide all commenters with notice of the final permit decision. If Region 10 cannot read a comment due to technical difficulties and cannot contact the commenter for clarification, Region 10 may not be able to consider the comment. Please be aware that any personal information, including addresses or phone numbers that are included with a public comment will be included in the public record for the permit.

**Send comments on the draft permit to:**

Email: [R10ocsairpermits@epa.gov](mailto:R10ocsairpermits@epa.gov)  
Fax: 206-553-0110  
Mail: Kulluk Beaufort Air Permit  
EPA Region 10  
1200 6th Ave, Ste. 900, AWT-107  
Seattle, WA 98101

All timely comments will be considered in making the final decision, included in the record, and responded to by Region 10. Region 10 will prepare a statement of reasons for changes made in the final permit and a response to comments received, and will provide all commenters with notice of the final permit decision.

**1.3.2 Public Hearing and Informational Meetings**

Region 10 is holding an informational meeting and public hearing on the draft permit as follows:

<u>Barrow</u>	<u>Anchorage</u>
August 23, 2011	August 26, 2011
Informational Meeting 5:00 pm – 6:30 pm	Public Hearing 6:00 pm – 7:30pm
Public Hearing 7:00 pm – 9:00 pm	Loussac Library
Inupiat Heritage Center	Anchorage, Alaska
Barrow, Alaska	

The purpose of the public hearing is to receive public comments on the draft permit for Shell’s operation of the Kulluk and Associated Fleet on the Beaufort Sea OCS. For more information about the hearing, contact Suzanne Skadowski, EPA Region 10 Community Involvement, at 206-553-6689 or [skadowski.suzanne@epa.gov](mailto:skadowski.suzanne@epa.gov).

**1.3.3 Administrative Record**

The record for this draft permit includes Shell’s application, including addendums and supplemental information; the SOB; the Environmental Justice Analysis; the Technical Support Document Review of Shell’s Ambient Air Quality Impact Analysis attached to the SOB (Region

10 Technical Analysis); the additional documents and information submitted by Shell; and other materials relied on by Region 10 in issuance of the draft permit.

The permit record for this draft permit is available at EPA Region 10, 1200 6th Ave, Seattle, Washington, 9:00 am – 4:00 pm, Monday-Friday. To request a copy of or to review these materials, contact Suzanne Skadowski as described above.

The draft OCS/Title V Permit, SOB, Environmental Justice Analysis, the Region 10 Technical Analysis, and the key supplemental materials submitted by Shell are available online at:

**EPA Region 10 web site:** [www.yosemite.epa.gov/R10/airpage.nsf/Permits/kullukap](http://www.yosemite.epa.gov/R10/airpage.nsf/Permits/kullukap)

These documents will also be available at the locations listed below. Please call in advance for available viewing times.

**EPA Alaska Office**, Federal Building, 222 West 7<sup>th</sup> Ave, Anchorage, Alaska, 907-271-5083

**Barrow City Office**, 2022 Ahkovak Street, Barrow, Alaska, 907-852-4050

**Wainwright City Office**, 1217 Airport Road, Wainwright, Alaska, 907-763-2815

**Atqasuk City Office**, 5010 Ekosik Street, Atqasuk, Alaska, 907-633-6811

**Kali School Library**, 1029 Ugrak Ave, Point Lay, Alaska, 907-833-2312

**Point Hope City Office**, 530 Natchiq Street, Point Hope, Alaska, 907-368-2537

For more information about the informational meeting, the public hearing or the draft permit, to request a copy of the draft permit documents on CD, or to be added to Region 10's arctic permits mailing list, contact Suzanne Skadowski at 206-553-6689 or [skadowski.suzanne@epa.gov](mailto:skadowski.suzanne@epa.gov).

## 1.4 Source Description

The following section describes the individual emission units that comprise the Kulluk and Associated Fleet.

### Kulluk

While the Kulluk is attached to the seabed and exploring for oil and gas, the Kulluk will use a variety of pollutant-emitting equipment to support drilling operations. The emission units permitted on the Kulluk are listed in Table 1-1. The “K” that appears at the beginning of each emission unit ID signifies that the unit is located on the Kulluk.

Shell has identified groupings of emission units based upon the function each group serves. Shell is not requesting authorization to install specific makes and models of engines. Rather, Shell is requesting authorization to install groupings of engines categorized by known function. This permit allows operation of any emission unit that fits within the description presented in Table 1-1 and that operates in compliance with the terms of the permit. The ratings presented in Table 1-1 are approximations and do not limit Shell from installing larger equipment. As noted in Table 1-1, most of the emission units on the Kulluk are internal combustion engines. As noted earlier, the Kulluk is also equipped with boilers or heaters and an incinerator. All fuel-burning equipment will combust only diesel fuel with a sulfur content of less than 0.01 percent by weight.

**Table 1-1: Kulluk Emission Units**

<b>Emission Unit ID</b>	<b>Description</b>	<b>Approximate Aggregate Rating<sup>3</sup></b>
K-1A – 1D	Electricity Generation Engines	10,352 hp
K-2A – 2Z	MLC HPU Engines	1,500 hp
K-3A – 3Z	MLC Air Compressor Engines	1,500 hp
K-4A – 4C	Deck Crane Engines	1,200 hp
K-5A – 5Z	Heaters and Boilers	6 MMBtu/hr
K-6	Emergency Generator Engine	1,047 hp
<i>K-7A – 7D: Seldom-Used Sources</i>		1,650 hp
K-7A	Remote-Operated-Vehicle Engine	300 hp
K-7B	Emergency Anchor Lifting Crane Engine	300 hp
K-7C	Emergency Diver Compressor Engine	300 hp
K-7D1 – 7D5	Emergency Lifeboat Propulsion Engines	750 hp
K-8	Incinerator	276 lb/hr
K-9	Fuel Tanks	423,469 gallons
K-10	Drilling Mud System	NA
K-11	Shallow Gas Diverter System <sup>4</sup>	NA

Emission units with ID beginning with “K-1” are engines that generate electricity to support well drilling activity. Region 10 makes reference to the first four letters of the alphabet, “A” through “D” as Shell intends to install and operate up to four 2011 model year engines with combined 10,352 horsepower output.

Emission units with ID beginning with “K-2” are engines associated with hydraulic power units (HPU) that are employed to construct the Mud Line Cellar (MLC). These engines are portable and are not permanent fixtures on the Kulluk. To provide flexibility in the number of MLC HPU engines Shell intends to employ, EPA makes reference to the entire alphabet “A” through “Z” when identifying the potential span of emission units to serve the MLC HPU function. Shell predicts that the aggregate rating for the MCL HPU engines will be approximately 1,500 horsepower output.

Emission units with ID beginning with “K-3” are engines associated with air compressors that are employed to construct the MLC. These engines are portable and are not permanent fixtures on the Kulluk. To provide flexibility in the number of MLC air compressor engines Shell intends to employ, EPA makes reference to the entire alphabet “A” through “Z” when identifying the potential span of emission units to serve the MLC air compressor function. Shell predicts that the aggregate rating for the MLC compressor engines will be approximately 1,500 horsepower output.

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<sup>3</sup> This permit does not limit the permittee to the specific rating listed. Permit conditions may limit operations to less than rated capacity.

<sup>4</sup> Permit conditions prohibit the shallow gas diverter system from emitting any air pollutants.

Emission units with ID beginning with “K-4” are existing engines associated with the three deck cranes that are employed to move equipment and supplies around on the deck of the Kulluk. EPA makes reference to these three engines as “A”, “B” and “C.” The aggregate rating of the deck crane engines is approximately 1,200 horsepower output.

Emission units with ID beginning with “K-5” are boilers and heaters. To provide flexibility in the number of boilers and heaters Shell intends to employ, EPA makes reference to the entire alphabet “A” through “Z” when identifying the potential span of emission units to serve the boiler and heater function. Shell predicts that the aggregate rating for boilers and heaters will be approximately 6 MMBtu per hour heat input.

Unit K-6 is an emergency generator engine. Shell is in the process of replacing the existing emergency generator engine with a 2011 model year engine. The new engine’s rating is 1,047 horsepower output.

Emission units with ID beginning with “K-7” are seldom-used engines. These engines include one remote-operated vehicle engine “A”, one emergency anchor lifting crane engine “B”, one emergency diver compressor engine “C” and up to five emergency lifeboat propulsion engines “D1” through “D5”. These engines are portable and are not permanent fixtures on the Kulluk. The aggregate rating of these seldom-used engines is 1,650 horsepower output.

Unit K-8 is a waste incinerator. Shell predicts that the incinerator will have a maximum waste feed rate of 276 pounds per hour.

Unit K-9 represents three diesel fuel tanks. The three storage tanks have aggregate capacity of 423,469 gallons. Unit K-10 represents the drilling mud system. Unit K-11 represents a shallow gas diverter system. This system will only be activated in the event of an emergency.

#### Associated Fleet

Shell identified the types of vessels in the Associated Fleet that will support the Kulluk, and the groupings of emission units on each vessel based upon the function each group serves. Shell is not requesting authorization to install specific makes and models of engines, but is instead requesting authorization to install groupings of engines categorized by known function. This permit allows operation of any emission unit that fits within the description presented in Table 1-2 and that operates in compliance with the terms of the permit. The ratings presented in Table 1-2 are approximations and do not limit Shell from installing larger equipment. Most of the equipment consists of internal combustion engines. All fuel-burning equipment will consume only diesel fuel with a sulfur content of less than 0.01 percent by weight.

**Table 1-2: Associated Fleet Emission Units**

Emission Unit ID	Description	Approximate Aggregate Rating <sup>5</sup>
<i>Icebreaker No. 1 (IB1)</i>		
IB1-1A – 1Z	Propulsion Engines and Generator Engines	32,200 hp
IB1-2A – 2Z	Heaters and Boilers	10 MMBtu/hr
IB1-3A – 3Z	Seldom-Used Sources	Various
IB1-4	Incinerator	154 lb/hr
<i>Icebreaker No. 2 - Anchor Handler (IB2)</i>		
IB2-1A – 1Z	Propulsion Engines and Generator Engines	32,200 hp
IB2-2A – 2Z	Heaters and Boilers	10 MMBtu/hr
IB2-3A – 3Z	Seldom-Used Sources	Various
IB2-4	Incinerator	154 lb/hr
<i>Resupply Vessel/Barge and Tug (RV/BT)<sup>6,7</sup></i>		
RV/BT-1A – 1Z	Propulsion Engines and Generator Engines	12,000 hp <sup>8</sup>
RV/BT-2A – 2Z	Seldom-Used Sources	Various
<i>Oil Spill Response Vessel (OSRV)</i>		
OSRV-1A – 1Z	Propulsion Engines and Generator Engines	3,500 hp
OSRV-2A – 2Z	Seldom-Used Sources	Various
OSRV-3	Incinerator	125 lb/hr
<i>OSRV Work Boats (OSRV WB)<sup>7</sup></i>		
OSRV WB-1A – 1Z	Propulsion Engines and Generator Engines	600 hp <sup>8</sup>

Up to two icebreakers will be deployed. The “IB1” and “IB2” that appear at the beginning of each emission unit ID signify that the unit is located on that particular vessel. One of the icebreakers will also serve as an anchor handler and general utility vessel. Shell has identified four categories of emissions units on each icebreaker. Within the first category, an unidentified number of propulsion engines and generator engines “1A” through “1Z” will have an estimated aggregate capacity of 32,200 horsepower output. Within the second category, an unidentified number of heaters and boilers “2A” through “2Z” will have an estimated aggregate capacity of 10 MMBtu per hour heat input. Within the third category, an unidentified number of seldom-used sources “3A” through “3Z” will have an unidentified aggregate horsepower output. Only one unit, an incinerator, comprises the fourth category of emission unit for each icebreaker. The incinerator on each icebreaker will have an estimated maximum feed rate of 154 pounds per hour.

Multiple resupply vessels/barge and tug combinations will be deployed to resupply the Kulluk and to remove waste. The “RV/BT” that appears at the beginning of each emission unit ID signifies that the unit is located on a resupply vessel/barge and tug combination. Shell has

<sup>5</sup> This permit does not limit the permittee to the specific rating listed. Permit conditions may limit operations to less than rated capacity.

<sup>6</sup> Resupply vessels include, but are not limited to, resupply ships and barge and tugboat combinations.

<sup>7</sup> Multiple different RV/BT and OSRV WB may be employed over the course of a single drilling season.

<sup>8</sup> The rating for RV/BT and OSRV WB propulsion engines and generator engines listed in the table reflects approximate aggregate rating for an individual vessel, not for all RV/BT and OSRV WB combined.

identified two categories of emission units on each RV/BT. An unidentified number of propulsion engines and generator engines “1A” through “1Z” will have an estimated aggregate capacity of 12,000 horsepower output. An unidentified number of seldom-used sources “2A” through “2Z” will have an unidentified aggregate horsepower output.

One oil spill response vessel will be deployed as a contingency measure. It will engage in routine oil spill response exercises. The “OSRV” that appears at the beginning of each emission unit ID signifies that the unit is located on the oil spill response vessel. Shell has identified three categories of emission units on the OSRV. Within the first category, an unidentified number of propulsion engines and generator engines “1A” through “1Z” will have an estimated aggregate capacity of 3,500 horsepower output. Within the second category, an unidentified number of seldom-used sources “2A” through “2Z” will have an unidentified aggregate horsepower output. Only one unit, an incinerator, comprises the third category. It will have an estimated maximum feed rate of 125 pounds per hour.

OSRV work boats will reside upon the OSRV and will be launched routinely to participate in oil spill response exercises. The “OSRV WB” that appears at the beginning of each emission unit ID signifies that the unit is located on an OSRV workboat. Shell has identified the propulsion engines and generator engines “1A” through “1Z” as the sole category of emission units on these vessels. The aggregate rating per vessel is approximately 600 horsepower output assuming, for example, that each OSRV WB is equipped with two 300-horsepower propulsion engines.

## **2. REGULATORY APPLICABILITY**

### **2.1 The Outer Continental Shelf (OCS)**

The OCS regulations at Part 55 implement Section 328 of the CAA and establish the air pollution control requirements for OCS sources and the procedures for implementation and enforcement of the requirements.

Section 328 and Part 55 distinguish between OCS sources located within 25 miles of a state’s seaward boundaries referred to as the “Inner OCS” and those located beyond 25 miles of a state’s seaward boundaries referred to as the “Outer OCS”. CAA § 328(a)(1); 40 CFR § 55.3(b) and (c). In this case, Shell is seeking a permit for exploratory drilling that will be conducted on both the Inner and Outer OCS.

40 CFR § 55.13 generally sets forth the federal requirements that apply to OCS sources on the Outer OCS. These sources are subject to the New Source Performance Standards (NSPS) in 40 CFR Part 60; the PSD program in 40 CFR § 52.21 if the OCS source is also a major stationary source or if there is a major modification to a major stationary source; standards promulgated under Section 112 of the CAA if rationally related to the attainment and maintenance of federal and state ambient air quality standards or the requirements of Part C of Title I of the CAA; and the operating permit program under Title V of the CAA as implemented in Part 71. See 40 CFR § 55.13(a), (c), (d)(2), (e), and (f)(2), respectively. The applicability of these requirements to Shell’s exploration drilling program is discussed in Sections 2.2 to 2.6 below.

The OCS regulations also contain provisions relating to monitoring, reporting, inspections, compliance, and enforcement. See 40 CFR §§ 55.8 and 55.9. Section 55.8(a) and (b) authorize Region 10 to require monitoring, reporting, and inspections for OCS sources, and provide that all

monitoring, reporting, inspection, and compliance requirements of the CAA apply to OCS sources. These provisions, along with the provisions of the applicable substantive programs, provide authority for the monitoring, recordkeeping, reporting and other compliance assurance measures included in this draft OCS/Title V permit.

Section 328 of the CAA provides that requirements for sources located within the Inner OCS be the same as would be applicable if the sources were located in the corresponding onshore area (COA). Because the Inner OCS requirements are based on onshore requirements, and onshore requirements may change, Section 328(a)(1) requires that EPA update the OCS requirements, as necessary, to maintain consistency with onshore requirements in Appendix A to Part 55. For permit conditions that apply in the Inner and Outer OCS and cite to the COA regulations and federal requirements, the COA regulations provide authority only for the condition as it applies to the Inner OCS. The COA requirements are incorporated by reference in 40 CFR § 55.14 and listed in Appendix A.

On February 8, 2011, EPA proposed a consistency update to approve the incorporation of Alaska onshore requirements into 40 CFR 55.14. 76 Fed. Reg. 7,518. These requirements were proposed in response to the receipt of a Notice of Intent on December 10, 2010 from Shell. On June 27, 2011, EPA finalized the consistency update. 76 Fed. Reg. 37,274. EPA incorporated applicable provisions of the following Alaska Administrative Code (AAC) regulations by reference into 40 CFR § 55.14:

- Article 1 – Ambient Air Quality Management;
- Article 2 – Program Administration;
- Article 3 – Major Stationary Source Permits;
- Article 4 – User Fees;
- Article 5 – Minor Permits; and
- Article 9 – General Provisions.

### **2.1.1 The “OCS Source”**

Section 328 of the CAA establishes requirements to control air pollution from “OCS sources.” Defining when the Kulluk becomes an “OCS source” therefore determines when CAA § 328 applies to and regulates air pollution from the Kulluk. This question is of primary importance because the later in time a vessel becomes an OCS source and the sooner it ceases to be an OCS source, the more limited the time during which potential emissions from both the Kulluk and its Associated Fleet will be included under the synthetic minor limits in the permit and in the air quality analysis. Based on an evaluation of the anchoring process Shell intends to use in light of the statutory and regulatory definition of OCS source, and the legislative history and policy behind CAA § 328 and the Outer Continental Shelf Lands Act (OCSLA), Region 10 proposes that the Kulluk be considered an OCS source at all times that it is attached to the seabed at a drill site by at least one anchor.

### **2.1.2 Statutory and Regulatory Framework**

Section 328 provides that

The terms “Outer Continental Shelf source” and “OCS source” include any equipment, activity, or facility which—

- (i) emits or has the potential to emit any air pollutant,
- (ii) is regulated or authorized under the Outer Continental Shelf Lands Act [43 U.S.C. 1331 *et seq.*], and
- (iii) is located on the Outer Continental Shelf or in or on waters above the Outer Continental Shelf.

