



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 10

1200 Sixth Avenue, Suite 900
Seattle, Washington 98101-3140

OUTER CONTINENTAL SHELF
PREVENTION OF SIGNIFICANT DETERIORATION
PERMIT TO CONSTRUCT

Permit Number: R10OCS/PSD-AK-09-01 Issuance Date: Draft - TBD
Effective Date: Draft - TBD

In accordance with the provisions of Clean Air Act (CAA) Section 328 and Code of Federal
Regulations (CFR) Title 40, Part 55, and the provisions of Part C to Title I of the CAA and 40
CFR § 52.21,

Shell Gulf of Mexico Inc.
3601 C Street, Suite 1000
Anchorage, AK 99503

is authorized to construct and operate the Frontier Discoverer drillship and its air emission units
and to conduct other air pollutant emitting activities in accordance with the permit conditions
listed in this permit, and only at the following lease blocks from the Chukchi Sea lease sale 193:

- NR02-02: 6819 6820 6821 6822 6868 6869 6870 6871 6872 6918 6919 6920 6921 6922 6968 6969
6970 6971 6972 7018 7019 7020 7021 7022 7023 7068 7069 7072
NR03-01: 6105 6106 6155 6156 6161 6162 6211 6212 6261 6363 6364 6413 6414 6415 6418 6419
6462 6463 6464 6465 6467 6468 6469 6512 6513 6514 6515 6516 6517 6518 6519 6562 6563
6564 6565 6567 6568 6569 6612 6613 6614 6615 6616 6617 6618 6665 6666 6667 6668 6705
6706 6712 6715 6716 6717 6753 6754 6755 6756 6761 6762 6765 6766 6767 6803 6804 6805
6810 6811 6812 6813 6814 6815 6816 6817 6853 6854 6855 6860 6861 6862 6863 6864 6865
6866 6903 6904 6905 6908 6909 6910 6911 6912 6913 6914 6915 6916 6953 6954 6955 6956
6957 6958 6959 6960 6961 6962 6963 6964 6965 7006 7007 7008 7009 7010 7011 7012 7013
7014 7056 7057 7058 7059 7060 7061 7062 7063 7106 7107 7108 7109 7110 7119
NR03-02: 6114 6115 6161 6163 6164 6165 6213 6214 6215 6220 6259 6261 6263 6264 6265 6270
6271 6321 6322 6359 6360 6371 6372 6409 6410 6422 6423 6459 6508 6558 6608 6658 6671
6672 6708 6713 6714 6715 6721 6722 6757 6761 6762 6763 6764 6765 6766 6771 6807 6811
6812 6813 6814 6815 6816 6817 6856 6862 6863 6864 6865 6866 6905 6912 6913 6914 6915
6916 6962 6963 6964 6965
NR04-01: 6352 6401 6402 6452 6453 6503 6504 6554 6604
NR03-03: 6007 6008 6009 6010 6017 6018 6020 6056 6057 6058 6059 6067 6068 6070 6108 6219
6560 6561 6609 6610 6611 6658 6659 6660 6709 6721 6722 6723 6759 6771 6772 6773 6823

Terms not otherwise defined in this permit have the meaning assigned to them in the referenced
statutes and regulations. All terms and conditions of the permit are enforceable by the United
States Environmental Protection Agency and citizens under the Clean Air Act.

Richard Albright
Director, Office of Air, Waste and Toxics

Date

## ABBREVIATIONS AND ACRONYMS

BACT.....	Best Available Control Technology
CFR.....	Code of Federal Regulations
CO.....	Carbon Monoxide
EPA.....	United States Environmental Protection Agency
hp.....	brake horsepower
kW.....	kiloWatts (mechanical)
kWe.....	kiloWatts electrical
lbs.....	pounds
MMBtu/hr.....	Million British thermal units per hour
NA.....	Not applicable
NAAQS.....	National Ambient Air Quality Standards
NH <sub>3</sub> .....	Ammonia
NO <sub>x</sub> .....	Oxides of Nitrogen
OCS.....	Outer Continental Shelf
PM.....	Particulate Matter
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
QA/QC.....	Quality Assurance/Quality Control
SCR.....	Selective Catalytic Reduction
SO <sub>2</sub> .....	Sulfur Dioxide
VOC.....	Volatile Organic Compound

## AUTHORITY

The United States Environmental Protection Agency (EPA) is proposing to issue this outer continental shelf (OCS)/prevention of significant deterioration (PSD) permit pursuant to Section 328 of the CAA, 42 U.S.C. § 7627, and the implementing OCS regulations at 40 CFR Part 55, and pursuant to Part C to Title I of the CAA, 42 USC §§ 7470 to 7492, and the implementing PSD air quality regulations at 40 CFR § 52.21. This proposed action is based upon the application initially submitted by Shell Offshore Inc.<sup>1</sup> on December 19, 2008, supplemental submittals identified in the administrative record for this permit action, and upon the technical analysis performed by EPA.

## FINDINGS

On the basis of the information in the administrative record, EPA has determined that:

1. The permittee will meet all of the applicable requirements of the 40 CFR Part 55;
2. The permittee will meet all of the applicable requirements of the 40 CFR § 52.21.

## APPROVAL CONDITIONS

Shell Gulf of Mexico Inc. (Shell or permittee) is authorized to construct and operate the vessels and emission units listed in Tables 1 through 5, at any of the lease blocks identified on Page 1 of this permit, and consistent with the representations in the permit application and subject to the conditions in this permit.

**Table 1 – Frontier Discoverer Emission Units**

ID	Description	Make and Model	Rating <sup>a</sup>
FD-1 – 6	Generator Engines	Caterpillar D399 SCAC 1200 rpm	1,325 hp
FD-7	Propulsion Engine	Mitsubishi 6UEC65	7,200 hp
FD-8	Emergency Generator	Caterpillar 3304	131 hp
FD-9 – 11	MLC Compressor Engines	Caterpillar C-15	540 hp
FD-12 – 13	HPU Engines	Detroit 8V-71	250 hp
FD-14	Port Deck Crane Engine	Caterpillar D343	365 hp
FD-15	Starboard Deck Crane Engine	Caterpillar D343	365 hp
FD-16 – 17	Cementing Unit Engines	Detroit 8V-71N	335 hp
FD-18	Cementing Unit Engine	GM 3-71	147 hp
FD-19	Logging Winch Engine	Detroit 4-71N	128 hp
FD-20	Logging Winch Engine	John Deere 4024TF	36 kW
FD-21 – 22	Heat Boilers	Clayton 200	7.97 MMBtu/hr
FD-23	Incinerator	TeamTec GS500C	276 lb/hr

<sup>1</sup> Although the permit application was initially submitted by Shell Offshore Inc., the applicant has since clarified that Shell Gulf of Mexico Inc. is the only entity with rights to conduct activities under the leases and is responsible for compliance with all regulations and orders for activities on the leases. Shell Gulf of Mexico Inc. has confirmed that it stands by all statements made in the permit application. As a result, EPA is issuing the permit to Shell Gulf of Mexico Inc.

FD-24 -30	Fuel Tanks	Not applicable (NA)	Various
FD-31	Supply Ship Generator Engine(s)	Generic	584 hp
FD-32	Drilling Mud System	NA	NA
FD-33	Shallow Gas Diverter System	NA	NA

<sup>a</sup> Permit conditions may limit operation to less than rated capacity.

**Table 2 – Icebreaker #1**

Description	Make and Model	Maximum Aggregate Rating <sup>a</sup>
Aggregate of Propulsion Engines and Generator Engines	Various	31,200 hp
Generator Engine(s)	Various	2,800 hp
Heat Boiler(s)	Various	10 MMBtu/hr
Incinerator	Various	154 lbs/hr

<sup>a</sup> Permit conditions may limit operation to less than rated capacity.

**Table 3 – Icebreaker #2**

Description	Make and Model	Maximum Aggregate Rating <sup>a</sup>
Aggregate of Propulsion Engines and Generator Engines	Various	31,200 hp
Generator Engine(s)	Various	2,800 hp
Heat Boiler(s)	Various	10 MMBtu/hr
Incinerator	Various	154 lbs/hr

<sup>a</sup> Permit conditions may limit operation to less than rated capacity.

**Table 4 – Supply Ship**

Description	Make and Model	Maximum Aggregate Rating <sup>a</sup>
Propulsion Engines	Various	7,200 hp
Generator Engine(s)	Various	584 hp

<sup>a</sup> Permit conditions may limit operation to less than rated capacity.

**Table 5 – Oil Spill Response Fleet**

ID	Description	Make and Model	Rating <sup>a</sup>
<b>Oil Spill Response Main Ship - Nanuq</b>			
N-1 - 2	Propulsion Engines	Caterpillar 3608	2,710 hp
N-3 – 4	Electrical Generators	Caterpillar 3508	1,285 hp
N-5	Emergency Generator	John Deere	166 kW
N-6	Incinerator	ASC/CP100	125 lbs/hr
<b>Oil Spill Response Work Boat - Kvichak 34-foot No. 1</b>			
K-1 – 2	Propulsion Engines	Cummins QSB	300 hp
K-3	Generator Engines	Various	12 hp
<b>Oil Spill Response Work Boat - Kvichak 34-foot No. 2</b>			

K-4 – 5	Propulsion Engines	Cummins QSB	300 hp
K-6	Generator Engines	Various	12 hp
<b>Oil Spill Response Work Boat - Kvichak 34-foot No. 3</b>			
K-7 - 8	Propulsion Engines	Cummins QSB	300 hp
K-9	Generator Engines	Various	12 hp

<sup>a</sup> Permit conditions may limit operation to less than rated capacity.

**Effective Date.** This permit becomes effective 30 days after the service of notice of the final permit decision, unless review of the permit decision is requested pursuant to 40 CFR § 124.19.

**OCS Source.** Permit Conditions contained in Sections A through R, except for those conditions addressing notification, reporting and testing, apply only during the time that the Frontier Discoverer drillship (Discoverer) is an OCS Source. Permit Conditions addressing notification, reporting and testing apply at all times as specified. For the purpose of this permit, the Discoverer is an “OCS Source” during all times between placement of the first anchor on the seabed to removal of the last anchor from the seabed at a drill site.

## A. GENERALLY APPLICABLE REQUIREMENTS

1. **Construction and Operation.** The permittee shall construct and operate the OCS Source and the Associated Fleet in accordance with the application and supporting materials submitted by the permittee and in accordance with this permit. For purposes of this permit, Icebreaker #1, Icebreaker #2, the supply ship, the Nanuq and Kvichaks No. 1-3 shall collectively be referred to as the “Associated Fleet.”
2. **Compliance Required.** The permittee shall comply with all requirements of 40 CFR § 52.21, Part 55, and this permit. Failure to do so shall be considered a violation of Section 111(e) and 165 of the CAA. All enforcement provisions of the CAA, including but not limited to, Section 113, 114, 120, 167, 303, and 304 apply to the permittee.
3. **Compliance with Other Requirements.** This permit does not relieve the permittee of the responsibility to comply fully with applicable provisions of any other requirements under federal law.
4. **Notification to Owners, Operators, and Contractors.** The permittee must notify all other owners or operators, contractors, and the subsequent owners or operators associated with emissions from the source of the conditions of this permit.
5. **Expiration of Approval to Construct.** As provided in 40 CFR § 52.21(f)(4), this approval shall become invalid if: construction is not commenced within 18 months after the effective date of this permit, construction is discontinued for a period of 18 months, or construction is not completed within a reasonable time. EPA may extend the 18-month period upon a satisfactory showing that an extension is justified.
6. **Permit Revision, Termination and Reissuance.** This permit may be revised, terminated, or revoked and reissued by EPA for cause. Cause exists to revise, terminate, or revoke and reissue this permit under the following circumstances:
  - 6.1 This permit contains a material mistake;

- 6.2 Materially inaccurate statements were made in establishing the terms or conditions of this permit;
  - 6.3 The permittee fails to comply with any material condition of this permit; or
  - 6.4 This permit must be revised, terminated, or revoked and reissued to assure compliance with Clean Air Act requirements.
7. **Credible Evidence.** For the purpose of establishing whether or not the permittee has violated or is in violation of any requirement of this permit, nothing in this permit shall preclude the use, including the exclusive use, of any credible evidence or information relevant to whether the permittee would have been in compliance with applicable requirements if the appropriate performance or reference test or procedure had been performed.
8. **Inspection and Entry.** Upon presentation of credentials and other documents as may be required by law, the permittee shall allow EPA or an authorized representative to perform the following:
- 8.1 Enter upon the Discoverer, any support vessel, any location where emissions-related activity is conducted, or any location where records must be kept under the conditions of the permit;
  - 8.2 Have access to and copy, at reasonable times, any records that must be kept under the conditions of the permit;
  - 8.3 Inspect at reasonable times any facilities, equipment (including monitoring and air pollution control equipment), practices, or operations regulated or required under the permit; and
  - 8.4 As authorized by the Clean Air Act, sample or monitor at reasonable times substances or parameters for the purpose of assuring compliance with the permit or applicable requirements.
9. **Recordkeeping Requirements.** In addition to the specific recordkeeping requirements contained in the source-wide and emission unit sections of this permit, the permittee shall keep records of required monitoring information that include the following:
- 9.1 The date, place, and time of sampling or measurements;
  - 9.2 The date(s) analyses were performed;
  - 9.3 The company or entity that performed the analyses;
  - 9.4 The analytical techniques or methods used;
  - 9.5 The results of such analyses; and,
  - 9.6 The operating conditions as existing at the time of sampling or measurement.

The permittee shall retain records of all required monitoring data and support information for a period of at least 5 years from the date of the monitoring sample, measurement, report, or application. Support information includes all calibration and maintenance records, all original strip-chart recordings for continuous monitoring instrumentation, and copies of all reports required by this permit.

- 10. Agency Notifications.** Unless otherwise specified in this permit, any documents required to be submitted under this permit, including reports, test data, monitoring data, notifications, and applications for renewals and permit modifications shall be submitted to:

OCS/PSD Air Quality Permits  
U.S. EPA - Region 10, AWT-107  
1200 Sixth Avenue, Suite 900  
Seattle, WA 98101  
Facsimile no. 206-553-8509

- 11. Certification.** Any document required to be submitted under this permit shall be certified by a responsible official, as that term is defined in 40 CFR § 71.2, of the permittee as to truth, accuracy, and completeness. Such certification shall state that based on information and belief formed after reasonable inquiry, the statements and information in the document are true, accurate and complete.
- 12. Severability.** The provisions of this permit are severable, and in the event of any challenge to any portion of this permit, or if any portion is held invalid, the remaining permit conditions shall remain valid and in force.
- 13. Property Rights.** This permit does not convey any property rights of any sort, or any exclusive privilege.

## **B. SOURCE-WIDE REQUIREMENTS**

- 1. Drill Site Notification.** At least 10 days prior to setting the first anchor from the Discoverer to the seabed at any drill site, the permittee shall notify EPA via facsimile of the following information:
- 1.1 The location of the proposed drill site, using coordinates in the following formats:
    - 1.1.1 Latitude and longitude, and
    - 1.1.2 Universal Transverse Mercator grid system.
  - 1.2 The lease block within the Chukchi Sea lease sale 193 where the drill site is located;
  - 1.3 The proposed date that the first Discoverer anchor will be set on the seabed and the probable duration of operation at that location;
  - 1.4 Confirmation that emissions from the source would impact no Class I area. The confirmation shall include a description of the legal and factual basis for this determination; and
  - 1.5 Confirmation that emissions from the source would impact no area where an applicable increment was known to be violated. The confirmation shall include a description of the legal and factual basis for this determination.

2. **Duration of Exploration Operations.** The permittee shall only conduct exploration drilling operations in the Chukchi Sea between July 1 and December 31 each year (referred to hereafter as the “drilling season”).
  - 2.1 During any rolling 12-month period, the permittee shall not operate the Discoverer as an OCS Source in excess of 168 calendar days. Each partial day shall be counted as a calendar day.
  - 2.2 For each drill site at which the Discoverer operates, the permittee shall record the following:
    - 2.2.1 The location of each drill site, using a modern global positioning system to determine the location. Location shall be recorded by providing coordinates in the following formats:
      - 2.2.1.1 Latitude and longitude, and
      - 2.2.1.2 Universal Transverse Mercator grid system.
    - 2.2.2 The lease block within the Chukchi Sea lease sale 193 where the drill site is located;
    - 2.2.3 The date and hour that the first Discoverer anchor was set on the seabed;
    - 2.2.4 The date and hour that the last Discoverer anchor was removed from the seabed.
  - 2.3 Any time spent drilling a relief well shall be included in the time recorded in Conditions B.2.2.3 and B.2.2.4.
3. **Drilling Season Notification.** Each drilling season, the permittee shall report to EPA via facsimile the information below, within 3 days of occurrence:
  - 3.1 The date and hour that the first Discoverer anchor for that drilling season, was set on the seabed; and
  - 3.2 The date and hour that the last Discoverer anchor for that drilling season was removed from the seabed.
4. **Best Available Control Technology (BACT) for Sulfur Dioxide (SO<sub>2</sub>) Emissions from Discoverer Emission Units.** The permittee shall not combust any liquid fuel with sulfur content greater than 0.0015 percent by weight, as determined by Condition B.4.1, in any emission unit on the Discoverer (except for Unit FD-7).
  - 4.1 Representative fuel samples shall be obtained using one of the methods in 40 CFR § 80.330(b). The sulfur content of the fuel shall be determined using ASTM D 5453-08b.
  - 4.2 Monitoring, Recordkeeping and Reporting. The permittee shall:
    - 4.2.1 Prior to mobilizing the Discoverer for the first time at the beginning of a drilling season, determine the sulfur content in each fuel oil storage tank on the Discoverer. The permittee shall obtain a representative sample of the fuel and analyze the sample for sulfur content using the procedures in Condition B.4.1.

- 4.2.2 Thereafter, determine and record the sulfur content upon receiving each fuel shipment, as follows:
  - 4.2.2.1 Obtain a representative sample of the fuel delivered and analyze the sample for sulfur content using the procedures in Condition B.4.1; or
  - 4.2.2.2 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 the ASTM method listed in Condition B.4.1.
- 4.3 Within 3 business days of identification, report to EPA any instance of a liquid fuel with sulfur content greater than 0.0015 percent by weight being combusted in any emission unit on the Discoverer (except Unit FD-7).
- 5. **SO<sub>2</sub> Emissions Limit for Associated Fleet.** The permittee shall not combust any liquid fuel with sulfur content greater than 0.19 percent by weight, as determined by Condition B.5.1, in any emission unit on the Associated Fleet.
  - 5.1 Representative fuel samples shall be obtained using one of the methods in 40 CFR § 80.330(b). The sulfur content of the fuel shall be determined using ASTM D 5453-08b.
  - 5.2 Monitoring, Recordkeeping and Reporting. The permittee shall:
    - 5.2.1 Prior to mobilizing the Discoverer for the first time at the beginning of a drilling season, determine the sulfur content in each fuel oil storage tank on the vessels comprising the Associated Fleet. The permittee shall obtain a representative sample of the fuel and analyze the sample for sulfur content using the procedures in Condition B.5.1.
    - 5.2.2 Thereafter, determine and record the sulfur content upon receiving each fuel shipment, as follows:
      - 5.2.2.1 Obtain a representative sample of the fuel delivered and analyze the sample for sulfur content using the procedures in Condition B.5.1; or
      - 5.2.2.2 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 the ASTM method listed in Condition B.5.1.
  - 5.3 Within 3 business 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 any vessel comprising the Associated Fleet.
- 6. **BACT for Particulate Matter Emissions (PM, PM<sub>10</sub>, and PM<sub>2.5</sub>) from Discoverer Diesel IC Engine Crankcase Ventilation.** Except for the MLC Diesel Compressor Engines (FD-9 - 11), each diesel IC engine on the Discoverer shall be equipped with a closed crankcase ventilation (CCV) system.

- 7. General Testing Requirements.** Whenever conducting a stack test required by this permit, and unless specifically stated otherwise in this permit, the permittee shall comply with the following testing requirements in addition to the specific testing requirements contained in the emission unit sections of this permit:
- 7.1 The permittee shall provide EPA at least 30 days prior notice of any stack test. If after 30 days notice for an initially scheduled stack test, there is a delay in conducting the scheduled stack test, the permittee shall notify EPA as soon as possible of any delay in the original test date, either by providing at least 7 days prior notice of the rescheduled date of the stack test, or by arranging a rescheduled date with EPA by mutual agreement.
  - 7.2 The permittee shall submit to EPA a source test plan 30 days prior to any required testing. The source test plan shall include and address the following elements:
    - 7.2.1 Purpose and scope of testing;
    - 7.2.2 Source description, including a description of the operating scenarios and mode of operation during testing and including fuel sampling and analysis procedures;
    - 7.2.3 Schedule/dates of testing;
    - 7.2.4 Process data to be collected during the test and reported with the results, including source-specific data identified in the emission unit sections of this permit;
    - 7.2.5 Sampling and analysis procedures, specifically requesting approval for any proposed alternatives to the reference test methods, and addressing minimum test length (e.g., one hour, 8 hours, 24 hours, etc.) and minimum sample volume;
    - 7.2.6 Sampling location description and compliance with the reference test methods;
    - 7.2.7 Analysis procedures and laboratory identification;
    - 7.2.8 Quality assurance plan;
    - 7.2.9 Calibration procedures and frequency;
    - 7.2.10 Sample recovery and field documentation;
    - 7.2.11 Chain of custody procedures;
    - 7.2.12 Quality Assurance (QA)/Quality Control (QC) project flow chart;
    - 7.2.13 Data processing and reporting;
    - 7.2.14 Description of data handling and QC procedures; and
    - 7.2.15 Report content and timing.
  - 7.3 Unless EPA determines in writing that other operating conditions are representative of normal operations or unless specified in the emission unit sections of this permit, the source shall be operated at a capacity of at least 90% but no more than 100% of maximum during all tests.

- 7.4 Only regular operating staff may adjust the processes or emission control devices during or within 2 hours prior to the start of a source test. Any operating adjustments made during a source test, that are a result of consultation during the tests with source testing personnel, equipment vendors, or consultants, may render the source test invalid.
- 7.5 For the duration of each test run (unless otherwise specified), the permittee shall record the following information:
- 7.5.1 All data which is required to be monitored during the test in the emission unit sections of this permit; and
- 7.5.2 All continuous monitoring system data which is required to be routinely monitored in the emission unit sections of this permit for the emission unit being tested.
- 7.6 Each source test shall follow the reference test methods specified by this permit and consist of at least three (3) valid test runs. For purposes of this permit:
- 7.6.1 EPA Test Methods 1, 2, 3A, 4, 5, 6C, 7E, 9, 10, 19, and 25A are set forth in 40 CFR Part 60, Appendix A;
- 7.6.2 EPA Test Methods 201, 201A and 202 are set forth in 40 CFR Part 51, Subpart M;
- 7.6.3 Conditional Test Method 027 (CTM-027), “Procedure for Collection and Analysis of Ammonia in Stationary Sources,” is set forth at <http://www.epa.gov/ttn/emc/ctm.html>;
- 7.6.4 Conditional Test Method 038 (CTM-038), “Measurement of Ammonia Emissions from Highway, Nonroad, and Stationary Use Diesel Engines by Extractive Fourier Transform Infrared (FTIR) Spectroscopy,” is set forth at <http://www.epa.gov/ttn/emc/ctm.html>;
- 7.6.5 Other Test Method 27 (OTM 27), “Determination of PM<sub>10</sub> and PM<sub>25</sub> Emissions from Stationary Sources (Constant Sampling Rate Procedure),” is set forth at <http://www.epa.gov/ttn/emc/prelim.html>;
- 7.6.6 Other Test Method 28 (OTM 28), “Dry Impinger Method for Determining Condensable Particulate Emissions from Stationary Sources,” is set forth at <http://www.epa.gov/ttn/emc/prelim.html>; and
- 7.6.7 ASTM D 5453-09 is set forth at <http://www.astm.org/Standards/D5453.htm>
- 7.7 Facilities for performing and observing the emission testing shall be provided that meet the requirements of 40 CFR § 60.8(e) and EPA Method 1.
- 7.8 Emission test reports shall be submitted to EPA within 45 days of completing any emission test required by this permit along with items required to be recorded in Condition B.7.5 above.
- 7.9 EPA Methods 1, 2, 3A, 3B, 4 and 19 shall be used as necessary to convert the measured NO<sub>x</sub>, PM, PM<sub>10</sub>, PM<sub>2.5</sub> and CO emissions into units of the emission limits in the permit.

- 7.10 Source test emission data shall be reported as the arithmetic average of all valid test runs and in the terms of any applicable emission limit, unless otherwise specified in the emission unit sections of this permit.
- 7.11 An alternative test method or a deviation from a test method identified in this permit may be approved as follows:
  - 7.11.1 The permittee must submit a written request to EPA at least 60 days before the stack test is scheduled to begin which includes the reasons why the alternative or deviation is needed and the rationale and data to demonstrate that the alternative test method or deviation from the reference test method:
    - 7.11.1.1 Provides equal or improved accuracy and precision as compared to the specified reference test method; and
    - 7.11.1.2 Does not decrease the stringency of the standard as compared to the specified reference test method.
  - 7.11.2 If requested by EPA, the demonstration referred to in Condition 7.11.1 must use Method 301 in 40 CFR Part 63, Appendix A, to validate the alternative test method or deviation.
  - 7.11.3 EPA must approve the request in writing.
  - 7.11.4 Until EPA has given written approval to use an alternative test method or to deviate from the test method specified in this permit, the permittee is required to use the test method specified in this permit when conducting a source test under this permit.
8. **Prohibited Activities.** The permittee shall not flow test wells, flare gas, or store liquid hydrocarbons recovered during well testing.
9. **Monthly Emissions Calculations.** By the tenth of each month, the permittee shall, using monitoring data collected pursuant to the requirements of this permit, calculate and record the monthly emissions of CO, NO<sub>x</sub>, PM<sub>2.5</sub>, PM<sub>10</sub>, SO<sub>2</sub> and VOC for the preceding month.
10. **Rolling 12-Month Emissions Calculations.** By the tenth of each month, the permittee shall calculate and record the rolling 12-month emissions of CO, NO<sub>x</sub>, PM<sub>2.5</sub>, PM<sub>10</sub>, SO<sub>2</sub> and VOC by using the monthly emissions calculated for the previous 12 months pursuant to Condition B.9.
11. **Reporting.** The permittee shall report to EPA via facsimile any exceedance of any emission limit or any throughput limit contained in this permit within 3 business days of identification.
12. **Good Operating and Maintenance Requirements.** At all times, including periods of startup, shutdown, and malfunction, the permittee shall, to the extent practicable, maintain and operate each emission unit, including any associated air pollution control equipment, in a manner consistent with good air pollution control practices for minimizing emissions. Determination of whether acceptable operating and maintenance procedures are being used will be based on information available to EPA which may include, but is not limited to, monitoring results, opacity observations, review of operating and maintenance procedures, and inspection of the source.

