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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION 10  
1200 Sixth Avenue  
Seattle, Washington 98101

ALASKA OUTER CONTINENTAL SHELF  
AIR QUALITY CONTROL MINOR PERMIT  
APPROVAL TO CONSTRUCT

Permit Number: R10OCS-AK-07-01

The United States Environmental Protection Agency (EPA) under the authority of Clean Air Act (Act) Section 328 [42 U.S.C. 7627] and Code of Federal Regulations Title 40, Part 55 [40 CFR Part 55] issues Air Quality Control Minor Permit No. R10OCS-AK-07-01 to the permittee identified below:

**Permittee:** Shell Offshore, Inc.  
3601 C Street, Suite 1334  
Anchorage, AK 99503

**Owner:** Same as permittee

**Operator:** Frontier Drilling USA, Inc.  
1000 Louisiana, Suite 1210  
Houston, TX 77002

**OCS Source:** Kulluk Drilling Unit (Kulluk)

**Project:** Portable Exploratory Drilling Operation

**Location:** Any drill site within a Beaufort Sea outer continental shelf (OCS) lease block authorized by the United States Minerals Management Service (MMS) within 25 miles of the State of Alaska's seaward boundary

**Source Contact:** Susan Childs  
Shell Offshore, Inc.  
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Anchorage, AK 99503  
Phone: 907-770-3700  
E-mail: Susan.Childs@shell.com

**Fee Contact:** Same as source contact

Pursuant to 42 U.S.C. §7627(a)(1), the permittee shall comply with the terms and conditions of this permit. Failure to comply with the terms and conditions of the permit shall be considered a violation of Section 111(e) of the Act, 42 U.S.C. §7410 et seq.

  
Richard Albright  
Director, Office of Air, Waste and Toxic

6/12/07  
Date

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### Abbreviations/Acronyms

AAC	Alaska Administrative Code
Act	Federal Clean Air Act
ADEC	Alaska Department of Environmental Conservation
AS	Alaska Statutes
ASTM	American Society of Testing and Materials
CFR	Code of Federal Regulations
EPA	United States Environmental Protection Agency
Kulluk	Kulluk Drilling Unit
MMS	United States Mineral Management Service
NA	Not Applicable
NAICS	North American Industry Classification System
OCS	Outer Continental Shelf
ORL	Owner Requested Limit
PS	Performance Specification
PTE	Potential to Emit
RM	Reference Method
SIC	Standard Industrial Classification
SN	Serial Number
TAR	Technical Analysis Report
Unit ID	Emission Unit Identification Number

### Units and Measures

dscf	dry standard cubic foot
gph	gallons per hour
gr./dscf	grains per dry standard cubic foot (1 pound = 7,000 grains)
hp	brake horsepower or boiler horsepower
kW	kiloWatts
kW-e	kiloWatts electric <sup>2</sup>
lbs	pounds
mmBtu	million British thermal units
ppm	parts per million
ppmv	parts per million by volume
tph	tons per hour
tpy	tons per year
wt%	weight percent

### Pollutants

CO	Carbon Monoxide
HAPS	Hazardous Air Pollutants
NO <sub>x</sub>	Oxides of Nitrogen
NO <sub>2</sub>	Nitrogen Dioxide
NO	Nitric Oxide
PM <sub>10</sub>	Particulate Matter with an aerodynamic diameter less than 10 microns
SO <sub>2</sub>	Sulfur Dioxide
VOC	Volatile Organic Compound

<sup>1</sup> For boilers: One boiler horsepower = 33,472 Btu-fuel per horsepower-hour divided by the boiler's efficiency. For engines: Approximately 7,000 Btu-fuel per brake horsepower-hour is required for an average diesel internal combustion engine.

<sup>2</sup> kW-e refers to rated generator electrical output rather than engine output.

**Section 1. Terms and Conditions**

**Authorizations/Emission Unit Inventory and Description**

1. Minor Permit No. R10OCS-AK-07-01 authorizes the permittee to mobilize, operate, and demobilize the Kulluk at a drill site authorized by MMS in the Beaufort Sea OCS, in accordance with the terms and conditions of this permit.
  - 1.1 The Permittee shall record the date and hour of both initial and final operation of the Kulluk at each drill site.
    - a. The initial operation of the Kulluk at each drill site is defined as when the setting of the Kulluk's last anchor to the seafloor is completed.
    - b. The final operation of the Kulluk at each drill site is defined when the Kulluk's last anchor is removed from the seafloor.
  - 1.2 The permittee shall report to EPA via facsimile or e-mail the information recorded in Condition 1.1.
    - a. Submit the information required by Condition 1.1.a within 3 days of initial operation at a drill site.
    - b. Submit the information required by Condition 1.1.b within 3 days of final operation at a drill site.
2. Minor Permit No. R10OCS-AK-07-01 authorizes the permittee to utilize vessels in support of the Kulluk in accordance with the terms and conditions of this permit as follows:
  - 2.1 Conditions 5, 6, 7, 8, and 9 apply to emission units on support vessels operating at or within 25 miles of the drill site.
  - 2.2 Conditions 10, 11, 12, 13, 14 and 15 apply to emissions units on support vessels when:
    - a. The vessel is physically attached to the Kulluk at a drill site, and
    - b. The emission unit is engaged in any activity not directly related to propulsion of a vessel.
  - 2.3 The permittee may use an alternative support vessel not listed in Table 2 without a permit revision as follows:
    - a. Notify EPA of the alternative support vessel 45 days prior to operation within 25 miles of a drill site.