Such activities include, but are not limited to, platform and drillship exploration, construction, development, production, processing, and transportation. For purposes of this subsection, emissions from any vessel servicing or associated with an OCS source, including emissions while at the OCS source or en route to or from the OCS source within 25 miles of the OCS source, shall be considered direct emissions from the OCS source.

42 U.S.C. § 7627(a)(4)(C).

Section 55.2 of the OCS regulations defines an OCS source by first incorporating the above language from sections (i), (ii), and (iii) of CAA § 328(a)(4)(C), and then adding:

This definition shall include vessels only when they are:

- (1) Permanently or temporarily attached to the seabed and erected thereon and used for the purpose of exploring, developing or producing resources therefrom, within the meaning of section 4(a)(1) of OCSLA (43 U.S.C. § 1331 *et seq.*); or
- (2) Physically attached to an OCS facility, in which case only the stationary sources aspects of the vessels will be regulated.

40 CFR § 55.2.

OCSLA § 4(a)(1), which is referenced in the regulatory definition of OCS source in the case of vessels, states:

The Constitution and laws and civil and political jurisdiction of the United States are extended to the subsoil and seabed of the Outer Continental Shelf and to all artificial islands, and to all installations and other devices permanently or temporarily attached to the seabed, which may be erected thereon for the purposes of exploring for, developing, or producing resources therefrom...

43 U.S.C. § 1333(a)(1)(emphasis added). Notably, EPA’s regulatory definition of OCS source as related to vessels uses the same key terms as OCSLA § 4(a)(1) —“attached to the seabed,” “erected thereon,” and “used for the purpose of...” — but the phrasing is different. OCSLA § 4(a)(1) applies to devices “which may be erected thereon and used for the purpose of...” in an explanatory clause. EPA’s regulatory definition applies to devices that are “attached to the seabed and erected thereon and used for the purpose of exploring, developing or producing resources therefrom,” but goes on to explain that those terms are used “within the meaning of

section 4(a)(1) of OCSLA.” Moreover, as already noted, CAA § 328 describes the activities of a source as including but not limited to “platform and drillship exploration, construction, development, production, processing, and transportation.”

### **2.1.3 The Kulluk’s Anchoring Process at a Drill Site**

The Kulluk is a conical drilling platform without its own propulsion power. With the start of each drilling season authorized in the draft permit, the Kulluk will be towed by an anchor handler to a selected drilling location. When it reaches the drilling location, the Kulluk will drop and secure its ship anchor. When the anchor is secure, the anchor handler will release the tow cable and the Kulluk will be held in position above the drilling location by its ship anchor. The anchor handler will then move to the leeward side of the Kulluk, extend the first stabilization anchor cable, connect the high holding power anchor and lower it to the seabed. The anchor handler will deploy each stabilization anchor in a pre-determined sequence, and in this manner all 12 of the Kulluk’s main stabilizing anchors will be connected to the seabed. Once all of the stabilization anchors are in place, they will be sequentially adjusted to the appropriate tension for drilling activity. No other vessels are involved in the anchoring procedure.

When vacating a drill site, the retrieval of the stabilization anchors is a reversal of the placement process. The Kulluk’s ship anchor is the final anchor to be lifted from the seabed. The retrieval of the ship anchor will occur after the Kulluk is connected to the anchor handler to be towed from the drilling location.

### **2.1.4 Region 10’s Proposed Determination of When the Kulluk Becomes an OCS Source**

Region 10 proposes to consider the Kulluk an OCS source, subject to Clean Air Act § 328 requirements, from the time it is attached to the seabed by a single anchor at a drill site, which will first occur when the Kulluk’s ship anchor is secured at a drill site, until the last anchor is detached from the drill site. We believe this interpretation, in the context of this specific permitting action, is consistent with the relevant statutes and regulations applicable to this specific permitting action for the reasons explained below.

The statutory definition of OCS source in the CAA specifies that a source can engage in a wide range of activities, including but not limited platform and drillship exploration, construction, development, production, processing, and transportation. EPA’s regulatory definition of OCS source with respect to vessels requires that a vessel be “permanently or temporarily attached to the seabed and erected thereon and used for the purpose of exploring, developing or producing resources therefrom, as those terms are used in Section 4(a)(1) of OCSLA.” 40 CFR § 55.2 (emphasis added). As discussed above, OCSLA § 4(a)(1) uses the same three terms or phrases (“attached,” “erected,” “used for the purpose of”), but with different phrasing: “permanently or temporarily attached to the seabed, which may be erected thereon for the purpose of exploring for, developing or producing resources therefrom” (emphasis added).

Region 10 believes that, as in OCSLA § 4(a)(1), the reference to “erected thereon” in 40 CFR § 55.2 is intended to reflect the process by which a vessel becomes attached to the seabed and used thereafter for the purpose of exploring, developing, or producing resources from the seabed. There is no discussion in the legislative history for CAA § 328 or OCSLA § 4(a)(1) of “erected” in the context of defining what is an OCS source or the reach of OCSLA § 4(a)(1). And there is no indication in either the proposed or final OCS regulations that EPA intended that the terms “attached to the seabed,” “erected thereon,” and “used for the purpose of” be used in any way

different or given any different meaning from the way those terms are used in OCSLA § 4(a)(1). To the contrary, the preamble to the final OCS regulation indicates that the language was intended to cover vessels meeting two requirements, that they be attached to the seabed and used for the specified purpose:<sup>9</sup>

The definition of “OCS source” has been modified to clarify when EPA will consider vessels to be OCS sources. Section 328(a)(4)(C)(ii) defines an OCS source as a source that is, among other things, regulated or authorized under the OCSLA. The OCSLA in turn provides that the Department of Interior (“DOI”) may regulate “all installations and other devices permanently or temporarily attached to the seabed, which may be erected thereon for the purpose of exploring, developing or producing resources therefrom, or any such installation or other device (other than a ship or vessel) for the purpose of transporting such resources.” 43 U.S.C. § [4(a)(1)]. *Vessels therefore will be included in the definition of “OCS source” when they are “permanently or temporarily attached to the seabed” and are being used “for the purpose of exploring, developing or producing resources therefrom.” This would include, for example, drill ships on the OCS.*

57 Fed. Reg. 40792, 40793 (September 4, 1992)(emphasis added).

In this context, Region 10 believes (1) that that the Kulluk is “attached to the seabed” when it is attached to the seabed by at least one anchor, and (2) that the Kulluk is “erected [on the seabed]” when that attachment occurs at the location where the Kulluk may be used for the purpose of “exploring, developing, or producing resources [from the seabed].” This is because the verb “to erect” generally means “to construct” or “to build,” definitions that generally suggest an intention that the activity be conducted according to some plan or specification. See The American Heritage® Dictionary of the English Language (definitions of erect, construct, and build); Merriam Webster (same). Requiring that the attachment to the seabed occur at the location where the OCS activity will (or is reasonably expected to) be conducted ensures that the attachment to the seabed is related to, and for the purpose of, engaging in a systematic, planned activity as an OCS source. These interpretations of “attached” and “erected” are also consistent with the language of OCSLA § 4(a)(1), which used the phrase “which may be erected thereon” more as an explanatory phrase than as a separate requirement from attachment.

With respect to the criterion that the Kulluk be “used for the purpose of exploring, developing or producing resources,” after further consideration of the issue, Region 10 believes that this criterion is met by the fact that the Kulluk is a drillship. Although the phrasing “used for the purpose of” could indicate a requirement that the Kulluk be actively exploring for resources in order for that criterion to be met, Region 10 believes such an interpretation is too narrow to be reasonable and is contrary to Congress’s intent. First, according to common parlance, a hammer is a tool that is “used for the purpose of” hammering even when it is not in fact hammering a nail or other object. Similarly, Region 10 believes a drillship such as the Discoverer is clearly a vessel “used for the purpose of exploring, developing, or producing resources” even when it is not in fact engaged in the actual drilling of mud line cellars or drilling for oil. Its attachment to

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<sup>9</sup> This provision was not included in the proposed 40 CFR Part 55, but was instead added to the definition of OCS source at promulgation of the final rule.

the seabed at a drill site confirms that the vessel is intended to be used for the purpose of exploring, developing, or producing resources from the seabed.

This interpretation of the regulatory definition of OCS source with respect to vessels is consistent not only with OCSLA § 4(a)(1), but also with the statutory definition of OCS source in the CAA. In Section 328(a)(4)(C), Congress specifically stated that the activities of an OCS source include construction. Congress’s direction that construction activity be considered part of an OCS source indicates Congress’s intent that the definition of OCS source be given an expansive meaning and is inconsistent with an interpretation that would require that construction of the source be fully completed and actually engaged in drilling activities before being considered an OCS source.<sup>10</sup>

In sum, based on the analysis discussed above, Region 10 proposes to consider the Kulluk an OCS source when it is attached to the seabed by at least one anchor at a drill site. This proposal is consistent with the regulatory definition of OCS source in 40 CFR § 55.2, which in turn is consistent with CAA § 328 and OCSLA § 4(a)(1) given the purpose and legislative history of these statutes. In reaching this conclusion, Region 10 notes that vessels used for oil exploration and production (not to mention OCS vessels used for other purposes) vary greatly in configuration. Therefore, Region 10’s proposal in this case that the Kulluk is an OCS source as defined in 40 CFR § 55.2 when attached to the seabed by a single anchor at a drill site does not necessarily resolve when other types of vessels or drill rigs become OCS sources, an issue that will vary to some extent depending on the factual differences in the equipment used to carry out the OCS activity and the particular project.

The effect of this determination of when the Kulluk is considered an OCS source on permits terms and conditions and emissions is discussed in Section 3.1 below.

## **2.2 “Potential to Emit”**

A source’s potential to emit or “PTE” is defined as the maximum capacity of the source to emit a pollutant under its physical and operational design. Any physical or operational limitation on the capacity of the source to emit a pollutant, including air pollution control equipment and restrictions on hours of operation or on the type or amount of material combusted, stored or processed, shall be treated as part of its design if the limitation or the effect it would have on emissions is enforceable.<sup>11</sup> See 40 CFR §§ 52.21(b)(4) and 55.2. As discussed above and in more detail below, the applicability of several CAA major source programs, including PSD and Title V, depends on whether the source’s PTE will exceed certain thresholds.

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<sup>10</sup> Region 10’s interpretation of 40 CFR § 55.2’s cross-reference to OCSLA § 4(a)(1), and its application to the Discoverer, is also consistent with regulations promulgated by the Minerals Management Service, now BOEMRE, under OCSLA. Those regulations define “facility” as “all installations or devices permanently or temporarily attached to the seabed. They include mobile offshore drilling units (MODUs), even while operating in the ‘tender assist’ mode (i.e. with skid-off drilling units) or other vessels engaged in drilling or downhole operations. . . .” 40 CFR § 250.105. Cf. *Alliance to Protect Nantucket Sound, Inc. v. United States Dep’t of the Army*, 398 F.3d 105, 109 (1st Cir. 2005) (interpreting the “which may be erected” clause in OCSLA § 4(a)(1)).

<sup>11</sup> EPA requires that PTE limits be either federally enforceable or legally and practicably enforceable. Subsequent references in this SOB to “enforceable” PTE or synthetic minor limits means that the limit must be either federally enforceable or legally and practicably enforceable.

For OCS sources, the definition of “potential emissions” in Part 55 explains which emissions from vessels associated with the OCS source are included in the PTE of the OCS source, providing that:

Pursuant to section 328 of the Act, emissions from vessels servicing or associated with an OCS source shall be considered direct emissions from such a source while at the source, and while en route to or from the source when within 25 miles of the source, and shall be included in the “potential to emit” for an OCS source. This definition does not alter or affect the use of this term for any other purposes under §§ 55.13 or 55.14 of this part, except that vessel emissions must be included in the “potential to emit” as used in §§ 55.13 or 55.14 of this part.

40 CFR § 55.2 (definition of “potential emissions”).

Thus, emissions from vessels servicing or associated with an OCS source that are within 25 miles are considered in determining the PTE or “potential emissions” of the OCS source. Emissions from such associated vessels are therefore included as direct emissions from the OCS source in determining whether the OCS source is a “major” source under CAA programs, including PSD and Title V. Emissions from such vessels are also considered in determining whether emissions from the OCS source cause or contribute to a violation of the National Ambient Air Quality Standards (NAAQS).<sup>12</sup> See Order Denying Review in Part and Remanding Permits, Shell Gulf of Mexico, Inc and Shell Offshore, Inc., Frontier Discoverer Drilling Units, OCS Appeal Nos. 10-01 through 10-04, Slip. Op. 38 (December 30, 2010)(“the Region’s decision to impose Permit conditions to control the Associated Fleet’s emissions to comply with the NAAQS and PSD increment, but not to apply BACT to the Associated Fleet, is not a clearly erroneous application of section 328 and the CAA’s PSD requirements”).

### **2.3 Prevention of Significant Deterioration of Air Quality (PSD) Applicability**

Under 40 CFR § 55.13(d)(2) and the COA regulations for Alaska (see 40 CFR § 55.14), the PSD permitting requirements set forth at 40 CFR § 52.21 are applicable to OCS sources located on the OCS off the coast of Alaska that qualify as major stationary sources required to obtain permits under 40 CFR § 55.21. The objective of the PSD program is to prevent significant adverse environmental impact from air emissions by a proposed new or modified major source. Under the PSD regulations, a stationary source is “major” if, among other things, it emits or has the potential to emit 100 tpy or more of a “regulated NSR pollutant” as defined in 40 CFR § 52.21(b)(50), and the stationary source is one of a named list of source categories. In addition to the preceding criteria, any stationary source is also considered a major source if it emits or has the potential to emit 250 tpy or more of a regulated NSR pollutant. 40 CFR § 52.21(b)(1). Recently effective regulations provide that a new major source subject to PSD will also be subject to PSD for GHGs if it will emit or have the potential to emit 75,000 tpy CO<sub>2</sub>e or more of GHGs, or, even if it is not otherwise subject to PSD, 100,000 CO<sub>2</sub>e tpy or more of GHGs,

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<sup>12</sup> Section 109 of the CAA requires EPA to promulgate regulations establishing National Ambient Air Quality Standards or “NAAQS” for those air pollutants (criteria pollutants) for which air quality criteria have been issued pursuant to Section 108 of the CAA. EPA has set NAAQS for six criteria pollutants: SO<sub>2</sub>, particulate matter (PM<sub>10</sub> and PM<sub>2.5</sub>), nitrogen dioxide (as NO<sub>x</sub>), CO, ozone (precursors NO<sub>x</sub> and volatile organic compounds (VOC)), and lead. 40 CFR Part 50.

provided that the source also has a PTE that is at or above the CAA mass-based major source thresholds. See 75 Fed. Reg. 31,514 (June 3, 2010).

As discussed below, based on Shell’s request, Region 10 has included enforceable limits in this draft OCS/Title V permit such that Shell’s PTE will remain below the PSD major source thresholds and therefore not be subject to PSD.

## **2.4 Title V Applicability and Authority to Create Limits on PTE**

The Part 71 rules implementing the Title V permitting program apply to an OCS source if the source meets the definition of a “Part 71 source.” See 40 CFR §§ 55.13(f)(2); 71.2 (definition of Part 71 source); 71.4(d). A Part 71 source includes any “major source,” which in turn includes a source with a PTE of 100 tons per year or more of any air pollutant subject to regulation under the CAA and any source with a PTE of 10 tpy or more of any hazardous air pollutants (HAP) or 25 tpy of all HAP combined. 40 CFR §§ 55.13(f)(2); 71.2 (definition of major source). The purpose of the Title V permit is to collect and impose upon a source in a single permit all “applicable requirements” that apply to the source as well as monitoring, recordkeeping, reporting and other conditions necessary to ensure compliance with such applicable requirements. See CAA §§ 502(a) and 504(a). As discussed below, because the PTE for the Shell project is greater than 100 tpy for several criteria pollutants, it is classified as a major source under Part 71 and Title V. See 40 CFR § 71.2 (definition of major source).

EPA’s rules applying to sources of air pollution on the Outer OCS (40 CFR Part 55) do not include provisions requiring construction permits for minor sources. Because of this, Shell has applied for its OCS/Title V air quality operating permit in advance of construction so that it can obtain enforceable permit limits on its PTE that will restrict its emissions to below the PSD major source thresholds.

Title V of the CAA and Part 71 provide authority to create limits in a Title V permit that restrict a source’s PTE so that the source can operate without additional requirements, such as PSD, that would otherwise be necessary in the absence of such synthetic minor limits. See CAA § 504(a) (“Each permit shall include enforceable emission limitations...and such other conditions as are necessary to assure compliance with applicable requirements [of the Act]...”); see also, CAA § 304(f) (defining the term “emission limitation, standard of performance or emission standard” for purposes of the citizen suit provision to include “any other standard, limitation, or schedule established under any permit issued pursuant to subchapter V [Title V], any permit term or condition, and any requirement to obtain a permit as a condition of operations.”).

Moreover, two provisions of Part 71 recognize that Title V permits can be used to limit PTE. 40 CFR § 71.6(b) provides that all terms and conditions in a Part 71 permit, “including any provisions designed to limit a source’s potential to emit, are enforceable by the Administrator and citizens under the Act.” Part 71 provisions for permit modifications similarly recognize the authority to establish such limits by stating that minor permit modifications cannot involve a change to a permit term or condition that a source has assumed to avoid applicable requirements to which the source would otherwise be subject. See 40 CFR § 71.7(e)(1)(i)(A)(4)(i). The Environmental Appeals Board (EAB) has specifically acknowledged that “Title V permits (and other permits as well) may function as vehicles for establishing such PTE limits, potentially allowing a source to avoid more burdensome permitting requirements for ‘major sources’ by instead qualifying as a ‘synthetic minor’ source for purposes of some other regulatory

programs.” In re Peabody Western Coal Company, 12 EAD 22, 31 (EAB Feb. 18, 2000)(upholding a Region’s decision to deny a request to establish a limit on PTE in a Part 71 permit because of concerns regarding the practicable enforceability of such a limit in a case involving large quantities of fugitive emissions).