**C. DISCOVERER GENERATOR ENGINES (FD-1 – 6)**

- 1. Operation of Selective Catalytic Reduction (SCR) Unit.** At all times that any of Units FD-1 – 6 are in operation, the exhaust from each Unit shall be directed to an operating SCR unit.
- 2. Operation of Oxidation Catalyst.** At all times that any of Units FD-1 – 6 are in operation, the exhaust from each Unit shall be directed to an operating oxidation catalyst.
- 3. BACT Limits.** Emissions from each generator engine (Units FD-1 – 6) shall not exceed the emission limits specified for each of the pollutants below:
  - 3.1 Nitrogen oxides (NO<sub>x</sub>):** 0.50 grams (g) per kilowatt-hour (kW-hr)
    - 3.1.1 For compliance with Condition C.3.1, measurement of NO<sub>x</sub> shall be determined using EPA Method 7E.
  - 3.2 Ammonia (NH<sub>3</sub>):** 5 parts per million by volume (ppmv) at actual stack gas conditions
    - 3.2.1 For compliance with Condition C.3.2, measurement of NH<sub>3</sub> shall be determined using EPA Conditional Test Method 027 or 038.
  - 3.3 Particulate Matter (PM):** 0.127 g/kW-hr
    - 3.3.1 For compliance with Condition C.3.3, measurement of PM shall be determined using EPA Method 5.
  - 3.4 Particulate Matter with an aerodynamic diameter less than 10 microns (PM<sub>10</sub>):** 0.127 g/kW-hr
    - 3.4.1 For compliance with Condition C.3.4, measurement of PM<sub>10</sub> shall be determined using EPA Method 201/201A and Other Test Method (OTM) 28, provided, however, that once proposed changes to Method 202 in 56 Fed. Reg. 12970 (March 25, 2009) become final and effective, EPA Method 202 shall be used in lieu of OTM 28.
  - 3.5 Particulate Matter with an aerodynamic diameter less than 2.5 microns (PM<sub>2.5</sub>):** 0.127 g/kW-hr.
    - 3.5.1 For compliance with Condition C.3.5, measurement of PM<sub>2.5</sub> shall be determined using EPA Method 201/201A and OTM 28, provided, however, that once proposed changes to Method 202 in 56 Fed. Reg. 12970 (March 25, 2009) become final and effective, EPA Method 202 shall be used in lieu of OTM 28.
  - 3.6 Visible Emissions:** Visible emissions, excluding condensed water vapor, shall not reduce visibility through the exhaust effluent more than 20 percent averaged over any six consecutive minutes.
    - 3.6.1 For compliance with Condition C.3.6, measurement of visible emissions shall be determined using EPA Method 9.

- 3.7. **Carbon Monoxide (CO):** 0.1790 g/kW-hr  
3.7.1 For compliance with Condition C.3.7, measurement of CO shall be determined using EPA Method 10.
- 3.8. **Volatile Organic Compounds (VOC):** 0.0230 g/kW-hr  
3.8.1 For compliance with Condition C.3.8, measurement of VOC shall be determined using EPA Method 25A.
4. **Potential to Emit (PTE) Emission Limits.** Emissions from each generator engine (Units FD-1 – 6) shall not exceed the emission limits specified for each of the pollutants below:
- 4.1 **Nitrogen oxides (NO<sub>x</sub>):** 1.550 tons/rolling 12-month period  
4.1.1 For compliance with Condition C.4.1, measurement of NO<sub>x</sub> shall be determined using EPA Method 7E.
- 4.2 **Particulate Matter with an aerodynamic diameter Less than 10 microns (PM<sub>10</sub>):** 4.80 lbs/day  
4.2.1 For compliance with Condition C.4.2, measurement of PM<sub>10</sub> shall be determined using EPA Method 201/201A and OTM 28, provided, however, that once proposed changes to Method 202 in 56 Fed. Reg. 12970 (March 25, 2009) become final and effective, EPA Method 202 shall be used in lieu of OTM 28.
- 4.3 **Particulate Matter with an aerodynamic diameter less than 2.5 microns (PM<sub>2.5</sub>):** 4.80 lbs/day  
4.3.1 For compliance with Condition C.4.3, measurement of PM<sub>2.5</sub> shall be determined using EPA Method 201/201A and OTM 28, provided, however, that once proposed changes to Method 202 in 56 Fed. Reg. 12970 (March 25, 2009) become final and effective, EPA Method 202 shall be used in lieu of OTM 28.
5. **Fuel Usage Limit.** The permittee shall not combust in excess of 311.0 gallons of fuel per hour in all of Units FD-1 – 6 in aggregate.
6. **Stack Test Requirements.** Prior to each of the first three drilling seasons that the Discoverer operates under this permit in the Chukchi Sea, the permittee shall stack test at least two of Units FD-1 – 6 as follows:
- 6.1 At the end of the first three drilling seasons that the Discoverer operates under this permit in the Chukchi Sea, all six of Units FD-1 – 6 shall have been stack tested under the requirements of this section.
- 6.2 Each stack test shall be conducted at three different loads: 50%, 75% and 100%.
- 6.3 Each stack test run shall test for emissions of CO, NO<sub>x</sub>, PM<sub>2.5</sub>, PM<sub>10</sub>, VOC and visible emissions.
- 6.4 During each test run, the permittee shall monitor and record the following information:
- 6.4.1 Quantity of fuel used (in gallons);

- 6.4.2 Density of the fuel used (in lbs/gallon);
  - 6.4.3 Heat content of the fuel used (in Btu/gallon); and
  - 6.4.4 Electrical power produced (in kWe-hr).
- 6.5 For each engine, and each pollutant, the permittee shall determine emission factors in the following units: g/kW-hr, g/kWe-hr, lbs/kW-hr, lbs/kWe-hr and lbs/gallon.

**7. Monitoring, Recordkeeping and Reporting:** The permittee shall:

- 7.1 Equip each of Units FD-1 - 6 with a diesel fuel flow meter:
  - 7.1.1 Each fuel flow meter shall be located as close as practical to the fuel intake of the engine;
  - 7.1.2 Each fuel flow meter shall be totalizing and nonresettable; and
  - 7.1.3 Each fuel flow meter shall measure the fuel flow rate with accuracy equal to or better than 2 percent of the meter's upper range value.
- 7.2 No less than 60 days before initial deployment of the Discoverer to the Chukchi Sea for the first drilling season, collect information from the manufacturer of each fuel flow meter so as to determine its accuracy. Submit this information to EPA no less than 30 days prior to operation within the Chukchi Sea.
- 7.3 Maintain the accuracy of each fuel flow meter in accordance with manufacturer's recommendations.
- 7.4 Monitor and record fuel usage for each engine on an hourly basis.
- 7.5 Monitor and record the power output, in kWe, resulting from the operation of each of Units FD-1 -6 at least once every 10 minutes;
- 7.6 Monitor and record the following operational parameters for each SCR, at least once every 10 minutes:
  - 7.6.1 The operational status of urea pump;
  - 7.6.2 The stack temperature upstream of the catalyst in either Celsius (°C), or Fahrenheit (°F);
  - 7.6.3 The load level of all engines exhausting to the SCR system; and
  - 7.6.4 The ammonia concentration in each stack.
- 7.7 Monitor and record the hourly NO<sub>x</sub> emissions from the exhaust of each engine, at least once per hour.
- 7.8 Each month, determine compliance with the BACT limit in Condition C.3.1 for each hour during the month by calculating NO<sub>x</sub> emissions using the highest emission factor collected under Condition C.6.5 and fuel usage data collected under Condition C.7.4.

- 7.9 Each day, calculate and record for the previous calendar day, the emissions of NO<sub>x</sub>, PM<sub>2.5</sub> and PM<sub>10</sub> using the highest emission factor collected under Condition C.6.5 and fuel usage collected under Condition C.7.4.

**D. DISCOVERER PROPULSION ENGINE (FD-7)**

1. The permittee shall not operate Unit FD-7 for any reason when operating the Discoverer as an OCS Source.
2. The permittee shall report to EPA via facsimile any deviation from Condition D.1 within 3 business days of identification.

**E. DISCOVERER EMERGENCY GENERATOR (FD-8)**

1. The permittee shall operate Unit FD-8 for no more than:
  - 1.1 20 minutes during any one hour;
  - 1.2 20 minutes during any one day; and
  - 1.3 8 hours during any rolling 12-month period.
2. For each instance in which Unit FD-8 is operated while the Discoverer is an OCS Source, the permittee shall record the duration of the episode and the reason for operating.
3. The permittee shall report to EPA via facsimile any deviation from Condition E.1 within 3 business days of identification.

**F. MLC COMPRESSOR ENGINES (FD-9 - 11)**

1. **BACT Limits.** Emissions from each MLC compressor engine (Units FD-9 – 11) shall not exceed the emission limits specified for each of the pollutants below:
  - 1.1 **NO<sub>x</sub> and non-methane hydrocarbons (NMHC), in aggregate:** 4.0 g/kW-hr
    - 1.1.1 For compliance with Condition F.1.1, measurement of NO<sub>x</sub> shall be determined using EPA Method 7E.
    - 1.1.2 For compliance with Condition F.1.1, measurement of NMHC shall be determined using EPA Method 25A.
  - 1.2 **PM:** 0.20 g/kW-hr
    - 1.2.1 For compliance with Condition F.1.2, measurement of PM shall be determined using EPA Method 5.
  - 1.3 **PM<sub>10</sub>:** 0.20 g/kW-hr
    - 1.3.1 For compliance with Condition F.1.3, measurement of PM<sub>10</sub> shall be determined using EPA Method 201/201A and OTM 28, provided, however, that once proposed changes to Method 202 in 56 Fed. Reg. 12970 (March 25, 2009) become final and effective, EPA Method 202 shall be used in lieu of OTM 28.

- 1.4 **PM<sub>2.5</sub>:** 0.20 g/kW-hr
- 1.4.1 For compliance with Condition F.1.4, measurement of PM<sub>2.5</sub> shall be determined using EPA Method 201/201A and OTM 28, provided, however, that once proposed changes to Method 202 in 56 Fed. Reg. 12970 (March 25, 2009) become final and effective, EPA Method 202 shall be used in lieu of OTM 28.
- 1.5 **Visible Emissions:** Visible emissions, excluding condensed water vapor, shall not reduce visibility through the exhaust effluent more than 20 percent averaged over any six consecutive minutes.
- 1.5.1 For compliance with Condition F.1.5, measurement of visible emissions shall be determined using EPA Method 9.
- 1.6 **CO:** 3.5 g/kW-hr.
- 1.6.1 For compliance with Condition F.1.6, measurement of CO shall be determined using EPA Method 10.
2. **PTE Annual Emission Limits.** Emissions from all three MLC compressor engines (Units FD-9 – 11) in aggregate shall not exceed the emission limits specified for each of the pollutants below:
- 2.1 **NO<sub>x</sub>:** 5.37 tons/rolling 12-month period
- 2.1.1 For compliance with Condition F.2.1, measurement of NO<sub>x</sub> shall be determined using EPA Method 7E.
3. **PTE Daily Emission Limits.** Emissions from each MLC compressor engine (Units FD-9 – 11) shall not exceed the emission limits specified for each of the pollutants below:
- 3.1 **PM<sub>10</sub>:** 4.2 lbs/day
- 3.1.1 For compliance with Condition F.3.1, measurement of PM<sub>10</sub> shall be determined using EPA Method 201/201A and OTM 28, provided, however, that once proposed changes to Method 202 in 56 Fed. Reg. 12970 (March 25, 2009) become final and effective, EPA Method 202 shall be used in lieu of OTM 28.
- 3.2 **PM<sub>2.5</sub>:** 4.32 lbs/day
- 3.2.1 For compliance with Condition F.3.2, measurement of PM<sub>2.5</sub> shall be determined using EPA Method 201/201A and OTM 28, provided, however, that once proposed changes to Method 202 in 56 Fed. Reg. 12970 (March 25, 2009) become final and effective, EPA Method 202 shall be used in lieu of OTM 28.
4. **Fuel Usage Limit.** The permittee shall not use in excess of 81,346 gallons of fuel in all three of Units FD-9 – 11 in aggregate during any rolling 12-month period.
5. **Stack Test Requirements.** Prior to each of the first three drilling seasons that the Discoverer operates under this permit in the Chukchi Sea, the permittee shall stack test at least one of Units FD-9 – 11 as follows:

- 5.1 At the end of three drilling seasons that the Discoverer operates under this permit in the Chukchi Sea, all three of Units FD-9 – 11 shall have been stack tested under the requirements of this section.
- 5.2 Each stack test shall be conducted at three different loads: 50%, 75% and 100%.
- 5.3 Each stack test run shall test for emissions of CO, NO<sub>x</sub>, NMHC, PM<sub>2.5</sub>, PM<sub>10</sub> and visible emissions.
- 5.4 During each test run, the permittee shall monitor and record the following information:
  - 5.4.1 Quantity of fuel used (in gallons);
  - 5.4.2 Density of the fuel used (in lbs/gallon);
  - 5.4.3 Heat content of the fuel used (in Btu/gallon); and
  - 5.4.4 Mechanical power output (in kW).
- 5.5 For each engine, and each pollutant, the permittee shall determine emission factors in the following units: g/kW-hr, lbs/kW-hr and lbs/gallon.

**6. Monitoring, Recordkeeping and Reporting:** The permittee shall:

- 6.1 Equip each of Units FD-9 -11 with a diesel fuel flow meter:
  - 6.1.1 Each fuel flow meter shall be located as close as practical to the fuel intake of the engine;
  - 6.1.2 Each fuel flow meter shall be totalizing and nonresettable; and
  - 6.1.3 Each fuel flow meter shall measure the fuel flow rate with accuracy equal to or better than 2 percent of the meter's upper range value.
- 6.2 No less than 60 days before initial deployment of the Discoverer to the Chukchi Sea for the first drilling season, collect information from the manufacturer of each fuel flow meter so as to determine its accuracy. Submit this information to EPA no less than 30 days prior to operation within the Chukchi Sea.
- 6.3 Maintain the accuracy of each fuel flow meter in accordance with manufacturer's recommendations.
- 6.4 Monitor and record fuel usage for each engine on a daily basis.
- 6.5 Each day, calculate and record for the previous calendar day, the emissions of NO<sub>x</sub>, PM<sub>2.5</sub> and PM<sub>10</sub> using the highest emission factor collected under Condition F.5.5 and fuel usage data collected under Condition F.6.4.

**G. HPU ENGINES (FD-12 - 13)**

1. **Operation of Catalyzed Diesel Particulate Filter (CDPF).** At all times that any of Units FD-12 – 13 are in operation, the exhaust from each Unit shall be directed to an operating CleanAIR Systems CDPF, Part No. FDA300.

- 1.1 Each CDPF shall be equipped with an operating HiBACK monitor and alarm unit, that records exhaust pressure and temperature.
- 1.2 During each day that each of Units FD-12 -13 is operated, the exhaust temperature shall be above 300°C, or 572 °F for at least 30% of the time.
2. **BACT Limits.** Emissions from each HPU engine (Units FD-12 – 13) shall not exceed the emission limits specified for each of the pollutants below:
  - 2.1 **NO<sub>x</sub>:** 13.155 g/kW-hr
    - 2.1.1 For compliance with Condition G.2.1, measurement of NO<sub>x</sub> shall be determined using EPA Method 7E.
  - 2.2 **PM:** 0.253 g/kW-hr
    - 2.2.1 For compliance with Condition G.2.2, measurement of PM shall be determined using EPA Method 5.
  - 2.3 **PM<sub>10</sub>:** 0.253 g/kW-hr
    - 2.3.1 For compliance with Condition G.2.3, measurement of PM<sub>10</sub> shall be determined using EPA Method 201/201A and OTM 28, provided, however, that once proposed changes to Method 202 in 56 Fed. Reg. 12970 (March 25, 2009) become final and effective, EPA Method 202 shall be used in lieu of OTM 28.
  - 2.4 **PM<sub>2.5</sub>:** 0.253 g/kW-hr
    - 2.4.1 For compliance with Condition G.2.4, measurement of PM<sub>2.5</sub> shall be determined using EPA Method 201/201A and OTM 28, provided, however, that once proposed changes to Method 202 in 56 Fed. Reg. 12970 (March 25, 2009) become final and effective, EPA Method 202 shall be used in lieu of OTM 28.
  - 2.5 **Visible Emissions:** Visible emissions, excluding condensed water vapor, shall not reduce visibility through the exhaust effluent more than 20 percent averaged over any six consecutive minutes.
    - 2.5.1 For compliance with Condition G.2.5, measurement of visible emissions shall be determined using EPA Method 9.
  - 2.6 **CO:** 0.40 g/kW-hr.
    - 2.6.1 For compliance with Condition G.2.6, measurement of CO shall be determined using EPA Method 10.
  - 2.7 **VOC:** 0.20 g/kW-hr.
    - 2.7.1 For compliance with Condition G.2.6, measurement of VOC shall be determined using EPA Method 25A.
3. **BACT Good Combustion Practices for NO<sub>x</sub>.** The permittee shall:
  - 3.1 Ensure that a full-time equipment maintenance specialist shall be on board at all times during operation as an OCS Source;

- 3.2 Train operating personnel to identify signs of improper operation and maintenance, including visible plumes, and to report these events to the maintenance specialist as soon as possible, but no later than within three hours of identification;
  - 3.3 Have the maintenance specialist inspect, once each week, each of Units FD-12 – 13 for proper operation and maintenance consistent with the manufacturer’s recommendations;
  - 3.4 Ensure that the operation and maintenance manual provided by the manufacturer for each of Units FD-12 – 13 shall be kept on board the Discoverer at all times;
  - 3.5 Follow the manufacturer’s recommended operation and maintenance procedures for each of Units FD-12 – 13;
  - 3.6 Maintain, on board the Discoverer, a log detailing when inspections pursuant to Condition G.3.3 and maintenance pursuant to Condition G.3.5 were conducted; and
  - 3.7 No less than 30 days prior to each deployment of the Discoverer to the Chukchi Sea, the permittee shall provide notice to the EPA on how the permittee shall comply with the requirements of Conditions G.3.1 and G.3.2 for the upcoming drilling season.
- 4. PTE Annual Emission Limits.** Emissions from both HPU engines (Units FD-12 – 13) in aggregate shall not exceed the emission limits specified for each of the pollutants below:
- 4.1 **NO<sub>x</sub>:** 8.18 tons/rolling 12-month period
    - 4.1.1 For compliance with Condition G.4.1, measurement of NO<sub>x</sub> shall be determined using EPA Method 7E.
- 5. PTE Daily Emission Limits.** Emissions from each HPU engine (Units FD-12 – 13) shall not exceed the emission limits specified for each of the pollutants below:
- 5.1 **PM<sub>10</sub>:** 2.40 lbs/day
    - 5.1.1 For compliance with Condition G.5.1, measurement of PM<sub>10</sub> shall be determined using EPA Method 201/201A and OTM 28, provided, however, that once proposed changes to Method 202 in 56 Fed. Reg. 12970 (March 25, 2009) become final and effective, EPA Method 202 shall be used in lieu of OTM 28.
  - 5.2 **PM<sub>2.5</sub>:** 2.40 lbs/day
    - 5.2.1 For compliance with Condition G.5.2, measurement of PM<sub>2.5</sub> shall be determined using EPA Method 201/201A and OTM 28, provided, however, that once proposed changes to Method 202 in 56 Fed. Reg. 12970 (March 25, 2009) become final and effective, EPA Method 202 shall be used in lieu of OTM 28.
- 6. Fuel Usage Limit.** The permittee shall not use in excess of 44,338 gallons of fuel in both of Units FD-12 – 13 in aggregate during any rolling 12-month period.
- 7. Stack Test Requirements.** Prior to each of the first two drilling seasons that the Discoverer operates under this permit in the Chukchi Sea, the permittee shall stack test at least one of Units FD-12 – 13 as follows:

- 7.1 At the end of two drilling seasons that the Discoverer operates under this permit in the Chukchi Sea, both of Units FD-12 – 13 shall have been stack tested under the requirements of this section.
- 7.2 Each stack test shall be conducted at three different loads: 50%, 75% and 100%.
- 7.3 Each stack test run shall test for emissions of CO, NO<sub>x</sub>, PM<sub>2.5</sub>, PM<sub>10</sub>, VOC and visible emissions.
- 7.4 During each test run, the permittee shall monitor and record the following information:
  - 7.4.1 Quantity of fuel used (in gallons);
  - 7.4.2 Density of the fuel used (in lbs/gallon);
  - 7.4.3 Heat content of the fuel used (in Btu/gallon); and
  - 7.4.4 Mechanical power output (in kW).
- 7.5 For each engine, and each pollutant, the permittee shall determine emission factors in the following units: g/kW-hr, lbs/kW-hr and lbs/gallon.

**8. Monitoring, Recordkeeping and Reporting:** The permittee shall:

- 8.1 Equip each of Units FD-12 -13 with a diesel fuel flow meter:
  - 8.1.1 Each fuel flow meter shall be located as close as practical to the fuel intake of the engine;
  - 8.1.2 Each fuel flow meter shall be totalizing and nonresettable; and
  - 8.1.3 Each fuel flow meter shall measure the fuel flow rate with accuracy equal to or better than 2 percent of the meter's upper range value.
- 8.2 No less than 60 days before initial deployment of the Discoverer to the Chukchi Sea for the first drilling season, collect information from the manufacturer of each fuel flow meter so as to determine its accuracy. Submit this information to EPA no less than 30 days prior to operation within the Chukchi Sea.
- 8.3 Maintain the accuracy of each fuel flow meter in accordance with manufacturer's recommendations.
- 8.4 Monitor and record fuel usage for each engine on a daily basis.
- 8.5 Monitor the exhaust temperature of each engine by use of the HiBACK monitor and alarm unit, whenever the engine is in operation.
- 8.6 Each day, calculate and record for the previous calendar day, the percent of operational time for each engine that the exhaust temperature was above 300°C (572°F).
- 8.7 Each day, calculate and record for the previous calendar day, the emissions of NO<sub>x</sub>, PM<sub>2.5</sub> and PM<sub>10</sub> using the highest emission factor collected under Condition G.7.5 and fuel usage data collected under Condition G.8.4.

## H. DECK CRANES (FD-14 - 15)

1. **Operation of Catalyzed Diesel Particulate Filter (CDPF).** At all times that any of Units FD-14 – 15 in operation, the exhaust from each Unit shall be directed to an operating CleanAIR Systems CDPF, Part No. 07040401AF.

1.1 Each CDPF shall be equipped with an operating HiBACK monitor and alarm unit, that records exhaust pressure and temperature.

1.2 During each day that each of Units FD-14 -15 is operated, the exhaust temperature shall be above 300°C, or 572°F, for at least 30% of the time.

2. **BACT Limits.** Emissions from each deck crane engine (Units FD-14 – 15) shall not exceed the emission limits specified for each of the pollutants below:

2.1 **NO<sub>x</sub>:** 10.327 g/kW-hr

2.1.1 For compliance with Condition H.2.1, measurement of NO<sub>x</sub> shall be determined using EPA Method 7E.

2.2 **PM:** 0.0715 g/kW-hr

2.2.1 For compliance with Condition H.2.2, measurement of PM shall be determined using EPA Method 5.

2.3 **PM<sub>10</sub>:** 0.0715 g/kW-hr.

2.3.1 For compliance with Condition H.2.3, measurement of PM<sub>10</sub> shall be determined using EPA Method 201/201A and OTM 28, provided, however, that once proposed changes to Method 202 in 56 Fed. Reg. 12970 (March 25, 2009) become final and effective, EPA Method 202 shall be used in lieu of OTM 28.

2.4 **PM<sub>2.5</sub>:** 0.0715 g/kW-hr.

2.4.1 For compliance with Condition H.2.4, measurement of PM<sub>2.5</sub> shall be determined using EPA Method 201/201A and OTM 28, provided, however, that once proposed changes to Method 202 in 56 Fed. Reg. 12970 (March 25, 2009) become final and effective, EPA Method 202 shall be used in lieu of OTM 28.

2.5 **Visible Emissions:** Visible emissions, excluding condensed water vapor, shall not reduce visibility through the exhaust effluent more than 20 percent averaged over any six consecutive minutes.

2.5.1 For compliance with Condition H.2.5, measurement of visible emissions shall be determined using EPA Method 9.

2.6 **CO:** 0.220 g/kW-hr.

2.6.1 For compliance with Condition H.2.6, measurement of CO shall be determined using EPA Method 10.

2.7 **VOC:** 0.0640 g/kW-hr.

2.7.1 For compliance with Condition H.2.7, measurement of VOC shall be

determined using EPA Method 25A.

**3. BACT Good Combustion Practices for NO<sub>x</sub>.** The permittee shall:

- 3.1 Ensure that a full-time equipment maintenance specialist shall be on board at all times during operation as an OCS Source;
- 3.2 Train operating personnel to identify signs of improper operation and maintenance, including visible plumes, and to report these events to the maintenance specialist as soon as possible, but no later than within three hours of identification;
- 3.3 Have the maintenance specialist inspect, once each week, each of Units FD-14 – 15 for proper operation and maintenance consistent with the manufacturer’s recommendations;
- 3.4 Ensure that the operation and maintenance manual provided by the manufacturer for each of Units FD-14 – 15 shall be kept on board the Discoverer at all times;
- 3.5 Follow the manufacturer’s recommended operation and maintenance procedures for each of Units FD-14 – 15;
- 3.6 Maintain, on board the Discoverer, a log detailing when inspections pursuant to Condition H.3.3 and maintenance pursuant to Condition H.3.5 were conducted; and
- 3.7 No less than 30 days prior to initial deployment of the Discoverer to the Chukchi Sea, the permittee shall provide notice to the EPA on how the permittee shall comply with the requirements of Conditions H.3.1 and H.3.2 for the upcoming drilling season.

**4. PTE Annual Emission Limits.** Emissions from both deck crane engines (Units FD-14 – 15) in aggregate shall not exceed the emission limits specified for each of the pollutants below:

- 4.1 **NO<sub>x</sub>:** 9.50 tons/rolling 12-month period
  - 4.1.1 For compliance with Condition H.4.1, measurement of NO<sub>x</sub> shall be determined using EPA Method 7E.

**5. PTE Daily Emission Limits.** Emissions from each deck crane engine (Units FD-14 – 15) shall not exceed the emission limits specified for each of the pollutants below:

- 5.1 **PM<sub>10</sub>:** 0.96 lbs/day
  - 5.1.1 For compliance with Condition H.5.1, measurement of PM<sub>10</sub> shall be determined using EPA Method 201/201A and OTM 28, provided, however, that once proposed changes to Method 202 in 56 Fed. Reg. 12970 (March 25, 2009) become final and effective, EPA Method 202 shall be used in lieu of OTM 28.
- 5.2 **PM<sub>2.5</sub>:** 0.96 lbs/day
  - 5.2.1 For compliance with Condition H.5.2, measurement of PM<sub>2.5</sub> shall be determined using EPA Method 201/201A and OTM 28, provided, however, that once proposed changes to Method 202 in 56 Fed. Reg. 12970 (March 25, 2009) become final and effective, EPA Method 202 shall be used in lieu of OTM 28.

6. **Fuel Usage Limit.** The permittee shall not use in excess of 63,661 gallons of fuel in both of Units FD-14 – 15 in aggregate during any rolling 12-month period.
7. **Stack Test Requirements.** Prior to each of the first two drilling seasons that the Discoverer operates under this permit in the Chukchi Sea, the permittee shall stack test at least one of Units FD-14 – 15 as follows:
  - 7.1 At the end of two drilling seasons that the Discoverer operates under this permit in the Chukchi Sea, both of Units FD-14 – 15 shall have been stack tested under the requirements of this section.
  - 7.2 Each stack test shall be conducted at three different loads: 50%, 75% and 100%.
  - 7.3 Each stack test run shall test for emissions of CO, NO<sub>x</sub>, PM<sub>2.5</sub>, PM<sub>10</sub>, VOC and visible emissions.
  - 7.4 During each test run, the permittee shall monitor and record the following information:
    - 7.4.1 Quantity of fuel used (in gallons);
    - 7.4.2 Density of the fuel used (in lbs/gallon);
    - 7.4.3 Heat content of the fuel used (in Btu/gallon); and
    - 7.4.4 Mechanical power output (in kW).
  - 7.5 For each engine, and each pollutant, the permittee shall determine emission factors in the following units: g/kW-hr, lbs/kW-hr and lbs/gallon.
8. **Monitoring, Recordkeeping and Reporting:** The permittee shall:
  - 8.1 Equip each of Units FD-14 -15 with a diesel fuel flow meter:
    - 8.1.1 Each fuel flow meter shall be located as close as practical to the fuel intake of the engine;
    - 8.1.2 Each fuel flow meter shall be totalizing and nonresettable; and
    - 8.1.3 Each fuel flow meter shall measure the fuel flow rate with accuracy equal to or better than 2 percent of the meter's upper range value.
  - 8.2 No less than 60 days before initial deployment of the Discoverer to the Chukchi Sea for the first drilling season, collect information from the manufacturer of each fuel flow meter so as to determine its accuracy. Submit this information to EPA no less than 30 days prior to operation within the Chukchi Sea.
  - 8.3 Maintain the accuracy of each fuel flow meter in accordance with manufacturer's recommendations.
  - 8.4 Monitor and record fuel usage for each engine on a daily basis.
  - 8.5 Monitor and record the exhaust temperature of each engine by use of the HiBACK monitor and alarm unit, while the engine is in operation.