- (i) The notification shall include a list of emissions units, ratings, emission factors, and a proposed methodology for monitoring vessel emissions.
  - b. Operate the alternative support vessel in accordance with:
    - (i) All terms and conditions of this permit, and
    - (ii) An EPA-approved methodology for monitoring vessel emissions, similar to those described under Condition 7.
- 2.4 The permittee shall not operate an alternative support vessel prior to receiving EPA approval of a methodology for monitoring vessel emissions.

3. The emissions units listed in Table 1 are collectively referred to as the Kulluk. The Unit ID will be used to identify an emissions unit. The Source Group will be used to identify a collection of emissions units utilizing the same emission factor to determine NO<sub>x</sub> emissions.

Table 1 – Kulluk Emission Units					
Unit ID	Source Group	Unit Description	Make/Model	Capacity	Unit
K-1	A1	Electrical Generator Engine	EMD / unknown	2,816	hp
K-2	A1	Electrical Generator Engine	EMD / unknown	2,816	hp
K-3	A1	Electrical Generator Engine	EMD / unknown	2,816	hp
K-4	A3	Emergency Electrical Generator Engine	Unknown	920	hp
K-5	A3	Air Compressor Engine	Hydraulic	500	hp
K-6	A3	Air Compressor Engine	Hydraulic	500	hp
K-7	A3	Air Compressor Engine	Hydraulic	500	hp
K-8	A3	Deck Crane Engine	Mercedes / OM404	293	kW
K-9	A3	Deck Crane Engine	Mercedes / OM404	293	kW
K-10	A3	Deck Crane Engine	Mercedes / OM404	293	kW
K-11	A3	Thrustmaster Engine	Caterpillar / 3516 B	2,000	hp
K-12	A3	Thrustmaster Engine	Caterpillar / 3516 B	2,000	hp
K-13	A3	HPP Engine	Unknown	< 600	hp
K-14	A3	HPP Engine	Unknown	< 600	hp
K-15	A2	Heat Boiler	Unknown	2.4	mmBtu/hr
K-16	A2	Heat Boiler	Unknown	2.4	mmBtu/hr
K-17	A2	Hot Water Heat	Unknown	0.54	mmBtu/hr

<sup>3</sup> The Source Group for which an emissions unit is identified is used for the purpose of determining NO<sub>x</sub> emissions pursuant to Condition 7.

Table 1 – Kulluk Emission Units					
Unit ID	Source Group	Unit Description	Make/Model	Rating	
K-18	A2	Hot Water Heat	Unknown	0.54	mmBtu/hr
K-19	K	Incinerator	TeamTec / GS500C	276	lb/hr
K-20	T	Fuel Tank	Unknown / Kulluk ID: 5P-10C	680	cubic meters
K-21	T	Fuel Tank	Unknown / Kulluk ID: 5P-10C	676	cubic meters
K-22	T	Fuel Tank	Unknown / Kulluk ID: 5P-10C	247	cubic meters

4. The emissions units listed in Table 2 are collectively referred to as the Kulluk support vessels, and the Unit ID will be used to identify the emissions units.
- 4.1 Emissions from the vessels, when operating within 25 miles of the Kulluk, will be considered direct emissions from the Kulluk for the following purposes:
- a. Determining assessable emissions, and
  - b. Determining regulatory applicability.
- 4.2 An emission unit on a vessel is an OCS source (a part of the Kulluk) and is subject to regulation under the following two conditions:
- a. The vessel is physically attached to the Kulluk at a drill site, and
  - b. The emission unit is engaged in any activity not directly related to propulsion of a vessel.

Table 2 – Kulluk Support Vessels					
Unit ID	Source Group	Unit Description	Make/Model	Rating	
Vladimir Ignatjuk (icebreaker)					

<sup>4</sup> The Source Group for which an emissions unit is identified is used for the purpose of determining NO<sub>x</sub> emissions pursuant to Condition 7.