Region 10 is relying on this authority to include in Shell’s OCS/Title V permit synthetic minor permit limits that will limit the source’s PTE to below the thresholds that would make it subject to PSD permitting.

## 2.5 The PTE of the OCS Source

In determining the PTE for Shell’s Beaufort Sea exploration drilling program, Region 10 included the potential emissions from the Kulluk while operating as an OCS source, as well as the potential emissions from the Associated Fleet – the icebreakers, oil spill response vessel and work boats, and the resupply vessel/barge and tug combination, when operating within 25 miles of the Kulluk while it is an OCS source.

In order to determine which pollutants require enforceable limits in order to reduce PTE to below PSD major source thresholds, it is necessary to calculate the “pre-permitted” PTE for the project. Once calculation of the pre-permitted PTE has identified the pollutants for which the source would be a major PSD source without a Title V or COA minor permit, enforceable permit conditions can be developed limiting the PTE of the OCS source to below PSD major source thresholds.

Table 2-1 lists the pre-permitted PTE as well as the permitted PTE for the regulated NSR pollutants CO, NO<sub>x</sub> and SO<sub>2</sub>. Table 2-1 also lists the pre-permitted PTE for GHGs. For these pollutants, Shell has requested that Region 10 include enforceable limits to reduce emissions to less than PSD major source thresholds. The reductions shown between the pre-permitted PTE and the permitted PTE reflect the impact of federally enforceable limits imposed in the permit to demonstrate compliance with the NAAQS and, as stated above, to lower the PTE to below PSD major source thresholds. See April 29, 2011 letter from Shell to Region 10 in the administrative record supporting this permitting action for detailed emissions calculations used to determine both pre-permitted PTE and permitted PTE.<sup>13</sup>

**Table 2-1: Potential to Emit Key Pollutants**

Air Pollutant	Pre-Permitted PTE (tpy)	Permitted PTE (tpy)
Carbon Monoxide (CO)	855	200
Nitrogen Oxides (NO <sub>x</sub> )	2,339	240
Sulfur Dioxide (SO <sub>2</sub> )	833	10
Greenhouse Gases (GHG)	141,487	80,000

<sup>13</sup> See May 10, 2011 correspondence for updated emission factor references provided by Shell.

Because exploration drilling programs are not included in the list of source categories subject to a 100-tpy PSD applicability threshold, the requirements of the PSD program apply if the project PTE is at least 250 tpy of a regulated NSR pollutant. PSD review also applies if GHG PTE is at least 100,000 tpy. From the pre-permitted PTE shown in Table 2-1, it is evident that Shell's Beaufort Sea exploration drilling program would be a major PSD source for CO, SO<sub>2</sub>, NO<sub>x</sub> and GHG because each would exceed the major source thresholds if federally enforceable limits were not imposed via the permit. Therefore, based on the pre-permitted PTE of the Shell project, federally enforceable limits for CO, SO<sub>2</sub>, NO<sub>x</sub>, and GHGs must be included in the OCS/Title V permit in order for Shell's OCS source to qualify as a "synthetic minor" not subject to PSD.

Shell has estimated its emissions of hazardous air pollutants (HAP) from its Beaufort Sea exploration drilling program at 3.4 tpy for all HAP combined. See April 29, 2011 letter from Shell to Region 10 in the administrative record for detailed HAP emissions calculations. Based upon these calculations, the project is an area source of HAP, rather than a major source of HAP.

## **2.6 Other Standards and Requirements Applicable to the OCS Source**

As discussed above, OCS sources located beyond 25 miles of a state's seaward boundaries are subject to the NSPS in 40 CFR Part 60; the PSD program in 40 CFR § 52.21 if the OCS source is also a PSD major stationary source or if there is a major modification to a PSD major stationary source; standards promulgated under Section 112 of the CAA if rationally related to the attainment and maintenance of federal and state ambient air quality standards or the requirements of Part C of Title I of the CAA; and the operating permit program under Title V and Part 71. See 40 CFR § 55.13(a), (c), (d)(2), (e), and (f)(2), respectively. See also 40 CFR § 71.4(d).

Part 55 makes the requirements of Part 71 applicable to this OCS source. See 40 CFR § 55.13(f). Part 71 requires a Title V permit to address all "applicable requirements" as that term is defined in 40 CFR Part 71.2. The following subsections of this Section discuss the categories of Title V "applicable requirements" for the Shell exploratory operations, as well as other requirements that must be included in the OCS/Title V permit.

### **2.6.1 Part 55 Requirements as Applicable Requirements**

Standards and requirements to control air pollution from OCS sources under Section 328 of the CAA are included in the definition of applicable requirement in 40 CFR § 71.2 and apply to the source as provided in Part 55. Accordingly, all requirements of Part 55 applicable to the OCS source have been included in the draft OCS/Title V permit and are discussed in Section 3, this includes the COA requirements incorporated by reference in 40 CFR § 55.14.

### **2.6.2 NAAQS as Applicable Requirements for Title V Temporary Sources**

Region 10 interprets the CAA and EPA regulations to require that a temporary source seeking a Title V permit demonstrate that it will not cause or contribute to a violation of the NAAQS at all locations where it is authorized to operate. Section 504(e) of the CAA authorizes a Title V permitting authority to issue a single permit authorizing emissions from similar operations by the same source owner at multiple temporary locations, provided that the permit includes conditions that will assure compliance with all applicable requirements at all locations. EPA regulations at 40 CFR § 71.6(e) provide that a "temporary source" is any source that moves at least once during the term of a Title V permit. The application submitted by Shell requests authorization to

conduct exploratory drilling at multiple temporary locations during the term of the permit, and the project is therefore a temporary source under Title V.

Section 504(e) further provides that requirements applicable to Title V temporary sources include, but are not limited to, “ambient standards and compliance with any applicable increment or visibility requirements under Part C” of Title I of the Act. In turn, implementing regulations at 40 CFR § 71.2 define “applicable requirements” as including “(13) any national ambient air quality standard [NAAQS] or increment or visibility requirements under Part C, Title I of the Act, but only as it would apply to temporary sources permitted pursuant to section 504(e) of the Act.” EPA included the same language in 40 CFR § 70.2. When EPA adopted its Part 70 regulations, the Agency interpreted Section 504(e) of the Act to make compliance with the NAAQS an applicable requirement for temporary sources. 57 Fed. Reg. 32550, 32276 (July 21, 1992) (“Under the Act, NAAQS implementation is a requirement imposed on States in the SIP; it is not imposed directly on a source. In its final rule, EPA clarifies that the NAAQS and the increment and visibility requirements under part C of title I of the Act are applicable requirements for temporary sources only.”). Based on this prior interpretation by EPA, Region 10 reads the definition of “applicable requirement” in 40 CFR 71.2 to mean that compliance with the NAAQS is an applicable requirement for all Title V temporary sources and therefore this source.

The definition of “applicable requirement” in 40 CFR 71.2 says that the NAAQS, increment, and visibility requirements are applicable requirements “only as it would apply to temporary sources permitted pursuant to Section 504(e) of the Act.” Section 504(e) of the CAA identifies applicable requirements for temporary sources as including “ambient standards and compliance with any applicable increment or visibility requirements under part C.” Region 10 interprets these provisions to mean that NAAQS are applicable requirements for all Title V temporary sources, but that increment and visibility requirements are applicable requirements only if such sources would otherwise be subject to PSD. Because the language in section 504(e) of the Clean Air Act uses the term “applicable” before “increment or visibility requirements under part C,” Region 10 interprets Section 504(e) to only make increment and visibility requirements “applicable requirements” for a temporary source when they would otherwise be “applicable” to a new major stationary source or major modification to an existing major stationary source in a permit required under Part C of the Act. Because the permittee is taking limits such that the source will not be a new major stationary source subject to PSD, the increment and visibility requirements under 40 CFR § 52.21 and Part C of the Act are not “applicable” in this instance.

Thus, the NAAQS are considered “applicable requirements” for the Kulluk and the OCS/Title V permit must contain terms and conditions that ensure compliance with the NAAQS at all relevant locations. The application submitted by Shell includes an analysis of the air quality impacts of the emissions from its exploratory operations on the NAAQS. The air quality analysis generally follows the regulations and guidance applicable to air quality analyses supporting permits issued under the PSD program. Part 71 does not describe how a Title V temporary source should demonstrate compliance with the NAAQS. In the absence of regulations or guidance setting out the requirements for a demonstration that the terms and conditions of a Title V permit for a temporary source will assure compliance with NAAQS at all authorized locations or operation, Region 10 believes that following the regulations and guidance for conducting an air quality analysis with respect to NAAQS under the PSD program is an appropriate approach. See 40 CFR Part 52, Appendix W (“Industry and control agencies have long expressed a need for

consistency in the application of air quality models for regulatory purposes . . . The *Guideline* provides a common basis for estimating the air quality concentrations of criteria pollutants used in assessing control strategies and developing emission limits.”)

While EPA recognizes that temporary sources must demonstrate compliance with the NAAQS at all authorized locations, in the context of OCS permits, there remains some uncertainty as to whether Section 328 of the CAA should be read by EPA to require such a showing for areas of ambient air over the OCS or solely on land. EPA is therefore currently assessing how to apply the NAAQS to OCS sources beyond 25 miles of a state’s seaward boundary on the Outer OCS. And, for sources located within 25 miles of a state seaward boundary on the Inner OCS, it is considering how to apply those regulatory requirements consistent with the mandate in CAA § 328(a)(1) that requirements to control pollution from OCS sources located within 25 miles of the state seaward boundary “shall be the same as would be applicable if the source were located in the corresponding onshore area.” Under any readings of these provisions, Region 10 believes that the permit applicant has made a sufficient showing to meet this applicable requirement. As discussed in more detail in Section 4 below, Region 10 reviewed and analyzed Shell’s application and air quality analysis and concluded that it demonstrates that the emissions impact from its exploratory operations, when operating in compliance with the terms and conditions of the draft OCS/Title V permit, will not cause or contribute to a violation of any NAAQS at any location in the ambient air over any point on the OCS or within the state seaward boundary.<sup>14</sup> Therefore, resolving the point of compliance questions is not necessary for this permitting action.

As also discussed below in Section 3, the draft OCS/Title V permit includes emission limits, operating restrictions, and associated monitoring, recordkeeping, and reporting requirements to ensure emissions authorized under the permit will not cause or contribute to a violation of any NAAQS.

### **2.6.3 New Source Performance Standards as Applicable Requirements**

Standards promulgated under Section 111 of the CAA are “applicable requirements” under 40 CFR § 71.2 and Section 111 standards promulgated under 40 CFR Part 60 (Part 60) apply to OCS sources as provided in 40 CFR § 55.13(c). Specific NSPS subparts in Part 60 apply to a source based on the source category, equipment capacity, and the date when the equipment commenced construction or modification. All emission units operating on the Kulluk are potentially subject to NSPS regulations because each is an emission unit on an OCS source. The application submitted by Shell provides that the Kulluk will contain emission units in four NSPS source categories: stationary compression-ignition internal combustion engines, boilers, incinerators, and fuel tanks. The requirements of applicable NSPS subparts for stationary compression-ignition internal combustion engines and incinerators are discussed in Section 3 of the SOB.

*NSPS Subparts K, Ka, and Kb:* 40 CFR Part 60, Subparts K, Ka, and Kb apply to petroleum liquids tanks as follows: K applies to tanks with capacity greater than 40,000 gallons that commenced construction or modification between March 8, 1974 and May 19, 1978; Ka applies to tanks with capacity greater than 40,000 gallons that commenced construction or modification

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<sup>14</sup> As discussed in more detail below, the draft OCS/Title V permit includes a condition that supports excluding the area within 500 meters of the hull of the Kulluk from ambient air.

after May 18, 1978 and before July 23, 1984; Kb applies to tanks with capacity greater than 75 cubic meters (19,813 gallons) that commenced construction, reconstruction or modification after July 23, 1984.

EPA does not know whether the tanks on the Kulluk are newer than 1984. However, the fuel stored in the tanks is the diesel used to fuel the emission units on board the Kulluk, and diesel fuel has a very low vapor pressure. They will therefore be exempted from the provisions of NSPS Kb as provided in 40 CFR § 60.110b(b) because the Reid vapor pressure of diesel fuel is less than 3.5 kPa. A representative range for the Reid vapor pressure of diesel fuel is available from AP-42, Chapter 7, Table 7.1-2. Consequently, the permit contains no conditions regarding operation of these tanks. Note that the tanks will have very low emissions – about 7 lbs of VOC per year.

*NSPS Dc*: 40 CFR Part 60, Subpart Dc, applies to boilers with a capacity of at least 10 MMBtu/hr. Based upon the information Shell provided to Region 10, there are no boilers on the Kulluk with a heat input capacity exceeding 10 MMBtu/hr. Therefore, the Kulluk boilers are not subject to NSPS Subpart Dc.

#### **2.6.4 National Emission Standards for Hazardous Air Pollutants (NESHAP) as Applicable Requirements**

NESHAP and other Section 112 standards are “applicable requirements” under 40 CFR § 71.2. Pursuant to 40 CFR § 55.13(e), such standards apply to OCS sources if rationally related to the attainment and maintenance of federal or state ambient air quality standards or the requirements of Part C of Title I of the Act. All emission units operating on the Kulluk are potentially subject to NESHAP regulations because each is an emission unit on an OCS source.

No source categories on board the Kulluk or Associated Fleet are currently regulated by NESHAPs promulgated at 40 CFR Part 61. Consequently, the emission units on the Kulluk are not subject to the requirements of Part 61.

The application submitted by Shell provides that the Kulluk will contain emission units in two source categories subject to NESHAP standards for area sources promulgated under 40 CFR Part 63: stationary reciprocating internal combustion engines and boilers. The applicability of specific NESHAP subparts to these emission units is discussed in Section 3 of the SOB.

#### **2.6.5 Monitoring, Recordkeeping, and Reporting**

As discussed above, 40 CFR § 55.8(a) authorizes Region 10 to require monitoring, reporting, and inspections for OCS sources, and 40 CFR § 55.8(b) provides that all monitoring, reporting, inspection, and compliance requirements of the CAA apply to OCS sources. In addition, Part 71 requires all Title V permits to contain monitoring, recordkeeping, and reporting to assure compliance with all Title V permit terms and conditions. See 40 C.F.R. §§ 71.6(a)(3)(i)(B) and 71.6(c)(1).

Accordingly, Region 10 has included in the draft OCS/Title V permit monitoring, recordkeeping, and reporting to assure compliance with all permit terms and conditions based on the following authority. As required by 40 C.F.R. § 55.8(b) and 40 C.F.R. § 71.6(a)(3)(i)(A), Region 10 has included in the OCS/Title V permit the monitoring requirements contained in all applicable requirements. Where the applicable requirement contains no periodic monitoring, Region 10 has included periodic monitoring sufficient to yield reliable data from the relevant time period that

are representative of the source's compliance with the permit as provided in 40 C.F.R. § 71.6(a)(3)(i)(B). See also 40 CFR § 55.8(a). Finally, where there is some periodic monitoring in the applicable requirement, but that monitoring is not sufficient to assure compliance with permit terms and conditions, Region 10 has supplemented that monitoring to assure such compliance, as required by 40 C.F.R. § 71.6(c)(1) and 40 CFR § 55.8(a). Region 10 has also included all applicable and other appropriate recordkeeping and reporting requirements.

### **3. PERMIT TERMS AND CONDITIONS**

#### **3.1 Overview**

The permittee intends to implement its Beaufort Sea exploration drilling program through the use of the Kulluk and the Associated Fleet. The permittee has applied for a COA minor permit and an OCS/Title V permit containing limitations necessary to ensure that the project emissions are reduced to below PSD thresholds. This section of the SOB describes the permit terms Region 10 considers necessary to ensure the project remains a minor source, not subject to PSD, as well as to ensure that the project does not cause or contribute to a violation of any NAAQS and complies with all other applicable requirements.

#### **3.2 Generally Applicable Requirements**

This section describes the permit conditions that apply generally to the Kulluk and the Associated Fleet and generally relate to permit administration or enforcement.

Condition A.1 requires the permittee to construct and operate the OCS source and the Associated Fleet in accordance with its application and supporting materials and in accordance with the final permit, and to submit supplementary or corrected information discovered to have been omitted from the permit application, as provided in 40 CFR §§ 55.6(a)(4)(i) and 71.5(b).

Condition A.2 requires that when two or more provisions apply to the same emission unit or activity, the permittee must comply with both, as provided in 40 CFR § 71.6(a)(1) and 18 AAC 50.326(a).

Condition A.3 specifies the enforcement authority for violation of OCS, COA and Part 71 regulations and this permit, as provided in 40 CFR §§ 55.9(a)-(b) and 71.6(a)(6)(i), and specifies other provisions governing compliance with permit terms and conditions as well as applicable requirements that apply to Title V sources pursuant to 40 CFR §§ 55.9(a)-(b), 71.5(c)(8)(iii)(A-B), 71.6(a)(6)(ii) and 71.6(c)(3). Operation in violation of a permit term or condition is not authorized under this permit.

Condition A.4 makes clear that, except with respect to the extent of the Title V permit shield with respect to Clean Air Act requirements included and specifically identified in the permit as provided in 40 CFR § 71.6(f)(1)(i), the permit does not relieve the permittee of the responsibility to comply fully with all other requirements of federal law. See 40 CFR §§ 55.6(a)(4)(iii) and 71.6(f)(3)(i-iv). The permittee is required to obtain approval from other agencies before it is authorized to begin exploratory drilling in the Beaufort Sea. Condition A.4 makes clear the permittee's obligation to satisfy all other federal requirements prior to commencing operation under this CAA permit.

Condition A.5 requires the permittee to notify all owners, operators and contractors of the source of the requirements of the permit, as provided in 40 CFR § 55.6(a)(4)(iv).

Condition A.6 addresses the expiration of the permit and the ramifications if the permittee does or does not renew its permit. It is important to note that, if the permittee does not submit a complete and timely renewal application, the permittee's right to operate is terminated. The expiration date of the permit is listed on the top right-hand corner of the front page of the permit. This condition includes terms generally applicable to Title V sources pursuant to 40 CFR §§ 71.5(a)(1)(iii), 71.5(a)(2), 71.5(c)(5), 71.6(a)(11), 71.7(b), & 71.7(c)(1), 71.7(c)(1)(ii) and 71.7(c)(3).