- 8.6 Each day, calculate and record for the previous calendar day, the percent of operational time for each engine that the exhaust temperature was above 300°C (572°F).
- 8.7 Each day, calculate and record for the previous calendar day, the emissions of NO<sub>x</sub>, PM<sub>2.5</sub> and PM<sub>10</sub> using the highest emission factor collected under Condition H.7.5 and fuel usage data collected under Condition H.8.4.

## I. CEMENTING UNIT AND LOGGING WINCH ENGINES (FD-16 - 20)

1. **Operation of Catalyzed Diesel Particulate Filter (CDPF).** At all times that any of the cementing units (Units FD-16 – 18) or logging winches (Units FD-19-20) are in operation, the exhaust from each Unit shall be directed to operating CleanAIR Systems CDPF, Part No. FDA300 for Units FD-16 and 17, Part No. FDA225 for Units FD-18 and 19, and as specified by CleanAIR Systems for Unit FD-20.

- 1.1 Each CDPF shall be equipped with an operating HiBACK monitor and alarm unit, that records exhaust pressure and temperature.
- 1.2 During each day that each of Units FD-16 -20 is operated, the exhaust temperature shall be above 300°C, or 572°F, for at least 30% of the time.

2. **BACT Limits.** Emissions from each of Units FD-16 – 20 shall not exceed the emission limits specified for each of the pollutants below:

2.1 **NO<sub>x</sub>:**

FD-16	13.155 g/kW-hr
FD-17	13.155 g/kW-hr
FD-18	15.717 g/kW-hr
FD-19	15.717 g/kW-hr
FD-20	7.50 g/kW-hr

2.1.1 For compliance with Condition I.2.1, measurement of NO<sub>x</sub> shall be determined using EPA Method 7E.

2.2 **PM:**

FD-16	0.253 g/kW-hr
FD-17	0.253 g/kW-hr
FD-18	0.386 g/kW-hr
FD-19	0.386 g/kW-hr
FD-20	0.090 g/kW-hr

2.2.1 For compliance with Condition I.2.2, measurement of PM shall be determined using EPA Method 5.

2.3 **PM<sub>10</sub>:**

FD-16	0.253 g/kW-hr
FD-17	0.253 g/kW-hr
FD-18	0.386 g/kW-hr
FD-19	0.386 g/kW-hr

FD-20 0.090 g/kW-hr

2.3.1 For compliance with Condition I.2.3, measurement of PM<sub>10</sub> shall be determined using EPA Method 201/201A and OTM 28, provided, however, that once proposed changes to Method 202 in 56 Fed. Reg. 12970 (March 25, 2009) become final and effective, EPA Method 202 shall be used in lieu of OTM 28.

2.4 **PM<sub>2.5</sub>:**

FD-16 0.253 g/kW-hr  
FD-17 0.253 g/kW-hr  
FD-18 0.386 g/kW-hr  
FD-19 0.386 g/kW-hr  
FD-20 0.090 g/kW-hr

2.4.1 For compliance with Condition I.2.4, measurement of PM<sub>2.5</sub> shall be determined using EPA Method 201/201A and OTM 28, provided, however, that once proposed changes to Method 202 in 56 Fed. Reg. 12970 (March 25, 2009) become final and effective, EPA Method 202 shall be used in lieu of OTM 28.

2.5 **Visible Emissions:**

Visible emissions, excluding condensed water vapor, shall not reduce visibility through the exhaust effluent more than 20 percent averaged over any six consecutive minutes.

2.5.1 For compliance with Condition I.2.5, measurement of visible emissions shall be determined using EPA Method 9.

2.6 **CO:**

FD-16 0.40 g/kW-hr  
FD-17 0.40 g/kW-hr  
FD-18 0.880 g/kW-hr  
FD-19 0.880 g/kW-hr  
FD-20 0.550 g/kW-hr

2.6.1 For compliance with Condition I.2.6, measurement of CO shall be determined using EPA Method 10.

2.7 **VOC:**

FD-16 0.20 g/kW-hr  
FD-17 0.20 g/kW-hr  
FD-18 0.270 g/kW-hr  
FD-19 0.270 g/kW-hr  
FD-20 0.750 g/kW-hr

2.7.1 For compliance with Condition I.2.7, measurement of VOC shall be determined using EPA Method 25A.

**3. BACT Good Combustion Practices for NO<sub>x</sub>.** The permittee shall:

3.1 Ensure that a full-time equipment maintenance specialist shall be on board at all

- times during operation as an OCS Source;
- 3.2 Train operating personnel to identify signs of improper operation and maintenance, including visible plumes, and to report these events to the maintenance specialist as soon as possible, but no later than within three hours of identification;
  - 3.3 Have the maintenance specialist inspect, once each week, each of Units FD-16 – 20 for proper operation and maintenance consistent with the manufacturer’s recommendations;
  - 3.4 Ensure that the operation and maintenance manual provided by the manufacturer for each of Units FD-16 – 20 shall be kept on board the Discoverer at all times;
  - 3.5 Follow the manufacturer’s recommended operation and maintenance procedures for each of Units FD-16 – 20;
  - 3.6 Maintain, on board the Discoverer, a log detailing when inspections pursuant to Condition I.3.3 and maintenance pursuant to Condition I.3.5 were conducted; and
  - 3.7 No less than 30 days prior to initial deployment of the Discoverer to the Chukchi Sea, the permittee shall provide notice to the EPA on how the permittee shall comply with the requirements of Conditions I.3.1 and I.3.2 for the upcoming drilling season.
- 4. PTE Annual Emission Limits.** Emissions from all cementing unit and logging winch engines (Units FD-16 – 20) in aggregate shall not exceed the emission limits specified for each of the pollutants below:
- 4.1 **NO<sub>x</sub>:** 12.77 tons/rolling 12-month period
    - 4.1.1 For compliance with Condition I.4.1, measurement of NO<sub>x</sub> shall be determined using EPA Method 7E.
- 5. PTE Daily Emission Limits.** Emissions from each deck crane engine (Units FD-14 – 15) shall not exceed the emission limits specified for each of the pollutants below:
- 5.1 **PM<sub>10</sub>:** 3.73 lbs/day
    - 5.1.1 For compliance with Condition I.5.1, measurement of PM<sub>10</sub> shall be determined using EPA Method 201/201A and OTM 28, provided, however, that once proposed changes to Method 202 in 56 Fed. Reg. 12970 (March 25, 2009) become final and effective, EPA Method 202 shall be used in lieu of OTM 28.
  - 5.2 **PM<sub>2.5</sub>:** 3.73 lbs/day
    - 5.2.1 For compliance with Condition I.5.2, measurement of PM<sub>2.5</sub> shall be determined using EPA Method 201/201A and OTM 28, provided, however, that once proposed changes to Method 202 in 56 Fed. Reg. 12970 (March 25, 2009) become final and effective, EPA Method 202 shall be used in lieu of OTM 28.
- 6. Fuel Usage Limit.** The permittee shall not use in excess of:
- 6.1 57,960 gallons of fuel in all Units FD-16 – 20 in aggregate during any rolling 12-

month period; and

6.2 345 gallons of fuel in all Units FD-16 – 20 in aggregate during any calendar day.

**7. Stack Test Requirements.** Prior to each of the first three drilling seasons that the Discoverer operates under this permit in the Chukchi Sea, the permittee shall stack test at least one of Units FD-16 – 20 as follows:

7.1 At the end of the first three drilling seasons that the Discoverer operates under this permit in the Chukchi Sea, all of Units FD-16 – 20 shall have been stack tested under the requirements of this section.

7.2 Each stack test shall be conducted at three different loads: 50%, 75% and 100%.

7.3 Each stack test run shall test for emissions of CO, NO<sub>x</sub>, PM<sub>2.5</sub>, PM<sub>10</sub>, VOC and visible emissions.

7.4 During each test run, the permittee shall monitor and record the following information:

7.4.1 Quantity of fuel used (in gallons);

7.4.2 Density of the fuel used (in lbs/gallon);

7.4.3 Heat content of the fuel used (in Btu/gallon); and

7.4.4 Mechanical power output (in kW).

7.5 For each engine, and each pollutant, the permittee shall determine emission factors in the following units: g/kW-hr, lbs/kW-hr and lbs/gallon.

**8. Monitoring, Recordkeeping and Reporting:** The permittee shall:

8.1 Equip each of Units FD-16 - 20 with a diesel fuel flow meter:

8.1.1 Each fuel flow meter shall be located as close as practical to the fuel intake of the engine;

8.1.2 Each fuel flow meter shall be totalizing and nonresettable; and

8.1.3 Each fuel flow meter shall measure the fuel flow rate with accuracy equal to or better than 2 percent of the meter's upper range value.

8.2 No less than 60 days before initial deployment of the Discoverer to the Chukchi Sea for the first drilling season, collect information from the manufacturer of each fuel flow meter so as to determine its accuracy. Submit this information to EPA no less than 30 days prior to operation within the Chukchi Sea.

8.3 Maintain the accuracy of each fuel flow meter in accordance with manufacturer's recommendations.

8.4 Monitor and record fuel usage for each engine on a daily basis.

8.5 Monitor and record the exhaust temperature of each engine by use of the HiBACK monitor and alarm unit, while the engine is in operation.

- 8.6 Each day, calculate and record for the previous calendar day, the percent of operational time for each engine that the exhaust temperature was above 300°C (572°F).
- 8.7 Each day, calculate and record for the previous calendar day, the emissions of NO<sub>x</sub>, PM<sub>2.5</sub> and PM<sub>10</sub> using the highest emission factor collected under Condition I.7.5 and fuel usage data collected under Condition I.8.4.

**J. HEAT BOILERS (FD-21 - 22)**

**1. BACT Limits.** Emissions from each of the heat boilers (Units FD-21 – 22) shall not exceed the emission limits specified for each of the pollutants below:

- 1.1 **NO<sub>x</sub>:** 0.20 lbs/MMBtu
  - 1.1.1 For compliance with Condition J.1.1, measurement of NO<sub>x</sub> shall be determined using EPA Method 7E.
- 1.2 **PM:** 0.0235 lbs/MMBtu
  - 1.2.1 For compliance with Condition J.1.2, measurement of PM shall be determined using EPA Method 5.
- 1.3 **PM<sub>10</sub>:** 0.0235 lbs/MMBtu
  - 1.3.1 For compliance with Condition J.1.3, measurement of PM<sub>10</sub> shall be determined using EPA Method 201/201A and OTM 28, provided, however, that once proposed changes to Method 202 in 56 Fed. Reg. 12970 (March 25, 2009) become final and effective, EPA Method 202 shall be used in lieu of OTM 28.
- 1.4 **PM<sub>2.5</sub>:** 0.0235 lbs/MMBtu
  - 1.4.1 For compliance with Condition J.1.4, measurement of PM<sub>2.5</sub> shall be determined using EPA Method 201/201A and OTM 28, provided, however, that once proposed changes to Method 202 in 56 Fed. Reg. 12970 (March 25, 2009) become final and effective, EPA Method 202 shall be used in lieu of OTM 28.
- 1.5 **Visible Emissions:** Visible emissions, excluding condensed water vapor, shall not reduce visibility through the exhaust effluent more than 20 percent averaged over any six consecutive minutes.
  - 1.5.1 For compliance with Condition J.1.5, measurement of visible emissions shall be determined using EPA Method 9.
- 1.6 **CO:** 0.0770 lbs/MMBtu
  - 1.6.1 For compliance with Condition J.1.6, measurement of CO shall be determined using EPA Method 10.
- 1.7 **VOC:** 0.00140 lbs/MMBtu
  - 1.7.1 For compliance with Condition J.1.7, measurement of VOC shall be determined using EPA Method 25A.

**2. BACT Good Combustion Practices for NO<sub>x</sub>, PM, PM<sub>2.5</sub>, PM<sub>10</sub>, CO and VOC.** The permittee shall:

- 2.1 Ensure that a full-time equipment maintenance specialist shall be on board at all times during operation as an OCS Source;
- 2.2 Train operating personnel to identify signs of improper operation and maintenance, including visible plumes, and to report these events to the maintenance specialist as soon as possible, but no later than within three hours of identification;
- 2.3 Have the maintenance specialist inspect, once each week, each of Units FD-21 – 22 for proper operation and maintenance consistent with the manufacturer’s recommendations;
- 2.4 Ensure that the operation and maintenance manual provided by the manufacturer for each of Units FD-21 – 22 shall be kept on board the Discoverer at all times;
- 2.5 Follow the manufacturer’s recommended operation and maintenance procedures for each of Units FD-21 – 22;
- 2.6 Maintain, on board the Discoverer, a log detailing when inspections pursuant to Condition J.2.3 and maintenance pursuant to Condition J.2.5 were conducted; and
- 2.7 No less than 30 days prior to initial deployment of the Discoverer to the Chukchi Sea, the permittee shall provide notice to the EPA on how the permittee shall comply with the requirements of Conditions J.2.1 and J.2.2 for the upcoming drilling season.

**3. PTE Annual Emission Limits.** Emissions from all heat boilers (Units FD-21 – 22) in aggregate shall not exceed the emission limits specified for each of the pollutants below:

- 3.1 **NO<sub>x</sub>:** 6.46 tons/rolling 12-month period
  - 3.1.1 For compliance with Condition J.3.1, measurement of NO<sub>x</sub> shall be determined using EPA Method 7E.

**4. PTE Daily Emission Limits.** Emissions from each heat boiler (Units FD-21 – 22) shall not exceed the emission limits specified for each of the pollutants below:

- 4.1 **PM<sub>10</sub>:** 4.50 lbs/day
  - 4.1.1 For compliance with Condition J.4.1, measurement of PM<sub>10</sub> shall be determined using EPA Method 201/201A and OTM 28, provided, however, that once proposed changes to Method 202 in 56 Fed. Reg. 12970 (March 25, 2009) become final and effective, EPA Method 202 shall be used in lieu of OTM 28.
- 4.2 **PM<sub>2.5</sub>:** 4.50 lbs/day
  - 4.2.1 For compliance with Condition J.4.2, measurement of PM<sub>2.5</sub> shall be determined using EPA Method 201/201A and OTM 28, provided, however, that once proposed changes to Method 202 in 56 Fed. Reg. 12970 (March 25, 2009) become final and effective, EPA Method 202 shall be used in lieu of OTM 28.

**5. Stack Test Requirements.** Prior to each of the first two drilling seasons that the

Discoverer operates under this permit in the Chukchi Sea, the permittee shall stack test at least one of Units FD-21 – 22 as follows:

- 5.1 At the end of the first two drilling seasons that the Discoverer operates under this permit in the Chukchi Sea, both of Units FD-21 – 22 shall have been stack tested under the requirements of this section.
- 5.2 Each stack test shall be conducted at three different loads: 50%, 75% and 100%.
- 5.3 Each stack test run shall test for emissions of CO, NO<sub>x</sub>, PM<sub>2.5</sub>, PM<sub>10</sub>, VOC and visible emissions.
- 5.4 During each test run, the permittee shall monitor and record the following information:
  - 5.4.1 Quantity of fuel used (in gallons);
  - 5.4.2 Density of the fuel used (in lbs/gallon); and
  - 5.4.3 Heat content of the fuel used (in Btu/gallon).
- 5.5 For each boiler, and each pollutant, the permittee shall determine emission factors in the following units: lbs/MMBtu and lbs/gallon.

**6. Monitoring, Recordkeeping and Reporting:** The permittee shall:

- 6.1 Equip each of Units FD-21 - 22 with a diesel fuel flow meter:
  - 6.1.1 Each fuel flow meter shall be located as close as practical to the fuel intake of the boiler;
  - 6.1.2 Each fuel flow meter shall be totalizing and nonresettable; and
  - 6.1.3 Each fuel flow meter shall measure the fuel flow rate with accuracy equal to or better than 2 percent of the meter's upper range value.
- 6.2 No less than 60 days before initial deployment of the Discoverer to the Chukchi Sea for the first drilling season, collect information from the manufacturer of each fuel flow meter so as to determine its accuracy. Submit this information to EPA no less than 30 days prior to operation within the Chukchi Sea.
- 6.3 Maintain the accuracy of each fuel flow meter in accordance with manufacturer's recommendations.
- 6.4 Monitor and record fuel usage for each boiler on a daily basis.
- 6.5 Each day, calculate and record for the previous calendar day, the emissions of NO<sub>x</sub>, PM<sub>2.5</sub> and PM<sub>10</sub> using the highest emission factor collected under Condition J.5.5 and fuel usage data collected under Condition J.6.4.

**K. INCINERATOR (FD-23)**

1. **BACT Limits.** Emissions from the incinerator (Unit FD-23) shall not exceed the emission limits specified for each of the pollutants below:

- 1.1 **NO<sub>x</sub>:** 5.0 lbs/ton of waste incinerated
  - 1.1.1 For compliance with Condition K.1.1, measurement of NO<sub>x</sub> shall be determined using EPA Method 7E.
- 1.2 **PM:** 8.20 lbs/ ton of waste incinerated
  - 1.2.1 For compliance with Condition K.1.2, measurement of PM shall be determined using EPA Method 5.
- 1.3 **PM<sub>10</sub>:** 8.20 lbs/ton of waste incinerated
  - 1.3.1 For compliance with Condition K.1.3, measurement of PM<sub>10</sub> shall be determined using EPA Method 201/201A and OTM 28, provided, however, that once proposed changes to Method 202 in 56 Fed. Reg. 12970 (March 25, 2009) become final and effective, EPA Method 202 shall be used in lieu of OTM 28.
- 1.4 **PM<sub>2.5</sub>:** 7.00 lbs/ton of waste incinerated
  - 1.4.1 For compliance with Condition K.1.4, measurement of PM<sub>2.5</sub> shall be determined using OTM 27 and OTM 28, provided, however, that once proposed changes to Method 201/201A in 56 Fed. Reg. 12970 (March 25, 2009) become final and effective, EPA Method 1/201A shall be used in lieu of OTM 27 and once proposed changes to Method 202 in 56 Fed. Reg. 12970 (March 25, 2009) become final and effective, EPA Method 202 shall be used in lieu of OTM 28.
- 1.5 **CO:** 31.0 lbs/ton of waste incinerated
  - 1.5.1 For compliance with Condition K.1.5, measurement of CO shall be determined using EPA Method 10.
- 1.6 **VOC:** 3.0 lbs/ton of waste incinerated
  - 1.6.1 For compliance with Condition K.1.6, measurement of VOC shall be determined using EPA Method 25A.
2. **BACT Good Combustion Practices for NO<sub>x</sub>, PM, PM<sub>2.5</sub>, PM<sub>10</sub>, CO and VOC.** The permittee shall:
  - 2.1 Ensure that a full-time equipment maintenance specialist shall be on board at all times during operation as an OCS Source;
  - 2.2 Train operating personnel to identify signs of improper operation and maintenance, including visible plumes, and to report these events to the maintenance specialist as soon as possible, but no later than within three hour of identification;
  - 2.3 Have the maintenance specialist inspect, once each week, Unit FD-23 for proper operation and maintenance consistent with the manufacturer’s recommendations;
  - 2.4 Ensure that the operation and maintenance manual provided by the manufacturer for Unit FD-23 shall be kept on board the Discoverer at all times;
  - 2.5 Follow the manufacturer’s recommended operation and maintenance procedures for Unit FD-23;

- 2.6 Maintain, on board the Discoverer, a log detailing when inspections pursuant to Condition K.2.3 and maintenance pursuant to Condition K.2.5 were conducted; and
- 2.7 No less than 30 days prior to initial deployment of the Discoverer to the Chukchi Sea, the permittee shall provide notice to the EPA on how the permittee shall comply with the requirements of Conditions K.2.1 and K.2.2 for the upcoming drilling season.
- 3. PTE Annual Emission Limits.** Emissions from the incinerator (Unit FD-23) shall not exceed the emission limits specified for each of the pollutants below:
- 3.1 **NO<sub>x</sub>:** 0.32 tons/rolling 12-month period
- 3.1.1 For compliance with Condition K.3.1, measurement of NO<sub>x</sub> shall be determined using EPA Method 7E.
- 4. PTE Daily Emission Limits.** Emissions from the incinerator (Unit FD-23) shall not exceed the emission limits specified for each of the pollutants below:
- 4.1 **PM<sub>10</sub>:** 6.25 lbs/day
- 4.1.1 For compliance with Condition K.4.1, measurement of PM<sub>10</sub> shall be determined using EPA Method 201/201A and OTM 28, provided, however, that once proposed changes to Method 202 in 56 Fed. Reg. 12970 (March 25, 2009) become final and effective, EPA Method 202 shall be used in lieu of OTM 28.
- 4.2 **PM<sub>2.5</sub>:** 5.34 lbs/day
- 4.2.1 For compliance with Condition K.4.2, measurement of PM<sub>2.5</sub> shall be determined using OTM 27 and OTM 28, provided, however, that once proposed changes to Method 201/201A in 56 Fed. Reg. 12970 (March 25, 2009) become final and effective, EPA Method 1/201A shall be used in lieu of OTM 27 and once proposed changes to Method 202 in 56 Fed. Reg. 12970 (March 25, 2009) become final and effective, EPA Method 202 shall be used in lieu of OTM 28.
- 5. PTE Throughput-Based Emission Limits.** Emissions from the incinerator (Unit FD-23) shall not exceed the emission limits specified for each of the pollutants below:
- 5.1 **PM<sub>10</sub>:** 8.20 lbs/ton of waste incinerated
- 5.1.1 For compliance with Condition K.5.1, measurement of PM<sub>10</sub> shall be determined using EPA Method 201/201A and OTM 28, provided, however, that once proposed changes to Method 202 in 56 Fed. Reg. 12970 (March 25, 2009) become final and effective, EPA Method 202 shall be used in lieu of OTM 28.
- 5.2 **PM<sub>2.5</sub>:** 7.00 lbs//ton of waste incinerated
- 5.2.1 For compliance with Condition K.5.2, measurement of PM<sub>2.5</sub> shall be determined using OTM 27 and OTM 28, provided, however, that once proposed changes to Method 201/201A in 56 Fed. Reg. 12970 (March 25, 2009) become final and effective, EPA Method 1/201A shall be used in lieu of OTM 27 and once proposed changes to Method 202 in 56 Fed. Reg.

12970 (March 25, 2009) become final and effective, EPA Method 202 shall be used in lieu of OTM 28.

5.3 **SO<sub>2</sub>:** 2.50 lbs//ton of waste incinerated

5.3.1 For compliance with Condition K.5.3, measurement of SO<sub>2</sub> shall be determined using EPA Method 6C.

**6. Waste Throughput Limit.** The permittee shall not incinerate in excess of:

6.1 256,200 lbs of all types of waste in Unit FD-23 during any rolling 12-month period; and

6.2 1525 lbs of all types of waste in Unit FD-23 during any calendar day.

**7. Stack Test Requirements.** Prior to each of the first three drilling seasons that the Discoverer operates under this permit in the Chukchi Sea, the permittee shall stack test the incinerator (Unit FD-23) as follows:

7.1 Each stack test shall be conducted at full rated capacity.

7.2 For the first drilling season, each stack test run shall test for emissions of CO, NO<sub>x</sub>, PM<sub>2.5</sub>, PM<sub>10</sub>, SO<sub>2</sub> and VOC.

7.3 For subsequent drilling seasons, each stack test run shall test for emissions of NO<sub>x</sub>, PM<sub>2.5</sub>, PM<sub>10</sub>, and SO<sub>2</sub>.

7.4 During each test run, the permittee shall monitor and record the following information:

7.4.1 Quantity of fuel used (in gallons);

7.4.2 Density of the fuel used (in lbs/gallon);

7.4.3 Heat content of the fuel used (in Btu/gallon);

7.4.4 Quantity of waste incinerated (tons); and

7.4.5 Type of waste incinerated.

7.5 For each pollutant, the permittee shall determine emission factors in the following units: lbs/ton of waste incinerated.

**8. Monitoring, Recordkeeping and Reporting:** The permittee shall:

8.1 For each batch of waste charged to the incinerator:

8.1.1 Record the date and time that each batch of waste was charged to the incinerator;

8.1.2 Weigh the batch of waste by using a weigh scale used that shall be accurate to within 0.05 lbs; and

8.1.3 Record the weight of each batch of waste charged to the incinerator.

- 8.2 No less than 60 days before initial deployment of the Discoverer to the Chukchi Sea for the first drilling season, collect information from the manufacturer of the weigh scale to determine its accuracy. Submit this information to EPA no less than 30 days prior to operation within the Chukchi Sea.
- 8.3 Maintain the accuracy of the weigh scale in accordance with manufacturer's recommendations.
- 8.4 Monitor and record the exhaust temperature of the incinerator at least every 15 minutes.
- 8.5 Each day, calculate and record for the previous calendar day, the emissions of NO<sub>x</sub>, PM<sub>2.5</sub> and PM<sub>10</sub> using the highest emission factor collected under Condition K.7.5 and waste material incinerated throughput collected under Condition K.8.1.

**L. SUPPLY SHIP GENERATOR ENGINE (FD-31)**

**1. Operational Limits.** For events where the supply ship is attached to the Discoverer, the permittee shall:

- 1.1 Limit operation of the supply ship generator to no more than 12 hours per day for each event;
- 1.2 Only operate a generator that is rated at or less than 292 hp; and
- 1.3 Limit the total number of events to 8 per rolling 12-month period.

**2. PTE Annual Emission Limits.** Emissions from operation of the supply ship generator engine (Unit FD-31) shall not exceed the emission limits specified for each of the pollutants below:

- 2.1 **NO<sub>x</sub>:** 0.43 tons/rolling 12-month period
  - 2.1.1 For compliance with Condition L.2.1, measurement of NO<sub>x</sub> shall be determined using EPA Method 7E.

**3. PTE Daily Emission Limits.** Emissions from operation of the supply ship generator engine (Unit FD-31) shall not exceed the emission limits specified for each of the pollutants below:

- 3.1 **PM<sub>10</sub>:** 7.60 lbs/day
  - 3.1.1 For compliance with Condition L.3.1, measurement of PM<sub>10</sub> shall be determined using EPA Method 201/201A and OTM 28, provided, however, that once proposed changes to Method 202 in 56 Fed. Reg. 12970 (March 25, 2009) become final and effective, EPA Method 202 shall be used in lieu of OTM 28.
- 3.2 **PM<sub>2.5</sub>:** 7.60 lbs/day
  - 3.2.1 For compliance with Condition L.3.2, measurement of PM<sub>2.5</sub> shall be determined using EPA Method 201/201A and OTM 28, provided, however, that once proposed changes to Method 202 in 56 Fed. Reg. 12970 (March

25, 2009) become final and effective, EPA Method 202 shall be used in lieu of OTM 28.