Table 2 – Kulluk Support Vessels

Unit ID	Source Group	Unit Description	Make/Model	Rating	
VI-1	B1	Main Propulsion Engine		5,800	hp
VI-2	B1	Main Propulsion Engine		5,800	hp
VI-2	B1	Main Propulsion Engine		5,800	hp
VI-4	B1	Main Propulsion Engine		5,800	hp
VI-5	B2	Electrical Generator Engine		1,431	hp
VI-6	B2	Electrical Generator Engine		1,431	hp
VI-7	B3	Heat Boiler		2.4	mmBtu/hr
VI-8	B3	Hot Water Heater		0.54	mmBtu/hr
VI-9	K	Incinerator		66	Lb/hr
<b>Tor Viking II (icebreaker)</b>					
TV-1	C1	Main Prop. Engine / Electrical Generator Engine	MaK 8M32	5,046	hp
TV-2	C1	Main Prop. Engine / Electrical Generator Engine	MaK 8M32	5,046	hp
TV-3	C1	Main Prop. Engine / Electrical Generator Engine	MaK 6M32	3,784	hp
TV-4	C1	Main Prop. Engine / Electrical Generator Engine	MaK 6M32	3,784	hp
TV-5	C2	Harbor Electrical Generator Engine	Caterpillar 3412	1,168	hp
TV-6	C2	Harbor Electrical Generator Engine	Caterpillar 3412	1,168	hp
TV-7	C3	Heat Boiler		1.37	mmBtu/hr
<b>Jim Kilabuk (resupply vessel)</b>					
JK-1	D	Main Propulsion Engine	EMD / V20 645	3,600	hp
JK-2	D	Main Propulsion Engine	EMD / V20 645	3,600	hp
JK-3	D	Electrical Generator Engine	Caterpillar / D3406	292	hp
JK-4	D	Electrical Generator Engine	Caterpillar / D3406	292	hp
JK-5	D	HPP Engine	Caterpillar / D343	300	hp

Table 2 – Kulluk Support Vessels					
Unit ID	Source Group	Unit Description	Make/Model	Rating	
JK-6	D	Bow Thruster	Caterpillar / D343	300	hp
Nanuq (Main Oil Spill Response Vehicle)					
N-1	E	Propulsion Engine		2,710	hp
N-2	E	Propulsion Engine		2,710	hp
N-3	E	Electrical Generator Engine		1,285	hp
N-4	E	Electrical Generator Engine		1,285	hp
N-5	E	Emergency Electrical Generator Engine		1,285	hp
N-6	E	Boiler		75	MMBtu/hr
N-7	K	Incinerator	ASC / CP100	125	lb/hr
Kvichak No. 1 34-foot Oil Spill Response Work Boat					
OSRK1-1	E	Engine		300	hp
OSRK1-2	E	Engine		300	hp
OSRK1-3	E	Electrical Generator Engine		12	hp
Kvichak No. 2 34-foot Oil Spill Response Work Boat					
OSRK2-1	E	Engine		300	hp
OSRK2-2	E	Engine		300	hp
OSRK2-3	E	Electrical Generator Engine		12	hp
Affinity/Perseverance (Arctic tanker & oil spill response vessel)					
AP-1	E	Propulsion Engine	MAN B&W / 7S60MC	15,820	kW
AP-2	E	Electrical Generator Engine P	MAN B&W / 7L23	1,120	kW
AP-3	E	Electrical Generator Engine C	MAN B&W / 7L23	1,120	kW
AP-4	E	Electrical Generator Engine S	MAN B&W / 7L23	1,120	kW
AP-5	E	Emergency Electrical Generator Engine	Cummins / NT855	295	kW
AP-6	E	Framo Power Pack	Cummins / KTA19	477	kW
AP-7	E	Framo Power Pack	Cummins / KTA19	477	kW
AP-8	E	Framo Power Pack	Cummins / KTA19	477	kW

Table 2 – Kulluk Support Vessels

Unit ID	Source Comp	Unit Description	Make/Model	Rating	
AP-9	E	Auxiliary Boiler	KangRim / MB07S01	85	MMBtu/hr
AP-10	E	Incinerator	TeamTec / OG 400	580	kW