Condition A.7 contains provisions for modification, revocation, reopening and reissuance and termination of the permit pursuant to 40 CFR §§ 71.6(a)(6)(iii), 71.7(f) and 71.6(a)(8).

Condition A.8 clarifies that the specification of a reference test method does not preclude the use of other credible evidence for the purpose of establishing whether or not the permittee is in compliance with a particular requirement. This is consistent with Region 10's interpretation of the Clean Air Act requirements. See 40 CFR §§ 52.12(c), 60.11(g), 61.12(e), and 62 Fed. Reg. 8314 (February 24, 1997).

Condition A.9 includes EPA's inspection authority for Title V sources pursuant to 40 CFR § 71.6(c)(2).

Condition A.10 includes the general recordkeeping requirements for Title V sources, including a record retention requirement of five years pursuant to 40 CFR § 71.6(a)(3)(ii)(A-B).

Condition A.11 specifies the Region 10 address to which information under the permit must be submitted.

Condition A.12 requires the certification of all documents submitted under the permit as required by 40 CFR §§ 71.5(d), 71.6(c)(1) and 71.9(h)(2).

Conditions A.13 and A.14 contain standard language regarding severability of permit conditions and property rights that are applicable to Title V sources pursuant to 40 CFR § 71.6(a)(5) and 71.6(a)(6)(iv).

Condition A.15 contains standard language regarding the obligation of the permittee to respond to information requests from Region 10, pursuant to 40 CFR § 71.6(a)(6)(v) and 71.5(a)(3).

Condition A.16 contains standard language governing emergency situations at Title V sources, pursuant to 40 CFR §§ 71.6(g)(1) - (5).

Condition A.17 contains standard language regarding deviation reports for Title V sources pursuant to 40 CFR §§ 71.6(a)(3)(i)(B), 71.6(a)(3)(iii)(B) and 71.6(a)(3)(iii)(C).

Conditions A.18 applies on the Inner OCS and requires the permittee to comply with applicable excess emission and permit deviation reporting requirement in 18 AAC 50.235(a)(2) and 18 AAC 50.240 except as provided in Condition A.19. The State of Alaska adopted this condition as Standard Permit Condition III (revised as of August 20, 2008) and Standard Permit Condition IV (revised as of August 20, 2008) under 18 AAC 50.346(b) as part of the construction permit program and these condition are included in State construction permits.

The permittee is required to notify EPA when emissions or operations deviate from the requirements of the permit. This condition satisfies two State of Alaska regulations related to excess emissions: the technology-based emission standard regulation and the excess emission regulation. Although there are some differences between the regulations, Condition A.18 satisfies the requirement of each regulation.

The reports themselves and the other monitoring records required under this permit provide monitoring of whether the Permittee has complied with the condition. Please note that there may be additional federally required excess emission reporting requirements.

Condition A.19 includes provisions requiring semi-annual monitoring reporting (called an “operating report” in the permit) and an annual compliance certification report as required by 40 CFR §§ 71.6(a)(3)(iii)(A) and 71.6(c)(5). The annual compliance certification is required to be submitted along with the semi-annual monitoring report due February 28 given that the corresponding operating period coincides with the drilling season. Given that the drilling season ends no later than November 30, the permittee is provided 90 days from the termination of drilling activity to compile and submit this report.

Condition A.20 contains standard language regarding off permit changes at Title V sources pursuant to 40 CFR §71.6(a)(12).

Condition A.21 contains standard language regarding emissions trading and operational flexibility at Title V sources pursuant to 40 CFR § 71.6(a)(13)(i).

Condition A.22 ensures compliance with the applicable fee requirement in 18 AAC 50.400 – 50.405. This condition requires the permittee, owner, or operator to pay administration fees as set out in regulation. Paying administration fees is required as part of obtaining and holding a permit for operation on the Inner OCS.

Conditions A.23 and A.24 apply on the Inner OCS and implements the applicable requirements in 18 AAC 50.410 – 50.420. The regulations require all permits to include due dates for the payment of fees and the method the permittee may use to re-compute assessable emissions.

The State of Alaska adopted this condition as Standard Permit Condition I (revised as of August 25, 2004) under 18 AAC 50.346(b) and the condition is included in State construction permits. The default assessable emissions are generally potential emissions of each air pollutant in excess of 10 tpy authorized by the permit. Assessable emissions are defined as the quantity of each air pollutant for which emission fees are assessed.

This condition allows the permittee to calculate actual annual assessable emissions based on previous actual annual emissions. Assessable emissions are based on each air pollutant. Therefore, fees based on actual emissions shall be paid on any pollutant emitted whether or not the permit contains any limitation of that pollutant.

This condition specifies that, unless otherwise approved by EPA, calculations for assessable emission based on actual emissions use the most recent previous calendar year’s emissions. Since each current year’s assessable emission are based on the previous year, the EPA will not give refunds or make additional billings at the end of the current year if the estimated emissions and current year actual emissions do not match.

Condition A.25 contains standard language regarding Part 71 fees for Title V sources pursuant to 40 CFR § 71.9.

Condition A.26.1 applies on the Inner OCS and requires the Permittee to conduct source tests requested by EPA. The State of Alaska adopted this condition under 18 AAC 50.345(k) as part of its construction permit program standard permit condition and the condition is included in State construction permits. This condition ensures compliance with the applicable regulation in 18 AAC 50.220(a).

Conditions A.26.2 through A.26.4 apply within the Inner OCS and implements the applicable requirements in 18 AAC 50.220(b) and apply because the permittee is required to conduct source tests as set out in Conditions A.28.2 through A.28.4. These conditions supplement the specific monitoring requirements stated elsewhere in the permit.

Condition A.26.5 applies on the Inner OCS and implements the applicable requirements in 18 AAC 50.345(a) and applies when the source exhaust is observed for visible emissions. As provided in 18 AAC 50.345(a) the requirement for test plans, notifications and reports do not apply to visible emissions observations by smoke readers, except in connection with required particulate matter testing.

Condition A.26.6 applies on the Inner OCS and implements the applicable requirements in 18 AAC 50.345(l) – (o) and applies because the permittee is required to conduct source tests by this permit. Standard Conditions 18 AAC 50.345(l) – (o) are incorporated through this condition.

Condition A.26.7 applies on the Inner OCS and requires the permittee to reduce particulate matter data in accordance with 18 AAC 50.220(f). It applies when the permittee tests for compliance with the PM standard in 18 AAC 50.050 or 50.055. This condition incorporates a regulatory requirement for PM source tests. This condition supplements specific monitoring requirements stated elsewhere in the proposed permit.

### **3.3 COA Source-Wide Requirements**

Conditions B.1 – B.4: Conditions B.1 through B.4 apply on the Inner OCS and implements the applicable requirements in 18 AAC 50.055(a). 18 AAC 50.055(a) applies to the operation of fuel-burning equipment and industrial processes. Units K-1A through K-7D5 in Table 1 of the permit are fuel-burning equipment and industrial processes. The State of Alaska adopted this condition as a Standard Permit Condition IX (revised as of August 20, 2008) under 18 AAC 50.346(c) as part of the construction permit program and this condition is included in State construction permits. Condition B.1 prohibits the permittee from causing or allowing visible emissions in excess of the applicable standard in 18 AAC 50.055(a)(1). The permittee must monitor, record and report emissions in accordance with Conditions B.2 through B.4 of this permit.

Condition B.2.2 has slightly modified the State’s Standard Permit Condition in this permit by removing the part of the Standard Permit Condition which requires semiannual method 9 observations. Shell stated in the permit application that the Beaufort Sea drilling season will be July 1 through November 30 annually. Given the length of the drilling season (five months) EPA determined that the permittee would not be able to conduct the semiannual Method 9 observations contemplated in the State’s Standard Permit Conditions.

#### **Liquid fuel-fired burning equipment**

For liquid fired fuel-burning equipment Units K-1A through K-7D5, the MR&R requirements in the State’s Standard Permit Condition IX.

Monitoring: In general, the visible emissions shall be observed by a Method 9 Plan or Smoke/No Smoke Plan as detailed in Condition B.2. Corrective actions such as maintenance procedures and either more frequent or less frequent testing may be required depending on the results of the observations.

Recordkeeping: The permittee is required to record the results of all visible emission observations and record any actions taken to reduce visible emissions.

Reporting: The permittee is required to report: 1) emissions in excess of the federal and state visible emission standard and 2) deviations from permit conditions. The permittee is required to include copies of the results of all visible emission observations with the OCS operating report.

Condition B.5 – B.9: Conditions B.5 through B.9 apply on the Inner OCS and implements the applicable requirements in 18 AAC 50.055(b). This requirement applies to operation of all industrial processes and fuel burning equipment in Alaska. The State of Alaska adopted this condition as a Standard Permit Condition IX (revised as of August 20, 2008) under 18 AAC 50.346(c) as part of the construction permit program and this condition is included in State construction permits. Units K-1A through K-7D5 of Table 1 are fuel burning equipment and industrial processes.

Condition B.5 prohibits emissions in excess of the state PM (also called grain loading) standard applicable to fuel-burning equipment and industrial processes. The Permittee must establish by actual visual observations that can be supplemented by other means, such as a defined Stationary Source Operation and Maintenance Program, that the stationary source is in continuous compliance with the State's emission standards for visible emissions and particulate matter.

These conditions detail a stepwise process for monitoring compliance with the State's visible emissions and particulate matter standards for liquid and gas fired sources. Equipment types covered by these conditions are internal combustion engines, turbines, heaters, boilers, and flares. Initial monitoring frequency schedules are established along with subsequent reductions or increases in frequency depending on the results of the self-monitoring program.

Reasonable action thresholds are established in these conditions that require the Permittee to progressively address potential visible emission problems from sources either through maintenance programs and/or more rigorous tests that will quantify whether a specific emission standard has been exceeded.

Monitoring recording and reporting requirements are listed in Conditions B.6 through B.9. The permittee must establish actual visible observation which can be supplemented by other means to demonstrate that the emission unit is in continuous compliance with the State's emission standards for PM.

Condition B.10 – B.12: Conditions B.10 through B.12 apply on the Inner OCS and require the permittee to comply with the sulfur compound emission standard for all fuel-burning equipment and industrial processes. This requirement applies to operation of all industrial processes and fuel burning equipment in Alaska. The State of Alaska adopted Conditions B.17 and B.19 as a Standard Permit Condition XI (revised as of August 25, 2004) under 18 AAC 50.346(c) as part of the construction permit program. In addition Standard Permit Condition XII (August 25, 2004) was adopted under 18 AAC 50.345(c). As a result, these standard permit conditions are included in State construction permits. Units K-1A through K-7D5 of Table 1 are fuel-burning equipment and industrial processes.

The 0.01 percent by weight limitation on sulfur in the No. 2 diesel fuel assures compliance with the COA's 500 ppm SO<sub>2</sub> stack gas standard based on the following calculations:

$$\begin{aligned} C_d &= (1 \text{ lb S}/10,000 \text{ lb fuel}) \times (2 \text{ lb SO}_2/\text{lb S}) \times (385 \text{ dscf SO}_2/64 \text{ lb SO}_2) \times (1 \text{ lb fuel}/19,571 \\ &\quad \text{Btu}) \times (\text{Btu}/0.00919 \text{ dscf}) \\ &= 6.7 \times 10^{-6} \text{ dscf SO}_2/\text{dscf exit gas} = 6.7 \text{ ppm} \end{aligned}$$

The permittee may not cause or allow the affected equipment to violate this standard. Conditions B.11 and B.12 contain the COA Regulations for recordkeeping and reporting requirements to ensure compliance with the Sulfur Compound Emission Standard.

Condition B.13: Condition B.13 applies on the Inner OCS and ensures compliance with the applicable visible emission requirements in 18 AAC 50.055(a). This condition prohibits the permittee from causing or allowing visible emissions in excess of the applicable standard in 18 AAC 50.055(a)(1).

The permittee must monitor, record, and report emissions in accordance with Condition B.2 through B.44 of this permit.

Condition B.14: Condition B.14 applies on the Inner OCS and ensures compliance with the applicable requirement in 18 AAC 50.346(b)(5) and applies to all emission units except those subject to federal emission standards, those subject to continuous emission parametric monitoring, and for insignificant emission units. This condition requires the permittee to comply with good air pollution control practices for all sources.

Maintaining and operating equipment in good working order is fundamental to preventing unnecessary or excess emissions. The State of Alaska adopted this condition as a Standard Permit Condition II (revised as of August 25, 2004) under 18 AAC 50.346(b) as part of the construction permit program and this Standard Permit Condition included in State construction permits. The State condition is based on the assumption that good maintenance is performed. Without appropriate maintenance, equipment can deteriorate more quickly than with appropriate maintenance.

The permittee is required to keep maintenance records to show that proper maintenance procedures were followed and to make the records available to the EPA. The EPA may use these records as a trigger for requesting source testing if the records show that maintenance had been deferred. EPA also has authority under Section 114 of the CAA to require source testing at any time to determine compliance with CAA requirements.

Condition B.15: Condition B.15 applies on the Inner OCS and implements the applicable requirement in 18 AC 50.110. Air Pollution Prohibited requirements apply to the stationary source because the stationary source will have emissions. The State of Alaska adopted this condition as a Standard Permit Condition II (revised as of August 25, 2004) under 18 AAC 50.346(a) as part of the construction permit program and is included in State construction permits.

The condition prohibits the permittee from causing any emission which is injurious to human health or welfare, animal or plant life, or property, or which would unreasonably interfere with the enjoyment of life or property. While the other permit conditions and emission limitations should ensure compliance with this condition, unforeseen emission impacts can cause violations of this standard. These violations would go undetected except for complaints from affected

persons. Therefore, to monitor compliance, the permittee must monitor and respond to complaints.

The permittee is required to report any complaints and injurious emissions. The permittee must keep a record of the date, time, and nature of all complaints received and summary of the investigation and corrective actions undertaken for these complaints and to submit copies of these records upon request by EPA.

The EPA will determine whether the necessary actions were taken. No corrective actions are necessary if the complaint is frivolous or there is not a violation of 18 AAC 50.110; however this condition is intended to prevent the permittee from prejudging that complaints are invalid.

Condition B.16: Condition B.16 states that nothing in this permit relieves the permittee from the requirement to obtain a minor permit for modifications that are subject to 18 AAC Article 5 Minor Permits. This permit term is particularly relevant as the permittee considers changes to the Kulluk or Associated Fleet. Before making changes to emission units on the Kulluk or Associated Fleet, Condition C.4 of the permit requires Shell to conduct and submit a modeling analysis to support changes to the emissions units on the Kulluk and Associated Fleet. Such changes may also trigger the requirement to obtain from EPA a permit to construct. Condition B.16 emphasizes that the permittee's compliance with Condition C.4 does not relieve Shell of its obligation to obtain a minor permit for such changes, if applicable.

### **Source-Wide Notifications**

Condition C.1: The permittee has requested authorization to operate the Kulluk at multiple drill site locations on its lease holdings in lease sales 186, 195 and 202 of the Beaufort Sea under a single permit that restricts all such operations to below PSD major source thresholds. This condition requires the permittee to notify and provide to Region 10 by April 1 each year a list of proposed drill locations and the expected date that the Kulluk will become an OCS source. This allows EPA to confirm that the Kulluk will be operating at a location addressed by the permit and dictates which permit conditions will apply because some conditions only apply on the Inner OCS.

Condition C.2: Total operation as an OCS source under the permit is limited to 120 days per drilling season. This condition requires the permittee to notify Region 10 of the actual beginning and end of each drilling season. This provision provides information that EPA uses to enforce the limitations on the length of the drilling season and the number of days of drilling.

Condition C.3: As discussed above, the Associated Fleet vessels and the emission units thereon that the permittee will use as allowed under this permit will be leased and have therefore not been identified to Region 10. For the Kulluk, Shell has not identified specific make and models or serial numbers for the permitted equipment along with other emission unit characteristics. Condition C.3 requires this information to be sent to Region 10 by April 1 each year. This will allow Region 10 enough time to ensure the equipment is adequately addressed by the permit.

Condition C.4: NAAQS are applicable requirements for Title V temporary sources, such as the Kulluk Drill Rig and the Associated Fleet. This condition requires the permittee to establish via a replicable modeling analysis that emissions from the Kulluk and Associated Fleet, as actually configured in each year of operation, do not cause or contribute to a violation of the NAAQS. This condition reflects the fact that the permittee does not own the Associated Fleet vessels, and

therefore does not have specific information on the equipment and precise configurations that will be operated from year to year. Shell has also indicated that emission units on the Kulluk could change from year to year. Region 10 has relied on the information and details submitted supporting this initial permitting action to establish permit terms and conditions ensuring that under the proposed configuration the source will not cause or contribute to a violation of any NAAQS.

The emission units on the Kulluk and Associated Fleet that are actually used in each year must comply with all of the conditions and limitations in this permit, including the Synthetic Minor PTE Limits (condition D.4), the Operational Restrictions to Protect the NAAQS (condition D.5), and the Emission Limits to Protect the NAAQS (condition D.6). However, different configurations of emission units as well as their stack characteristics (height, diameter, location relative to structures) can change the modeled impact even if emissions are the same. This condition assures compliance with the NAAQS, an applicable requirement, if the equipment or vessels in any drilling season differ from the equipment or vessels described in the permit application. Requiring subsequent modeling analyses to be conducted in an identical manner, reflecting only specific equipment or configuration changes, to establish that any future configuration satisfying this requirement would have been approvable at the time of issuance of this permit, is using a protocol based on sound scientific principles to provide reproducible results with the same inputs. The permit contains conditions to assure that the results of the protocol are recorded (by requiring the modeling analysis and results to be submitted to EPA before the drilling season) and will be used for determining whether the NAAQS will be met for the configuration used during each drilling season.

Note that any changes to the project must also be evaluated under applicable new source review programs and for compliance with title V permit modification requirements. Nothing in this condition or otherwise in this permit exempts modifications at this source from applicable new source review requirements.