**4. Stack Test Requirements.** Prior to the first supply ship trip of each drilling season to resupply the Discoverer while the Discoverer is operating under this permit in the Chukchi Sea, the permittee shall stack test the supply ship generator engine (Unit FD-31) as follows:

- 4.1 If the generator from the intended supply ship has already been tested pursuant to Conditions L.4.2 through L.4.5 during the past 5 years, no additional stack testing is required;
- 4.2 Each stack test shall be conducted at 100% load.
- 4.3 Each stack test run shall test for emissions of NO<sub>x</sub>, PM<sub>2.5</sub> and PM<sub>10</sub>.
- 4.4 During each test run, the permittee shall monitor and record the following information:
  - 4.4.1 Manufacturer and model no. of the engine;
  - 4.4.2 The rated capacity of the engine (in hp);
  - 4.4.3 Quantity of fuel used (in gallons);
  - 4.4.4 Density of the fuel used (in lbs/gallon);
  - 4.4.5 Heat content of the fuel used (in Btu/gallon); and
  - 4.4.6 Electrical power output (in kWe).
- 4.5 For each engine, and each pollutant, the permittee shall determine emission factors in the following units: lbs/kWe-hr and lbs/gallon.

**5. Monitoring, Recordkeeping and Reporting:** The permittee shall:

- 5.1 For each event, record the date and time that the supply ship attaches to the Discoverer;
- 5.2 For each event, record the date and time that the supply ship detaches from the Discoverer;
- 5.3 For each event, record the manufacturer, model no. and rated capacity (in hp) of the supply ship generator engine; and
- 5.4 For each event, calculate daily emissions of NO<sub>x</sub>, PM<sub>2.5</sub> and PM<sub>10</sub> using the data collected under Conditions L.4.5, L.5.1 and L.5.2. In calculating emissions, the permittee shall assume that the Unit 31 was operated at full load during the time the supply ship was attached to the Discoverer.

## **M. SHALLOW GAS DIVERTER SYSTEM (FD-33)**

**1. Shallow Gas Diversions.** The permittee shall:

- 1.1 Record the frequency and duration of each shallow gas diversion.
- 1.2 Report the frequency and duration of each shallow gas diversion no later than February 1<sup>st</sup> for the time period beginning January 1<sup>st</sup> and ending December 31<sup>st</sup> of the preceding year.

## **N. ICEBREAKER #1**

1. **Aggregate Capacity Limits.** For a given drilling season, the permittee may select any vessel as Icebreaker #1, subject to the following conditions:
  - 1.1 The total capacity of all propulsion engines and generator engines on Icebreaker #1 shall not exceed 31,200 hp.
  - 1.2 The total capacity of all generator engines on Icebreaker #1 shall not exceed 2,800 hp.
  - 1.3 The total capacity of all boilers on Icebreaker #1 shall not exceed 10 MMBtu/hr.
  - 1.4 The total capacity of all incinerators on Icebreaker #1 shall not exceed 154 lbs/hr.
  - 1.5 Total uncontrolled emissions of PM<sub>2.5</sub> from all emission sources on board Icebreaker #1 shall not exceed 42.20 lbs/hour.
    - 1.5.1 For compliance with Condition N.1.5, measurement of PM<sub>2.5</sub> shall be determined using EPA Method 201/201A and OTM 28, provided, however, that once proposed changes to Method 202 in 56 Fed. Reg. 12970 (March 25, 2009) become final and effective, EPA Method 202 shall be used in lieu of OTM 28.
    - 1.5.2 For the purposes of Condition N.1.5, emissions from each emission unit shall be based on operation of that emission unit at 100% of rated capacity, except for the propulsion engines, for which emissions shall be based on operation of that emission unit at 80% of rated capacity.
  - 1.6 Total uncontrolled emissions of PM<sub>10</sub> from all emission sources on board Icebreaker #1 shall not exceed 48.0 lbs/hour.
    - 1.6.1 For compliance with Condition N.1.6, measurement of PM<sub>10</sub> shall be determined using EPA Method 201/201A and OTM 28, provided, however, that once proposed changes to Method 202 in 56 Fed. Reg. 12970 (March 25, 2009) become final and effective, EPA Method 202 shall be used in lieu of OTM 28.
    - 1.6.2 For the purposes of Condition N.1.6, emissions from each emission unit shall be based on operation of that emission unit at 100% of rated capacity, except for the propulsion engines, for which emissions shall be based on operation of that emission unit at 80% of rated capacity.
  - 1.7 No later than 45 days prior to deployment to the Chukchi Sea each drilling season, the permittee shall provide notification to EPA of the vessel selected as Icebreaker #1. The notification shall include a list of all emission sources on board the vessel as well as manufacturer, model and rated capacity of each such emission source.

- 1.8 During the drilling season, the permittee may switch the designation of Icebreaker #1 and Icebreaker #2 and reposition the vessels, provided that Icebreaker #1 continues to comply with the distance and location requirements of Condition N.6 until Icebreaker #2 complies with the distance and location requirements of Condition N.6. The permittee shall record the date and time that the designations are switched and provide notification to EPA within 3 business days. Subsequent to the designation switch, each vessel must comply with the requirements of Condition N or O as applicable to its new designation.
2. **Capacity Limit on Icebreaker #1 Propulsion Engines.** At all times while the Discoverer is an OCS Source and Icebreaker #1 is within 25 miles of the Discoverer, the permittee shall limit operation of the propulsion engines in Icebreaker #1 to no greater than 80% of rated capacity.
3. **PTE Annual Emission Limits.** At all times while the Discoverer is an OCS Source and Icebreaker #1 is within 25 miles of the Discoverer, emissions from all emission sources on Icebreaker #1 and Icebreaker #2 in aggregate shall not exceed the emission limits specified for each of the pollutants below:
  - 3.1 **NO<sub>x</sub>:** 1699.0 tons/rolling 12-month period
    - 3.1.1 For compliance with Condition N.3.1, measurement of NO<sub>x</sub> shall be determined using EPA Method 7E.
4. **PTE Daily Emission Limits.** At all times while the Discoverer is an OCS Source and Icebreaker #1 is within 25 miles of the Discoverer, emissions from all emission sources on Icebreaker #1 and Icebreaker #2 in aggregate shall not exceed the emission limits specified for each of the pollutants below:
  - 4.1 **PM<sub>10</sub>:** 2,304.0 lbs/day
    - 4.1.1 For compliance with Condition N.4.1, measurement of PM<sub>10</sub> shall be determined using EPA Method 201/201A and OTM 28, provided, however, that once proposed changes to Method 202 in 56 Fed. Reg. 12970 (March 25, 2009) become final and effective, EPA Method 202 shall be used in lieu of OTM 28.
  - 4.2 **PM<sub>2.5</sub>:** 2,025.7 lbs/day
    - 4.2.1 For compliance with Condition N.4.2, measurement of PM<sub>2.5</sub> shall be determined using EPA Method 201/201A and OTM 28, provided, however, that once proposed changes to Method 202 in 56 Fed. Reg. 12970 (March 25, 2009) become final and effective, EPA Method 202 shall be used in lieu of OTM 28.
5. **Fuel Usage Limit.** At all times while the Discoverer is an OCS Source and Icebreaker #1 is within 25 miles of the Discoverer, the permittee shall not use in excess of:
  - 5.1 11,429,120 gallons of fuel in all of the emission sources on board Icebreaker #1 and Icebreaker #2 in aggregate during any rolling 12-month period;
  - 5.2 68,030 gallons of fuel in all of the emission sources on board Icebreaker #1 and Icebreaker #2 in aggregate during any calendar day;

**6. Operating Location and Distance from Discoverer.** Except when transferring crew and supplies to and from the Discoverer, Icebreaker #1 shall operate outside of a cone with its apex 150 meters behind the stern of the Discoverer, plus and minus 20 degrees from the centerline of the Discoverer, and extending 4800 meters beyond the bow of the Discoverer.

6.1 For the purpose of Condition N.6, the permittee shall use a global positioning system or laser range finder capable of accuracy to within 10 meters.

**7. Attachment to Discoverer.** At no time shall Icebreaker #1 be attached to the Discoverer.

**8. Volume Source Limit for Icebreaker #1.** The permittee shall ensure that the volume source release height of Icebreaker #1 is no less than 25.22 meters.

8.1 For the purposes of Condition N.8, the volume source release height shall be determined by:

8.1.1 The permittee shall obtain the vessel source dimensions and emission source parameters;

8.1.2 The permittee shall determine the volume source release height based on plume rise and by using the following information:

8.1.2.1 The SCREEN3 model as set forth in 40 CFR Part 51, Appendix W;

8.1.2.2 An hourly meteorological condition of “D stability,” as that term is used in 40 CFR Part 51, Appendix W;

8.1.2.3 A wind speed of 20 meters per second; and

8.1.2.4 The vessel dimensions and emission source parameters required under Condition N.8.1.1.

8.1.3 If EPA promulgates a different screening model in place of SCREEN3 in 40 CFR Part 51, Appendix W, the permittee shall use that newly promulgated screening model to determine the volume source release height.

**9. Stack Test Requirements.** Prior to each drilling season while the Discoverer is operating under this permit in the Chukchi Sea, the permittee shall stack test each propulsion engine, generator engine, boiler and incinerator on Icebreaker #1 as follows:

9.1 Each stack test on the propulsion engines shall be conducted at four different loads: 20%, 40%, 60% and 80%.

9.2 Each stack test on the generator engines shall be conducted at three different loads: 50%, 75% and 100%.

9.3 Each stack test on the boilers shall be conducted at full loads.

9.4 Each stack test on the incinerator shall be conducted at full load.

9.5 Each stack test run shall test for emissions of NO<sub>x</sub>, PM<sub>2.5</sub> and PM<sub>10</sub>.

9.6 During each test run for the propulsion engines, generator engines, and boilers, the permittee shall monitor and record the following information:

- 9.6.1 Quantity of fuel used (in gallons);
  - 9.6.2 Density of the fuel used (in lbs/gallon);
  - 9.6.3 Heat content of the fuel used (in Btu/gallon); and
  - 9.6.4 For the engines, electrical power output (in kWe).
  - 9.7 During each test run for the incinerator, the permittee shall monitor and record the quantity of waste material incinerated (in lbs).
  - 9.8 For each engine, and each pollutant, the permittee shall determine emission factors in the following units: lbs/kWe-hr and lbs/gallon.
  - 9.9 For each boiler, and each pollutant, the permittee shall determine emission factors in the following units: lbs/MMBtu and lbs/gallon.
  - 9.10 For each incinerator, and each pollutant, the permittee shall determine emission factors in the following units: lbs/ton of waste combusted.
- 10. Monitoring, Recordkeeping and Reporting.** The permittee shall:
- 10.1 Equip each of the propulsion engines, generator engines and boilers on board Icebreaker #1 with a diesel fuel flow meter:
    - 10.1.1 Each fuel flow meter shall be located as close as practical to the fuel intake of each engine or boiler;
    - 10.1.2 Each fuel flow meter shall be totalizing and nonresettable; and
    - 10.1.3 Each fuel flow meter shall measure the fuel flow rate with accuracy equal to or better than 2 percent of the meter's upper range value.
  - 10.2 No less than 60 days before initial deployment of the Discoverer to the Chukchi Sea for the first drilling season, collect information from the manufacturer of each fuel flow meter so as to determine its accuracy. Submit this information to EPA no less than 30 days prior to operation within the Chukchi Sea.
  - 10.3 Maintain the accuracy of each fuel flow meter in accordance with manufacturer's recommendations.
  - 10.4 Monitor and record fuel usage for each propulsion engine, generator engine and boiler.
  - 10.5 At least 45 days before deployment to the Discoverer each drilling season, the permittee shall notify the EPA of the volume source release height of Icebreaker #1.
  - 10.6 Once each hour, and using a global positioning system or laser range finder capable of accuracy to within 10 meters, measure and record the date, time and location of Icebreaker #1.
  - 10.7 Once each hour, monitor and record the date, time, direction the bow of the Discoverer is pointed, and wind direction at the Discoverer.

- 10.8 Record any instance that Icebreaker #1 attaches to the Discoverer.
- 10.9 Each day, calculate and record for the previous calendar day, the emissions of NO<sub>x</sub>, PM<sub>2.5</sub> and PM<sub>10</sub> using the highest emission factor for each tested engine, boiler or incinerator collected under Conditions N.9.8, N.9.9 and N.9.10 and fuel usage data collected under Condition N.10.4, to determine emissions from that source. For the purposes of this condition, the permittee shall assume that the incinerator has been operated continuously at the maximum operating rate, and shall use the highest emission factor collected under Condition N.9.10.

**O. ICEBREAKER #2**

**1. Aggregate Capacity Limits.** For a given drilling season, the permittee may select any vessel as Icebreaker #2, subject to the following conditions:

- 1.1 The total capacity of all propulsion engines and generator engines on Icebreaker #2 shall not exceed 31,200 hp.
- 1.2 The total capacity of all generator engines on Icebreaker #2 shall not exceed 2,800 hp.
- 1.3 The total capacity of all boilers on Icebreaker #2 shall not exceed 10 MMBtu/hr.
- 1.4 The total capacity of all incinerators on Icebreaker #2 shall not exceed 154 lbs/hr.
- 1.5 Total uncontrolled emissions of PM<sub>2.5</sub> from all emission sources on board Icebreaker #2 shall not exceed 42.2 lbs/hour.
  - 1.5.1 For compliance with Condition O.1.5, measurement of PM<sub>2.5</sub> shall be determined using EPA Method 201/201A and OTM 28, provided, however, that once proposed changes to Method 202 in 56 Fed. Reg. 12970 (March 25, 2009) become final and effective, EPA Method 202 shall be used in lieu of OTM 28.
  - 1.5.2 For the purposes of Condition O.1.5, emissions from each emission unit shall be based on operation of that emission unit at 100% of rated capacity, except for the propulsion engines, for which emissions shall be based on operation of that emission unit at 80% of rated capacity.
- 1.6 Total uncontrolled emissions of PM<sub>10</sub> from all emission sources on board Icebreaker #2 shall not exceed 48.0 lbs/hour.
  - 1.6.1 For compliance with Condition O.1.6, measurement of PM<sub>10</sub> shall be determined using EPA Method 201/201A and OTM 28, provided, however, that once proposed changes to Method 202 in 56 Fed. Reg. 12970 (March 25, 2009) become final and effective, EPA Method 202 shall be used in lieu of OTM 28.
  - 1.6.2 For the purposes of Condition O.1.6, emissions from each emission unit shall be based on operation of that emission unit at 100% of rated capacity, except for the propulsion engines, for which emissions shall be based on operation of that emission unit at 80% of rated capacity.
- 1.7 No later than 45 days prior to deployment to the Chukchi Sea each drilling season,

the permittee shall provide notification to EPA of the vessel selected as Icebreaker #2. The notification shall include a list of all emission sources on board the vessel as well as manufacturer, model and rated capacity of each emission source.

- 1.8 During the drilling season, the permittee may switch the designation of Icebreaker #1 and Icebreaker #2 and relocate the vessels, provided that Icebreaker #1 continues to comply with the distance and location requirements of Condition N.6 until Icebreaker #2 complies with the distance and location requirements of Condition N.6. The permittee shall record the date and time that the designations are switched and provide notification to EPA within 3 business days. Subsequent to the designation switch, each vessel must comply with the requirements of Condition N or O as applicable to its new designation.
2. **Capacity Limit on Icebreaker #2 Propulsion Engines.** At all times while the Discoverer is an OCS Source and Icebreaker #2 is within 25 miles of the Discoverer, the permittee shall limit operation of the propulsion engines in Icebreaker #2 to 80% of rated capacity.
3. **PTE Annual Emission Limits.** At all times while the Discoverer is an OCS Source and Icebreaker #2 is within 25 miles of the Discoverer, emissions from all emission sources on Icebreaker #2 in aggregate shall not exceed the emission limits specified for each of the pollutants below:
  - 3.1 **NO<sub>x</sub>:** 849.0 tons/rolling 12-month period
    - 3.1.1 For compliance with Condition O.3.1, measurement of NO<sub>x</sub> shall be determined using EPA Method 7E.
4. **PTE Daily Emission Limits.** At all times while the Discoverer is an OCS Source and Icebreaker #2 is within 25 miles of the Discoverer, emissions from all emission sources on Icebreaker #2 in aggregate shall not exceed the emission limits specified for each of the pollutants below:
  - 4.1 **PM<sub>10</sub>:** 1,152.0 lbs/day
    - 4.1.1 For compliance with Condition O.4.1, measurement of PM<sub>10</sub> shall be determined using EPA Method 201/201A and OTM 28, provided, however, that once proposed changes to Method 202 in 56 Fed. Reg. 12970 (March 25, 2009) become final and effective, EPA Method 202 shall be used in lieu of OTM 28.
  - 4.2 **PM<sub>2.5</sub>:** 1,012.8 lbs/day
    - 4.2.1 For compliance with Condition O.4.2, measurement of PM<sub>2.5</sub> shall be determined using EPA Method 201/201A and OTM 28, provided, however, that once proposed changes to Method 202 in 56 Fed. Reg. 12970 (March 25, 2009) become final and effective, EPA Method 202 shall be used in lieu of OTM 28.
5. **Fuel Usage Limit.** At all times while the Discoverer is an OCS Source and Icebreaker #2 is within 25 miles of the Discoverer, the permittee shall not use in excess of:
  - 5.1 5,714,560 gallons of fuel in all of the emission sources on board Icebreaker #2 in aggregate during any rolling 12-month period;

- 5.2 34,015 gallons of fuel in all of the emission sources on board Icebreaker #2 in aggregate during any calendar day;
- 6. Operating Distance from Discoverer.** Except when transferring crew and supplies to and from the Discoverer, or as provided for in Conditions O.7 and O.8, Icebreaker #2 shall operate outside of a cone with its apex 150 meters behind the stern of the Discoverer, plus and minus 20 degrees from the centerline of the Discoverer, and extending 1000 meters beyond the bow of the Discoverer.
- 6.1 For the purpose of Condition O.6, the permittee shall use a global positioning system or laser range finder capable of accuracy to within 10 meters.
- 7. Anchor Handling Operations.** Notwithstanding Conditions O.6 and O.9, Icebreaker #2 may operate within 1,000 meters of the Discoverer while Icebreaker #2 is being used to either set or retrieve anchors for the Discoverer.
- 8. Bow Washing Operations.** Notwithstanding Conditions O.6 and O.8, Icebreaker #2 may operate within 1,000 meters of the Discoverer while Icebreaker #2 is being used to remove ice from the bow of the Discoverer (i.e. bow washing), subject to the following conditions:
- 8.1 During bow washing operations, Icebreaker #2 shall operate such that the closest point of the icebreaker to the closest point on the Discoverer shall not be less than 100 meters;
- 8.2 The permittee shall record the date, hour and minute that Icebreaker #2 begins its approach to the Discoverer to remove bow ice;
- 8.3 The permittee shall, every 5 minutes after the time in Condition O.8.2, record the distance between Icebreaker #2 and the Discoverer, until completion of bow washing operations as specified in Condition O.8.4;
- 8.4 The permittee shall record the date, hour and minute that Icebreaker #2 returns to its ice management position at least 1,000 meters from the Discoverer;
- 8.5 For the purpose of Condition O.8, the permittee shall use a global positioning system or laser range finder capable of accuracy to within 10 meter.
- 9. Attachment to Discoverer.** At no time shall Icebreaker #2 be attached to the Discoverer.
- 10. Volume Source Limit for Icebreaker #2.** The permittee shall ensure that the volume source release height of Icebreaker #2 is no less than 25.22 meters.
- 10.1 For the purposes of Condition O.10, the volume source release height shall be determined by:
- 10.1.1 The permittee shall obtain the vessel source dimensions and emission source parameters;
- 10.1.2 The permittee shall determine the volume source release height based on plume rise and by using the following information:
- 10.1.2.1 The SCREEN3 model as set forth in 40 CFR Part 51, Appendix W;

10.1.2.2 A hourly meteorological condition of “D stability,” as that term is used in 40 CFR Part 51, Appendix W;

10.1.2.3 A wind speed of 20 meters per second; and

10.1.2.4 The vessel dimensions and emission source parameters required under Condition O.10.1.1.

10.1.3 If EPA promulgates a different screening model in place of SCREEN3 in 40 CFR Part 51, Appendix W, the permittee shall use that newly promulgated screening model to determine the volume source release height.

**11. Stack Test Requirements.** Prior to each drilling season while the Discoverer is operating under this permit in the Chukchi Sea, the permittee shall stack test each propulsion engine, generator engine, boiler and incinerator on Icebreaker #2 as follows:

11.1 Each stack test on the propulsion engines shall be conducted at four different loads: 20%, 40%, 60% and 80%.

11.2 Each stack test on the generator engines shall be conducted at three different loads: 50%, 75% and 100%.

11.3 Each stack test on the boilers shall be conducted at full loads.

11.4 Each stack test on the incinerator shall be conducted at full load.

11.5 Each stack test run shall test for emissions of NO<sub>x</sub>, PM<sub>2.5</sub> and PM<sub>10</sub>.

11.6 During each test run for the propulsion engines, generator engines, and boilers, the permittee shall monitor and record the following information:

11.6.1 Quantity of fuel used (in gallons);

11.6.2 Density of the fuel used (in lbs/gallon);

11.6.3 Heat content of the fuel used (in Btu/gallon); and

11.6.4 For the engines, electrical power output (in kWe).

11.7 During each test run for the incinerator, the permittee shall monitor and record the quantity of waste material incinerated (in lbs).

11.8 For each engine, and each pollutant, the permittee shall determine emission factors in the following units: lbs/kWe-hr and lbs/gallon.

11.9 For each boiler, and each pollutant, the permittee shall determine emission factors in the following units: lbs/MMBtu and lbs/gallon.

11.10 For each incinerator, and each pollutant, the permittee shall determine emission factors in the following units: lbs/ton of waste combusted.

**12. Monitoring, Recordkeeping and Reporting.** The permittee shall:

- 12.1 Equip each of the propulsion engines, generator engines and boilers on board Icebreaker #2 with a diesel fuel flow meter:
    - 12.1.1 Each fuel flow meter shall be located as close as practical to the fuel intake of each engine or boiler;
    - 12.1.2 Each fuel flow meter shall be totalizing and nonresettable; and
    - 12.1.3 Each fuel flow meter shall measure the fuel flow rate with accuracy equal to or better than 2 percent of the meter's upper range value.
  - 12.2 No less than 60 days before initial deployment of the Discoverer to the Chukchi Sea for the first drilling season, collect information from the manufacturer of each fuel flow meter so as to determine its accuracy. Submit this information to EPA no less than 30 days prior to operation within the Chukchi Sea.
  - 12.3 Maintain the accuracy of each fuel flow meter in accordance with manufacturer's recommendations.
  - 12.4 Monitor and record fuel usage for each propulsion engine, generator engine and boiler.
  - 12.5 At least 45 days before deployment to the Discoverer each drilling season, the permittee shall notify the EPA of the volume source release height of Icebreaker #2.
  - 12.6 Once each hour, and using a global positioning system or laser range finder capable of accuracy to within 10 meters, measure and record the date, time and location of Icebreaker #2.
  - 12.7 Once each hour, monitor and record the date, time, direction the bow of the Discoverer is pointed, and wind direction at the Discoverer.
  - 12.8 Record any instance that Icebreaker #2 attaches to the Discoverer.
  - 12.9 Each day, calculate and record for the previous calendar day, the emissions of NO<sub>x</sub>, PM<sub>2.5</sub> and PM<sub>10</sub> using the highest emission factor for each tested engine, boiler or incinerator, collected under Conditions O.11.8, O.11.9 and O.11.10 and fuel usage data collected pursuant to Condition O.12.4 to determine emissions from that source. For the purposes of this condition, the permittee shall assume that the incinerator has been operated continuously at the maximum operating rate, and shall use the highest emission factor collected under Condition O.11.10.
- 13. One Icebreaker Scenario.** In the event Shell elects to deploy only one icebreaker instead of two icebreakers, the icebreaker deployed shall be considered Icebreaker #2 and shall comply with Conditions O.1 through O.12.

**P. SUPPLY SHIP**

- 1. Capacity Limit on Supply Ship Propulsion Engines.** At all times while the Discoverer is an OCS source and the supply ship is within 25 miles of the Discoverer, the permittee

shall limit operation of the propulsion engines in the supply ship to no greater than 80% of rated capacity.

**2. Volume Source Limit for Supply Ship.** The permittee shall ensure that the volume source release height of the supply ship is no less than 15.24 meters.

2.1 For the purposes of Condition P.2, the volume source release height shall be determined by:

2.1.1 The permittee shall obtain the vessel source dimensions and emission source parameters;

2.1.2 The permittee shall determine the volume source release height based on plume rise and by using the following information:

2.1.2.1 The SCREEN3 model as set forth in 40 CFR Part 51, Appendix W;

2.1.2.2 A hourly meteorological condition of “D stability,” as that term is defined in 40 CFR Part 51, Appendix W;

2.1.2.3 A wind speed of 20 meters per second; and

2.1.2.4 The vessel dimensions and emission source parameters required under Condition P.2.1.1.

2.1.3 If EPA promulgates a new screening model in place of SCREEN3 in 40 CFR Part 51, Appendix W, the permittee shall use that newly promulgated screening model to determine the volume source release height.

**3. Monitoring, Recordkeeping and Reporting.** The permittee shall:

3.1 At all times while the Discoverer is an OCS source and the supply ship is within 25 miles of the Discoverer, monitor the power output of each propulsion engine on the supply ship at least once every 15 minutes.

3.1.1 The monitored power output shall be recorded as a direct readout value as well as a percentage of the rated capacity of each engine.

3.2 At least 45 days before deployment to the Discoverer each drilling season, the permittee shall notify the EPA of the volume source release height.

3.3 For each trip to the Discoverer while the Discoverer is an OCS Source, the permittee shall record the following:

3.3.1 The date and time that the supply ship came within 25 miles of the Discoverer; and

3.3.2 After the delivery to the Discoverer, the date and time that the supply ship was no longer within 25 miles of the Discoverer.