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### Requirement to Pay Fees

5. **Assessable Emissions.** The permittee shall pay to EPA an annual emission fee no later than July 1 of each year. The fee is based on the Kulluk's assessable emissions at each drill site as determined by EPA under 18 AAC 50.410. The assessable emission fee rate is set out in 18 AAC 50.410(b) or as modified by EPA. The EPA will assess fees per ton of each air pollutant that the Kulluk emits or has the potential to emit in quantities greater than 10 tons per year at a drill site. The quantity for which fees will be assessed is the lesser of
- 5.1 The Kulluk's assessable potential to emit (sum of assessable pollutants) of 363 tons per year; or
  - 5.2 The Kulluk's projected annual rate of emissions that will occur from July 1 to the following June 30, based upon actual annual emissions emitted during the most recent calendar year or another 12-month period approved in writing by EPA, when demonstrated by
    - a. An enforceable test method described in 18 AAC 50.220;
    - b. Material balance calculations;
    - c. Emission factors from EPA's publication AP-42, Vol. I, adopted by reference in 18 AAC 50.035; or
    - d. Other methods and calculations approved by EPA.
6. **Assessable Emission Estimates.** Emission fees will be assessed as follows:
- 6.1 No later than March 31 of each year, the permittee may submit an estimate of the Kulluk's assessable emissions to EPA Region 10, Office of Air, Waste and Toxics (AWT-107), ATTN: OCS Air Permit Program, 1200 Sixth Avenue, Seattle, WA 98101; the submittal must include all of the assumptions and calculations used to estimate the assessable emissions in sufficient detail, so EPA can verify the estimates; or
  - 6.2 If no estimate is received on or before March 31 of each year, emission fees for the next fiscal year will be based on the potential to emit set forth in condition 5.1.
- Owner Requested Limits Rendering Prevention of Significant Deterioration (PSD) Review Unnecessary**
7. **Nitrogen Oxides (NO<sub>x</sub>) Emission Limitation.** The permittee shall not allow the sum of emissions from the Kulluk and from support vessels operating at or within 25 miles of the drill site to exceed 245.0 tons of NO<sub>x</sub> within any Rolling 52-week period while mobilizing, operating, and demobilizing the Kulluk within 25 miles of a drill site.

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- 7.1 Emissions generated by the Kulluk and its support vessels shall be aggregated across multiple Kulluk drill sites only to the extent that:
- a. The emissions were generated within the same 52-week period, and
  - b. The drill sites are located within 500 meters of one another.
    - (i) The perimeter of each Kulluk drill site is the hull of the Kulluk.
- 7.2 Emissions generated by the Kulluk and its support vessels shall be aggregated with emissions from another OCS source owned or operated by permittee and its support vessels only to the extent that:
- a. The emissions were generated within the same 52-week period, and
  - b. The drill sites are located within 500 meters of one another.
    - (i) The perimeter of each Kulluk drill site is the hull of the Kulluk, and the perimeter of each OCS source drill site is the hull of the OCS source.
- 7.3 When the Kulluk and its support vessels are in transit to or from another drill site less than 25 miles away, attribute the emissions as follows:
- a. Half of the transit emissions shall be attributed to one of the two drill sites, and
  - b. The other half of the transit emissions shall be attributed to the other drill site.
- 7.4 The permittee shall calculate and record the Rolling 52-week NO<sub>x</sub> Emissions by adding the most recent Weekly NO<sub>x</sub> Emissions to the preceding 51 Weekly NO<sub>x</sub> Emissions.
- a. The permittee shall calculate and record both the Weekly NO<sub>x</sub> Emissions and the Rolling 52-week NO<sub>x</sub> Emissions for activities within 25 miles of a drill site according to the following frequency:
    - (i) No later than 3 days after the end of the week if the Kulluk is at the drill site on the last day of the week.
    - (ii) No later than 3 days after the Kulluk has left the drill site if the Kulluk leaves the drill site before the last day of the week.
- 7.5 The permittee shall report to EPA Rolling 52-week NO<sub>x</sub> Emissions as follows:
- a. The permittee shall report to EPA a summary of Rolling 52-week NO<sub>x</sub> Emissions annually to EPA. The report shall be submitted no later than December 31 for time period beginning December 1 (of the previous calendar year) and ending November 30.

- b. The permittee shall report to EPA any exceedance of Condition 7 within 3 days of identification.

7.6 The permittee shall calculate and record Weekly NO<sub>x</sub> Emissions pursuant to Condition 7.7, Condition 7.8, and Condition 7.9.

- a. Condition 7.7 shall be used in those instances when the permittee is monitoring, or is attempting to monitor, a Source Group's collective fuel usage at least once every 7 days.
- b. Condition 7.8 shall be used in those instances when the permittee is monitoring, or is attempting to monitor, each Source Unit's power output at least once every 15 minutes. This applies to all Source Units within a Source Group.
- c. Condition 7.9 shall be used for each incinerator
- d. Definitions.

- (i) A Source Group is a group of emission units for which overall emissions are characterized by either:

- (A) A single worst-case fuel-based emission factor, or
- (B) A common set of load-dependent emission factors.

- (ii) A Source Unit is an emission unit within a Source Group for which overall emissions are characterized by a common set of load-dependent emission factors.

7.7 The permittee shall calculate and record Weekly NO<sub>x</sub> Emissions for each Source Group as follows:

$$\text{Weekly NO}_x \text{ Emissions (tons)} = \left[ \sum_{i=\text{Source Group}} (F_i \times EF_i) \right] / 2000,$$

i = Source Group

F<sub>i</sub> = fuel consumption for Source Group i in units of "gallons diesel fuel combusted per week"

EF<sub>i</sub> = emission factor for Source Group i in units of "lb NO<sub>x</sub> emitted per gallon diesel fuel combusted"

- a. The permittee shall use Source Group-specific emission factors established pursuant to Condition 8.1.a. or 8.1.b.