### **3.4 Source-Wide Emission Limits & Operational Restrictions**

Condition D.1: This condition specifies the frequency (weekly or monthly) for calculating and summing emissions of specified pollutants and averaging times. Pollutants with hourly or daily limits are calculated weekly; pollutants with monthly-rolling limits are calculated monthly. Specific calculations are required in other conditions in the permit that use the results to determine compliance with emission limits, including the synthetic minor PTE limits in Permit Condition D.4 and the NAAQS-based emission limits in Permit Condition D.6. The calculated emissions also will form the basis for paying emission-based fees. This condition also clarifies which emission factor to use for groups of emissions units and how to convert tracked operating hours to fuel usage data used in compliance calculations.

Condition D.2: This condition contains tables that specify the emission factors<sup>15</sup> that are required to be used for purposes of the permit for calculating emissions under and compliance with the emission limits and other terms and conditions in the permit. These emission factors apply until an alternative test-derived emission factor has been developed pursuant to Condition D.2 of the permit.

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<sup>15</sup> See July 20, 2011 EPA memorandum entitled, “Derivation of Emission Factors in Tables D.2.1 and D.2.2 of Draft Permit to Shell for Operation of Conical Drilling Unit Kulluk in Beaufort Sea.”

Condition D.3.1 and D.3.2: These conditions limit the annual duration of the permittee’s exploration operations in the Beaufort Sea. The permittee’s drilling season will largely be limited by sea ice conditions. Some variability can be expected from year to year. However, the permittee may begin drilling on July 1 and must cease operations as an OCS source by November 30 of each year. The permittee has specifically requested that the permit impose an annual limit of 120 days of operation as an OCS source. This condition limits the drilling season to the period between July 1 and November 30 of each year, which is referred to as the “drilling season” in the permit, and limits the number of days of operation as an OCS source to 120 calendar days each drilling season. This is not a continuous 120 day period but an aggregation of all time operating as an OCS source during a given drilling season. In addition, for each drill site,

Conditions D.3.3, D.3.4 and D.3.5 are necessary for ambient air quality protection. The conditions restrict the duration of time Shell can perform certain higher-emitting activities utilizing equipment on the Kulluk. The permittee shall not conduct any Drilling Activity in excess of 1,632 hours within a drilling season. Drilling Activity includes MLC Drilling Activity and Well Drilling Activity. Well Drilling Activity is defined as any time when the top drive is engaged and turning the conventional rotary bit. MLC Drilling Activity is defined as any time when any MLC HPU engine or MLC air compressor engine is operating. MLC Drilling Activity is expected to generate the most air pollution. The permittee shall not conduct any MLC Drilling Activity in excess of 480 hours.

Condition D.3.6 requires the permittee to document the exact location of the Kulluk when drilling, the lease block where drilling is occurring, and the duration of the Kulluk as an OCS source at that site.

Conditions D3.7 and D3.8 require monitoring and recording to document compliance with Conditions D 3.4 and D3.5.

Condition D.3.9 also clarifies that time recorded as an OCS source must include time spent drilling relief wells.

Condition D.4: This condition imposes synthetic minor limits (tons per “year”) to ensure that the source’s emissions remain below the levels that would make it a PSD major source and subject to PSD permitting. Only pollutants that would otherwise (without the permit) be potentially emitted at rates above the PSD thresholds must be limited; this condition limits NO<sub>x</sub>, CO, SO<sub>2</sub> and GHG emissions below the PSD tons per “year” thresholds in this condition. The ton per “year” period is either a 12 month rolled monthly or a 365 day period rolled daily depending on how confident EPA is in the compliance techniques employed. EPA prefers shorter rolling compliance periods for pollutants that are harder to measure or confirm.

SO<sub>2</sub> emissions are limited using an emission limit as well as fuel and fuel sulfur content limits. The permit requires compliance with the SO<sub>2</sub> limit to be determined by measuring the total amount of fuel burned and confirming the total amount of fuel burned using nearly continuous measurements and confirming the total amount of sulfur in the fuel burned. Confidence that this technique will ensure continuous compliance is high, therefore “yearly” emissions are required to be summed only monthly.

GHG emissions are limited using an emission limit as well as a fuel limit. Compliance with the GHG emission limit is determined by measuring the total amount of fuel burned and calculating

the emission using measured fuel and emission factors. The combination of fuel and incineration limits as well as the fact that the emission factors are expected to be relatively consistent results in good confidence in the overall compliance technique and therefore “yearly” emissions are required to be summed only monthly.

CO and NO<sub>x</sub> emissions are limited using emission limits. Compliance with the CO and NO<sub>x</sub> emission limits is determined by multiplying measured fuel by periodically confirmed emissions factors. Because EPA expects the emission factors to be more variable, the “yearly” emissions are summed on a daily frequency.

For compliance techniques that rely on emission factors, the permit includes default emission factors that can be used until unit-specific emission factors are determined through testing (see Condition E.2). The testing protocol required by the permit results in conservatively high emission unit-specific emission factors, which help to assure compliance. The permit also includes specific monitoring requirements for fuel usage in engines and boilers and waste feed rates to the incinerators so limits on operational parameters can be confirmed. A cap has been set on the capacity of the incinerators. Permit-required monitoring of the SCR and oxidation catalyst control devices will help assure the devices are operating correctly and achieving the emissions reductions expected. In fact, when monitoring indicates that the SCR or oxidation catalyst units are not operating correctly, the permittee must use emissions factor that assume no control devices exist – basically “uncontrolled” emissions that are 10 times the controlled emissions from an SCR unit and 5 times the controlled emissions from an oxidation catalyst.

The limits are generally not applied to individual emission units in this permit due to the need for operational flexibility. Exploration operations such this one experience highly variable operations (well to well and season to season) due to natural elements (e.g. weather, the sea and the remoteness of the area) and the exploratory nature of the operation – that is exploration of the unknown. Given the need for flexibility, the remoteness of the operation and mix of pollutants and emission units, EPA believes that the pollutant- and emission unit-specific compliance techniques in this permit are warranted.

GHGs is the air pollutant defined in 40 CFR § 86.1818–12(a) as the aggregate group of six greenhouse gases: carbon dioxide (CO<sub>2</sub>), nitrous oxide (N<sub>2</sub>O), methane (CH<sub>4</sub>), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF<sub>6</sub>). 40 CFR § 52.21(b)(49)(i). The term “tpy CO<sub>2</sub> equivalent emissions (CO<sub>2</sub>e)” represents an amount of GHGs emitted, and is computed by multiplying the mass amount of emissions (tpy), for each of the six greenhouse gases in the pollutant GHGs, by the gas's associated global warming potential published at Table A–1 of 40 CFR Part 98, Subpart A (Global Warming Potentials). 40 CFR § 52.21(b)(49)(ii). The Kulluk and Associated Fleet emit three of the six GHGs (CO<sub>2</sub>, N<sub>2</sub>O, and CH<sub>4</sub>). The permit requires the use of each greenhouse gas' associated global warming potential from 40 CFR Part 98, Subpart A, Table A–1 – Global Warming Potentials, to calculate total CO<sub>2</sub>e emissions.

A small amount of CH<sub>4</sub> may be emitted by the Drilling Mud System (K-10). When wells are drilled through porous, hydrocarbon bearing rock, drilling fluids (mud) circulated through the drill bit can carry gaseous hydrocarbons from the well back to Kulluk. These gases are typically released as fugitive emissions when the mud is processed for reuse on the Kulluk or stored and shipped away; however, some of the emissions pass through a vent. Although fugitive emissions are not counted towards PSD applicability for exploratory drill rigs (see 40 CFR §

52.21(b)(1)(iii)), the permittee has agreed to count all of these methane emissions under the PTE limit for GHGs.

Based on past drilling experience, the permittee has estimated that approximately 399 pounds of methane per month could be released from the circulated mud. To account for this potential methane release while determining compliance with the GHG PTE limit, the permit assumes 4 tons per month of CO<sub>2</sub>e emissions (399 pounds CH<sub>4</sub> per month multiplied by CH<sub>4</sub> global warming potential) will be released from the drilling mud and reduces the amount of GHGs that can be emitted from other operations.

For the Kulluk and Associated Fleet, GHGs will be emitted by various fuel combustion sources (engines, boilers) and by incinerators. Region 10 is therefore establishing three limitations in the permit:

- A GHG 12-month rolling limit of 80,000 tpy CO<sub>2</sub>e;
- A total aggregate 12-month rolling limit for fuel combusted of 7,011,023 gallons<sup>16</sup>;
- A total aggregate daily waste-combusting capacity limit of 13,704 pounds.

It was necessary to assume a certain amount of waste is incinerated each day in order to calculate the season-long diesel fuel allowance for combustion equipment in aggregate. The daily waste-combusting capacity was calculated by summing the approximate capacities for incinerators on the Kulluk and Associated Fleet while considering operating limits proposed by this permit. EPA is proposed to limit operation of the Kulluk incinerator to 12 hours per day. Here is the calculation:

$$13,704 \text{ lb/day} = (276 \text{ lb/day})(12 \text{ hours/day}) + (154 \text{ lb/day})(24 \text{ hr/day}) + (154 \text{ lb/day})(24 \text{ hr/day}) + (125 \text{ lb/day})(24 \text{ hr/day})$$

For determining compliance with the 80,000 tpy CO<sub>2</sub>e limitation, GHG emission calculations for many units will be based upon fuel usage. For certain units not expected to contribute significantly to overall emissions and for whom daily operation monitoring may be a challenge, emission calculations will be based upon the assumption that the unit is operating at maximum rated capacity. Examples of such units include incinerators and heaters/boilers.

Condition D.4.9 prohibits Shell from operating the Kulluk in the Beaufort Sea within the same drilling season as the Noble Discoverer drilling vessel. With this condition, the scope of emissions generating activity occurring in time and space that could be considered part of the source under the CAA does not extend beyond the Kulluk.

Conditions D.5 and D.6: These conditions include provisions necessary to ensure that the project does not cause or contribute to a violation of any NAAQS under authorized operational scenarios. As discussed in Section 2 above, for a Title V temporary source, the NAAQS are an applicable requirement and the Title V permit must include terms and conditions to ensure compliance with the NAAQS at all locations. See 40 CFR §§ 71.2 (definition of applicable requirement), 71.6(a)(1), and 71.6(e). Specific to just the Inner OCS, COA 18 AAC 50.544(c)(1) requires this permit to construct to contain terms and conditions necessary to protect the short and long-term SO<sub>2</sub> standards, the 24-hr PM<sub>10</sub> standard and the annual NO<sub>2</sub> standard. The air

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<sup>16</sup> See July 20, 2011 EPA memorandum entitled, “Calculation of No. 2 Diesel Fuel Usage Restriction for Condition D.4.6 in Draft Permit to Shell for Operation of Conical Drilling Unit Kulluk in Beaufort Sea.”

quality modeling analysis submitted as part of the permit application demonstrated initial compliance with the NAAQS. The air quality impact analysis is discussed in Section 4. Emission limitations and operational restrictions have been included to ensure compliance with the hourly NO<sub>2</sub> and the 24-hour PM<sub>10</sub> and PM<sub>2.5</sub> NAAQS. These conditions convert key assumptions that were made by the permittee in the modeling analysis into enforceable permit conditions.

The air quality analysis submitted by the permittee modeled emissions from the Kulluk beginning 500 meters from the hull of the Kulluk and assumes that the Coast Guard will impose a safety zone of this distance around the Kulluk to exclude the public from the area in which the main operations will be conducted.<sup>17</sup> Region 10 will include in the permit a requirement that the permittee have in place during all times of operation as an OCS source a safety zone of at least 500 meters within which the Coast Guard prohibits public access. To implement this provision, the draft permit also requires that the permittee develop in writing and implement a public access control program to locate, identify and intercept the general public by radio, physical contact, or other reasonable measures to inform the public that they are prohibited by Coast Guard regulations from entering the area within 500 meters of the Kulluk. Region 10 has included these provisions in Condition D.5.1, consistent with the permittee's demonstration that emissions from their exploratory operations will not cause or contribute to a violation of the NAAQS in any location that constitutes ambient air. Thus, the permittee's application demonstrates that it complies with the NAAQS at all authorized locations, regardless of EPA's ultimate decision about the point of compliance.<sup>18</sup>

Conditions D.5.2 through D.5.5 include specific operational restrictions inherent in the modeling analysis conducted by the permittee. These conditions include limits on hour of operation for specific equipment, duration and frequency of certain activities, and a requirement that certain stacks be vertical uncapped stacks. For example, the permit places a restriction on the number of times a vessel can operate in dynamic positioning mode while resupplying (including removing waste) the Kulluk over the course of a drill season. The permit also restricts the duration of such events to 24 hours. Region 10 is relying on vessel tracking data required to be collected via modern global positioning system technology under Condition F.1.3 and has included recordkeeping requirements.

The NAAQS protection limits in Condition D.6 include emission limits on specific emission units or groups of specific emission units (including whole vessels) that reflect emission rates used in the modeling analysis conducted in support of the permit application (discussed in more detail in Section 4 and Appendix A of this SOB). Although the permit allows some flexibility in the selection of vessels and equipment as part of its operations, the vessels and equipment selected must comply with the emission limits and operations restrictions in the permit. For example, Condition D.6.1.1 and D.6.1.2 limit emissions from the Kulluk electric generation

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<sup>17</sup> See Shell Permit Application 02/28/11, page 44 of Appendix F

<sup>18</sup> Ambient air is defined as "...that portion of the atmosphere, external to buildings, to which the general public has access." 40 CFR § 50.1(e). Ambient air does not include atmosphere over land owned or controlled by a source and to which the public access is precluded by a fence or physical barrier. See Letter from Douglas M. Costle, EPA Administrator to The Honorable Jennings Randolph, re: Ambient Air dated December 19, 1980; Letter from Steven C. Riva, EPA Region 2, to Leon Sedefian, New York State Department of Conservation, re: Ambient Air for the Offshore LNG Broadwater Project, October 9, 2007.

engines. While Condition D.6.1.1 specifies the emission limit applicable to the engines while they generate electricity to support well drilling activity, Condition 6.1.2 limits engine emissions at all other times. Engine emissions are greater during well drilling activity given the demand on the generators for additional power. The need for additional power correlates to the engines operating at higher loads and thus consuming additional diesel fuel. The frequency and duration of the well drilling activity and associated emissions must be limited so as to protect the NAAQS as discussed previously in this SOB for Conditions D.3.3 to D.3.5 of the proposed permit.

The hourly emission limits for NO<sub>x</sub> and daily emission limits for PM<sub>10</sub> and PM<sub>2.5</sub> in Conditions D.6.1 through D.6.12 reflect the emission rates employed in the modeling analysis. The permittee calculated these emission rates by summing the rates for each emission unit, group of emission units, or vessel, depending on which approach was appropriate considering the modeling approach used by the permittee in its permit application. For example, emissions from the Kulluk electric generation engines were modeled together as one point source given that their emissions will be exhausted to a common stack. It is appropriate for EPA to limit emissions from this group of engines collectively as one. For the MLC air compressor engines, however, it is not appropriate to limit their emissions collectively on those occasions when these portable units are not co-located. The permittee assumed two groups of these engines would be located on opposite sides of the Kulluk. To ensure consistency with the modeling analysis, half of the emissions are assigned to one group and half of the emissions to the other. Contrast the MLC air compressor modeling approach with that for the Associated Fleet. Because emissions from the icebreakers were modeled as a single area source (to represent movement of vessels) as opposed to a stationary point source, it is appropriate to simply limit total emissions from both vessels.

The emission limits in Condition D.6.1 through D.6.12 rely on the monitoring, recordkeeping, and reporting requirements in Conditions D.13 through D.15 to document compliance under the authority of 40 CFR §§ 71.6(a)(3), 71.6(c)(1) and 55.8(a). Compliance with the NO<sub>x</sub> emission limits will be determined through use of emission factors (lb/unit) and recorded hourly operation rates (units/hour) for a particular emission unit or group of emission units. For engines and boilers or heaters, the permittee is generally required to measure the gallons of diesel fuel consumed (gal/hr) and multiply the measured value by the appropriate emission factor (lb/gal) in order to determine emissions. Compliance with the PM<sub>2.5</sub> and PM<sub>10</sub> is determined in the same manner except that the operating rate of the emission unit or group of emission units is measured over the course of an entire day, not just an hour.

In lieu of monitoring fuel flow, the permittee may elect to measure an emission unit's operating time over the course of an averaging period so long as, for purposes of calculating emissions, the unit is assumed to have been operating at maximum capacity. In the case of boilers, heaters and incinerators (with the exception of the Kulluk incinerator that is limited to operating just 12 hours per day), the permittee may simply assume the emission unit is operating at maximum capacity each hour over the course of the entire drilling season. This may be attractive for the permittee for those units that were modeled as if operating at maximum capacity each day.

For engines employing an oxidation catalyst, determining the correct PM<sub>2.5</sub> and PM<sub>10</sub> emission factor will be based upon whether the monitoring data required to be collected pursuant to Condition F.2 of the permit indicates the oxidation catalyst is functioning properly. For engines employing a selective catalytic reduction (SCR) unit, determining the correct NO<sub>x</sub> emission factor to employ will be based upon whether the monitoring data collected pursuant to Condition

F.3 of the proposed permit indicates the SCR unit functioning properly. For incinerators, determining the correct PM<sub>2.5</sub> and PM<sub>10</sub> emission factor will be based upon whether the monitoring data required to be collected pursuant to Condition F.2.5 indicates that the incinerator is being operated in manner consistent with how it operated during the emission-factor derivation testing.

Condition D.7: This condition prohibits the permittee from flow testing wells, flaring gas, storing liquid hydrocarbons recovered during well testing, allowing vessels associated with this project to approach within 25 miles of the Kulluk unless it is listed in **Table 2** of the permit, and emitting NSR regulated pollutant or GHG from the shallow gas diverter system. Emissions from these activities have not been estimated or analyzed, so this condition prohibits them.

Condition D.8: All of the emissions estimates are based on the equipment and control equipment being operated using good practices. Consequently, this condition requires the use of good air pollution control practices for minimizing emissions and is based on language in the general provisions of the NSPS and NESHAP (see 40 CFR §§ 60.11(e) and 63.6(e)) under the authority of 40 CFR §§ 71.6(a)(1) and 71.6(a)(3)(i).