**Q. OIL SPILL RESPONSE FLEET**

**1. PTE Annual NO<sub>x</sub> Emission Limits.** At all times while the Discoverer is an OCS source and the Nanuq is within 25 miles of the Discoverer, emissions of NO<sub>x</sub> from operation of the Nanuq propulsion engines (Units N-1 -2) and Nanuq generators(Units N-3 – 4) shall

not exceed the emission limits specified below:

- 1.1 Nanuq propulsion engines (Units N-1 -2): 61.16 tons/rolling 12-month period  
Nanuq generators(Units N-3 – 4): 108.18 tons/rolling 12-month period
  - 1.1.1 For compliance with Condition Q.1.1, measurement of NO<sub>x</sub> shall be determined using EPA Method 7E.
2. **Fuel Usage Limit.** At all times while the Discoverer is an OCS source and the Nanuq is within 25 miles of the Discoverer, the permittee shall not use in excess of:
  - 2.1 259,896 gallons of fuel in the Nanuq propulsion engines (Units N-1 - 2) in aggregate during any rolling 12-month period;
  - 2.2 272,496 gallons of fuel in the Nanuq generator engines (Units N-3 – 4) in aggregate during any rolling 12-month period;
  - 2.3 1,547 gallons of fuel in the Nanuq propulsion engines (Units N-1 - 2) in aggregate during any calendar day;
  - 2.4 1,622 gallons of fuel in the Nanuq generator engines (Units N-3 – 4)in aggregate during any calendar day;
3. **Operating Distance from Discoverer.** Except for transport of crew and supplies to and from the Discoverer or when responding to an oil spill, the oil spill response fleet shall operate such that the closest point of the fleet to the closest point on the Discoverer shall not be less than 2,000 meters.
  - 3.1 For the purpose of Condition Q.3, the permittee shall use a global positioning system or laser range finder capable of accuracy to within 10 meters.
4. **Operating Location.** Except for transport of crew and supplies to and from the Discoverer or when responding to an oil spill, the oil spill response fleet shall operate at a location that is downwind from the Discoverer.
5. **Attachment to Discoverer.** At no time shall the Nanuq or any of the Kvichak work boats be attached to the Discoverer.
6. **Stack Test Requirements.** Prior to each of the first two drilling seasons while the Discoverer is operating under this permit in the Chukchi Sea, the permittee shall stack test at least one of the Nanuq propulsion engines (Units N-1 – 2) and one of the Nanuq generator engines (Units N-3 – 4) as follows:
  - 6.1 At the end of two drilling seasons that the Discoverer operates under this permit in the Chukchi Sea, all of Units N-1 – 4 shall have been stack tested under the requirements of this section.
  - 6.2 Each stack test shall be conducted at four different loads: 25%, 50%, 75% and 100%.
  - 6.3 Each stack test run shall test for emissions of NO<sub>x</sub>.
  - 6.4 During each test run, the permittee shall monitor and record the following information:

- 6.4.1 Quantity of fuel used (in gallons);
  - 6.4.2 Density of the fuel used (in lbs/gallon);
  - 6.4.3 Heat content of the fuel used (in Btu/gallon); and
  - 6.4.4 Electrical power output (in kWe).
- 6.5 For each engine, and each pollutant, the permittee shall determine emission factors in the following units: lbs/kWe-hr and lbs/gallon.
- 7. Monitoring, Recordkeeping and Reporting.** The permittee shall:
- 7.1 Equip each of Units FD-N-1 - 4 with a diesel fuel flow meter:
    - 7.1.1 Each fuel flow meter shall be located as close as practical to the fuel intake of the boiler;
    - 7.1.1 Each fuel flow meter shall be totalizing and nonresettable; and
    - 7.1.2 Each fuel flow meter shall measure the fuel flow rate with accuracy equal to or better than 2 percent of the meter's upper range value.
  - 7.2 No less than 60 days before initial deployment of the Discoverer to the Chukchi Sea for the first drilling season, collect information from the manufacturer of each fuel flow meter so as to determine its accuracy. Submit this information to EPA no less than 30 days prior to operation within the Chukchi Sea.
  - 7.3 Maintain the accuracy of each fuel flow meter in accordance with manufacturer's recommendations.
  - 7.4 Monitor and record fuel usage for each propulsion and generator engine (Units N-1 – 4) on a daily basis.
  - 7.5 Once each hour, and using a global positioning system or laser range finder capable of accuracy to within 10 meters, measure and record the location of the Nanuq and the distance from the closest point of the oil spill response fleet to the closest point on the Discoverer.
  - 7.6 Once each hour, monitor and record the wind direction at the Discoverer.
  - 7.7 Record any instance that the Nanuq or Kvichak work boats attach to the Discoverer.
  - 7.8 Each day, calculate and record for the previous calendar day, the emissions of NO<sub>x</sub>, using the highest emission factor for each tested engine collected under Condition Q.6.5 and fuel usage data collected under Condition Q.7.4.

## **R. POST-CONSTRUCTION AMBIENT AIR QUALITY MONITORING**

- 1. **Ambient Air Quality Monitoring Station.** The permittee shall install, operate and maintain a Federal Reference Method or Federal Equivalent Method ambient air quality monitoring station to measure and record PM<sub>2.5</sub> concentration data in accordance with EPA, 1984a: *Ambient Monitoring Guidelines for Prevention of Significant Deterioration*

(PSD), EPA-450/4-87-007, May 1987, U.S. Environmental Protection Agency, Research Triangle Park, NC..

- 1.1 An alternative PM<sub>2.5</sub> monitoring station may be used in lieu of the required monitoring station provided that approval of the monitoring station is obtained from EPA;
  - 1.2 The monitoring period shall commence within 120 days after the final permit is issued and shall continue for a minimum of 1 year after commencement of initial operation of the Discoverer in the Chukchi Sea as an OCS Source;
  - 1.3 The data recovery shall be at least 80% percent of the data possible during the monitoring period; and
  - 1.4 The monitoring station shall continue to operate and record data until such time that written approval is obtained from EPA authorizing the termination of its operation.
- 2. Meteorological Monitoring Station.** The permittee shall install, operate and maintain a meteorological monitoring station to monitor and record data in accordance with EPA, 1984a: *Ambient Monitoring Guidelines for Prevention of Significant Deterioration (PSD)*, EPA-450/4-87-007, May 1987, U.S. Environmental Protection Agency, Research Triangle Park, NC..
- 2.1 An alternative meteorological monitoring station may be used in lieu of the required monitoring station provided that approval of the monitoring station is obtained from EPA;
  - 2.2 Data shall include horizontal wind direction and speed, temperature, solar radiation and temperature difference;
  - 2.3 Each quarter's data recovery must be at least 90% percent of the data possible for each variable measured during the monitoring period;
  - 2.4 The monitoring period shall commence within 120 days after the final permit is issued and shall continue for a minimum of 1 year after commencement of operation of the OCS source; and
  - 2.5 The monitoring station shall continue to operate and record data until such time that written approval is obtained from EPA authorizing the termination of its operation.
- 3. Ambient Air Quality and Meteorological Monitoring Plan.** At least 60 days prior to the commencement of the data collection, the permittee shall submit to EPA for approval an ambient air quality and meteorological monitoring plan for the post-construction monitoring requirements specified in Conditions R.1 and R.2 in accordance with the requirements of 40 CFR Part 58, Appendix A “Quality Assurance Requirements for SLAMS, SPMs and PSD Air Monitoring.” The plan shall include a description of the proposed monitoring site.
- 4. Monthly Reporting.** Within 30 days after the end of each calendar month, the permittee shall submit to EPA a printed summary of the PM<sub>2.5</sub> and meteorological monitoring data collected during the prior calendar month.
- 5. Audit Reports.** The permittee shall submit audit reports with 30 days after the following events:

- 5.1 Completion of the post-installation equipment audit;
- 5.2 Completion of independent performance and system audits;
- 5.3 Completion of quarterly audits required for ambient air quality data collection system; and
- 5.4 Completion of the semi-annual audits required for the meteorological data collection system.

Quarterly and semi-annual audit periods shall be based on a calendar year.

6. **Annual Report.** Within 60 days after the end of each calendar year and following completion of the collection of monitoring, the permittee shall submit to EPA annual/final reports in text, tabular, and graphic forms, including data in digitized format. The digitized formats of the measured air quality and meteorological data shall be in ASCII format and AIRS format.
7. **System and Performance Audit Report.** Within 60 days after completion of data collection, the permittee shall also submit the final report for the system and performance audits required prior to monitoring termination.



# United States Department of the Interior



MINERALS MANAGEMENT SERVICE  
Alaska Outer Continental Shelf Region  
3801 Centerpoint Drive, Suite 500  
Anchorage, Alaska 99503-5823

FEB 12 2010

EPA Region 10  
Shell Chukchi OCS Air Permit  
1200 6<sup>th</sup> Avenue Suite 900. AWT-I 07  
Seattle, WA 98101-3140  
Fax: 206-553-0110  
Email: [R10-ocsairpermits@epa.gov](mailto:R10-ocsairpermits@epa.gov)

Subject: *New Modified Air Quality Permit Proposed for Shell to Operate the Frontier Discoverer Drillship in the Chukchi Sea, Alaska - MMS comments*

On October 2, 2009, this office provided you with comments regarding the Air Quality Permit proposed for Shell Gulf of Mexico to operate in the Chukchi Sea, Alaska. We have reviewed the *New Modified Air Quality Permit Proposed for Shell to Operate the Frontier Discoverer Drillship in the Chukchi Sea, Alaska* public-noticed on January 8, 2010. The Minerals Management Service (MMS) is submitting the following comments and responding to specific questions posed in the public notice.

As noted in our original October 2, 2009 comments, we believe that EPA has evaluated the permit on worst case analyses that result in permit terms and restrictions that limit necessary operational flexibility for personnel and environmental safety without obvious benefits to air quality. These restrictions include limits on the location, movement and tethering of support craft to the Discoverer, and are itemized in our comments below.

1. Requirement N. Icebreaker #1 Requirement N.7. *"Operating Location and Distance from Discoverer. Except when transferring crew and supplies to and from the Discoverer, Icebreaker #1 shall operate outside of a cone with its apex 150 meters behind the stern of the Discoverer, plus and minus 20 degrees from the centerline of the Discoverer, and extending 4800 meters beyond the bow of the Discoverer. "*

This requirement sets a distance and direction prohibition between Icebreaker #1 and the Discoverer. We assume the restrictions are to account for a worst case pollutant modeling concentration that could occur if the wind aligned with the two vessels along their major axes. However, this may be a rare event (wind direction along the major axes for both vessels). Safe vessel operation requires the flexibility to evaluate on-scene circumstances which might affect the safe operation of the vessels associated with the operation. Ice and weather conditions and ice management operations may require that



the location of the associated fleet vessels be organized in such a way as to enhance safety that does not conform to this generic separation scenario. The permit should clarify and accommodate such emergency configurations.

2. Requirement N. 8 *"Attachment to Discoverer. At no time shall Icebreaker #1 be attached to the Discoverer."*

As stated, this requirement does not take into account maintaining the safety of these vessels in emergency situations, including transferring crew and supplies in emergency situations. The permit should clarify and accommodate such emergency situations. While the permit provides for notification of EPA if this condition is not met, the permit does not give direction on when it might be allowed.

3. Requirement O. Icebreaker #2 Requirement O.7. *"Operating Distance from Discoverer. Except when transferring crew and supplies to and from the Discoverer, or as provided for in Conditions O.7 and O.8, Icebreaker #2 shall operate outside of a cone with its apex 150 meters behind the stern of the Discoverer, plus and minus 20 degrees from the centerline of the Discoverer, and extending 1000 meters beyond the bow of the Discoverer."*

See comments above for N.7 and N.8.

4. Requirement O.10. *"Attachment to Discoverer. At no time shall Icebreaker #2 be attached to the Discoverer."*

See comments above for N.7 and N.8.

5. Q. Oil Spill Response Fleet Requirement Q.5. *"Operating Location. Except for transport of crew and supplies to and from the Discoverer or when responding to an oil spill, the oil spill response fleet shall operate at a location that is downwind from the Discoverer."*

It is not at all clear what air quality purpose this serves, and would seem to maximize air quality concentrations from the *Discoverer* and the response fleet. If there is not an air quality purpose, this requirement should be deleted. MMS has the jurisdiction for oil spill response plans for OCS facilities (30 CFR 254). If there is an air quality purpose, we request that you consult with us with regard to effects on spill response plans.

6. Requirement Q.6. *"Attachment to Discoverer. At no time shall the Nanuq or any of the Kvichak work boats be attached to the Discoverer."*

See comments above for N.7 and N.8.

7. Requirement R. Post-Construction Ambient Air Quality Monitoring
  1. *"Ambient Air Quality Monitoring Station. The permittee shall install, operate and maintain a Federal Reference Method or Federal Equivalent Method ambient air quality monitoring station to measure and record PM<sub>2.5</sub> concentration data..."*

2. *"Meteorological Monitoring Station. The permittee shall install, operate and maintain a meteorological monitoring station to monitor and record data..."*

3. *"Ambient Air Quality and Meteorological Monitoring Plan. At least 60 days prior to the commencement of the data collection, the permittee shall submit to EPA for approval an ambient air quality and meteorological monitoring plan for the post-construction monitoring requirements specified in Conditions R. 1 and R.2..."*

The goal of monitoring is to get a representation of the meteorological and ambient air quality conditions at the site of the activity. Because exploration activities are temporary (lasting months, and not operating year round), full year data collection offshore will be difficult to collect until permanent facilities exist on which to station year-round equipment. We encourage EPA to consider correlation of onshore data with available data collected offshore during the exploration timeframes. This is especially meaningful if background concentrations are being used to add to modeled concentrations offshore. Correlation of onshore ambient air quality monitoring data could be done with the onshore wind direction, to get estimates of the offshore background.

The MMS has an ongoing study titled *Beaufort/Chukchi Seas Mesoscale Meteorology Modeling Study Phase II (AK-06-05)* by the University of Alaska Fairbanks, Geophysical Institute. The study goal is to achieve accurate simulation of the Beaufort and Chukchi Seas surface wind and associated mesoscale meteorology using available observational data from 1979-2009. The results from this study will aid in correlating onshore and offshore data.

The public notice solicited comments on two specific aspects of the permit: 1) suitability of the ISC3-Prime modeling system, and 2) adopting an alternative definition of an "OCS source" to consider the Discoverer to be an OCS source when it is sufficiently secure and stable to commence exploration at a drill site. The MMS offers the following recommendations:

1. **Suitability of the ISC3-Prime Modeling System:** The MMS is very familiar with the ISC3-Prime Modeling System. The MMS finds that the ISC3-Prime modeling system as applied to this permit application is conservative and is more than sufficient to support this permit action and findings.
2. **Alternative definition of an OCS Source:** The MMS recommends EPA adopt the alternative definition for an OCS source to include "when it is sufficiently secure and stable to commence exploration at a drill site." This definition would be consistent with the MMS regulatory definitions and practices that MMS uses for administering its air quality authorities on the OCS. This office provided written comments on December 16, 2009, from the Regional Supervisor, Field Operations, to Ms. Julie Vergeront, Office of the Regional Counsel, describing MMS regulatory definition of an OCS source and administration of MMS air quality and anchor management activities. Another copy of that letter is enclosed.

The MMS believes that EPA's definition of an OCS source - based on a single anchor placement - conflicts with conventional marine operating practices. EPA should consider

using the jurisdictional distinction about an OCS facility described in the December 16, 2009 letter.

Adopting the revised definition would also clarify permit requirement D.I. This requirement currently prohibits the use of the main propulsion unit on the *Discoverer* once the vessel is an OCS source. This restriction, when applied to the *Discoverer* when only one anchor has been set, significantly impacts the safety of personnel and the *Discoverer*.

The MMS also understands that EPA Region 4 recently formed a working group with the MMS Gulf of Mexico Region regarding implementation of the PSD permit program in the eastern Gulf of Mexico and is looking to clarify many of the policy and administrative aspect of the PSD program for OCS facilities that have been involved in the Chukchi Sea permit. MMS looks forward to continued coordination between our offices and development of consistent regulatory standards among OCS areas.

If you have any questions, please contact Mr. Jeff Walker at (907) 334-5300.

Sincerely,

A handwritten signature in blue ink that reads "John Goll". The signature is fluid and cursive, with the first name "John" being larger and more prominent than the last name "Goll".

John Goll  
Regional Director

Enclosure



## United States Department of the Interior



MINERALS MANAGEMENT SERVICE  
Alaska Outer Continental Shelf Region  
3801 Centerpoint Drive, Suite 500  
Anchorage, Alaska 99503-5823  
DEC 16 2009

Julie A. Vergeront  
Office of Regional Counsel  
U.S. Environmental Protection Agency  
Region 10  
1200 Sixth Avenue, ORC-158  
Seattle, WA 98101-3123

Ms. Vergeront:

In response to your email, I'd like to provide the following information which I hope will assist EPA in completing Shell's Prevention of Significant Deterioration (PSD) permits for the Beaufort and Chukchi Seas. Specifically you requested MMS's view on when the Discoverer is "regulated or authorized under Outer Continental Shelf Lands Act (OCSLA)" in connection with the anchoring process.

MMS implementing regulations define a facility at 30 CFR 250.105. The definition of a facility means all installations or devices *permanently or temporarily attached to the seabed* (emphasis added). The same standard is used for administering MMS authorities for both air emissions (30 CFR 250.303) and for platform verification (30 CFR 250.900). We understand the EPA has the same standard under 40 CFR 55.2 for definition of an OCS Source.

Unless and until all anchors have been set, the Alaska Region does not consider the Discoverer Mobile Offshore Drilling Unit (MODU) to be an OCS facility "permanently or temporarily attached to the seabed." Until the Discoverer is permanently or temporarily attached to the seabed, the Discoverer is operated under, controlled by and subject to maritime laws and operating practices. During anchor deployment operations, the Discoverer is under the direction of the vessel master, who has ultimate responsibility under maritime law for the safety of the drillship and crew and the jurisdiction of the U.S. Coast Guard.

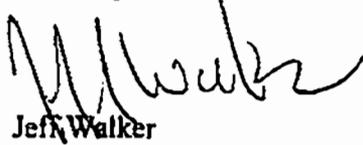
The delineation of responsibilities between the MMS and USCG for anchoring process is further clarified under a 1999 Memorandum of Agreement (MOA) between the MMS and USCG (<http://www.mms.gov/PDFs/cgmoufnlFinalMOA-MMSUSCG-OCS01Sep30-04.pdf>) The MOA delineates jurisdictional responsibilities for fixed facilities, floating facilities and MODU. The Discoverer is both a floating facility and a MODU. Under the MOA, the Alaska Region has no jurisdiction for the anchor deployment operations for the Discoverer, as either a MODU or a floating facility. The Alaska Region would exercise regulatory jurisdiction for a site specific mooring analysis for station-keeping only after the Discoverer has been securely and substantially moored so that it cannot be moved without a special effort.

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In addition, this office notes that MMS is not the agency responsible for issuing the permit to anchor the Discoverer. The U.S. Army Corps of Engineers (CORPS) authorizes placement of structures under the Rivers and Harbor Act. The CORPS issued findings that both Shell's Chukchi and Beaufort Sea exploration activities are authorized by the Nationwide Permit (NWP) No. 8, Oil and Gas Structures on the Outer Continental Shelf.

Please let me know if this responds to your request.

Sincerely,

A handwritten signature in black ink, appearing to read "Jeff Walker". The signature is written in a cursive, slightly slanted style.

Jeff Walker  
Field Operations, Regional Supervisor

cc: Susan Childs, Shell  
3601 C Street, Suite 1334  
Anchorage, AK 99503-5948



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 10

1200 Sixth Avenue, Suite 900  
Seattle, WA 98101-3140

SEP 04 2009

OFFICE OF  
AIR, WASTE AND TOXICS

Ms. Susan Childs  
Regulatory Affairs Manager, Alaska Venture  
Shell Offshore Inc.  
3601 C Street, Suite 1314  
Anchorage, Alaska 99503

Re: Incompleteness Determination for Outer Continental Shelf Pre-Construction Air Permit Application for the Frontier Discoverer Beaufort Sea Exploration Program.

Dear Ms. Childs:

On May 29, 2009, U.S. Environmental Protection Agency (EPA) Region 10 received Shell Offshore Inc.'s (SOI) Outer Continental Shelf (OCS) Pre-Construction Air Permit Application for the Frontier Discoverer Beaufort Sea Exploration Program in the Beaufort Sea. EPA conducted a partial completeness review of the May 29, 2009 permit application and determined that it was incomplete. EPA's July 29, 2009 partial incompleteness determination was based on a preliminary review of the section 2: Project Description and Emissions and section 3: Regulatory Applicability of the permit application. EPA's partial completeness determination did not include a review of information relating to the air quality modeling, air impact analyses and sections of the application relating to the emission control technology review.

On August 21, 2009 EPA received a fax of SOI's partial incompleteness letter<sup>1</sup> response. We have reviewed the response to determine if SOI has provided all the information requested in our July 29<sup>th</sup> letter. In addition, regional staff have reviewed the air quality modeling and air impact analyses of the Pre-Construction Air Permit Application for the Frontier Discoverer Beaufort Sea Exploration Program. EPA has not reviewed the emission control technology sections of the permit application. The information and data that SOI submitted to EPA as part of the Chukchi Sea OCS/ Prevention of Significant Deterioration (PSD) permit application that SOI wishes to be considered as part of the Beaufort Sea permit application should be submitted. EPA requests SOI update the Beaufort Sea application with the applicable Best Available Control Technology (BACT) determinations from the Chukchi Sea OCS/PSD permit application. We presume this will complete the emission control technology sections of the Beaufort Sea permit application.

Based on our review of SOI's partial incompleteness letter response and air quality modeling and air impact analyses sections of the permit application, we have determined that SOI's Pre-Construction Air Permit Application for the Frontier Discoverer Beaufort Sea Exploration Program is still incomplete. Pursuant to 40 CFR 124.3(c), we are listing below the information necessary to make these sections of the application complete. In addition,

<sup>1</sup> SOI's Partial Incompleteness Letter Response for the Frontier Discoverer Drill Vessel in the Beaufort Sea is dated August 21, 2009.

Attachment A includes a detailed list of technical comments on the modeling and monitoring sections. Additionally, we understand that SOI will be submitting revised emission data. Accordingly the emission data portion of the submission has not been fully reviewed.

### **Shell Offshore Inc. Partial Incompleteness Letter Response**

1. SOI provided EPA with a list of Chukchi Sea permit application updates since February 23, 2009 that SOI intends to incorporate by reference into the Beaufort Sea permit application. Rather than this incorporation by reference approach, EPA requests that SOI submit a permit application for the Beaufort Sea that that is a standalone document. Incorporating by reference components of the Chukchi Sea permit application in the Beaufort Sea permit application will slow EPA's review of the application, complicate the public review process, and lead to possible errors in what EPA determines to be the full and complete Beaufort Sea permit application.

Please submit a revised application that includes the relevant portions of the information SOI submitted for the Frontier Discoverer Drill Vessel in Chukchi Sea. This includes the updated emission inventory and any associated updates to the BACT, modeling analyses, operation scenarios, requested restrictions, etc.

2. EPA requested SOI to provide an update to Table 2-2 to reflect the correct potential to emit (PTE) (tons per year) of the OCS source for all regulated new source review (NSR) pollutants in order to document which pollutants exceed the significant emission rates for purposes of determining PSD applicability. SOI stated that the emission rates in Table 2-2 of the Beaufort Sea permit application accurately reflect potential emissions from the OCS source however EPA's review of Table 2-2 indicates that it more correctly reflects the requested allowable or permitted emissions and not the PTE as defined in 40 CFR Part 55. The PTE of the OCS source should reflect the effect on emissions of any existing, legally enforceable requirements, but not the effect of the SOI requested restrictions. This is important because SOI has indicated that the requested restrictions are not intended to limit the source's potential to emit and hence are not Owner Requested Limits under 18 AAC 50.

Please update Table 2-2 to provide a correct summary of the PTE (tons per year) for all regulated NSR pollutants in order to document which pollutants exceed the significant emission rates for purposes of PSD applicability.

3. The application does not include a proposed allowable emission inventory for particulate matter (PM), which is also required to determine the BACT requirements for PM.

Please provide EPA with the inventory for PM, including the supporting calculations, in the same format as the other BACT pollutants.

4. SOI stated in their partial incompleteness letter that the Alaska Department of Conservation (ADEC) has the authority to require SOI to obtain a permit to comply with 18 AAC 50.080 – Ice Fog Standards. Given that EPA is implementing ADEC's rules within 25 miles of Alaska's seaward boundary, EPA, and not ADEC will make a determination if an ice fog issue exists. Until we have a complete application, EPA is unable to determine if an ice fog issue would exist and therefore has not made the determination under this rule. No additional information is needed at this time with regard to this provision.

#### **Air Quality Modeling and Air Impact Analyses Incompleteness**

5. SOI has stated that they will redo the modeling analysis based on recent discussions with EPA.

Please provide EPA with an updated modeling analysis that reflects the latest information on emissions, operating scenarios, background data, etc.

6. SOI has identified other operating scenarios that need to be analyzed and included in the application. Permit terms and conditions may be included to reflect modeling assumptions including source locations and operating schedules and scenarios. Therefore, the modeling inputs should reflect SOI's operational needs and intentions.

If secondary operating scenarios are envisioned, please submit descriptions and the associated air impact analyses in the application.

7. While the application included PM<sub>10</sub> background data, it is not clear whether conservative PM<sub>10</sub> measurements were used to determine compliance with the national ambient air quality standards (NAAQS). The location of the monitoring site and the time period of the data were not identified but EPA believes it is data from Badami that was collected in 1999. The application contained no justification that this data is still representative of, or a conservative estimate of, current air quality at the project location.

Please submit PM<sub>10</sub> background data that is representative of current air quality at the project location. If using existing data, include a justification that the data is either representative of current air quality or is a conservative estimate of current air quality.

8. The permit application contained PM<sub>2.5</sub> background data that is not representative of current air quality levels at the project location and failed to meet data quality requirements as well as EPA's Quality Assurance/Quality Control requirements in Appendix A of 40 CFR Part 58. SOI used data from Wainwright which has not been demonstrated to be representative of, or a conservative estimate of, air quality in the Beaufort Sea project area. Wainwright PM<sub>2.5</sub> measurements from

November, 2008 to February, 2009 were used but this period of data is unacceptable because of data quality issues arising from a problem with the instrumentation, which has since been addressed.

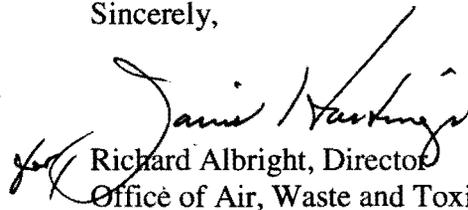
Please submit PM<sub>2.5</sub> background data that is representative of current air quality at the project location and which satisfies Appendix A requirements. If using existing data, include a justification that the data is either representative of current air quality or is a conservative estimate of current air quality.

- 9 The current application contains PM<sub>2.5</sub> background air quality data collected at Wainwright prior to the May submittal date. However, we are concerned about the use of this time period because the recent summer months (i.e., July and August) showed higher measured concentrations at Wainwright than earlier months. This is probably due to higher ambient temperatures which changes and/or thaws out any surface cover and the ground. Consequently, PM<sub>2.5</sub> data collection at a minimum, should represent the SOI drill season months of July to December so that EPA can be reasonably assured there won't be a NAAQS violation.

Please submit background PM<sub>2.5</sub> data that is representative of air quality concentrations during the SOI drill season of July 1 through December 31.

As we've previously discussed, the final permit issuance date turns on when EPA has received all of the necessary information to make significant progress processing the permit. Accordingly, please submit the missing information at your earliest convenience. If you have any questions, please contact Natasha Greaves at 206-553-7079.

Sincerely,

  
Richard Albright, Director  
Office of Air, Waste and Toxics

Enclosure

cc Eric Hansen, Environ International Corporation  
Mark Schindler, Octane, LLC  
Jeffrey Walker, MMS-Alaska Region  
Kirk Winges, Environ International Corporation

**ATTACHMENT A**  
**Air Quality Impact Analysis Comments to**  
**Outer Continental Shelf Pre-Construction Air Permit Application**  
**Frontier Discoverer Beaufort Sea Exploratory Drilling Program**  
**Dated May, 2009**

I. General Comments

- A. EPA understands that there are new operating scenarios and revised operating scenarios (e.g., bow ice washing, anchor handling, and ice breaker and oil spill response vessel replenishment). As part of the revised application,
1. Please include a table that lists and briefly summarizes **all** the primary and secondary operating scenarios.
  2. Please provide justification for performing either a quantitative or qualitative analysis of the emissions associated with each primary and secondary operative scenario.
  3. Please assimilate the new and revised analyses in the form of text, tables, figures and references into a revised application.
- B. If new or additional modeling is performed, please provide all input and output files on a CD or DVD as part of a revised application.
- C. EPA understands that SOI Offshore Inc. (SOI) started data collection on 15 August 2009 instead of June 2009 at the Badami monitoring station. The air pollutants being measured at the station include NO<sub>2</sub> and PM<sub>2.5</sub>. Again, EPA request SOI to also measure PM<sub>10</sub> and O<sub>3</sub> at this station. Please note that EPA will adhere to the data representativeness criteria contained in the 1987 Ambient Monitoring Guidelines for Prevention of Significant Deterioration (PSD) and Section 8.2.2.c in Appendix W of 40 CFR Part 51, and the PSD significant monitoring levels specified in 40 CFR Part 52.21(i)(5)(i).
- D. Because of new information provided to EPA, certain sections in the SOI Beaufort Sea outer continental shelf (OCS) PSD application and the CD containing the supporting modeling files were not reviewed.
- E. Please indicate if the National Park Service was provided a copy of the original May, 2009 PSD application. Please include an additional copy of a revised application and EPA will forward that copy to the National Park Service.