- b. The permittee shall monitor and record cumulative Source Group fuel usage at least once every 7 days.
  - (i) Each fuel flow meter used to satisfy the requirement of Condition 7.7.b. shall measure the fuel flow rate with accuracy equal to or better than 2 percent of the meter's upper range value.
  - (ii) Collect information from the manufacturer of each fuel flow meter so as to determine its accuracy. Submit this information to EPA 45 days prior to operation within 25 miles of a drill site.
  - (iii) Maintain the accuracy of each fuel flow meter in accordance with manufacturer's recommendations.
- c. For each week that the permittee fails to determine cumulative Source Group fuel usage, the permittee shall determine emissions assuming the Source Group consumed diesel fuel as if operating at capacity for the week.

7.8 The permittee shall calculate and record Weekly NO<sub>x</sub> Emissions for each Source Group as follows:

$$\text{Weekly NO}_x \text{ Emissions (tons)} = \left[ \sum_{j=\text{SourceUnit}} \left[ \sum_{n=\text{readings}} L_{j,n} \times EFE_{j,n} \right] \div m_j \right] / 2000,$$

- j = Source Unit within Source Group
- m<sub>j</sub> = number of load readings observed for a given hour for Source Unit j
- n = number of load readings observed during the week for Source Unit j
- L<sub>j,n</sub> = power output in units of "kilowatts" measured for Source Unit j during a given time interval during which a load reading is observed
- EFE<sub>j,n</sub> = load-dependent emission factor for Source Group i in units of "lb NO<sub>x</sub> emitted per Kilowatt-hour of power output"

- a. The permittee shall use Source Group-specific emission factors established pursuant to Condition 8.1.b.
- b. The permittee shall monitor and record Source Unit load at least once every 15 minutes.
  - (i) For each hour that the permittee fails to determine Source Unit load at least once every 15 minutes, the permittee shall determine emissions utilizing the worst-case load-based emission (highest combined factor and load within range) established for the Source Group pursuant to Condition 8.1.b.

7.9 The permittee shall record Weekly NO<sub>x</sub> Emissions for incinerators as 0.04 tons per week.

**8. Source Group-Specific NO<sub>x</sub> Emission Factors.**

**8.1 Selection of Fuel-Based Emission Factor or Load-Based Emission Factor.**

a. The permittee shall calculate NO<sub>x</sub> emissions by utilizing fuel-based emission factors for Source Groups A2, A3, B3, C2, C3, D, and E as provided in Table 3.

Source Group Description	Source Group	EF (lb NO <sub>x</sub> /gal)
Kulluk boilers/hot water heaters	A2	0.020
Kulluk remaining sources	A3	0.654
Vladimir Ignatjuk boiler / hot water heater	B3	0.020
Tor Viking II harbor electrical generator	C2	0.071 / 0.421 <sup>5</sup>
Tor Viking II boiler	C3	0.020
Jim Kilabuk sources	D	0.654
Oil Spill Response Fleet sources	E	0.472

b. The permittee shall calculate NO<sub>x</sub> emissions by utilizing either a fuel-based emission factor or a load-based emission factor for Source Groups A1, B1, B2, and C1 as follows:

(i) Until new emission factors are approved by EPA pursuant to Condition 8.2, the emission factors listed in Table 4 shall be utilized.

Source Group Description	Source Group	EF (lb NO <sub>x</sub> /gal)	EF (lb NO <sub>x</sub> /kw-hr)
Kulluk electrical generator engines	A1	0.293	0.0219
Vladimir Ignatjuk main propulsion engines	B1	0.455	0.0340
Vladimir Ignatjuk main generator engines	B2	0.455	0.0340
Tor Viking II main propulsion engines / generators	C1	0.111 / 0.389 <sup>5</sup>	0.00828 / 0.0290 <sup>5</sup>

(ii) Upon EPA approval of a new emission factor, the new emission factor shall be utilized to calculate emissions beginning with the day upon which

<sup>5</sup> Controlled / Uncontrolled. Proceed to Condition 8.3 to select which emission factor to utilize.



stack testing was performed to develop the new emission factor, except that:

- (A) New emission factors based upon stack testing conducted in 2007 shall be utilized to calculate all emissions generated during 2007.