Condition D.9: In its application materials, the permittee did not address crankcase ventilation emissions from the internal combustion engines to be used on the Kulluk and Associated Fleet vessels. Because these emissions of particulate matter were not included in the emission inventory or the modeling to demonstrate compliance with the NAAQS, Region 10 has required under this condition that these emission units be equipped with closed crankcase ventilation (CCV), which routes any crankcase ventilation emissions back to the engine intake under negative pressure.

Condition D.10: The permittee assumed that each main engine on the Kulluk and each propulsion and electric generation engine on the icebreakers would be controlled for NO<sub>x</sub> by a SCR system and that the SCR system would reduce NO<sub>x</sub> emissions by approximately 90%. The analyses in support of this permit action were based on the SCR units being fully operational at any time that the engine(s) they serve are running. This condition includes these assumptions as conditions of the permit.

Condition D.11: The permittee assumed that several engines on the Kulluk and each propulsion and electric generation engine on the icebreakers would be controlled for PM<sub>10</sub> and PM<sub>2.5</sub> by an oxidation catalyst system and that the catalyst system would reduce PM<sub>10</sub> and PM<sub>2.5</sub> emissions by approximately 50%. The analyses in support of this permit action were based on the catalyst units being fully operational at any time that the engine(s) they serve are running. This condition includes these assumptions as conditions of the permit.

### **3.5 Source-Wide Testing Conditions**

Condition E.1: This condition contains general testing requirements under the authority of 40 CFR §§ 71.6(a)(3) and 71.6(c)(1) related to how the stack tests must be conducted. It also contains a requirement to submit a test plan in advance of testing, procedures for approval of an alternative to or a deviation from a reference test method and time extensions. This condition requires all monitoring required by the permit to be performed and recorded during each test. The monitoring data is often used to confirm the validity of the tests and can form the basis for additional monitoring set points such as minimum temperature. For example, incinerator exit temperatures and SCR catalyst inlet temperatures are measured during the tests and used to

minimum values for monitoring – see Permit Conditions E.2.6 and E.3.7. Unless these requirements conflict with specific testing conditions in the permit, all sources testing done to comply with this permit should meet these general conditions.

Condition E.2: Because the Kulluk, Associated Fleet vessels, and all associated emission units to be used by the permittee are not specified or known at this time, many generic emission factors have been used to calculate the estimated emissions from this project. The permittee relied on a combination of emission testing of similar units, manufacturer's emissions data and literature, including AP-42. These sources of emissions information are generally considered to be less reliable and accurate than unit-specific testing data. Because of the inherent uncertainty of the project approach taken by the permittee, Region 10 has generally addressed this by basing emission limits on the estimated rates included in the permittee's permit application materials, and requiring thorough source testing in order to obtain unit-specific test data. Region 10 is therefore requiring that many units be tested prior to the first drilling seasons (as well as ongoing periodic testing), and that emissions data collected during these performance tests be used to derive emission factors which will be more accurate than the generic factors used by the permittee to support its permit application. This condition contains the required procedure for testing specific emission units to derive equipment-specific emission factors. The derivation of the emission factors is through an approved replicable procedure or ARM as provided for in 40 CFR § 71.2 and 40 CFR § 71.6(a)(1).

An important element of this condition is the selection of worst case emission factors for each emission unit or group of emission units tested. Testing engines at three loads will produce emission factors for each load. The permittee is required to use the highest of the three emission factors for determining ongoing compliance with emission limits in the permit for all operating loads during actual operation. This allows the permittee to avoid continuous engine load monitoring and provides additional confidence that the engine is complying with the emission limits in the permit. When a single emission factor will be used to represent a group of emission units, the highest emission factor of all the emission units in the group will be used for demonstrating compliance. This allows the permittee to monitor fuel to the group of engines in one place and provides yet another level of confidence that the group will be complying with the emission limits in the permit.

To support testing each engine at various operating loads, instrumentation is necessary to monitor the percentage of rated capacity that each engine is operating at during each test run. Because the specific engines and related ancillary equipment will be leased for this project and therefore are unknown at this time, Condition E.2 requires electrical power output monitoring devices be installed during the test. To account for possible variation in the specific equipment used, provisions are included to allow an alternative method of load measurement based on written approval by Region 10. This condition also requires the monitoring and recording of fuel injection timing while testing engines. This information is useful for establishing the conditions under which the engines were tested.

The condition separates the testing instructions between those for engines and those for testing incinerators. This condition also requires the testing to be completed by May 1 and reported to EPA by June 15. The results will be available to be used for compliance determinations during the drilling season that begins 15 days later (July 1) for each year that testing is performed. The

permittee is required to use the test-derived emission factor for all emission calculations and compliance determinations required under the permit.

Condition E.3: This condition specifies which emission units and pollutants must be tested to develop emission factors for ensuring compliance with synthetic minor and NAAQS-based emission limits. The permittee is required to test many emission units before the first two drilling seasons. The frequency, beginning in the third year, is then set based upon how variable the results are. EPA's goal is to determine representative emission factors for compliance use. Once relatively consistent (in two consecutive test years) emission factors have been identified, the frequency can be reduced but not discontinued. The less frequent testing is still necessary to indicate whether conditions and emission factors are changing over time.

Emission units that are less emitting, less variable in operations and emissions and used less frequently are required to be tested less frequently or not at all. EPA believes it is reasonable to focus emission testing resources where the results will most likely impact compliance decisions.

The tested pollutants include CO and NO<sub>x</sub> (two pollutants for which synthetic minor limits are needed) and PM<sub>10</sub> and PM<sub>2.5</sub> (which, along with NO<sub>x</sub>, are limited by the permit for NAAQS protection purposes). NO<sub>2</sub> will be also measured simultaneously with NO<sub>x</sub> so the NO<sub>2</sub> ratios assumed for use in the ambient air quality impact analysis can be verified. Visible emission testing is also required for additional unit performance feedback. Average incinerator exit and SCR inlet temperatures will be documented for use in compliance monitoring.

### **3.6 Source-Wide Monitoring & Recordkeeping Conditions**

Condition F.1: This condition requires the permittee to use a modern global positioning system on the Kulluk and all vessels in the Associated Fleet (except work boats) to track the movement and location of these vessels in order to implement permit conditions limiting the movement and location of certain vessels in the Associated Fleet. This includes requirements based on the inclusion of emissions of Associated Fleet vessels as emissions of the OCS source when Associated Fleet vessels are within 25 miles of the OCS source. Workboats are not required to be individually tracked because they never travel far from the vessel the workboats are stored on.

Condition F.2.1: This condition first requires that all monitoring equipment and systems necessary to perform the monitoring required by this permit (e.g. temperature, fuel flow, etc) are installed, calibrated, maintained and operated. This condition also includes specifications for fuel flow meters required by the permit. These provisions ensure that the meters meet appropriate accuracy specifications and that their installation is appropriate to provide the necessary data. Fuel monitoring requirements for smaller and seldom used emission units are also specified. An option for using operating time in place of fuel monitoring is included and operating time tracking is included here where appropriate. The measured operating time is converted to fuel usage by conservatively assuming that the monitored unit is operating at its maximum capacity – something few emission units do all of the time. The permit also includes requirements for monitoring the sulfur content of fuel for the Kulluk and the Associated Fleet.

Incinerator exit temperature monitoring is also required by this condition and expected to be kept above the minimum value established during emission testing. The permit condition clarifies when a reportable temperature deviation occurs.

Condition F.3: Region 10 has included additional parametric monitoring requirements to ensure the SCR pollution control systems required on the large engines on the Kulluk and the icebreakers are operating properly and achieving the anticipated pollutant reductions. Region 10 believes that the SCR systems will be effective if the inlet temperature to each system is high enough, the urea feed to the SCR system is operating, and the catalysts are still active. To ensure the continuing performance of these add-on control systems, on-going monitoring is required. For the SCR emission control systems, the permit requires monitoring and recording of the inlet temperature. The permit also requires monitoring and recording of the urea flow to the SCR unit. To ensure each catalyst is still active, the permit requires weekly measurements of NO<sub>x</sub> concentrations downstream of the SCR units with a portable monitoring device. Comparing the weekly NO<sub>x</sub> measurements against values measured during previous stack testing is expected to provide a reasonable assurance that the catalyst is still active and that adequate urea is being fed to the SCR system. The permittee is also required to develop a monitoring plan to ensure proper installation and operation of the SCR monitoring systems.

Condition F.4: Region 10 has included additional parametric monitoring requirements to ensure the oxidation catalyst pollution control systems required on most engines on the Kulluk and the large engines on the icebreakers are operating properly and achieving the anticipated pollutant reductions. Region 10 believes that the oxidation catalyst will be effective if the inlet temperature to each system is high enough and the catalysts are still active. To ensure the continuing performance of these add-on control systems, on-going monitoring is required. For the oxidation catalyst control system, the permit requires monitoring and recording of the inlet temperature. To ensure each catalyst is still active, the permit requires weekly measurements of CO concentrations downstream of the oxidation catalyst with a portable monitoring device. Comparing the weekly CO measurements against values measured during previous stack testing is expected to provide a reasonable assurance that the catalyst is still active. The permittee is also required to develop a monitoring plan to ensure proper installation and operation of the oxidation catalyst monitoring systems.

### **3.7 NESHAP and NSPS Conditions**

Condition G.1: As discussed in Section 2 above, applicable NSPS Part 60 standards apply to OCS sources and must be included in the Title V permit for the OCS source as applicable requirements. See 40 CFR §§ 55.13(c); 71.2. Condition G.1 includes the applicable requirements from 40 CFR Part 60, Subpart IIII (NSPS IIII) as they apply to the electric generation engines (Units K-1A – 1D), MLC HPU engines (Units K-2A – K-2Z), MLC air compressor engines (Units K-3A – 3Z) and the emergency generator engine (Unit K-6) on the Kulluk. NSPS IIII applies to stationary compression-ignition internal combustion (IC) engines, with the earliest applicability date being for units that were modified, or reconstructed after July 11, 2005, and the applicability date for newly manufactured engines that are not fire-pump engines being April 1, 2006.

This condition requires that engines on the Kulluk identified above be engines that are subject to 40 CFR 60, Subpart IIII based on their per cylinder displacement and model year. In other words, the permittee cannot install older engines that are not subject to Subpart IIII.

EPA recently amended NSPS IIII in June 2011 to require owners and operators to purchase diesel fuel that meets the requirements of 40 CFR 80.510(b) for nonroad diesel fuel. See 76 Fed. Reg. 37954. Owners and operators will no longer be required to ensure that the purchased diesel

fuel meets the specifications of 40 CFR 80.510(b) as it enters the engine. The proposed permit conditions reflect the requirements that will become effective August 28, 2011 as final decisionmaking on this proposed permitting action will occur after August 28.

As also discussed above, applicable NESHAPs promulgated under Section 112 of the CAA apply to OCS sources and must be included in Title V permits as applicable requirements if rationally related to the attainment and maintenance of federal and state ambient air quality standards or the requirements of Part C of Title I of the CAA. See 40 C.F.R. §§ 55.13(e) and 71.2. 40 C.F.R. Part 63, Subpart ZZZZ (NESHAP ZZZZ) applies to compression-ignition internal combustion engines (RICE), such as those that will be on the Kulluk. Region 10 has determined that NESHAP ZZZZ is rationally related to attainment of the NAAQS because NESHAP ZZZZ relies, in part, upon affected sources' compliance with NSPS IIII to achieve compliance with NESHAP ZZZZ. See 40 CFR § 63.6590(c). In effect, NESHAP ZZZZ requires compliance with NSPS IIII, which in turn are standards of performance designed to control pollutants for which federal ambient air quality standards have been promulgated (the NAAQS), as well as to control other pollutants.

The permittee has agreed to install new engines for certain functions on the Kulluk as identified above. The permit requires installation of these new engines that are subject to NSPS Subpart IIII. As provided in 40 CFR §63.6590(c), these engines will be compression-ignition stationary RICE located at an area source. Therefore, these emission units comply with Subpart ZZZZ by meeting the requirements of 40 C.F.R. Part 60, Subpart IIII, for compression-ignition engines and no additional Subpart ZZZZ provisions apply. See 40 CFR § 63.6590(c).

Condition G.2: As noted above, the Kulluk is an area source for HAP and NESHAP ZZZZ applies on the OCS as it is rationally related to attainment of the NAAQS. Units K-7A, K-7B, K-7C and K-7D1 – 7D5 are assumed to be existing sources as Shell did not identify any of these emission units as being subject to NSPS Subpart IIII. Unit K-7A is a non-emergency compression-ignition engine with rating less than 300 horsepower output. The other “K-7” group of engines are emergency compression-ignition engines with individual ratings less than 500 horsepower output. Given this information and the applicability structure of NESHAP ZZZZ, each of these existing units is subject to the same or similar NESHAP ZZZZ requirements. Compliance is required by May 3, 2013 pursuant to 40 CFR 63.6595(a).

Among the various NESHAP ZZZZ requirements that apply to each engine, note that the permittee is required to change the engine oil and oil filter at a frequency determined by engine function (emergency or non-emergency) and whether the permittee conducts an oil sample and analysis program. The permittee is also required to inspect the engine air cleaner, hoses and belts most likely at a frequency of once each year. No monitoring, recordkeeping, and reporting in addition to that required by NESHAP ZZZZ was considered necessary to provide a reasonable assurance of compliance with the applicable requirement for these emission units.

Condition G.3: As noted above, the Kulluk is an area source for HAP and NESHAP ZZZZ applies on the OCS as it is rationally related to attainment of the NAAQS. Units K-4A through K-4C are assumed to be existing sources as Shell did not identify any of these emission units as being subject to NSPS Subpart IIII. Units K-4A – 4C are subject to the NESHAP ZZZZ requirements for existing non-emergency compression ignition engines with power output

exceeding 300 horsepower but less than 500 horsepower, and compliance is required by May 3, 2013 pursuant to 40 CFR 63.6595(a).

Among the various NESHAP ZZZZ requirements that apply to each engine is the requirement to install either a closed crankcase ventilation system or an open one with a filtered exhaust. The permittee is also required to reduce HAP emissions from the exhaust such that CO (surrogate) emissions are reduced by 70 percent or do not exceed 49 ppmvd at 15 percent O<sub>2</sub>. The permittee is required to conduct an emissions test to determine compliance. The permittee is also prohibited from having any of these engines consume diesel fuel with a sulfur content of greater than 15 ppm by weight, in-use. Additional monitoring, recordkeeping, and reporting was considered necessary to provide a reasonable assurance of compliance with respect to the in-use diesel fuel sulfur-content limitation.

Condition G.4: The boilers and heaters on the Kulluk are subject an area source Maximum Achievable Control Technology standard: NESHAP, 40 CFR Part 63, Subpart JJJJJ. This MACT applies to boilers at industrial, commercial, and institutional area sources of HAPs. The rule includes limited applicable requirements for all oil-fired boilers (including diesels) regardless of size and age. Region 10 has determined that Subpart JJJJJ is rationally related to attainment of the NAAQS because compliance with the rule results in reductions of filterable PM, SO<sub>2</sub>, and VOC in addition to reductions of HAP. See 76 Fed. Reg. 15554, 15579-80 (March 23, 2011).

The heaters/boilers on the Kulluk have a combined rating of approximately 6 MMBtu/hr heat input, and are therefore subject to applicable requirements of Subpart JJJJJ, consisting primarily of a periodic tune-up and associated monitoring, recordkeeping, and reporting. These applicable requirements are included in Condition G.4. No monitoring, recordkeeping, and reporting in addition to that required by Subpart JJJJJ was considered necessary to provide a reasonable assurance of compliance with the applicable requirement for these emission units, a periodic tune-up.

Condition G.5: The incinerator on the Kulluk is subject to a New Source Performance Standard: 40 CFR Part 60, Subpart CCCC. This requirement applies to commercial and solid waste incinerators (CISWI) constructed after November 30, 1999. Although the exact date of manufacture of the incinerator that will be on-board the Kulluk is unknown at this time, it is likely the incinerator will have been constructed after that date, meet the definition of a CISWI, and be subject to the substantive requirements of Subpart CCCC unless it qualifies for one of the exemptions in 40 CFR § 60.2020. Shell has submitted an initial notification and exemption request to Region 10 on the grounds that the incinerator will burn more than 30 percent municipal solid waste and refuse derived fuel and have the capacity to burn less than 35 tons per day of municipal solid waste and refuse derived fuel. See 40 CFR§ 60.2020(c)(2). This exemption requires a subject source to maintain records as provided in the exemption in order to continue to qualify for the exemption. Region 10 has included in the permit a requirement to submit to Region 10 with the seasonal notification required under Condition G.5 a claim for operation under the exemption of 40 CFR § 60.2020(c)(2). Region 10 has also included in the permit provisions to implement this exemption, by requiring monitoring, recordkeeping, and reporting requirements to assure compliance with this exemption.

Note that EPA amended NSPS Subpart CCCC on March 21, 2011 to eliminate this exemption. See 76 Fed. Reg. 15704. On May 18, 2011, however, EPA stayed the effectiveness of the amendments until the proceedings for judicial review of these rules are completed or the EPA completes its reconsideration of the rules, whichever is earlier. The permit will be amended, as necessary, to reflect the outcome of the NSPS Subpart CCCC rule review consistent with the Title V program's permit reopening provisions as provided in Condition A.7.

#### **4. AIR QUALITY ANALYSIS**

As discussed in Section 2 above, Shell's permit applications triggered several COA and Title V requirements to assess the expected air quality impacts from the Kulluk and Associated Fleet and demonstrate that project emissions do not cause or contribute to a violation of the NAAQS. The details regarding these requirements are found in Appendix A (Region 10 Technical Support Document Review of Shell's Air Quality Analysis). To address these requirements, Shell submitted an ambient air quality analysis in support of their Kulluk permit application.

Region 10 has reviewed Shell's submittal and determined that Shell's analysis adequately shows that operating the Kulluk and Associated Fleet within the requested constraints will not cause or contribute to violations of the NAAQS. Region 10's assessment of Shell's analysis is fully described in Appendix A and is summarized below.