Note: Permit conditions may be included to reflect any modeling assumptions such as source location, operating scenarios and schedules to ensure compliance with ambient air quality standards and air quality increments. Therefore, model inputs should reflect SOI's operational needs and intentions.

## II. Specific Comments

### A. Section 1, Introduction

Page 1 states the Frontier Discoverer will be conducting exploratory drilling operations within and beyond 25-miles from the Alaska seaward boundary of the Beaufort Sea.

1. Please identify the lease sale area(s) where the drilling will occur.
2. Please identify the specific lease blocks within each lease sale area where the drilling may occur. (Page 76 in the OCS PSD application indicates 64 lease blocks are considered for exploratory drilling.)
3. Please redo Figure 1-1 to show both the 3-mile boundary line and the 25-mile line from the seaward boundary.

### B. Section 2, Project Description and Emissions

1. Page 5, fourth paragraph conveys that a helicopter will be used to transport workers from Deadhorse or Barrow to the drill ship every three to four weeks.
  - a. How many trips a day will the helicopter transport workers?
  - b. Will the helicopter be used for any other purpose and how frequently? Please be specific.
2. First line on page 14 states that the drill season is 168 days starting in July. Please confirm the beginning and ending dates of the drill season within a calendar year (i.e., 01 July to 31 December).
3. Page 18, second paragraph states that "...the ice management and anchor handling fleet would be either downwind of the Discoverer or beyond the 25-mile radius from the Discoverer..."
  - a. Please explain the downwind operations and duration of the ice management and anchor handling fleet and any changes to the maximum predicted concentrations and its locations that are used

to demonstrate compliance with ambient air quality standards and air quality increments. If these are secondary operating scenarios, please list them in the applicable table (see Comment I.A).

- b. Please confirm that there will be no more than the two vessels that compose the ice management and anchor handling fleet.
- c. The third paragraph on page 19 mentions bow ice washing of the Frontier Discoverer by the anchor handler vessel and this particular scenario was not modeled. Please provide a modeling analysis of this bow ice washing scenario.
- d. The first and second paragraphs on page 21 mentions anchor deployment and retrieval. Please provide a modeling analysis of this anchor handling scenario.
- e. SOI has recently conveyed that the ice management and anchor handling fleet, and the oil spill response vessel could have other operating scenarios not defined in the application. SOI is requested to:
  1. Identify and describe these secondary operating scenarios (see Comment I.A).
  2. Quantify the emission rates and list the source parameters of each of these scenarios.
  3. Provide a graphics showing the operating location of these scenarios relative to the Frontier Discoverer and the other vessels.
  4. Conduct a modeling analysis of these other secondary operating scenarios.
- f. Page 22 states that a tanker will be operating 25-miles beyond the Frontier Discoverer. EPA believes the tanker should be part of a growth analysis which warrants an assessment. Please identify the tanker in the operating scenario table (see Comment I.A), quantify the emissions of the tanker, and show the rates in the appropriate table. In addition, please conduct a quantitative or qualitative analysis of the tanker and provide justification for the selected analysis type.

C. Section 5, Ambient Impact Modeling

1. 40 CFR Part 50 does not list an annual standard for PM<sub>10</sub>. SOI is requested to add a footnote at the bottom of Table 5-1 to reflect that there is no annual federal PM<sub>10</sub> standard.
2. In the first paragraph on page 62, SOI states that the ISC-Prime model is a U.S. EPA approved, steady-state, multiple-source Gaussian plume mode. In actuality, the ISC-Prime model is a non-guideline model requiring EPA approval prior to its use in air permit applications. SOI is requested to correct this erroneous statement in its revised application.
3. Third paragraph on page 64 indicates that the anchor handler/ice management will operate at virtual idle. Please explain what is meant by “described distance” and “virtual idle.”
4. Last sentence, second paragraph on page 65 implies that there is not a minimum distance from the Frontier Discoverer to the anchor handler/ice management and ice breaker vessels during ice breaking activities. Please discuss the consistency of this sentence with the first sentence in the same paragraph and how it affects the modeling results.
5. The oil spill response fleets consist of an offshore management/skimmer, three 34-foot work boats and one 47-foot Rozema skimmer (page 21). Further, it is mentioned on page 66, first paragraph that the Nanuq could be in the vicinity and will provide berthing for the oil spill response crew.
  - a. Please confirm that the emissions and stack parameters have been provided for these particular sources and these sources have been modeled as part of the compliance demonstration with ambient air quality standards and air quality increments.
  - b. If the Nanuq is not available, please discuss the berthing options and associated air quality impacts.
6. Page 69 provides a description of how the oil spill response fleet will be characterized for modeling purposes. EPA recommends that each vessel composing the oil spill response fleet have its own distinct volume source length rather than an average length of 50-meters.
7. Graphics of the modeling domain are provided in Figures 5-3 to 5-5.
  - a. Figures 5-3 to 5-5 are provided but not mentioned in the Section 5.5. Please clarify.

- b. Figure 5-5 shows a rectangle south of the Frontier Discoverer. Please identify this rectangle.
  - c. If additional modeling scenarios are analyzed such as those identified in Section II.B, please provide graphics of those domains if different from Figures 5-3 to 5-5.
8. Third paragraph on page 74 describes the locations of the associated fleets relative to the Frontier Discoverer for modeling purposes. Because the modeling is based on this operating configuration of the vessels, permit terms and conditions may be included to reflect modeling assumptions including source locations and operating schedules and scenarios. If this is unacceptable to SOI, please provide justification and any supporting modeling analyses demonstrating a permit condition is unnecessary.
9. Page 74, third paragraph states that the supply ship will be located 50-feet astern of the Frontier Discoverer. Please identify the method used to transfer supplies and fuel to the Frontier Discoverer.
10. EPA Region 10 issued a memorandum dated 02 July 2009 which discusses "Implementing PSD Baseline Dates, Baseline Areas, and Baseline Concentrations on the Outer Continental Shelf in Alaska." SOI is requested to address baseline dates, baseline areas, trigger dates, and baseline concentrations as it relates to the proposed project in a revised application that is consistent with the memorandum. A copy of the 02 July 2009 memorandum is attached.
11. Pages 76 to 80 (and Section 7) provide a discussion of the allowable and actual emission inventories used to address compliance with ambient air quality standards and air quality increments. Alan Schuler at the State of Alaska has provided EPA and ENVIRON (SOI's contractor) with his comments regarding the adequacy of the two inventories in a 26 August 2009 email (see attached email).
  - a. Please respond to Comment #1 in the email and identify and include emission rates from any major or minor source applications that have been deemed complete but a permit has not been issued by the State of Alaska in the two inventories.
  - b. Please identify and include any fugitive and area sources in the two inventories.
  - c. For Comment #4, EPA agrees with the State of Alaska that there is no justification to double annual impacts to obtain short term impacts. EPA requests SOI to redo the modeling for **all** air pollutants using the maximum hourly emission rates. Furthermore,

the assumptions and methodologies used in developing the hourly emission rates for each air pollutant should be documented and incorporated in a revised application. If short term emission rates are not available, please contact EPA and the State of Alaska to discuss possible options.

- d. Related to Comment #5, please describe how long term and short actual emission rates for each applicable air pollutant were derived in a revised application.
- e. As part of Comment #6, please discuss the source of the stack parameters if either the stack height, stack gas exit temperature, stack gas exit velocity, inside stack diameter and/or stack location were not available. This comment also applies to area and volume sources and their modeling parameters.
- f. Per Comment #8, please provide a description of the assumptions, methods and references used to develop the two inventories in the revised application.

D. Section 6, Background Concentrations

1. EPA agreed that SOI could use conservative background measurements to represent ambient air quality levels in the Beaufort Sea.
  - a. Please provide the source of the gaseous data and the period of record of the data as footnotes to Table 6-1.
  - b. Please provide verification and text that the BP Exploration Alaska, Inc. Liberty Development Project collected SO<sub>2</sub>, NO<sub>2</sub> and CO data from 2007 and 2008 satisfy PSD data collection requirements including data quality.
  - c. Please discuss the representativeness of the BP Exploration Alaska, Inc. Liberty Development Project measurements in terms of conservatism and if there are any nearby sources that could contribute to the measurement levels.
2. The fourth paragraph on page 81 discusses PM<sub>10</sub> measurements from BPX in Prudhoe Bay with 24-hour concentrations as high as 55 micrograms per cubic meters. In the same paragraph, it states but fails to explain why this high 24-hour concentration was not used with SOI predicted impacts since the total impact is not expected to exceed the ambient air quality standards.

- a. Please explain why the 24-hour and annual PM<sub>10</sub> data from Prudhoe Bay are not used as background since the data would be conservative.
- b. Please identify the source of the PM<sub>10</sub> numbers appearing in Table 6-1.

(It should be noted that EPA has expressed concerns that the 1999 Badami PM<sub>10</sub> data is unrepresentative because it is not current.)

3. The PSD preconstruction monitoring level for PM<sub>10</sub> is 10 microgram per cubic meter for a 24-hour average. From Table 5-7 on page 75, the maximum predicted PM<sub>10</sub> 24-hour concentration is 27.4 micrograms per cubic meter. This maximum predicted concentration exceeds the monitoring level and consequently, SOI should initiate PM<sub>10</sub> data collection at the Badami monitoring station which restarted on 15 August 2009 to measure NO<sub>2</sub> and PM<sub>2.5</sub> background.
4. As early as April, 2008, EPA recommended that SOI start a preconstruction ambient air quality monitoring program for all criteria air pollutants consistent with the PSD regulation and guidance if they intended to propose projects in the Beaufort Sea OCS in the near future. EPA made the recommendation to SOI because of the lack of any current ambient air quality data including PM<sub>2.5</sub> that would be representative of the OCS and without knowing if a proposed project predicted concentrations would exceed PSD ambient monitoring thresholds. In addition, EPA informed SOI about our concerns that the 1999 measurements at Badami were not representative because they are not current.

SOI started a PM<sub>2.5</sub> (and NO<sub>2</sub>) data collection program on 15 August 2009 (delayed from June, 2009) at the refurbished Badami monitoring station to represent air quality levels in the Beaufort Sea OCS. However, the minimum required four months of data will not be available until 15 December 2009. In lieu of waiting four months, SOI proposed the use of four months of PM<sub>2.5</sub> collected at the Wainwright monitoring station from November, 2008 to February, 2009. Nevertheless, EPA has determined this period of PM<sub>2.5</sub> data collected at Wainwright to be unacceptable because certain data quality requirements were not satisfied, arising from a problem with the instrumentation, which has since been fixed. PM<sub>2.5</sub> data collected after 5 March 2009 at Wainwright is meeting the data quality requirements.

Recently provided data from Wainwright shows nine 24-hour periods of PM<sub>2.5</sub> measurements equal to or greater than the 8.0 micrograms per cubic meter during the months of July and August, 2009, with the highest

measured concentration at 14.42 micrograms per cubic meter. The 8.0 micrograms per cubic meter for a 24-hour average was measured in June, 2009. After its initial review and consideration of all the PM<sub>2.5</sub> 24-hour measurements from 06 March 2009 to 31 August 2009 at Wainwright, EPA now believes it is prudent to extend the PM<sub>2.5</sub> data collection at Wainwright and Badami such that the measurements include the months that SOI intends to conduct exploratory drilling operations. This would be the months of July to December for the SOI Beaufort Sea OCS PSD permit application.

In addition, Appendix A in 40 CFR Part 58 requires collocated PM<sub>2.5</sub> sampling at the monitoring station or at one of the PSD network monitoring stations. The monitoring stations at Wainwright and Badami currently are not operating a collocated sampler.

In summary, SOI is requested to submit PM<sub>2.5</sub> measurements representative of the months of July to December which meets the requirements contained in paragraph (m)(3) in 40 CFR Part 52.21 and Appendix A of 40 CFR Part 58. For the SOI Beaufort Sea OCS PSD application, EPA recommends measurements that are collected at Badami.

E. Section 7, Impact Modeling Results

Specific comments are not provided since SOI has proposed to redo the modeling analysis.

F. Section 8 Additional Impact Analyses

Data and information that SOI provided as part of its Chukchi OCS/PSD permits application that it wishes to be considered as part of the Beaufort Sea OCS/PSD permit application should be submitted as part of a revise application.

G. Air Quality Modeling Files, SOI OCS Beaufort Sea Permit Application CD

Specific comments are not provided since SOI has proposed to redo the modeling analysis.

Attachments



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION 10**

1200 Sixth Avenue, Suite 900  
Seattle, Washington 98101-3140

July 2, 2009

Reply To: AWT-107

**MEMORANDUM**

**SUBJECT:** Implementing PSD Baseline Dates, Baseline Areas, and  
Baseline Concentrations on the Outer Continental Shelf in Alaska

**FROM:** David C. Bray  
Senior Policy Advisor

**TO:** Rick Albright, Director  
Office of Air, Waste, and Toxics

Janis Hastings, Associate Director  
Office of Air, Waste, and Toxics

**Introduction**

The purpose of this memorandum is to clarify how EPA Region 10 intends to implement the PSD increments on the OCS in Alaska the absence of formal area designations under section 107(d).

**Background**

Pursuant to Section 328 of the Clean Air Act (Act) EPA has promulgated regulations to control air pollution from Outer Continental Shelf (OCS) sources to attain and maintain Federal and State ambient air quality standards and to comply with the provisions of Part C of title I (prevention of significant deterioration of air quality or PSD). See 40 CFR Part 55.

In Part C of Title I of the Act, Congress sets forth a program for preventing significant deterioration of air quality in areas that have air quality better than the National Ambient Air Quality Standards (NAAQS). Specifically, Congress established an approach for defining "significant deterioration" that relies upon changes in air quality concentrations from a baseline. The "baseline concentration" is defined in section 169(4) of the Act and the acceptable changes in concentration, called "increments," are defined in sections 163 (for Congressionally-established increments) and 166 (for EPA-established increments) of the Act.

Under Section 169(4) of the Act, the term "baseline concentration" means, "with respect to a pollutant, the ambient concentration levels which exist *at the time of the first application for a permit in an area subject to this part*, based on air quality data available in the Environmental Protection Agency or a State air pollution control agency and on such monitoring data as the permit applicant is required to submit. Such ambient concentration levels shall take into account

all projected emissions in, or which may affect, such area from any major emitting facility on which construction commenced prior to January 6, 1975, but which has not begun operation by the date of the baseline air quality concentrations determination. Emissions of sulfur oxides and particulate matter from any major emitting facility on which construction commenced after January 6, 1975, shall not be included in the baseline and shall be counted against the maximum allowable increases in pollutant concentrations established under this part.” (emphasis added). EPA has promulgated regulatory definitions for the phrases “the time of the first application for a permit” (known as the “minor source baseline date”) and “in an area subject to this part” (known as the “baseline area”). These definitions are found in 40 CFR 52.21(b) of EPA’s regulations and incorporated into the OCS regulations at 40 CFR 55.13.

The requirements to which OCS sources are subject depend on the distance of the source from shore. From the State’s seaward boundary (typically 3 miles from shore) and extending out 25 miles, the requirements for the Corresponding Onshore Area (COA), as well as federal requirements, apply to OCS sources; beyond 25 miles from the State’s seaward boundary, only federal requirements apply. See 40 CFR 55.3(b) and (c). Because of these different regulatory requirements, the implementation of PSD increments is different in these two portions of the OCS.

#### **Sources located less than 25 miles from the State’s seaward boundary**

In accordance with section 328 of the Act and EPA’s implementing regulations at 40 CFR Part 55, an OCS source located less than 25 miles from the State’s seaward boundary is subject to the same requirements as would be applicable if the source were located within the COA. Section 328(a) of the Act; 40 CFR 55.3(b). As a result, EPA incorporates by reference the air quality regulations, including the major source permitting programs, that are in effect in the COA and applies them to OCS sources inside this 25 miles limit. See 40 CFR 55.12. The OCS rules define the term “onshore area” in terms of the section 107(d) area designations. 40 CFR 55.2. Hence the COA is generally synonymous with a section 107(d) area and, if designated attainment or unclassifiable, with a PSD baseline area.

Since the COA PSD rules look to the designation of the COA for determining baseline dates, applying the COA PSD rule to an OCS source includes using the COA minor source baseline dates. Importantly, the minor source baseline dates for a section 107(d) area are not established in regulation, but rather they are determined through the implementation of the PSD regulations. See 40 CFR 52.21(b)(definition of “minor source baseline date”). Where the COA PSD rules apply on the OCS, the baseline date that has already been determined under the COA rule is the baseline date that applies for the permitting of the OCS source. This baseline date is then used to determine the baseline concentration in the area of the OCS source in accordance with the COA PSD rules.

When using the onshore minor source baseline date for OCS sources located less than 25 miles from the State’s seaward boundary, there is no need to define separate baseline areas (and hence section 107 area designations) for the OCS source. In fact, establishing this portion of the OCS as a separate baseline area, or extending the onshore baseline area onto the OCS, would be contrary to the current Part 55 rules which require a case-by-case determination of the COA for the purpose of determining the applicable onshore rules. See 40 CFR 55.5. Since the COA may be different than the nearest onshore area (NOA), and can actually differ from permit to permit,

the applicable permitting rules, and hence the baseline date, could be different than that of the NOA. As such, a fixed baseline area for the OCS within 25 miles of the State's seaward boundary could potentially prevent the utilization of the COA minor source baseline date, contrary to the intent of Congress that such sources be subject to the same requirements as would be applicable if the sources were located within the COA.

**Sources located more than 25 miles beyond the State's seaward boundary**

For sources locating on the OCS more than 25 miles from the State's seaward boundary, the EPA PSD rules at 40 CFR 52.21 apply. The definition of "baseline area" in the federal PSD rules relies on the existence of intrastate areas designated as attainment or unclassifiable under section 107(d) of the Act. See 40 CFR 52.21(b). Until EPA either designates section 107(d) areas on the OCS and/or promulgates revisions to the definition of "baseline area" in 40 CFR Part 55, it is appropriate to implement the term "baseline area" in 40 CFR 52.21(b), for OCS areas more than 25 miles from the State's seaward boundary by using the boundaries of the coastal Air Quality Control Regions on shore as a guide. Accordingly, the following areas will be considered as separate "baseline areas" for purposes of 40 CFR 52.21:

Each area bounded on the shoreward side by a parallel line 25 miles from the State's seaward boundary; on the seaward side by the boundary of U.S. territorial waters; and on the other two sides by the seaward extensions of the onshore Air Quality Control Region boundaries.

This approach is consistent with the approach of the Clean Air Act and EPA's implementing regulations for defining baseline areas on shore. Section 107 of the Act sets forth the criteria and processes for defining Air Quality Control Regions (AQCR's) and attainment/nonattainment designations. AQCR's for all States have been promulgated by EPA in 40 CFR Part 81, Subpart B. States are required, under section 107(d) to submit to the Administrator recommendations for attainment/nonattainment designations for (air quality control) regions or portions thereof. The final attainment/nonattainment designations for each State have been promulgated by EPA in 40 CFR Part 81, Subpart C. Under this statutory scheme, the largest possible onshore PSD baseline area is an AQCR. See Section 107(d) of the Act and 40 CFR 52.21(b)(definition of "baseline area"). The approach set forth in this memo essentially mirrors the onshore AQCR's for purposes of establishing separate offshore baseline areas in order to implement the PSD increments on the OCS for the areas more than 25 miles from the State's seaward boundary.

Once the "baseline area" is determined according to the above approach, the "minor source baseline date" and the "baseline concentration" are determined in accordance with the rules at 40 CFR 52.21.

cc: Herman Wong, OEA  
Pat Nair, OAWT,  
Doug Hardesty, OAWT  
Natasha Greaves, OAWT



"Schuler, Alan E (DEC)"  
<alan.schuler@alaska.gov>  
08/26/2009 04:01 PM

To Herman Wong/R10/USEPA/US@EPA  
cc Alan Schuler <alan.schuler@alaska.gov>, Kirk Winges  
<kwinges@Environcorp.com>, Scott Winges  
<swinges@Environcorp.com>

bcc

Subject ADEC Verification of Shell Regional Inventory

History:  This message has been replied to and forwarded.

Herman,

I conducted a cursory review of Shell's North Slope regional inventory. I've also corresponded with Shell's consultant regarding the inventory (see attached e-mail).

It is very evident that Shell put lot of work into developing this inventory. Most aspects are acceptable. However, I have several comments and/or recommendations, which are provided below.

#### Stationary Source List/Location

1. Shell's off-site stationary source list is extensive and appears to be fairly complete. I only noticed one missing item – the drill rig and turbine associated with BPXA's Liberty development project (which is a component of the Endicott stationary source inventory). These emission units have been permitted, but may not be fully operational yet. However, since they could be operating concurrently with Shell's operation, ***Shell should include the Liberty rig/turbine in the off-site assessment*** .
2. The off-site inventory covers multiple UTM zones. Shell therefore established a consistent coordinate system (UTM Zone 6) for the modeling analysis. I viewed the resulting source locations using a proprietary ISC/AERMOD Graphical User Interface. (Shell provided the PM-10 input files so that I could do this – see attached email.) I also imported quad-maps from the USGS to provide a visual reference. While I did not take the time to confirm the accuracy of each stationary source location, the general layout matches the layout shown on industry maps.
3. It appears that Shell is using the very conservative approach of assessing the *combined* impact from the off-site stationary sources. This is conservative since many of the stationary sources could likely be culled from the inventory per Section 8.2.3 of the Guideline on Air Quality Models, due to non-overlapping significant impacts (with Shell's project).

#### Short-term Emission Rates

4. Shell modeled the annual emissions and then estimated the short-term impacts by doubling the annual concentration. I have no ready means for assessing the *general* accuracy of the 2-fold assumption. However, I did find that in the case of BPXA's Central

Compressor Plant and BPXA's Central Gas Facility (which are currently going through the PSD permit process for SO<sub>2</sub> emission increases), the maximum short-term emission rates can be *much greater* than Shell's 2-fold assumption. (I also found *limited* cases where Shell's emission rates are greater than the previously accepted emission rates – for an unknown reason.) Since Shell has access to the previously accepted maximum short-term emission rates for some of the stationary sources (especially the SO<sub>2</sub> emission rates), ***I recommend that they remodel the short-term SO<sub>2</sub> impacts using the highest available emission rate for a given emission unit*** . This approach should provide a more accurate assessment of the short-term impacts than use of the 2-fold factor.

### Annual Emission Rates

5. I spot-checked Shell's potential NO<sub>x</sub> emissions and found the values to be consistent with my records. I did not check any of Shell's actual annual emissions since that would take more work to confirm than what I could commit to this project (note: our applicants generally do not use actual emissions in their modeling assessments so the actual emission inventory is not readily accessible.)

### Stack Parameters

6. I spot-checked Shell's stack parameters with the parameters used in the most recent modeling submittals by other applicants. Most of the values matched. Where differences were found, the values used by Shell are acceptable for an off-site inventory (i.e., they would likely result in a slightly more buoyant plume that would increase the potential for an overlapping impact with Shell's operations).

### Additional Comments

7. Shell did *not* include downwash in their off-site analysis. This is appropriate given the large distances between Shell's project area and the off-site sources. However, this approach may need to be re-evaluated if this data set is used by future applicants with tighter source-source distances.

8. The only documentation I saw regarding the regional (off-site) inventory is the attached e-mail. ***Shell should provide in their application (if they haven't already) a short description of the general method used to develop the regional inventory*** .

9. My review was extremely cursory – which is adequate given: a) the large source-to-source distances; b) the resulting expectation that the off-site impact constitutes a small fraction of the total impact (which Shell's consultant verbally confirmed); and c) Shell's very conservative approach of combining the off-site impact. However, a more thorough review may be warranted if this data set is used by future applicants with tighter source-source distances.

Please contact me if you have any questions.

Alan

---

Alan Schuler, P.E.  
Environmental Engineer  
Alaska Department of Environmental Conservation  
Voice: (907) 465-5112  
FAX: (907) 465-5129

**From:** Wong.Herman@epamail.epa.gov [mailto:Wong.Herman@epamail.epa.gov]  
**Sent:** Monday, August 17, 2009 9:25 AM  
**To:** Schuler, Alan E (DEC)  
**Subject:** Fw: ADEC Verification

Alan:

EPA met and discussed with Shell's consultants, ENVIRON, about the air quality impact analysis requirements for a proposed PSD source in the Beaufort Sea. As part of the PSD requirements, they have developed a nearby allowable and actual emissions inventory (including stack parameters) based on information and data from ADEC's web site and files. We have informed Shell that we would accept the emissions inventories and stack parameters if ADEC determines them to be adequate.

I understand that Shell's consultant has already contacted you about this review. From my perspective, it would be most efficient for you to work directly with Shell and their consultant, since they will be able to answer any questions you may have about their emission calculations and assumptions, and the stack parameters when they are missing.

EPA request ADEC's assistance in reviewing the Shell's project emission inventories and stack parameters. Once you have completed the review, please provide your conclusions directly to me, along with any supporting documentation.

Thanks,

Herman

----- Message from "Schuler, Alan E (DEC)" <alan.schuler@alaska.gov> on Fri, 21 Aug 2009 11:43:05 -0800 -----

**To:** Scott Winges <swinges@Environcorp.com>  
**cc:** Kirk Winges <kwinges@Environcorp.com>, "Schuler, Alan E (DEC)" <alan.schuler@alaska.gov>  
**Subject:** RE: Regional Emission Inventory

Scott,

I got waylaid on another project, so just got to your 8/20/09 e-mail now. Your write-up is very helpful.

Your explanation for item 4 has triggered some thoughts which I should have recalled and shared with you when you were in our office. Applicants frequently modeled the unrestricted SO<sub>2</sub>/PM-10 emissions in order to demonstrate compliance with the short-term standards/increments. For convenience, they used the same unrestricted SO<sub>2</sub>/PM-10 emissions for demonstrating compliance with the annual SO<sub>2</sub>/PM-10 standards/increments. This approach would be used even if there was an annual operating restriction imposed on the unit/source for NO<sub>x</sub> reduction purposes (either to protect the NO<sub>2</sub> std/inc, or to avoid PSD-major classification). This is probably why the modeled SO<sub>2</sub>/PM-10 emissions are inconsistent with the Title V emissions summary (which would reflect the SO<sub>2</sub>/PM-10 emissions as restricted by the annual limit).

I'm going to look at a couple of other items and then get back with you and Kirk.

Alan

**From:** Scott Winges [mailto:swinges@Environcorp.com]  
**Sent:** Thursday, August 20, 2009 2:51 PM  
**To:** Schuler, Alan E (DEC)  
**Cc:** Kirk Winges  
**Subject:** RE: Regional Emission Inventory

Hi Alan,

The regional emissions inventory has evolved into an extraordinarily complex series of spreadsheets. I will do my best to answer your questions here, but this is very complicated, so please feel free to call me to discuss any further questions or concerns about the regional emissions inventory.

#1

I may not have read this right, but I believe what you're looking for is a key to link sources taken from ADEC files (for potential emissions) to sources that were taken from the ADEC emission inventory (for actual emissions). For the sources that we took from the emission inventory, the tables (usually) give a description of the emission source. Unfortunately, the only key I have for the modeling files I received from you is the one I received from you when I came up to grab the files. The key is very old, and more often than not it is unhelpful for determining what these model ID's represent. Instead of analyzing these on a source by source basis, I typically analyzed the facility as a whole – looking specifically at facility wide potentials to emit.

#4

The answer your question #4 is extremely complicated, but I will do my best to explain the steps taken...

When I grabbed modeling files from ADEC I QA/QC'd them quite a bit since there were many discrepancies on how facilities were modeled (it was very common to find multiple modeling files in which a facility was modeled in several completely different manners - with different total emissions). One method I used to resolve this was to compare title 5 permit conditions with these modeling files – specifically their potentials to emit. If I could find that the sum of all emissions (for a given pollutant) was close to their potential to emit I would assume that these modeling files were accurate and up to date and would use them to represent the facility. Unfortunately, many times I could only find up to date modeling files for 1 pollutant – typically NO<sub>x</sub>. Since I primarily focused on NO<sub>x</sub> emissions when I came up there, most of our NO<sub>x</sub> files were complete and up to date. The PM10 files were a little less accurate, and the

SO2 files were even worse.