8.2 Development and Approval of New Emission Factors for Source Groups A1, B1, B2, and C1.

- a. Within 24 days of commencing operation at the first drill site, the permittee shall conduct stack testing as follows:
  - (i) Perform a stack test according to an EPA-approved stack test protocol on each class of engine within Source Groups B1 and C1 at three or more load points representing the expected operating range of the engines: 35%, 57%, and 80%.
    - (A) If the permittee elects to perform a stack test for only one engine from within Source Group C1, the permittee shall test either Unit TV-1 or Unit TV-2.
  - (ii) Perform a stack test according to an EPA-approved stack test protocol on one of the three engines within Source Groups A1 and B2 at three or more load points representing the expected operating range of the engines: 50%, 75%, and 100%.
  - (iii) Before conducting any stack tests, the permittee shall submit a plan to EPA. The plan must include the methods and procedures to be used for sampling, testing, and quality assurance, and must specify how the emission unit will operate during the test and how the permittee will document that operation. The permittee shall submit a complete plan within at least 30 days before the scheduled date of any test unless EPA agrees in writing to some other time period. Retesting may be done without resubmitting the plan.
- b. Within 15 days of completing the testing, the permittee shall submit to EPA a new emission factor for approval. A stack test report is to be submitted along with the permittee's request for a new emission factor.
  - (i) The proposed fuel-based emission factor shall be equivalent to the worst-case emissions as reflected in the stack test results. The units of the fuel-based emission factor are "lb NO<sub>x</sub> / gal."
  - (ii) The proposed load-based emission factor shall be a linear regression curve of emission factor as a function of load. The units of the load-based emission factor are "lb NO<sub>x</sub> / Kw-hr."

- c. The new emission factor shall be considered approved within 15 days of its receipt at EPA unless:
  - (i) EPA disapproves the new emission factor, or
  - (ii) EPA requests additional information.

8.3 Tor Viking Controlled and Uncontrolled Emission Factors.

- a. The permittee shall monitor and record at least once every 15 minutes the following parameters associated with the Tor Viking II Selective Catalytic Reduction Air Pollution Control System:
  - (i) Operational status of urea pump,
  - (ii) Stack temperature upstream of the catalyst, and
  - (iii) The load level of all engines exhausting to the SCR system.
- b. The permittee shall utilize a controlled emission factor for Source Group C1 and Source Group C2 for each 15-minute period in which:
  - (i) The urea pump is operating, and
  - (ii) The catalyst inlet temperature is greater than or equal to 250°C, and
- c. The permittee shall utilize an uncontrolled emission factor for Source Group C1 and Source Group C2 for each 15-minute period in which:
  - (i) The urea pump is not operating, or
  - (ii) The catalyst inlet temperature is less than 250°C.

9. **Sulfur Dioxide (SO<sub>2</sub>) Emission Limitation.** The permittee shall not combust any liquid fuel with sulfur content greater than 0.19 percent by weight in any emission unit on the Kulluk or a support vessel.<sup>6</sup>

- a. **Monitoring and Recordkeeping.** Monitor and keep records as follows:

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<sup>6</sup> Units K-8, K-9, K-10, K-13, and K-14 are further restricted to combusting only liquid fuel with a sulfur content less than 0.05 percent by weight pursuant to Condition 12.3.

- (i) Prior to mobilizing the Kulluk for the first time at the beginning of a drilling season, determine the sulfur content in each fuel oil storage tank on the Kulluk and all support vessels. The permittee shall obtain a representative sample of the fuel and analyze the sample for sulfur content using ASTM D-129, D-2622, or D-4294.
- (ii) Thereafter, determine and record the sulfur content upon receiving each fuel shipment.
  - (A) Obtain a representative sample of the fuel delivered and analyze the sample for sulfur content using ASTM D-129, D-2622, or D-4294; or
  - (B) Obtain a single certification of sulfur content for each shipment of fuel from the fuel supplier based on an analysis of the fuel, providing that the certification indicates that the sulfur content has been determined by one of the ASTM methods listed above.
- b. Within 3 days of identification, report to EPA any instance of a liquid fuel with sulfur content greater than 0.19 percent by weight being combusted in any emission unit on the Kulluk or a support vessel.

#### Standard for Incinerators

**10. Visible Emissions.** The permittee shall not cause or allow visibility through the exhaust effluent of an incinerator to be reduced by visible emissions, excluding condensed water vapor, by more than 20 percent averaged over any six consecutive minutes.

10.1 Performance Test. Within 24 days of initial operation of Unit K-19, observe Unit K-19 exhaust for visible emissions using Method 9. Observe its exhaust, following 40 C.F.R. 60, Appendix A-4, Method 9, for 6 minutes to obtain 24 consecutive 15-second opacity observations.

- a. If performance testing under Condition 10.1.a was accomplished previously at another drill site, no further performance testing is required for the remainder of that drilling season.