Region 10 evaluated Shell's modeling analysis under the guidance established in 40 CFR Part 51, Appendix W, *Guideline on Air Quality Models* (Appendix W). Shell used the American Meteorological Society/Environmental Protection Agency Regulatory Model (AERMOD) system of programs to estimate most of their ambient impacts. Region 10 used qualitative assessments to evaluate the ozone and lead impacts.

The AERMOD Modeling System consists of various modules. Shell used the AERMET component to process their meteorological data during periods of broken ice, and a non-Guideline model, the Coupled Ocean-Atmospheric Response Experiment (COARE) bulk flux algorithm to process the meteorological data during open water periods. Shell also used the Plume Volume Molar Ratio Method (PVMRM) to estimate their nitrogen dioxide (NO<sub>2</sub>) impacts. The COARE and PVMRM algorithms have not been approved by EPA for general use, but have been approved by Region 10 under the case-by-case alternative modeling provisions of Appendix W. Region 10 therefore specifically requests public comment on the suitability of these modeling algorithms for this permitting action.

The maximum modeled NO<sub>2</sub>, SO<sub>2</sub>, PM<sub>10</sub>, PM<sub>2.5</sub>, and CO impacts, background concentrations, total impacts, and NAAQS are summarized below in Table 4-1. The maximum impacts occur within 500 meters of the Kulluk and rapidly decrease as the distance from the Kulluk increases. All of the total impacts are less than the NAAQS at all locations that constitute ambient air. See Section 3.4 Conditions D.5 and D.6 of the SOB.

**Table 4-1: Modeled Impacts at the Location of Maximum Impact**

Air Pollutant	Averaging Period	Shell Only Impacts (without background) ( $\mu\text{g}/\text{m}^3$ )	Background Concentration ( $\mu\text{g}/\text{m}^3$ )	Total Impact Including Background ( $\mu\text{g}/\text{m}^3$ )	NAAQS ( $\mu\text{g}/\text{m}^3$ )	Total Impact as a % of NAAQS
NO <sub>2</sub>	1-hour	110.6	40.9	<b>151.5</b>	188	81%
	Annual	4.4	11	<b>15.4</b>	100	15%
PM <sub>2.5</sub>	24-hour	17.0	17	<b>34</b>	35	97%
	Annual	1.0	4	<b>5.0</b>	15	33%
PM <sub>10</sub>	24-hour	20.8	53	<b>73.8</b>	150	49%
SO <sub>2</sub>	1-hour	14.0	29	<b>43.0</b>	196	22%
	3-hour	8.9	29	<b>37.9</b>	1,300	3%
	24-hour	2.8	22	<b>24.8</b>	365	7%
	Annual	0.2	4	<b>4.2</b>	80	5%
CO	1-hour	1,268	1,742	<b>3,010</b>	40,000	8%
	8-hour	712	1,094	<b>1,806</b>	10,000	18%

The total 24-hour PM<sub>2.5</sub> impact at the location of maximum modeled impact is very close to the applicable NAAQS. This is partially due to the conservative assumptions used by Shell in its modeling analysis. For example, the 24-hour PM<sub>2.5</sub> NAAQS is based on a three-year average of the 98<sup>th</sup> percentile of the 24-hour concentrations. For modeling purposes, Shell assumed the Kulluk never relocates during the entire drilling season and returns to the same location each successive drilling season. This assumption produces the largest possible predicted impact, but overstates what would really occur under the more likely scenario of periodically relocating the Kulluk. In addition, the background concentration is a very conservative estimate of expected concentrations offshore in the vicinity of Shell’s operations and includes days during which the measured background concentrations onshore were likely influenced by local dust. Average background concentrations of PM<sub>2.5</sub> are much lower, at approximately 2  $\mu\text{g}/\text{m}^3$ .

The total impact (Kulluk and Associated Fleet plus background) in the local communities of Nuiqsut, Deadhorse and Kaktovik, which are located approximately 37, 44, and 14 km, respectively, from the closest Kulluk lease blocks, are shown in Table 4-2.

**Table 4-2: Total Impacts at Nearest Communities (from Kulluk operations and including background concentrations)**

Air Pollutant	Averaging Period	Total Impacts ( $\mu\text{g}/\text{m}^3$ ) at			NAAQS ( $\mu\text{g}/\text{m}^3$ )
		Nuiqsut	Deadhorse	Kaktovik	
NO <sub>2</sub>	1-hour	94	94	21	<b>188</b>
	Annual	11	11	1	<b>100</b>
PM <sub>2.5</sub>	24-hour	17	17	7	<b>35</b>
	Annual	4	4	3	<b>15</b>
PM <sub>10</sub>	24-hour	53	53	53	<b>150</b>
SO <sub>2</sub>	1-hour	14	29	10	<b>196</b>

Air Pollutant	Averaging Period	Total Impacts ( $\mu\text{g}/\text{m}^3$ ) at			NAAQS ( $\mu\text{g}/\text{m}^3$ )
		Nuiqsut	Deadhorse	Kaktovik	
	3-hour	180	29	11	<b>1,300</b>
	24-hour	25	22	4	<b>365</b>
	Annual	4	4	2	<b>80</b>
CO	1-hour	1,943	1,924	2,075	<b>40,000</b>
	8-hour	1,211	1,199	1,274	<b>10,000</b>

In all cases, background concentrations comprise the majority of total impacts at all onshore locations. A more detailed discussion of background data is provided in Appendix A.

## 5. OTHER REQUIREMENTS

### 5.1 Endangered Species Act and Essential Fish Habitat of Magnuson-Stevens Act

Section 7(a)(2) of the Endangered Species Act (ESA) requires federal agencies, in consultation with the National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service (NMFS) and/or the U.S. Fish and Wildlife Service (U.S. FWS) (collectively, “the Services”), to ensure that any action authorized, funded, or carried out by the agency is not likely to jeopardize the continued existence of a species listed as threatened or endangered, or result in the destruction or adverse modification of designated critical habitat of such species. 16 U.S.C. §1536(a)(2); see also 50 CFR §§ 402.13, 402.14. The federal agency is also required to confer with the Services on any action which is likely to jeopardize the continued existence of a species proposed for listing as threatened or endangered or which will result in the destruction or adverse modification of critical habitat proposed to be designated for such species. 16 U.S.C. §1536(a)(4); see also 50 CFR § 402.10. Further, the ESA regulations provide that where more than one federal agency is involved in an action, the consultation requirements may be fulfilled by a designated lead agency on behalf of itself and the other involved agencies. 50 CFR § 402.07.

BOEMRE, formerly Minerals Management Service (MMS), is the lead agency for ESA Section 7 compliance for Shell’s oil exploration activities in the Arctic and has consulted with the Services regarding Shell’s activities in the Beaufort Sea. In fulfilling its ESA obligations for this permitting action to date, Region 10 reviewed the ESA consultation documents prepared by BOEMRE and the biological opinions (BOs) issued by the Services resulting from the inter-agency ESA consultations regarding impacts from exploratory drilling on threatened and endangered species and designated critical habitats for listed species. The following list summarizes the primary documents reviewed by Region 10.

- Fish and Wildlife Service’s Endangered Species Act, Section 7 Biological Opinion for Beaufort and Chukchi Sea Program Area lease sales and associated seismic surveys and exploratory drilling, September 3, 2009
- National Marine Fisheries Service's revised Biological Opinion for Oil and Gas Leasing and Exploration Activities in the U.S. Beaufort and Chukchi Seas, Alaska; and Authorization of Small Takes Under the Marine Mammal Protection Act, July 17, 2008

- National Marine Fisheries Service’s Biological Opinion for Oil and Gas Leasing and Exploration Activities in the U.S. Beaufort and Chukchi Seas, Alaska; and Authorization of Small Takes Under the Marine Mammal Protection Act, June 16, 2006
- Mineral Management Service’s Environmental Assessment, Shell Offshore, Inc. 2010 Outer Continental Shelf Lease Exploration Plan, Camden Bay Alaska, October 2009
- Fish and Wildlife Service’s Programmatic Biological Opinion for Polar Bears on Beaufort Sea Incidental Take Regulations, June 23, 2008
- Proposed Threatened and Not Warranted Status for Subspecies and Distinct Population Segments of the Bearded Seal, 75 Fed. Reg. 77496 (December 10, 2010)
- Proposed Threatened Status for Subspecies of the Ringed Seal, 75 Fed. Reg. 77476 (December 10, 2010)
- Designation of Critical Habitat for the Polar Bear in the United States, 75 Fed. Reg. 76086 (December 7, 2010)

Since the BOs above addressed the same drilling activities associated with the draft OCS/Title V permit, EPA relied on those consultations and the protections mandated by BOEMRE as a result. EPA also conducted a review of any additional information regarding potential impacts of air emissions from the drilling activities on threatened and endangered species and designated critical habitat. Based upon the best available data, EPA determined that the issuance of a CAA permit to Shell for exploratory drilling was not likely to cause any adverse effects on proposed or listed species or designated critical habitat beyond those already identified, considered and addressed in the consultations between BOEMRE and the Services.

Region 10 communicated with the services concerning CAA permitting on the OCS in letters dated September 4, 2009 and March 1, 2010. These communications concerned Region 10’s issuance of a CAA permit for Shell to construct and operate the Discoverer drillship and its Associated Fleet on its lease blocks the Beaufort and Chukchi Seas. The draft OCS/Title V permit for Shell’s Kulluk drilling unit and Associated Fleet involves operations similar to the Discoverer drillship. The Services concurred in writing with Region 10’s determination in letters dated September 23, 2009, October 26, 2009, March 30, 2010 and April 5, 2010.

BOEMRE is in ongoing consultation with the Services regarding Shell’s Revised OCS Exploration Plan for Camden Bay, which will address the Kulluk operations as well as the final designation of polar bear critical habitat and the proposed listing of the bearded and ringed seals.<sup>19</sup>

In fulfilling its ESA obligations for this permitting action, Region 10 intends to rely, as appropriate, on the foundational and supplemental BOEMRE-Services determinations. Region 10 is once again completing additional evaluation work on the potential impacts of air emissions and is working to obtain the Services’ concurrence with its findings. Any final air permits that Region 10 may issue in this action will, as appropriate, include additional conditions that may be developed as a result of the updated ESA process.

### **5.1.1 Essential Fish Habitat of Magnuson-Stevens Act**

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<sup>19</sup> 2012 Outer Continental Shelf Lease Camden Bay Exploration Plan, and associated [Oil Discharge Prevention and Contingency Plan](#) (ODPCP), May 4, 2011

Section 305(b)(2) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA) requires federal agencies to consult with NOAA National Marine Fisheries Service (NMFS) with respect to any action authorized, funded, or undertaken by the agency that may adversely affect any essential fish habitat (EFH) identified under the MSA, 16 U.S.C. § 1855(b)(2), and implementing regulations at 50 CFR § 600.920. For activities that may have an adverse effect on EFH, agencies must provide NMFS with a written assessment of those effects unless the agency determines that the action would not adversely affect EFH. 40 C.F.R. § 600.920(e)(1).

BOEMRE is the lead federal agency for authorizing oil and gas exploration activities on the Alaskan OCS, including the Beaufort Sea. In accordance with the MSA, BOEMRE consults on essential fish habitat at the oil and gas lease sale stage and consulted with NMFS in connection with Lease Sales 186, 195, and 202 in the Beaufort Sea. BOEMRE received NMFS' comments on the Draft Environmental Impact Statement for the Lease Sales in a letter dated September 6, 2002. In this letter NMFS stated that no additional EFH consultation was required but the need for additional EFH consultation should be determined as specific projects are proposed.

In August 2009, EFH was designated for three species – saffron cod, Arctic cod, and Opilio crab. The most recent EFH consultation for OCS exploration in Beaufort Sea was conducted concurrently with the preparation and public review of the Arctic Multiple-Sale Draft Environmental Impact Statement. BOEMRE received NMFS' conservation recommendations in a letter dated June 26, 2009.

BOEMRE is currently updating its Environmental Assessment for Shell's Revised Camden Bay Outer Continental Shelf Lease Exploration Plan. This Environmental Assessment will include EFH consultation, as necessary, to address the effects of Shell's proposed exploration drilling project in the Beaufort Sea on EFH.

In fulfilling MSA obligations for this permitting action, Region 10 intends to rely on the consultations between BOEMRE and NMFS while also conducting additional compliance activities to address the potential effect of levels of air pollution authorized by the draft OCS/Title V permit on EFH identified under the MSA. Any final air permits that Region 10 may issue in this action will, as appropriate, include additional conditions that may be identified during the MSA process.

## **5.2 National Historic Preservation Act**

Section 106 of the National Historic Preservation Act (NHPA) requires federal agencies to take into account the effects of their undertakings on historic properties and provide the Advisory Council on Historic Preservation (ACHP) a reasonable opportunity to comment on such undertakings. Under the ACHP's implementing regulations at 36 C.F.R. Part 800, section 106 is implemented through a process involving consultation between federal agencies and the relevant state and/or tribal historic preservation officials, with opportunities for direct involvement by the ACHP in certain circumstances as well as opportunities for public input and involvement of other interested parties.

The goals of the procedural requirements of the section 106 consultation are to identify historic properties potentially affected by the undertaking, assess the potential effects of the undertaking on historic properties, and seek ways to avoid, minimize, or mitigate any adverse effects on historic properties. If more than one federal agency is involved in an undertaking, some or all of the agencies may designate a lead federal agency for this analysis. The lead federal agency then

acts on behalf of itself and the other agencies, fulfilling their responsibilities under the statute. Section 106 requires the lead agency to consult with the relevant parties on actions with the potential to affect historic properties.

As the lead federal agency, BOEMRE conducted Section 106 consultations with the Alaska State Historic Preservation Officer (SHPO) in conjunction with the Beaufort Sea Multiple-Sale Environmental Impact Statement and the Arctic Multiple-Sale Draft Environmental Impact Statement. BOEMRE concluded that the lease sales would have no effect on known offshore historic resources. The SHPO concurred with BOEMRE's conclusion on September 24, 2008. Following Shell's submission of its 2010 Camden Bay Exploration Plan, BOEMRE conducted a review of site-specific data and determined that there are no historic properties at Shell's proposed exploration drilling locations. The SHPO concurred with this determination on October 2, 2009. In fulfilling its NHPA obligations for this permitting action Region 10 is relying on BOEMRE's consultations.

### **5.3 Coastal Zone Management**

The Alaska Coastal Management Program (ACMP), authorized by the State of Alaska's 1977 Alaska Coastal Management Act, is designed to protect Alaska's rich and diverse coastal resources to ensure a healthy and vibrant coast that sustains long-term economic and environmental productivity. The ACMP requires that certain projects that will be conducted in Alaska's coastal zone be reviewed by coastal resource management professionals and found consistent with the statewide standards of the ACMP.

Pursuant to Title 11 of the Alaska Administrative Code at 11AAC 110.400 (b)(5), projects requiring the following EPA permits must undergo an ACMP consistency review:

- A. permit required under 33 U.S.C. 1342 (Clean Water Act), authorizing discharge of pollutants into navigable waters;
- B. permit required under 33 U.S.C. 1345 (Clean Water Act), authorizing disposal of sewage sludge;
- C. permit under 40 C.F.R. Part 63 for new sources or for modification of existing sources, or a waiver of compliance allowing extensions of time to meet air quality standards under 42 U.S.C. 7412 (CAA); or
- D. air quality exemption granted under 40 C.F.R. 60.14 or 40 C.F.R. 64.2 for stationary sources.

The OCS/Title V permit at issue in this action does not appear on the list. Thus, issuance of this Title V permit is not required to be preceded by an ACMP consistency review.

### **5.4 Executive Order 12898 – Environmental Justice**

As discussed in more detail below, based on available information, Region 10 concludes that the activities proposed to be authorized under the OCS/Title V permit will not have disproportionately high and adverse human health or environmental effects with respect to these air pollutants on minority or low-income populations residing in the North Slope, including coastal communities closest to the proposed operations. In reaching this conclusion, Region 10 considered the impact on communities while engaging in subsistence activities in areas where such activities are regularly conducted. The basis for this conclusion is summarized below and is

set forth in more detail in the Environmental Justice Analysis, which is included in the administrative record for this permit action.

It is important to note that the extent of an Environmental Justice Analysis will vary according to the unique circumstances of each case. The permit at issue here are is a OCS/Title V permit for a Title V temporary source that must assure compliance with the NAAQS and that also establishes limits on the PTE of the source so as to avoid PSD review, as well as a minor source construction permit under the COA regulations. The scope of the analysis conducted in this case is shaped by the type of permit at issue, the fact that Region 10 has received several OCS permit applications for operation in the OCS off the North Slope of Alaska, and the unique characteristics of the potentially affected communities, including the importance of subsistence activities to their lifestyle and cultural identity.

#### **5.4.1 Environmental Justice in Air Permitting**

Executive Order 12898 entitled “Federal Actions To Address Environmental Justice in Minority Populations and Low-Income Populations” states in relevant part that “each Federal agency shall make achieving Environmental Justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations.” Section 1-101 of Exec. Order 12898, 59 Fed. Reg. 7629 (Feb. 16, 1994). “Federal agencies are required to implement this order consistent with, and to the extent permitted by, existing law.” *Id.* at 7632.

The Title V operating permit program does not generally impose new substantive air quality control requirements. Rather, the Title V operating permit program is generally a vehicle for ensuring that existing air quality control requirements are appropriately applied to facility emission units and that compliance with these requirements is assured. Accordingly, the primary means of addressing environmental justice issues in the Title V program is through increased public participation and review by permitting agencies, and conditions to assure compliance with applicable requirements. As discussed above, the OCS/Title V permit at issue in this case is unusual in that it requires the source, as a Title V temporary source, to meet the NAAQS and also establishes limits on PTE. Region 10 has considered environmental justice concerns in this permitting action, where possible, in the context of assuring compliance with requirements applicable to the source, in particular assuring compliance with the NAAQS as a Title V temporary source and establishing PSD avoidance limits.