Many times the PM10 and especially the SO2 modeling files retrieved from ADEC represented a sum of emissions very different than the title 5 potential to emit. For instance, for the Central Compressor Plant example you brought up - if you were to add all the emissions up from the modeling files it would total (assuming we're looking at the same file) ~472 tons per year of SO2. The title 5 permit claims that the Central Compressor Plant has a maximum potential to emit of 147 tpy of SO2. Also, there were additional Central Compressor Plant sources modeled for NOx that were not included in these SO2 files. To deal with this issue, I first calculated the ratio of the facility's potential to emit for NOx to the facility's potential to emit for SO2. I then divided the potential NOx emissions (from the ADEC files that matched the title 5 permit) by the ratio of PTE NOx to SO2 to achieve potential SO2 emissions for each source - the sum of which is equal to the Title 5 permit potential to emit for SO2. I believe I did this for several facilities to achieve accurate emission totals.

I do not have a neat spreadsheet that documents all of these calculations. I have a couple "lovely" spreadsheets that document many calculations done for actual and potential emissions that we calculated, but this does not include the calculations done on ADEC files. If a spreadsheet documenting all of those calculations is needed I can provide it (with a little bit of time).

I uploaded reduced versions of the "lovely" spreadsheets to our ftp server so you can check them out. The two spreadsheets contain tons of calculations for each facility - so it might not be particularly easy to navigate, but it could be of use. You may access these on our ftp server at:  
<ftp://ftp.environ.org/pub/webaccess/Shell/>

Again, this is a complicated emission inventory - so please do not hesitate to call me (or email me) with any questions.

Cheers,  
-Scott

**Scott Winges | Associate**  
**ENVIRON International Corporation**  
**Direct: 425.412.1821 | Fax: 425.412.1840**  
[swinges@environcorp.com](mailto:swinges@environcorp.com)

---

**From:** Kirk Winges  
**Sent:** Thursday, August 20, 2009 1:02 PM  
**To:** Schuler, Alan E (DEC)  
**Cc:** Eric Hansen; Mark Schindler; Scott Winges  
**Subject:** RE: Regional Emission Inventory

Answers below in red

**Kirk Winges | Principal Consultant**  
ENVIRON International Corporation  
19020 33rd Avenue W, Suite 310  
Lynnwood, WA 98036  
V: 425.412.1813 | F: 425.412.1840

---

**From:** Schuler, Alan E (DEC) [mailto:[alan.schuler@alaska.gov](mailto:alan.schuler@alaska.gov)]  
**Sent:** Thursday, August 20, 2009 12:50 PM  
**To:** Kirk Winges  
**Cc:** Eric Hansen; Mark Schindler; Alan Schuler

**Subject:** RE: Regional Emission Inventory

Kirk,

I have a couple of questions/requests regarding Shell's Regional Inventory.

1. Contrary to what I said yesterday on the phone, I do need a key that links the various sets of model IDs used in Shell's spreadsheet. For example, there are two sets of Model IDs (along with different inventory counts) for the BP Central Compressor Plant. Please provide a key to reconcile the Model ID numbers.

I'll get Scott to put together a key for you. I'll try to have that to you later today.

2. Did Shell use annual emissions to model the *short-term* averaging periods, or did they use unrestricted emissions (which would be the proper way – unless there's a short-term operating limit)?

No, we used 2X times annual for short term. We literally had nothing to go on for short term, so that's best we could come up with.

3. Was BP's "Liberty" project included in the regional modeling analysis? I didn't see it, but given the size of the inventory, I may have overlooked it. (The Liberty project is a massive drill rig and turbine that will be located at Endicott).

No, it was not in there. We had no actuals for that source, only potentials.

4. I'm coming up with very different annual SO<sub>2</sub> emissions in many of my spot-checks (and in some cases, slightly different PM-10 emissions). For example, for model ID 801P (BP CCP) I'm coming up with an SO<sub>2</sub> PTE of 32 tpy based on BP's recently modeled emission rate of 0.92 g/s. Shell had 10 tpy (9.89 tpy to be exact). Please provide sample emission calculations, or the spreadsheets used to derive the emissions.

I will send you the ugly spreadsheet with all the calculations. Some of these discrepancies may result from access you have to modeling files and/or information we didn't have. Sometimes, we had conflicting info as well, and had to make a judgment call.

Thanks.

Alan

**From:** Kirk Winges [mailto:kwinges@Environcorp.com]

**Sent:** Friday, August 14, 2009 1:07 PM

**To:** Schuler, Alan E (DEC)

**Cc:** Eric Hansen; Mark Schindler

**Subject:** Regional Emission Inventory

Hi Alan:

As I indicated, I am providing our regional emission inventory for the Prudhoe Bay area. I have a much uglier spreadsheet that has all the calculations fed into it. It's barely small enough for email (about 9MB), but the main reason I haven't sent it is that it's very messy, with lots of notes and other stuff that might be confusing. If at some point you get involved and would like to see all the background details, I am happy to provide that.

Kirk

**Kirk D. Wings** | Principal Consultant

ENVIRON | [www.vironcorp.com](http://www.vironcorp.com)

19020 33rd Avenue W, Suite 310 | Lynnwood, WA 98036 USA

V: 425.412.1813 | M: 206.794.6010 | F: 425.412.1840 [kwinges@vironcorp.com](mailto:kwinges@vironcorp.com)

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----- Message from Kirk Wings <[kwinges@Environcorp.com](mailto:kwinges@Environcorp.com)> on Fri, 14 Aug 2009 13:07:17 -0800

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**To:** "Schuler, Alan E (DEC)" <[alan.schuler@alaska.gov](mailto:alan.schuler@alaska.gov)>

**cc:** Eric Hansen <[ehansen@Environcorp.com](mailto:ehansen@Environcorp.com)>, Mark Schindler <[mark.octane@me.com](mailto:mark.octane@me.com)>

**Subject:** Regional Emission Inventory

Hi Alan:

As I indicated, I am providing our regional emission inventory for the Prudhoe Bay area. I have a much uglier spreadsheet that has all the calculations fed into it. It's barely small enough for email (about 9MB), but the main reason I haven't sent it is that it's very mess, with lots of notes and other stuff that might be confusing. If at some point you get involved and would like to see all the background details, I am happy to provide that.

Kirk

**Kirk D. Wings** | Principal Consultant

ENVIRON | [www.vironcorp.com](http://www.vironcorp.com)

19020 33rd Avenue W, Suite 310 | Lynnwood, WA 98036 USA

V: 425.412.1813 | M: 206.794.6010 | F: 425.412.1840 [kwinges@vironcorp.com](mailto:kwinges@vironcorp.com)

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----- Message from Kirk Winges <kwinges@Environcorp.com> on Wed, 19 Aug 2009 15:56:11 -0800

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**To:** "Schuler, Alan E (DEC)"  
<alan.schuler@alaska.gov>

**Subject:** Input files

Here's a couple of model input files. One for PM10 actual emission and one for PM10 potential emissions.

### Kirk Winges | Principal Consultant

ENVIRON International Corporation  
19020 33rd Avenue W, Suite 310  
Lynnwood, WA 98036  
V: 425.412.1813 | F: 425.412.1840

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May 11, 2007

Natasha Greaves & Dan Meyer  
EPA Region 10  
Office of Air, Waste and Toxics (AWT-107)  
1200 Sixth Avenue  
Seattle, WA 98101

Gary Mendivil  
ACMP Coordinator  
Office of the Commissioner  
Alaska Department of Environmental Conservation  
410 Willoughby Avenue  
Suite 303  
Juneau Alaska 99801

Jeff Walker  
Regional Supervisor  
Minerals Management Service  
Alaska Regional Director  
3801 Center Point Drive, Suite 500  
Anchorage 99503-5823

Tom Chapple  
Air Quality Director  
Alaska Department of Environmental Conservation  
555 Cordova Street  
Anchorage, Alaska 99508

Ben A. Greene, PhD  
Oil, Gas and Energy Projects Manager  
Alaska Coastal Management Program  
Office of Project Management and Permitting  
Alaska Department of Natural Resources  
550 West 7th Avenue, Suite 705  
Anchorage, AK 99501-3559

Running Grass  
EPA Region 10  
Office of Environmental Justice  
1200 Sixth Avenue  
Seattle, WA 98101

Re: **Shell Offshore Inc. OCS Air Quality Comments**  
**2007-2009 Exploration Plan for an OCS Operation in the Beaufort Sea**  
30 CFR Part 250 (Minerals Management Service)  
40 CFR Part 55 (Environmental Protection Agency)  
11 AAC 110, 11 AAC 112, and 18 AAC 50 (State of Alaska)

Dear Ms. Greaves, Mr. Meyer, Mr. Mendivil, Mr. Walker, Mr. Chapple, Dr. Greene and Mr. Grass,

The North Slope Borough (NSB) provides the following comments on the Shell Offshore Inc. (Shell) OCS Air Permit Applications that were submitted to the Environmental Protection Agency on December 29, 2006, and supplemented on March 26, 2007, for the Beaufort Sea 2007-2009 OCS Exploration Drilling Program for the Shell Kulluk and Frontier Discoverer drilling units.

While EPA has issued the Shell Offshore Air Permit application for public comment, requesting input on compliance with EPA's regulations for OCS air emission sources under EPA's regulations at 40 CFR 55, the NSB is also providing comments on the air permit to MMS and ADEC to address compliance with MMS's federal regulations at 30 CFR Part 250, and the State of Alaska's regulations at 11 AAC 112, 11 AAC 110, and 18 AAC 50 for OCS air emission sources. EPA and MMS both have an obligation to meet the 1994 Executive Order 12898 on Environmental Justice. These comments have been submitted to EPA and MMS to address the NSB's Environmental Justice concerns as well.

All four agencies that have regulations that apply to the review and approval of OCS air pollution. Each agency is responsible for specific actions. The NSB has provided its comments to all four agencies, because there is a need for a coordinated effort for this air permit review. The NSB has found a number of areas in which one agency assumes that another is addressing their requirements, or interpreting their regulations correctly, but they are not. The NSB requests a coordinated review take place, and each agency ensure that their statutory and regulatory obligations are met on this project.

### **Summary of NSB's Comments**

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Overall, the NSB finds that Shell's air permit application does not meet EPA's, MMS's or ADEC's OCS air emission regulations, nor does it meet the obligations of the Clean Air Act. The NSB's key concerns are summarized in the list below, followed by a more detailed explanation.

1. MMS, ADEC and EPA did not hold a meaningful public process to obtain input from residents to meet their Environmental Justice, tribal, government-to-government and Coastal Zone Management Act obligations.
2. The permit application is based on scant data and models which have not been validated under arctic conditions, with no monitoring data whatsoever in the area of concern.
3. The lack of site specific monitoring and meteorologic data requires state and federal agencies to use conservative assumptions in permitting this project to ensure human health and the environment are protected; however, conservative assumptions have not been used introducing risk and concern. A conservative and regulatory sound approach would be to permit this project as a major source of air pollution, adhering to the rigors of the Clean Air Act.
4. The operations proposed by Shell will produce substantial air pollution, close to population centers such as Kaktovik, Nuiqsut and Barrow, and within very commonly used subsistence corridors. Air pollution in the Arctic is much more significant than in a more temperate region. The arctic region is subject to extreme atmospheric inversions, which results in the pollution being trapped in a mixing layer only a few feet above the surface. The health impact is thus likely to be much more substantial in the Beaufort Sea even at much lower levels of pollution than urban areas.
5. Shell's definition of an OCS source is not consistent with the Clean Air Act. The OCS source is the drill ship, not the drill site. Nothing in the Clean Air Act (CAA) defines an OCS source as a single exploration well site.
6. Nothing in state or federal law defines an OCS source as a drill site.

7. Shell has applied for a minor source air permit for each and every drill site they plan to explore over the next three years (2007-2009), to avoid the rigors of obtaining a major source air permit for each drilling ship. Shell should be applying for a major source air permit for each OCS source (drill ship).
8. Shell's exploration operations meet the definition of major source of air pollution under 40 CFR 55.2, which defines an OCS source as any equipment, activity, or facility which (1) emits or has the potential to emit any air pollutant, (2) is regulated or authorized under the OCS Lands Act, and (3) is located on the OCS or in or on waters above the OCS.
9. All of Shell's proposed operations meet the definition of a major source of air pollution because they are located on one or more of their contiguous or adjacent OCS leases, are under the control of the same company, and fall under the same Standard Industrial Code.
10. Shell proposes to avoid major source review to avoid baseline air quality monitoring data collection. The lack of baseline data collection adversely impacts the air pollution modeling results.
11. Shell proposes to avoid major source permitting to avoid the requirement to review and install the best available air pollution control technology on its OCS air pollution sources. This circumvents the fundamental goal of the Clean Air Act, which is pollution prevention.
12. Although seeking to avoid a "major source" designation may be expeditious for Shell from a business perspective, it is a flagrant and grievous violation of the principles of environmental justice. Given the already distressing increases and alarmingly high rates of pulmonary disease and cancer, our population warrants a particularly cautious regulatory approach to prevent further incremental degradation of our health.
13. Alaska State regulations for portable oil and gas operations were developed to permit land based oil and gas drilling rigs mounted on wheels to be driven from one well site to another on the North Slope. Nothing in the background for developing the portable oil and gas operations contemplated applying these regulations to drill ships or major OCS sources of air pollution.
14. EPA's public notice states that Alaska Regulations at 18 AAC 50.502(c)(2) require OCS sources to obtain a minor permit from EPA before commencing operation. Nothing in 18 AAC 50.502(c)(2) address an OCS drill ship or specifically states that an OCS drill ship is required to obtain a minor source permit.
15. EPA's January 12, 2007 EPA Guidance Memo directs air permitting authorities to begin their analysis by evaluating whether each individual surface site qualified as a separate stationary source. In Shell's case, each individual surface site does not qualify as a separate source, because the OCS source is the drill ship.
16. EPA's January 12, 2007 EPA Guidance Memo directs air permitting authorities to use a major source determination for oil and gas operations that (1) reasonably carries out the purposes of PSD, (2) approximates a common sense notion of a plant, and (3) avoids aggregating pollutant-emitting activities that as a groups would not fit in the ordinary meaning of building, structure, facility, or installation.
17. Shell should revise its air permit applications to include all of the drill ship emissions (and associated support vessels and equipment) into a single major source permit application to

reasonably carry out the purposes of PSD, and ensure best available pollution control equipment is installed when operating in the Beaufort Sea.

18. A drill site does not approximate a common sense notion of a plant. A plant is the combustion source, which is the drill ship. A drill site itself is not a "plant;" it is a location.
19. The emissions from a drill ship fit in the ordinary meaning of structure, facility, or installation. A drill site does not. A drill site is a location on a lease. A drill site is not a structure; it is not a facility; it is not an installation.
20. There are a number of areas in which one agency assumes that another is addressing the requirements or interpreting the regulations correctly, but they are not. A coordinated review should be carried out so that each agency is accountable for assuring regulatory compliance.
21. MMS' air pollution control regulations at 30 CFR 250 are not equivalent to EPA's regulation at 40 CFR 55. MMS has not demonstrated that the requirements of 30 CFR 250 have been met.
22. EPA's regulations at 40 CFR 55 do not relieve MMS of its obligation to address air pollution under 30 CFR 250.
23. MMS' regulations at 30 CFR 250.218(a)(1) require Shell's Exploration Plan to include the: projected peak hourly emissions; total annual emissions in tons per year; emissions over the duration of the proposed exploration activities; frequency and duration of emissions; and total of all emissions. This information is not found in the EPA air permit, nor has MMS evaluated it during the NEPA review, or during approval of Shell's Exploration Plan.
24. MMS' federal regulations 30 CFR 250 still exist and apply to OCS sources in the Beaufort Sea. MMS' regulations at 30 CFR 250.218 were not repealed when the EPA issued OCS regulations at 40 CFR 55.
25. Nothing in federal or state air pollution law or regulation establishes a 500 meter distance for aggregating or not aggregating pollution from OCS sources. The EPA's proposed use of 500 meters in determining whether air pollution must be aggregated for the purpose of major source classification is arbitrary and capricious. The Clean Air Act defines an OCS source as a drill ship and all other OCS support activities within a 25 mile radius. EPA can not redefine Congressional intent through a single permitting action.
26. Shell asserts in its permit applications at Section 3.2 that ADEC has no direct authority over the review and approval of the Shell project and its air permit. This is incorrect.
27. Shell's proposed project does not meet the requirements of 11 AAC 110 and 112, because it does not comply with all federal and state air quality laws and regulations.
28. In 1993, the Kulluk was determined to be a major OCS source, under the EPA's PSD regulations and MMS' OCS exploration approvals. ARCO was the operator of the Kulluk, and was required to complete a comprehensive major source air permit application, ambient air quality modeling assessment, BACT evaluation and human health impact assessment.
29. In 1993, ARCO estimated 120 days of Kulluk operation, along with its support vessels, would produce over 2,300 tons of NO<sub>x</sub> and over 260 tons of Carbon Monoxide (CO) Both pollutants exceeded the 250 ton PSD permit threshold for a major source. Surprisingly, Shell estimates the Kulluk drill ship emissions at 245 tons of NO<sub>x</sub> and over 82 tons of

Carbon Monoxide (CO). It is not reasonable for one operator, ARCO to be required to permit the Kulluk as a major source of air pollution in 1993, and later to permit the Kulluk as a minor source of air pollution for a very similar Exploration Plan in 2007.

30. The scope of Shell's air permit approval and application is not clear. Site specific data is missing for most years, and it is unclear if Shell is requesting a three (3) or five (5) year permit.
31. There are a number of deficiencies in Shell's emission inventory which are listed below:
  - Shell's emission inventory does not meet MMS' regulations at 30 CFR 250, because it does not include the total emissions over the duration of the proposed exploration activities, examine the impacts of small particulate matter, or does it examine particulate emissions at 2.5 microns or less (PM<sub>2.5</sub>).
  - It is not clear if Shell is proposing to conduct well tests flow back oil or flare gas.
  - The emission inventory does not address sources of emission that vent directly to atmosphere.
  - Shell has not included the emissions from a potential relief well.
  - It is unreasonable to issue a permit for 59 days of operation when the applicant clearly has stated that drilling could continue for 75 days or more per well if ice conditions or unanticipated drilling issues arise.
  - Shell has not estimated the potential to emit (PTE) for the ice breaker combustion sources assuming heavy ice conditions which can reasonably be expected during later September, October, and November in the Beaufort Sea. Shell bypassed the PTE requirements and immediately sought to avoid the rigors of a PSD major source permit, by proposing to reduce operating hours on units on an "assemblage of reasonable maximum activity levels."
  - Shell's emission inventory for the Kulluk drill ship and its associated support vessels of 245 tons of oxides of nitrogen (NO<sub>x</sub>), just barely falls below the PSD threshold for a major source permit of 250 tons. There is little room for error in this emission estimate. The total emissions can easily exceed 250 tons, at any single well if it takes longer than 59 days to drill, heavy ice conditions are encountered, if any of Shells operating restriction assumptions are incorrect, or if a relief well is required.
  - Shell's emission inventory for the Kulluk drill ship and the Discoverer Drill Ships should include a cumulative total of all emissions required to drill the exploration wells planned on a calendar year. Total drill ship emissions for each ship, on a yearly basis, exceed the PSD threshold for a major source permit of 250 tons by several magnitudes. A minor source permit is inappropriate for these large industrial sources of air pollution.
  - Shell's application excludes emissions from the Bow Thruster Diesel engine when it is used to move the supply boat (Jim Kilabuk) next to the drill ships. However, this clearly contradicts the CAA requirement to include all support vessel emissions in the emission inventory if they are operating within 25 miles of the OCS source.
  - Shell does not provide a historical operating basis for the operating hours or equipment use assumptions used in its application. The NSB requests that agencies require Shell to provided operating records for the Kulluk and Discoverer to verify combustion source usage requirements in similar previous exploration wells, so that the agencies and public

can determine if the operating hours and usage restrictions proposed by Shell are realistic and appropriate.

- Shell has not properly inventoried or modeled carbon monoxide emissions for units that will be operated at low loads, where carbon monoxide emissions will be elevated.
- Shell's emission estimates for 2007 are inconsistent with the emission estimates for 2008 and 2009. While Shell purports that its operating hour estimates are realistic for 2007 based on a maximum operating timeframe of 60 days at a drill site, it does not provide any technical rationale to support the proposed reduction to 43 days per drill site in 2008 and 2009.
- Shell's ambient air quality analysis is not site-specific, does not include the maximum potential to emit for all combustion sources included in the OCS source definition, does not use appropriate background monitoring data for all OCS source locations, does not use an EPA approved meteorologic data set, and is based on a simple single pollution stack screening model, rather than a site specific, multiple stack emission model.
- Shell's air pollution modeling approach is not site-specific and does not meet the technical quality required by the EPA or MMS on past OCS exploration projects in the Beaufort Sea using the Kulluk.
- Shell's application lacks data to adequately assess human health impacts to our coastal communities, and to subsistence hunters and subsistence resources that will be located downwind of Shell's large industrial pollution source.
- Shell's application does not include all required supporting technical information.
- Shell's application estimates hazardous air pollutants at a drill site level, but not at an OCS source level. In addition to this error, Shell's application does not provide hazardous air pollutant emission estimates for sources vented to atmosphere; Shell only provides estimates for combustion sources.

Attached are NSB's detailed comments supporting these conclusions.

To discuss these comments, please contact Gordon Brower (907) 852-0440, or in his absence during whaling season, please contact Martha Falk at the same number. The NSB requests a written response to our comments and concern by each agency addressed on this letter, and an opportunity for the NSB to review the responses and discuss them prior to any permits or approvals being issued on this project.

Sincerely,

Johnny Aiken  
Director

Enclosure: Attachment No.1; NSB's Detailed Air Quality Comments

Cc: NSB Mayor Edward S. Itta  
Karla Kolash, NSB Mayors Special Assistant  
Gordon Brower, NSB Land Management Regulations  
Taquik Hepa, NSB Wildlife Department  
Bessie O'Rourke, NSB Law Department  
Layla Hughes, NSB Law Department  
Harvey Consulting, LLC.  
City of Pt. Lay  
City of Pt. Hope  
City of Wainwright  
City of Atkasuk  
City of Anaktuvuk Pass  
City of Barrow  
City of Kaktovik  
City of Nuiqsut  
Alaska Eskimo Whaling Commission  
Inupiat Community of Arctic Slope (IRA)  
Native Village of Barrow Inupiat Traditional Government  
Native Village of Nuiqsut  
Native Village of Kaktovik  
Village of Wainwright  
Point Lay Tribal Council (IRA)  
Native Village of Point Hope  
Richard Albright, EPA Region 10  
Nancy Helm, EPA Region 10  
Running Grass, EPA Region 10  
John Goll, MMS Director, Anchorage  
Tom Chapple, ADEC Air Quality Director, Anchorage  
Ben A. Greene, PhD, ADNR, Anchorage  
Glenn Gray and Associates  
Dr. Aaron Wernham



**BEFORE THE ENVIRONMENTAL APPEALS BOARD  
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
WASHINGTON, D.C.**

IN THE MATTER OF:	)	Appeal No. PSD 10-
	)	
SHELL GULF OF MEXICO INC. and	)	PSD Approval No.
SHELL OFFSHORE INC.	)	R10OCS/PSD-AK-09-01
	)	

**Declaration of Megan Williams**

I, Megan M. Williams, hereby declare as follows:

1. I have a Master of Science degree in Air Resources Management from the Nelson Institute for Environmental Studies at the University of Wisconsin, Madison. I have a Bachelor of Science degree in Applied Mathematics, with an emphasis in Mechanical Engineering, from the College of Engineering and Applied Sciences at the University of Colorado, Boulder.

2. I have over ten years of experience working on air quality issues. Previously, I worked at the U.S. Environmental Protection Agency (EPA) from January of 1998 through November of 2002. While at the EPA, I lead the Region 8 program for nonattainment new source review and prevention of significant deterioration policy development and planning, reviewed state implementation plan revisions related to new source review permitting, contributed to air quality dispersion modeling analyses, and co-lead a national working group to re-examine agency policy on defining “baseline areas” under the Clean Air Act.

3. Prior to that, I managed EPA Region 8’s Indoor Air Quality Program, providing technical assistance and outreach to schools, state/local officials and the general public on indoor air quality management techniques and managing research projects to assess indoor air quality interventions. As an air permit engineer at the State of Wisconsin’s Department of Natural Resources from August 1995 to December 1997, I wrote Title V operating permits for various sources in northwest Wisconsin.

4. Currently, and for the past seven years, I have been an independent Air Quality Consultant, providing a variety of technical and policy analyses related to national, regional and local air quality and energy issues to various non-profit and government organizations.

5. I have reviewed Shell Offshore Inc. /Shell Gulf of Mexico’s (Shell) applications for permits under the Clean Air Act for both the company’s Beaufort and Chukchi Sea

operations, as well as the Environmental Protection Agency’s (EPA) statements of basis, EPA’s response to comments, and draft and final Prevention of Significant Deterioration (PSD) permits for these operations.

6. Shell’s operations in the Chukchi and Beaufort Seas are substantially similar in terms of the equipment and vessels being used and the controls being applied. The calculated potential to emit (PTE) from Shell’s operations are documented in EPA’s statements of basis for the PSD permits and reproduced in this chart, in tons per year (TPY):

Pollutant	Significance thresholds for emissions [TPY]	Chukchi PTE [TPY]	Beaufort PTE [TPY]
CO	100	449	464
NO <sub>x</sub>	40	1,188	1,371
PM	25	260	81
PM <sub>2.5</sub>	10	52	57
PM <sub>10</sub>	15	58	65
SO <sub>2</sub>	40	2	2
VOC	40	87	96
Lead	0.6	0.11	0.111
Ozone	40 for precursors VOC or NO <sub>x</sub>	See VOC and NO <sub>x</sub>	See VOC and NO <sub>x</sub>

7. In addition, I have reviewed all the other documents cited or referred to in this declaration and ensured they were provided to EPA during the public comment period. I make this declaration based upon my own personal knowledge.

***Potential Impacts to Coastal Communities***

8. Shell’s proposed exploration activities in the Chukchi Sea are predicted to result in substantial pollutant concentrations within approximately 100 kilometers of the North Slope communities of Wainwright and Point Lay. According to the modeling completed for Shell’s PSD permit application, its exploration activities will result in concentrations of NO<sub>x</sub> at Wainwright and Point Lay that exceed the Significance Level established by regulation in 30

CFR 250.303(e).<sup>1</sup> Therefore, a full impact analysis is required in order to adequately determine the cumulative impacts of the proposed emissions along with all other emissions that impact the same areas impacted by the exploration activities.

9. EPA's re-proposed Statement of Basis for Shell's Chukchi Sea exploration drilling program presents modeling results for assessed impacts to these local communities (Table 5-13). Of significance, fine particulate matter (PM<sub>2.5</sub>) concentrations at Wainwright and Point Lay are already at almost three-quarters of the short-term National Ambient Air Quality Standards (NAAQS) with Shell's contribution consuming ten percent of the total concentration at both locations. Shell's operations contribute to increased concentrations of PM<sub>2.5</sub> in these communities. Shell's operations also contribute to increased concentrations of PM<sub>10</sub> in these communities, where short-term PM<sub>10</sub> concentrations are already at 78% of the NAAQS in both Wainwright and Point Lay.