10.2 For each performance test conducted, record the following items:

- a. The name of the stationary source, emissions unit and location, stationary source type, observer's name and affiliation, and the date on the Visible Emissions Field Data Sheet in Section 3;

- b. The time, estimated distance to the emissions location, approximate wind direction, estimated wind speed, description of the sky condition (presence and color of clouds), plume background, and operating rate (load or fuel consumption rate) on the sheet at the time opacity observations are initiated and completed;
  - c. The presence or absence of an attached or detached plume and the approximate distance from the emissions outlet to the point in the plume at which the observations are made;
  - d. Opacity observations to the nearest five percent at 15-second intervals on the Visible Emissions Observation Record in Section 3; and
  - e. The minimum number of observations required by the permit; each momentary observation recorded shall be deemed to represent the average opacity of emissions for a 15-second period.
- 10.3 For each performance test conducted, report the results to EPA within 30 days of completing the test.

#### Standard for Fuel-Burning Equipment

**11. Visible Emissions.** The permittee shall not cause or allow visible emissions, excluding condensed water vapor, emitted from fuel-burning equipment to reduce visibility through the exhaust effluent by any one of the following:

- a. More than 20 percent averaged over any six consecutive minutes,
  - b. More than 20 percent for a total of more than three minutes in any one hour<sup>7</sup>.
- 11.1 Performance Test. Within 24 days of initial operation of an emissions unit, observe its exhaust, following 40 C.F.R. 60, Appendix A-4, Method 9, for 6 minutes to obtain 24 consecutive 15-second opacity observations. This condition applies to Units K-1 through K-18.
- a. If performance testing under Condition 11.1 was accomplished previously at another drill site for a particular emissions unit, no further monitoring is required for that emissions unit for the remainder of that drilling season.
- 11.2 For each performance test conducted, record the following items:

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<sup>7</sup> For purposes of this permit, the "more than three minutes in any one hour" criterion in this condition will no longer be effective if the Air Quality Control (18 AAC 50) regulation package effective May 3, 2002, is approved by EPA into the Alaska Implementation Plan.

- a. The name of the stationary source, emissions unit and location, stationary source type, observer's name and affiliation, and the date on the Visible Emissions Field Data Sheet in Section 3;
- b. The time, estimated distance to the emissions location, approximate wind direction, estimated wind speed, description of the sky condition (presence and color of clouds), plume background, and operating rate (load or fuel consumption rate) on the sheet at the time opacity observations are initiated and completed;
- c. The presence or absence of an attached or detached plume and the approximate distance from the emissions outlet to the point in the plume at which the observations are made;
- d. Opacity observations to the nearest five percent at 15-second intervals on the Visible Emissions Observation Record in Section 3; and
- e. The minimum number of observations required by the permit; each momentary observation recorded shall be deemed to represent the average opacity of emissions for a 15-second period.

11.3 For each performance test conducted, report the results to EPA within 30 days of completing the test.

12. **Particulate Matter.** The permittee shall not cause or allow particulate matter emitted from fuel-burning equipment to exceed, per cubic foot of exhaust gas corrected to standard conditions and averaged over three hours, 0.05 grains.

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- 12.1 The permittee shall not operate Units K-8, K-9, K-10, K-13, and K-14 without a diesel exhaust particulate matter filter system.
- a. Document the installation of the each particulate matter filter system and the resultant pollution control efficiency as installed.
  - b. Report the data required by Condition 12.1.a within 30 days of initial operation of an emissions unit.
- 12.2 The permittee shall maintain each diesel exhaust particulate matter filter system per the manufacturer's maintenance procedures.
- a. Maintain on-site a copy of the manufacturer's maintenance procedures.
  - b. Record any actions taken to verify and maintain each particulate matter filter system's pollution control efficiency.
- 12.3 The permittee shall not combust any liquid fuel with sulfur content greater than 0.05 percent by weight in Units K-8, K-9, K-10, K-13, and K-14.
- a. Monitor and keep records as follows:
    - (i) Prior to mobilizing the Kulluk for the first time at the beginning of a drilling season, the permittee shall determine the sulfur content in each fuel oil storage tank supplying fuel to Units K-8, K-9, K-10, K-13, and K-14. Obtain a representative sample of the fuel and analyze the sample for sulfur content using ASTM D-129, D-2622, or D-4294.
    - (ii) Thereafter, determine the sulfur content upon receiving each fuel shipment.
      - (A) Obtain a representative sample of the fuel delivered and analyze the sample for sulfur content using ASTM D-129, D-2622, or D-4294; or
      - (B) Obtain a single certification of sulfur content for each shipment of fuel from the fuel supplier based on an analysis of the fuel, providing that the certification indicates that the sulfur content has been determined by one of the ASTM methods listed above.
  - b. Within 3 days of identification, report to EPA any instance of a liquid fuel with sulfur content greater than 0.05 percent by weight being combusted in Unit K-8, K-9, K-10, K-13, or K-14.
- 12.4 Compliance with Condition 12 shall be determined for Unit K-1, K-2, and K-3 pursuant to the following terms:

- a. Prior to mobilizing the Kulluk for the first time at the beginning of a drilling season, the permittee shall conduct stack testing as follows:
  - (i) Perform a stack test according to an EPA-approved stack test protocol on at least one of the engines at three or more load points representing the expected operating range of the engines..
  - (ii) Before conducting any stack tests, the permittee shall submit a plan to EPA. The plan must include the methods and procedures to be used for sampling, testing, and quality assurance, and must specify how the emission unit will operate during the test and how the permittee will document that operation. The permittee shall submit a complete plan within at least 30 days before the scheduled date of any test unless EPA agrees in writing to some other time period. Retesting may be done without resubmitting the plan.
- b. The permittee shall determine particulate matter emissions based upon engine load conditions as follows:
  - (i) Within 15 days of completing the testing, the permittee shall submit to EPA for approval a correlation of operating load (kW-hr) to PM emissions rate (gr/dscf) along with the stack test report upon which the correlation is founded.
  - (ii) The correlation shall be considered approved within 15 days of its receipt at EPA unless :
    - (A) EPA disapproves or partially approved the correlation, or
    - (B) EPA requests additional information.
- c. The permittee shall monitor, calculate, and record emissions data as follows:
  - (i) Monitor and record each engine's operating load at least once every 15 minutes. At that time, identify whether the engine is transitioning between operating loads.
  - (ii) Every 15 minutes, calculate and record each engine's preceding 3-hour average operating load.
- d. The permittee shall report to EPA as follows:
  - (i) The permittee shall report annually to EPA a summary of those 3-hour time periods during which an engine emitted, on average, particulate matter in concentrations in excess of the 0.05 gr/dscf as determined using the EPA-approved correlation.

- (ii) The report shall be submitted no later than December 31 for time period beginning December 1 (of the previous calendar year) and ending November 30.

**13. Sulfur Compound Emissions.** The permittee shall not cause or allow sulfur compound emissions, expressed as sulfur dioxide, to exceed 500 ppm averaged over three hours.

13.1 **Monitoring and Recordkeeping.** Monitor and keep records of the sulfur content in the fuel combusted in Units K-1 through K-18 pursuant to Condition 9.a.

13.2 Report to EPA pursuant to Condition 9.b.

#### Generally Applicable Requirements

**14. Ambient Impacts.** The permittee shall not cause or contribute to a violation of a national ambient air quality standard or the standards of Alaska (18 AAC 50.110).

**15. Good Air Pollution Control Practices.** The permittee shall maintain and operate Emission Units in Source Groups A1, A2, K, and T, listed in Table 1, according to the manufacturer recommendations.

**16. Recordkeeping Requirements.** The permittee shall keep all records required by this permit for at least five years after the date of collection.

**17. Certification.** The permittee shall certify all reports, or other documents submitted to the EPA and required under the permit by including the signature of a responsible official for the permitted stationary source following the statement: "Based on information and belief formed after reasonable inquiry, I certify that the statements and information in and attached to this document are true, accurate, and complete." All reports and documents must be certified upon submittal.

**18. Termination.** This approval shall become invalid if construction of the Kulluk exploratory drilling activity is not commenced within 18 months after the effective date of this permit, or if construction of the activity is discontinued for a period of 18 months, unless EPA extends the 18-month period upon a satisfactory showing that an extension is justified, pursuant to 40 CFR 55.6(b)(4).



**Section 2. Permit Documentation**

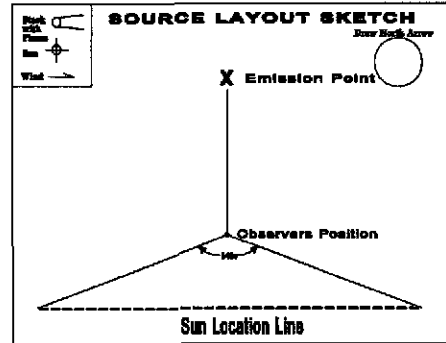
Date of Document	Description of Document
December 29, 2006	Application for Minor Permit
February 7, 2007	Supplement to Application
March 26, 2007	Supplement to Application
March 29, 2007	Supplement to Application

**Section 3. Attachments/Forms**

Permit No. R10OCS-AK-07-01 - Visible Emissions Field Data Sheet

Certified Observer: \_\_\_\_\_

Company &  
 Stationary Source: \_\_\_\_\_  
 Location: \_\_\_\_\_  
 Test No.: \_\_\_\_\_ Date: \_\_\_\_\_  
 Emission Unit: \_\_\_\_\_  
 Operating Rate: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_



Clock Time	Initial				Final
Observer location					
Distance to discharge					
Direction from discharge					
Height of observer point					
Background description					
Weather conditions					
Wind Direction					
Wind speed					
Ambient temperature					
Relative humidity					
Sky conditions: (clear, overcast, % clouds, etc.)					
Plume description:					
Color					
Distance visible					
Water droplet plume? (Attached or detached?)					
Other information					