As the EAB recently observed, for purposes of the Executive Order on Environmental Justice, “compliance with the NAAQS is emblematic of achieving a level of public health protection that, based on the level of protection afforded by the NAAQS, demonstrates that minority or low-income populations will not experience disproportionately high and adverse human health or environmental effects due to exposure to relevant criteria pollutants.” *Id.* Slip Op. 73. This is because the NAAQS are health-based standards, designed to protect public health with an adequate margin of safety, including sensitive populations such as children, the elderly, and asthmatics and is supported by the fact that “[t]he Agency sets the NAAQS using technical and scientific expertise, ensuring that the primary NAAQS protects the public health with an adequate margin of safety.” *Id.* The studies assessed by EPA in setting NAAQS and the integration of the scientific evidence presented therein have undergone extensive critical review by EPA, the Clean Air Scientific Advisory Committee (CASAC), and the public. When setting

the NAAQS, “[t]he Administrator’s final decisions draw upon scientific information and analysis related to health effects, population exposures, and risks; judgments about the appropriate response to the range of uncertainties that are inherent in scientific evidence and analyses; and comment received from CASAC and the public.” 75 Fed. Reg. 6481, 6438 (Feb. 9, 2010).

#### **5.4.2 Northern Inupiat Communities**

The North Slope is bordered by the Arctic Ocean to the north and the Brooks Mountain Range to the south. In all it encompasses approximately 89,000 square miles of northern Alaska. The incorporated villages of the North Slope Borough (NSB) include Point Hope, Point Lay, Wainwright, Atkasuk, Barrow, Nuiqsut, Kaktovik, and Anaktuvuk Pass. These communities are situated completely above the Arctic Circle and are considered remote villages, with no roads between them.

Most of the communities are coastal villages located near the Chukchi and Beaufort Seas. In the Beaufort Sea, the nearest towns or villages to Shell’s exploratory operations are Kaktovik, Deadhorse, and Nuiqsut, which are located 14, 44, and 37 kilometers (8, 27, and 22 miles), respectively, from the closest lease block in the Beaufort Sea at which Shell will be authorized to operate under the OCS/Title V permit.

As discussed in more detail in the Environmental Justice Analysis, a review of demographic characteristics shows that the North Slope area has a significantly high percentage of Alaska Natives, who are considered a minority under Executive Order 12898. In addition, nearly half the people who reside in the North Slope speak a language other than English at home. Subsistence foods from traditional practices such as hunting (marine mammals, terrestrial and birds), fishing, and whaling are an important component of the Inupiat diet.<sup>20</sup> In 2004, the Alaska Department of Fish and Game reported that over a 25 year period residents in the North Slope Borough harvested an average of 434 pounds of subsistence food per capita.<sup>21</sup> Subsistence activities also play an important cultural role.<sup>22</sup> Residents report traveling long distances offshore to hunt for bowhead whale and conduct other subsistence activities, up to 35 miles from Kaktovik and 60 miles from Nuiqsut.<sup>23</sup> Figure 5-1 depicts the location of subsistence activities in the Beaufort Sea. Shell has committed to halt drilling operations in the Camden Bay area around the end of August of each year for the Nuiqsut and Kaktovik subsistence bowhead whale hunt.

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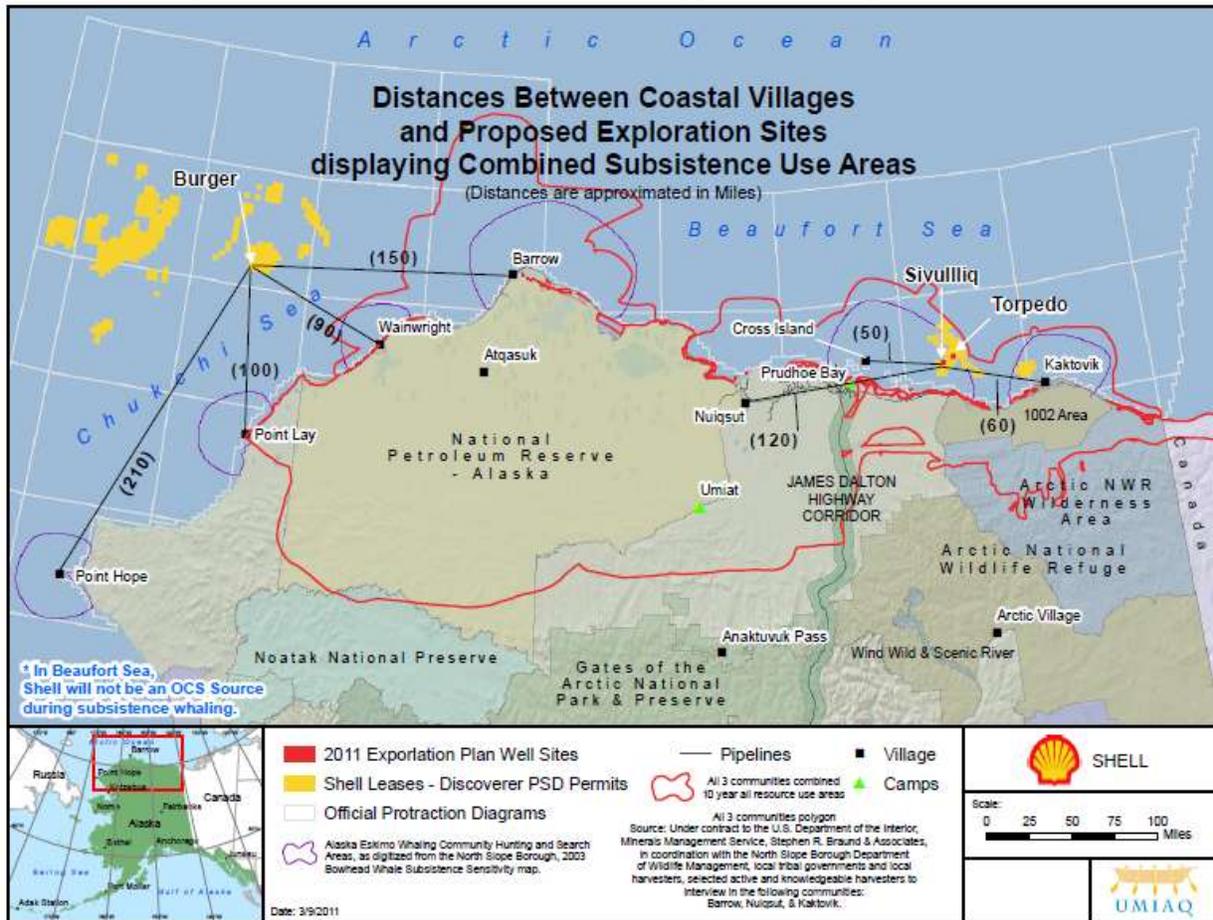
<sup>20</sup> Wernham, Inupiat Health and Proposed Alaskan Oil Development: Results of the First Intergrated Health Impact Assessment/Environmental Impact Statement for Proposed Oil Development on Alaska's North Slope, 2007.

<sup>21</sup> Wolfe, R. J. 2004. Local traditions and subsistence: a synopsis of twenty-five years of research in Alaska. Technical Paper No. 284. Alaska Department of Fish and Game, Division of Subsistence. Juneau, Alaska.

<sup>22</sup> In the words of the Environmental Director of the Inupiat Community of the Arctic Slope (ICAS), speaking at the Environmental Justice Session held during the 2011 Alaska Forum on the Environment, “For thousands of years, our people have depended on a subsistence lifestyle for a large majority of our food, and also for our cultural and spiritual health. Through the subsistence hunt, we not only provide food for our families, but we also carry on the ancient traditions that have been passed down to us by our parents and grandparents. Our subsistence activities define who we are and bind us together as a community. We therefore depend on the land and sea for our survival and we hold the deepest and most profound respect for the natural resources that have sustained us for so many years. Our very survival as a people depends on our ability to safeguard and protect the resources that have provided for us for thousands of years.”

<sup>23</sup> Stephen R. Braund & Associates. Report of Traditional Knowledge Workshops – Point Lay, Barrow, Nuiqsut, and Kaktovik. Chukchi and Beaufort Seas National Pollutant Discharge Elimination System Exploration General Permits Reissuance. 2011.

**Figure 5-1: Subsistence Use Areas Mapped Over Exploration Sites**



The 2009 Alaska Native Health Status Report issued by the Alaska Native Tribal Health Consortium provides an overview of health conditions in this region.<sup>24</sup> Between 2004 and 2007, the leading causes of death among Alaskan Natives living in the North Slope region were cancer, heart disease, suicide, unintentional injury and chronic obstructive pulmonary disease (COPD). There is a higher incidence of outpatient visits for upper respiratory problems in the North Slope area than in the rest of Alaska. In fact, in 2006 diseases of the respiratory system were the leading cause for inpatient hospitalization at Samuel Simmons Memorial Hospital in Barrow. Respiratory issues range from the common cold (acute) to pneumonia (severe).<sup>25</sup>

As discussed below, EPA has identified people with respiratory problems to be potentially at greater risk of experiencing adverse health effects from exposure to some pollutants, including NO<sub>2</sub> and SO<sub>2</sub>. This was taken into consideration when setting the new NAAQS standards for the 1-hour NO<sub>2</sub> and SO<sub>2</sub> NAAQS. EPA also noted in particular that the prevalence and severity of

<sup>24</sup>Alaska Native Tribal Health Consortium: Alaska Native Epidemiology Center. Alaska Native Health Status Report 2009 [http://www.anthc.org/chs/epicenter/upload/01\\_HSRintro.pdf](http://www.anthc.org/chs/epicenter/upload/01_HSRintro.pdf)

<sup>25</sup> Alaska Native Tribal Health Consortium: Alaska Native Epidemiology Center. Regional Health Profile: Arctic Slope, 2009. [http://www.anthc.org/chs/epicenter/upload/Regional\\_Health\\_Profile\\_ASNA\\_1109.pdf](http://www.anthc.org/chs/epicenter/upload/Regional_Health_Profile_ASNA_1109.pdf)

asthma is higher among certain ethnic or racial groups such as Alaskan Natives. 75 Fed. Reg. 6482 (February 9, 2010) and 75 Fed. Reg. 35527 (June 22, 2010).

### **5.4.3 Community Outreach**

Oil and gas operations in the Beaufort Sea are of great interest to the Northern Iñupiat communities. Region 10 has taken several measures to provide meaningful involvement for the communities of concern potentially impacted by the OCS/Title V permit. Recognizing the challenges and special considerations that are required in communicating with people in more than one culture for whom English is a second language, in May 2009, EPA issued the North Slope Communications Protocol establishing communications guidelines to specifically support meaningful involvement of North Slope communities in EPA decision-making. The goal of the protocol is to improve the agency's effectiveness in working with North Slope communities. Region 10 held early information meetings in Kaktovik and Barrow the week of June 13, 2011, regarding several OCS permit applications that have been submitted to Region 10, including the Kulluk application. The meetings were open to the public and invitations went to communities across the North Slope and a teleconference line was available for those not able to travel to the meeting.

In addition, Region 10 is holding a comment period on the draft OCS/Title V permit and, in anticipation of a significant degree of public interest in the draft permit, the agency is also scheduling a public hearing on the North Slope with a teleconference line available for other communities to call in. Region 10 will consider all comments received at the hearing or during the public comment period prior to taking final action on the permit. Region 10 specifically solicits public comment on its Environmental Justice Analysis.

Note that the draft permit requires Shell to have a plan for communicating to the North Slope communities on the Beaufort Sea on a periodic basis regarding when exploration activities are expected to begin and end at a drill site, the location of the drill site, and applicable restrictions on activities in the vicinity of Shell's exploration operations.

### **5.4.4 Air Impacts of Proposed Operations**

Region 10 has carefully considered the environmental justice impacts directly related to air quality from Shell's proposed operations, focusing on whether the issuance of the OCS/Title V permit would have disproportionately high and adverse human health or environmental effects on Alaska's Northern Iñupiat communities along the Beaufort Sea living and engaging in subsistence activities, including in areas closest to the activities proposed to be permitted.

As discussed in more detail in Section 4 above and in Region 10's Technical Analysis, Shell used the American Meteorological Society/Environmental Protection Agency Regulatory Model (AERMOD) system to model the impacts of the emissions proposed to be authorized under the permit. Region 10 has reviewed Shell's analysis and, as discussed above, concluded that it is consistent with EPA OCS and Title V permitting requirements. Modeled concentrations at communities along the Beaufort Sea, including the impact of emissions from Shell's proposed Discoverer operations, indicate compliance with all NAAQS, with values well below the NAAQS for all pollutants and averaging periods.

The pollutants and averaging periods closest to the NAAQS are 1-hour NO<sub>2</sub> emissions, 24-hour PM<sub>10</sub> and PM<sub>2.5</sub> emissions and annual PM<sub>2.5</sub> emission. At Kaktovik, located 14 km (8 miles) from the closest lease block, the total maximum modeled concentrations (considering background concentrations) are—as a percentage of the NAAQS—11% for the 1-hour NO<sub>2</sub> NAAQS, 20% for the 24-hour PM<sub>2.5</sub> NAAQS, 35% for the 24-hour PM<sub>10</sub> NAAQS, and 20% for the annual PM<sub>2.5</sub> NAAQS. At Nuiqsut, located 37 km (33 miles) from the closest lease block, the total maximum modeled concentrations are, 50% for the 1-hour NO<sub>2</sub> standard, 48% for the 24-hour PM<sub>2.5</sub> standard, 35% for the 24-hour PM<sub>10</sub> standard, and 26% for the annual PM<sub>2.5</sub> NAAQS. It should be noted that a majority of the total impacts are a result of background concentrations.

The total maximum modeled concentrations demonstrate that the NAAQS will be attained at all locations beyond the 500 meter ambient air boundary and will be below the standard in the Beaufort Sea North Slope communities and in the areas where the communities conduct subsistence activities.

### **5.4.5 Conclusion**

In summary, as indicated above, there is a significantly high population of Alaskan Natives in the North Slope, as well as a high population of individuals that speak a language other than English at home. These characteristics combined with the health profile of residents may increase vulnerability or sensitivity to air emissions as compared to the reference populations. Based on available information, Region 10 concludes that the activities proposed to be authorized under the draft OCS/Title V permit will not cause or contribute to air quality levels in excess of health-based standards for SO<sub>2</sub>, CO, PM<sub>10</sub>, PM<sub>2.5</sub>, Ozone or NO<sub>2</sub> beyond 500 meters of the center of the Kulluk. Region 10 therefore concludes that there will not be disproportionately high and adverse human health or environmental effects with respect to these air pollutants on minority or low-income populations residing in the North Slope. In reaching this conclusion, Region 10 considered the impact on communities while engaging in subsistence activities in areas where such activities are regularly conducted.

### **5.5 Executive Order 13175 – Tribal Consultation**

Executive Order 13175, issued on November 9, 2000 and entitled “Consultation and Coordination with Indian Tribal Governments,” requires federal agencies to have an accountable process to assure meaningful and timely input by tribal officials in the development of policies that have tribal implications. 65 Fed. Reg. 67249

EPA’s recently issued “EPA Policy on Consultation and Coordination with Indian Tribes” (May 4, 2011) and Region 10’s tribal consultation procedures call for consultation based on the potential to affect a tribal community or its subsistence resources.

As discussed above in Section 4 and Section 5.4, Region 10 expects minimal impacts from air emissions under the Kulluk draft permit at all on-shore locations. However, given the geographic proximity of the Kulluk’s operations to on-shore communities along the Beaufort Sea (approximately 14 kilometers or 8 miles from the closest lease block to Kaktovik), as well as the proximity between the Kulluk’s operations and off-shore areas where subsistence activities are conducted in the Beaufort Sea, Region 10 determined it is appropriate to consult with the Inupiat Community of the Arctic Slope (ICAS), the Native Village of Nuiqsut, and the Native Village of Kaktovik on the Kulluk draft permit. Accordingly, on June 7, 2011, Region 10 sent letters to

these tribal entities offering tribal consultation on the Kulluk draft permit for exploratory activities in the Beaufort Sea. ICAS has already requested consultation on pending OCS air permit applications for operations in both the Chukchi and Beaufort Seas, including the Kulluk draft permit and Region 10 intends to consult with ICAS on these proposed permitting actions. Consistent with EPA's tribal consultation policy, Region 10 will attempt to honor consultation requests from federally recognized tribal governments.

Region 10 has taken a number of affirmative steps to provide tribal entities and communities along the Beaufort Sea with information regarding the Kulluk draft permit and the permittee's proposed operations, as well as to ensure tribal entities and communities are aware of the opportunity to comment on this draft permit. In accordance with Region 10's May 2009 "North Slope Communications Protocol: Communications Guidelines to Support Meaningful Involvement of the North Slope Communities in EPA Decision-Making," a regional policy for early community and tribal involvement, Region 10 held informational meetings in Barrow and Kaktovik on June 15-17, 2011 on upcoming OCS air permitting actions in the Chukchi and Beaufort Seas. This included Region 10's plan to propose for public comment in the summer of 2011 a draft OCS/Title V permit for the permittee's proposed operations for the Kulluk in the Beaufort Sea. The meetings were open to the public and all North Slope entities (City Governments, Tribal Governments, the North Slope Borough, and the Alaska Eskimo Whaling Commission) received invitations to attend these early informational meetings.

Region 10 will also notify tribal entities and communities along the Beaufort and Chukchi Seas of the opportunity to provide public comment on this draft OCS/Title V permit during the public comment period and to attend and provide testimony during the scheduled public hearing.

## **5.6 National Environmental Policy Act**

The National Environmental Policy Act (NEPA) establishes a national environmental policy and goals for the protection, maintenance, and enhancement of the environment. NEPA includes a process for implementing these goals by federal agencies when they undertake major federal actions. The NEPA process involves an assessment of the environmental effects of a proposed action and alternatives. For projects that have the potential for significant environmental effects or that are environmentally controversial, a detailed statement called an Environmental Impact Statement (EIS) is prepared.

Section 7(c) of the Energy Supply and Environmental Coordination Act of 1974 specifically exempts actions under the CAA, including issuance of Title V permits, from the requirements of NEPA. Region 10 is therefore not required to develop an EIS prior to issuance of this permit.

## **Appendix A**

### **Technical Support Document Review of Shell’s Ambient Air Quality Impact Analysis**