10. Shell's proposed exploration activities in the Beaufort Sea are predicted to result in substantial pollutant concentrations within approximately 13, 36 and more than 50 kilometers from the North Slope communities of Kaktovik, Badami and Nuiqsut, respectively. According to Shell's exploration plan (EP), "[t]he preliminary air quality impact analysis shows that Shell will exceed the Significant Impact Levels (SILs) at the Beaufort Sea shoreline." EP at 207. Therefore, a full impact analysis is required in order to adequately determine the cumulative impacts of the proposed emissions along with all other emissions that impact the same areas impacted by the exploration activities.

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<sup>1</sup> See Table 5-13 in EPA's Re-Proposed Statement of Basis for the proposed OCS/PSD Permit No. R10OCS/PSD-AK-09-01. Predicted annual average NO<sub>2</sub> concentrations are 1.7 µg/m<sup>3</sup> at Wainwright and 1.8 µg/m<sup>3</sup> at Point Lay (compared with EPA's 1 µg/m<sup>3</sup> significance level). No significant ambient impact concentrations have been established for PM<sub>2.5</sub>.

11. EPA's proposed Statement of Basis for Shell's Beaufort Sea exploration drilling program presents modeling results for assessed impacts to these local communities (Tables 5-25, 5-26 and 5-27). Of significance, PM<sub>2.5</sub> concentrations at Kaktovik - with no modeled onshore source contribution - are over half of the short-term NAAQS with Shell's contribution alone consuming almost a quarter of the short-term NAAQS (24%) at this location. Predicted PM<sub>2.5</sub> concentrations at Badami and Nuiqsut - including modeled onshore source contributions at Badami only - consume 45% and 41% of the short-term NAAQS, respectively. Shell's operations - particularly near Kaktovik where they contribute almost half of the total impact - contribute to increased concentrations of PM<sub>2.5</sub> in these communities.

12. The EPA has been regulating PM<sub>2.5</sub> since 1997 and recently lowered the short-term NAAQS for PM<sub>2.5</sub> from 65 µg/m<sup>3</sup> to 35 µg/m<sup>3</sup> because scientific information showed that the pollutant is a health concern at levels lower than what the previous standard allowed.<sup>2</sup> Even PM<sub>2.5</sub> concentrations lower than the current NAAQS are a concern for human health. In fact, the Clean Air Scientific Advisory Committee (CASAC) - appointed by the EPA Administrator to recommend revisions to the existing standards, per section 109(d)(2) of the Clean Air Act - in their letter to the EPA on the revised PM<sub>2.5</sub> standard, unanimously recommended that the 24-hr PM<sub>2.5</sub> standard be lowered from 65 µg/m<sup>3</sup> to 30-35 µg/m<sup>3</sup> and that the annual standard be lowered from 15 µg/m<sup>3</sup> to 13-14 µg/m<sup>3</sup>.<sup>3</sup> EPA set the standard on the high end of the CASAC recommended range for the short-term standard and chose not to lower the annual standard at all. In response, CASAC made it clear in their September 29, 2006 recommendation letter to the EPA that their recommendations were based on "clear and convincing scientific evidence" and

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<sup>2</sup> 71 FR 61144, effective December 18, 2006.

<sup>3</sup> EPA-CASAC-LTR-06-003, Clean Air Scientific Advisory Committee Recommendations Concerning the Final National Ambient Air Quality Standards for Particulate Matter, September 29, 2006.

that the EPA’s decision not to lower the annual standard does not provide for “an adequate margin of safety ... requisite to protect the public health” as required by the CAA and, furthermore, that their recommendations were “consistent with the mainstream scientific advice that EPA received from virtually every major medical association and public health organization that provided their input to the Agency”.

13. Rates of chronic lung disease on the North Slope are dramatically higher than the general U.S. population.<sup>4</sup> Relying solely on compliance with the NAAQS risks increasing a pre-existing health disparity between the North Slope population and human populations elsewhere. In fact, the Nation’s leading health objective, as articulated by the Department of Health and Human Services’ Healthy People 2010 initiative, is “the elimination of health disparities.”<sup>5</sup> Given the affected population and significant scientific controversy regarding the level of the PM<sub>2.5</sub> NAAQS, relying solely on this measure to protect human health may not be sufficient. The fact that the EPA has set the PM<sub>2.5</sub> standards at levels that are not adequate to protect human health should result in the agency performing additional analyses – including consideration of secondary PM<sub>2.5</sub> formation - before approving a PSD permit including an environmental justice analysis where necessary.

***Secondary Pollutant Formation – Particulate Matter***

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<sup>4</sup> Beaufort Sea and Chukchi Sea Planning Areas, Oil and Gas Lease Sales 209, 212, 217, and 221 OCS EIS/EA MMS 2008-0055, Draft Environmental Impact Statement, p. 3-232.

<sup>5</sup> “*Healthy People 2010*, a broad-based collaborative effort among Federal, State, and Territorial governments, as well as hundreds of private, public, and nonprofit organizations, has set national disease prevention and health promotion objectives to be achieved by the end of this decade ([www.healthypeople.gov](http://www.healthypeople.gov)). The effort has two overarching goals: to increase the quality and years of healthy life and **to eliminate health disparities**. *Healthy People 2010* features 467 science-based objectives and 10 Leading Health Indicators, which use a smaller set of objectives to track progress toward meeting *Healthy People 2010* goals.” [Emphasis added] See <http://www.healthypeople.gov/LHI/Priorities.htm>.

14. Particulate matter pollution is a mixture of soot, smoke and tiny particles formed in the atmosphere from sulfur dioxide (SO<sub>2</sub>), nitrogen oxides (NO<sub>x</sub>) and ammonia (NH<sub>3</sub>). Fine particles (PM<sub>2.5</sub>) contain microscopic solids or liquid droplets that are so small they can get deep into the lungs and even into the bloodstream, bypassing the body's defense systems. They are implicated in thousands of premature deaths each year. Fine particles such as black carbon may have significant impacts on climate change, especially in the Arctic region.

15. In addition to primary PM<sub>2.5</sub> emissions (directly emitted from combustion point sources and from fugitive emissions sources), emissions of NO<sub>x</sub>, VOCs, SO<sub>2</sub> and ammonia can form, after being emitted into the atmosphere, into PM<sub>2.5</sub> and this can potentially be a significant component of ambient PM<sub>2.5</sub> concentrations.<sup>6</sup> While primary PM<sub>2.5</sub> emissions are generally a localized issue, secondary PM<sub>2.5</sub> emissions can occur on a more regional scale. Secondary PM<sub>2.5</sub> formation could be especially important considering the fact that the modeling results presented in the Statements of Basis for Shell's air permits predict PM<sub>2.5</sub> concentrations at over 84 percent of the 24-hour NAAQS and are barely within the appropriate margin of error when considering the accuracy of the data inputs for the analysis.<sup>7</sup>

16. The fraction of PM<sub>2.5</sub> concentrations in the ambient air that is due to the secondary formation of PM<sub>2.5</sub> (*e.g.*, sulfates and nitrates), as opposed to directly emitted [primary] PM<sub>2.5</sub> (*e.g.*, as a product of combustion) is dependent on many factors. However, the presence of strong temperature inversions that limit dispersion contribute to the formation of secondary PM<sub>2.5</sub> in the atmosphere and can increase secondary PM<sub>2.5</sub> formation. PM<sub>2.5</sub> concentrations, therefore, can be due to gaseous pollutants that form fine particles after reacting with other compounds in the air during meteorological inversions and it is important to consider

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<sup>6</sup> See Damberg, Policies for Addressing PM 2.5 Precursors.

<sup>7</sup> EPA Re-Proposed Stmt of Basis at Table 5-12.

these PM<sub>2.5</sub> precursor sources (*e.g.*, NO<sub>x</sub> from the diesel combustion sources associated with Shell's exploration drilling programs) when looking at overall PM<sub>2.5</sub> impacts. Because of the presence of strong temperature inversions on the North Slope, the contribution from secondary PM<sub>2.5</sub> to total PM<sub>2.5</sub> concentrations from the permitted sources on the OCS needs to be considered. Secondary PM<sub>2.5</sub> is an important, yet unidentified, component of Shell's air emissions.

17. The Environmental Protection Agency's Support Center for Regulatory Atmospheric Modeling (SCRAM) provides various resources for modeling the impacts of secondary PM<sub>2.5</sub> emissions. SCRAM is a resource that EPA could have relied upon for guidance in analyzing secondary PM<sub>2.5</sub> formation. Additionally, EPA's recently-developed model based on the Community Multi-scale Air Quality (CMAQ) model, which was used in support of the development of the PM<sub>2.5</sub> NAAQS, has been shown to "reproduce the results from an individual modeling simulation with little bias or error" and "provides a wide breadth of model outputs, which can be used to develop emissions control scenarios".<sup>8</sup> The Comprehensive Air quality Model with extensions (CAMx) is another tool available to assess secondary PM<sub>2.5</sub> formation. CAMx has source apportionment capabilities and can assess a wide variety of inert and chemically reactive pollutants, including inorganic and organic PM<sub>2.5</sub> and PM<sub>10</sub>. The Regional Modeling System for Aerosols and Deposition (REMSAD) can also model concentrations of both inert and chemically reactive pollutants on a regional scale, "including those processes relevant to regional haze and particulate matter". These are just some examples of current models with the capability to assess secondary PM<sub>2.5</sub> impacts.

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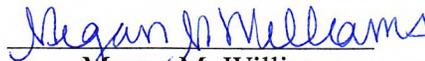
<sup>8</sup> See Technical Support Document for the Proposed PM NAAQS Rule.

18. There have been several oil and gas Environmental Impact Statements that have already used (or are using) CMAQ or CAMx to estimate PM<sub>2.5</sub> concentrations. The Uinta Basin Air Quality Study in Utah and the Four Corners Air Quality Group Modeling Project in Colorado are examples of completed modeling studies of this type.<sup>9</sup> And both the Continental Divide and Hiawatha EISs in Wyoming are examples of NEPA projects using grid modeling to assess PM<sub>2.5</sub> concentrations.<sup>10</sup>

19. Knowledge of the secondary PM<sub>2.5</sub> component is critical to understanding the best way to mitigate potential PM<sub>2.5</sub> impacts from Shell's operations.

Pursuant to 28 U.S.C. § 1746, I declare under penalty of perjury that the foregoing is true and correct, to the best of my knowledge.

Dated: April 30, 2010

  
Megan M. Williams

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<sup>9</sup> See Uinta Basin Air Quality Study (UBAQS) News Release (Attachment 5); Four Corners Air Quality Task Force Modeling Information (Attachment 6).

<sup>10</sup> See, Continental Divide EIS documents (available at [http://www.blm.gov/wy/st/en/info/NEPA/rfodocs/cd\\_creston.html](http://www.blm.gov/wy/st/en/info/NEPA/rfodocs/cd_creston.html)) and Hiawatha EIS documents (available at <http://www.blm.gov/wy/st/en/info/NEPA/rsfodocs/hiawatha.html>).



AIR SCIENCES INC.

DENVER • PORTLAND

**Outer Continental  
Shelf  
Pre-Construction  
Air Permit Application  
Revised**

**Frontier Discoverer  
Chukchi Sea  
Exploration  
Drilling Program**

PREPARED FOR:  
SHELL OFFSHORE INC.

PROJECT NO. 180-15  
FEBRUARY 23, 2009

Exhibit 15  
AEWC & ICAS

## BASELINE CONCENTRATIONS

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When comparing a project's impact to the NAAQS, an ambient background concentration is needed. The background concentration represents impacts from natural and anthropogenic sources not included in the impact modeling analysis. The Shell Burger Prospect drill site location on the Alaska OCS will be far (90 kilometers) from the Alaska shoreline and away from significant sources of pollution so that existing air quality concentrations can be represented with a regional value. According to the Guideline on Air Quality Models (40 CFR 51, Appendix W, Section 8.2.2c), if there are no monitors located in the vicinity of the source, a "regional site" may be used to determine background concentrations. A "regional site" is one that is located away from the area of interest, but is impacted by similar natural and distant man-made sources. Shell asserts that the data collected as part of both BP's Arctic North Slope Eastern Region (ANSER) monitoring program (near the BP Badami facility in 1999) and the Shell/CPAI Wainwright monitoring program represent regional background concentrations. While the Badami data sets are more than three years old, there has been little or no industrial or residential growth within a 25-kilometer radius of this station since the data were collected that would make these data sets unrepresentative of present-day conditions.

Shell and CPAI began monitoring NO<sub>2</sub>, PM<sub>2.5</sub>, PM<sub>10</sub>, SO<sub>2</sub>, CO, and O<sub>3</sub> concentrations at Wainwright, Alaska in November 2008. The Wainwright and Badami monitoring stations are both remotely located (minimal influence of industry and other human activities) and are the most representative "regional sites" on the North Slope for estimating offshore monitoring concentrations. A map of the ambient monitoring stations on the North Slope is provided in Figure 6-1. Shell utilizes available Wainwright monitoring data (beginning in November 2008 through December 2008) to demonstrate that the ANSER baseline data are in-fact regionally representative (or higher than) the Chukchi Sea. Shell will submit Wainwright ambient data through April 2009 to verify that the Badami data set is representative of the Wainwright and Chukchi baseline. Impact modeling results in Section 7 show that with these estimates of baseline the NAAQS are met and that even with a significant increase, the standards would still be met.

Because Badami is a regional site with an entire year of data, Shell utilizes the maximum measured concentrations from both the Wainwright station and Badami station to represent Chukchi Sea baseline concentrations.



**North Slope Monitoring Station Map**  
Damiana, Thomas to: Herman Wong

09/22/2009 10:43 AM

History: This message has been replied to.

Herman,

Attached is a full north slope map showing the monitoring station locations. Hope this is closer to what you were looking for. Please let me know if you are looking for something different and I will see what I can do.

Tom

**Tom Damiana**

Meteorologist/Engineer, Air Quality, Mountain/Southwest Region  
AECOM Environment  
D 970.530.3465  
[thomas.damiana@aecom.com](mailto:thomas.damiana@aecom.com)

**AECOM**

1601 Prospect Parkway  
Fort Collins, Colorado 80525-9769  
T 970.493.8878 F 970.493.0213

[www.aecom.com](http://www.aecom.com)

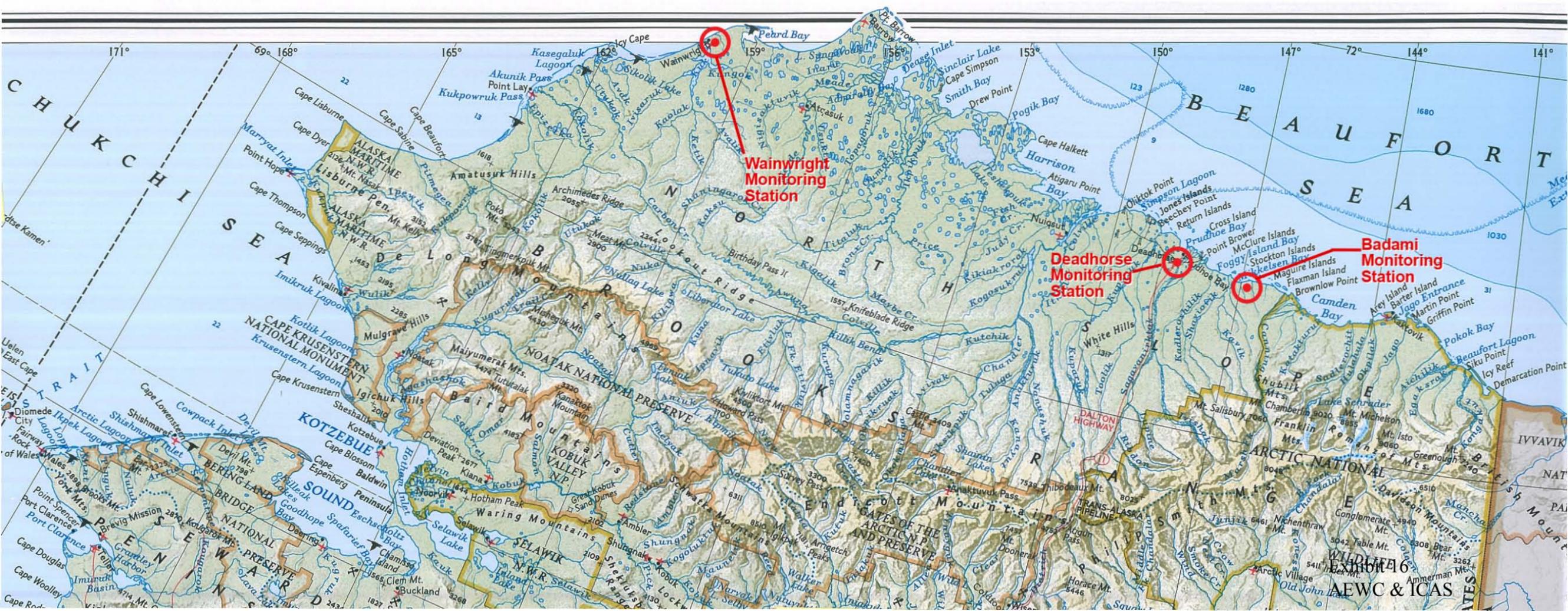
Please note: My e-mail has changed to [thomas.damiana@aecom.com]. Please update your address books accordingly. ENSR's parent company, AECOM Technology Corporation, is evolving to better serve its global clients. AECOM is forming a global business line – AECOM Environment – by utilizing the skills and capabilities from across its global environmental operations, including resources from ENSR, Earth Tech, STS and Metcalf & Eddy. AECOM Environment is devoted to providing quality environmental services to its global clients. With access to approximately 4,200 staff in 20 countries, AECOM Environment will be one of five new AECOM business lines, which also include AECOM Water, AECOM Transportation, AECOM Design, and AECOM Energy.

AECOM Environment provides a blend of global reach, local knowledge, innovation, and technical excellence in delivering solutions that enhance and sustain the world's built, natural, and social environments. Though our appearance is changing, our commitment to the success of your projects and your organization remains strong. We will keep you apprised of future details.

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## PM2.5 Collocated Sampling

**Herman Wong** to: Damiana, Thomas

Cc: Christopher Hall, Ann Williamson, Janis Hastings

07/27/2009 12:47 PM

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History: This message has been forwarded.

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Tom:

Following up on our earlier telephone conversation, EPA requests that a collocated PM2.5 sampler be located at one of your network monitoring sites or at a new site in the North Slope pursuant to 40 CFR Part 58. It is also my understanding that you will speak with Chris Hall to work out the details which includes:

1. Every three or six day sampling,
2. FEM with FRM, and
3. Expected installation date and start of data collection.

As I understanding it, PM10 collocated sampling is not necessary.

Thanks for working with us on this issue.

Herman



RE: Deadhorse Precision & Bias goals 

Christopher Hall to: Damiana, Thomas

12/09/2009 09:34 AM

Cc: "DeBell, Linsey"

Bcc: Denise Gertis

History: This message has been forwarded.

Tom,

I am not questioning the way you analyzed the State data set. Please take a look at the updated test worksheet (attached). I would suspect you would agree that these instruments were not in agreement even though the MQO goals are being met.

I will call you shortly.

Chris



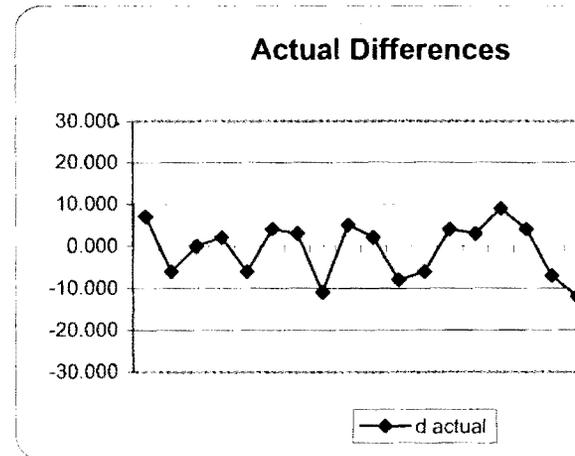
AECOM stddev bias equations.xls

## PM<sub>2.5</sub> Absolute Bias

Site ID: {Enter Site ID}	Pollutant type: PM <sub>2.5</sub> (Absolute Bias) - d calculated using actual differences						Bias (%)
Meas Val (Y)	Audit Val (X)	d actual	25th Percentile	d <sup>2</sup>	d	d  <sup>2</sup>	
9	2	7.000	-7.000	49.000	7.000	49.000	
4	10	-6.000	75th Percentile	36.000	6.000	36.000	
1			4.000				
4	2	2.000		4.000	2.000	4.000	
3	9	-6.000		36.000	6.000	36.000	
6	2	4.000		16.000	4.000	16.000	
5	2	3.000		9.000	3.000	9.000	
4	15	-11.000		121.000	11.000	121.000	
7	2	5.000		25.000	5.000	25.000	
4	2	2.000		4.000	2.000	4.000	
4	12	-8.000		64.000	8.000	64.000	
3	9	-6.000		36.000	6.000	36.000	
6	2	4.000		16.000	4.000	16.000	
5	2	3.000		9.000	3.000	9.000	
11	2	9.000		81.000	9.000	81.000	
6	2	4.000		16.000	4.000	16.000	
2	9	-7.000		49.000	7.000	49.000	
2	14	-12.000		144.000	12.000	144.000	
3	10	-7.000		49.000	7.000	49.000	
5	2	3.000		9.000	3.000	9.000	
3	11	-8.000		64.000	8.000	64.000	
7	2	5.000		25.000	5.000	25.000	
3	12	-9.000		81.000	9.000	81.000	

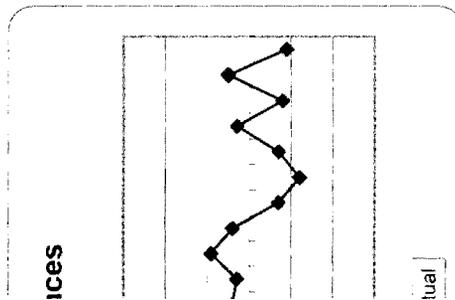
	n	Σ d	Σ d  <sup>2</sup>
	23	131.000	943.000
n-1		Σd	Σd <sup>2</sup>
	22	-29.000	943.000

<b>Bias (%) (Eqn 3)</b>
7.03
<b>Signed Bias (%)</b>
+/-7.03



"AB" (Eqn 4)	5.955
"AS" (Eqn 5)	2.991

Both Signs Positive  
FALSE  
Both signs Negative  
FALSE



date	primary FEM	audit FRM	diff (a-p)	abs diff	
10/23/2009	9	5	-4	4	
10/24/2009	4	3	-1	1	
10/25/2009	1	3			-1.00 mean
10/26/2009	4	3	-1	1	1.59 stddev
10/27/2009	3	3	0	0	0.79 AECOM precision
10/28/2009	6	3	-3	3	1.30 AECOM bias
10/29/2009	5	4	-1	1	
10/30/2009	4	3	-1	1	
10/31/2009	7	6	-1	1	
11/1/2009	4	3	-1	1	
11/2/2009	4	-			
11/3/2009	3	3	0	0	
11/4/2009	6	5	-1	1	
11/5/2009	5	3	-2	2	
11/6/2009	11	6	-5	5	
11/7/2009	6	4	-2	2	
11/8/2009	2	-			
11/9/2009	2	3	1	1	
11/10/2009	3	4	1	1	
11/11/2009	5	5	0	0	
11/12/2009	3	4	1	1	
11/13/2009	7	7	0	0	
11/14/2009	3	3	0	0	

date	primary FEM audit FRM	diff (a-p)	abs diff	
10/23/2009	9	2	-7	7 red text = test data values
10/24/2009	4	10	6	6
10/25/2009	1	5		1.32 mean
10/26/2009	4	2	-2	2 6.56 stddev
10/27/2009	3	9	6	6 3.28 AECOM precision
10/28/2009	6	2	-4	4 5.95 AECOM bias
10/29/2009	5	2	-3	3
10/30/2009	4	15	11	11
10/31/2009	7	2	-5	5
11/1/2009	4	2	-2	2
11/2/2009	4	12	8	8
11/3/2009	3	9	6	6
11/4/2009	6	2	-4	4
11/5/2009	5	2	-3	3
11/6/2009	11	2	-9	9
11/7/2009	6	2	-4	4
11/8/2009	2	9	7	7
11/9/2009	2	14	12	12
11/10/2009	3	10	7	7
11/11/2009	5	2	-3	3
11/12/2009	3	11	8	8
11/13/2009	7	2	-5	5
11/14/2009	3	12	9	9



**Re: Deadhorse Update**   
Herman Wong to: Thomas, Brad C  
Cc: Christopher Hall, "Thomas.Damiana@aecom.com"

10/28/2009 09:16 AM

Brad:

Chris and I have reviewed your letter with attachment and agree with the information it contains.

Herman

"Thomas, Brad C" Herman & Chris:

10/26/2009 05:24:48 PM



"Thomas, Brad C"  
<Brad.C.Thomas@conocophi  
llips.com>  
10/26/2009 05:25 PM

To Herman Wong/R10/USEPA/US@EPA, Christopher  
Hall/R10/USEPA/US@EPA  
cc "Thomas.Damiana@aecom.com"  
<Thomas.Damiana@aecom.com>  
Subject Deadhorse Update

Herman & Chris:

Attached is a letter updating the status of the Deadhorse station. We're on our 5th day of collocated data collection. Can you write back concurring/agreeing with the Deadhorse station location, equipment, and operations as described in the letter? Your concurrence helps us keep our financial folks happy and, thus, keeps us in the money for the project.

We know we owe you a QAPP and that will be coming directly - hopefully this week.

Brad Thomas  
ConocoPhillips Alaska  
Office: (907) 263-4741  
Cell: (907) 947-1597

[attachment "20091026 EPA Update.pdf" deleted by Herman Wong/R10/USEPA/US]



Herman  
Wong/R10/USEPA/US  
11/18/2009 09:11 AM

To Janis Hastings/R10/USEPA/US@EPA  
cc Pat Nair/R10/USEPA/US@EPA, Julie  
Vergeront/R10/USEPA/US@EPA, Juliane  
Matthews/R10/USEPA/US@EPA, Ann  
bcc  
Subject AQIA Handout at 17 November 2009 Meeting

Jan:

Because we ran over, I did not have time to speak about my Chukchi Sea air quality analysis needs for a re-notice of draft permit. Consequently, I met with Susan Childs, Kirk Wingses and Eric Hansen for about five minutes in the ET conference room afterwards to discuss the attached handout. There was no concerns raised by Shell or its contractors as they fully understood the requests and the reasons (i.e., technically defensible logic and justification as I explained to them).

I did add two additional items.

- #14. Reference and documentation
- #15. Soil and vegetation

Herman



Handout-17 November 2009.doc

17 November 2009

Subj: Chukchi Sea PSD Draft Permit Meeting with Shell;  
Information request

The following information is required before the technical staff can prepare a revised ambient air quality impact analysis and Statement of Basis

1. An approved Deadhorse Ambient Air Monitoring Plan with Data Quality Objectives.
2. Initial audit reports and subsequently monthly/quarterly reports.
3. PM<sub>2.5</sub> hourly and 24-hourly measurements from continuous sampler and filter sampler, respective.
4. Twenty-five (25) days of FEM/FEM data for precision.
5. Twenty-five (25) days of FEM/FRM data for bias.
6. A revised Wainwright QAPP that includes a collocation discussion.
7. A minimum of four months of PM<sub>2.5</sub> measurements (01 July to 31 Oct plus any portions of November and December).
8. A recalculated Wainwright long term PM<sub>2.5</sub> concentration:
  - a. During drill season (>4 months)
  - b. Annual without the 8 November 2008 to 6 March 2009 unacceptable data.
9. Revised tables and discussion of NAAQS and increment compliance demonstration
10. Any new scenarios and modeling.
11. A discussion of secondary formation of SO<sub>x</sub>, NO<sub>x</sub> and Organics to PM<sub>2.5</sub> in the Arctic.
12. A discussion of ozone formation in the Arctic (include the Wyoming high ozone concentrations during winter).
13. New emissions per Pat Nair and revised modeling with CD.