



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10

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

January 16, 2009

Reply To: AWT-107

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

Re: Application Incompleteness Determination for Frontier Discoverer Drill Vessel in
Chukchi Sea

Dear Ms. Childs:

On December 19, 2008, U.S. EPA Region 10 received Shell Offshore Inc.'s (SOI) Prevention of Significant Deterioration (PSD) permit application for the Frontier Discoverer Drill Vessel in the Chukchi Sea. Our understanding is that all operations of this vessel will occur beyond 25 miles from Alaska's seaward boundary.

Our preference, as Pat Nair of my staff communicated to you, was for SOI to wait for us to complete our review of SOI's modeling protocol, and to incorporate the appropriate responses and changes into the permit application. We understand, however, your interest in getting the permitting process initiated as soon as possible. Because the modeling protocol is no longer relevant we will not be providing comments separately on the modeling protocol for the Chukchi Sea drilling program.

Our completeness is based solely on the application received on December 19, 2008 and on the electronic modeling files sent under separate cover. Based on our review of these documents, we have determined SOI's application to be incomplete. Pursuant to 40 CFR 124.3(c), we are listing the information necessary to make the application complete: please refer to Attachments A and B for further details. By January 30, please provide us with an estimate of when we should expect to receive all the information identified.

If you have any questions, please contact Nancy Helm at 206-553-6908.

Sincerely

A handwritten signature in black ink, appearing to read "Richard Albright".

Richard Albright, Director
Office of Air, Waste and Toxics

cc Mark Schindler, Octane, LLC
Jeff Walker, MMS-Alaska Region

Exhibit 9
AEWC & ICAS

Attachment A

Air Quality Impact Analysis Comments to
Outer Continental Shelf Pre-Construction Air Permit Application
Frontier Discoverer Chukchi Sea Exploratory Drilling Program
Dated 11 December 2008 and Received by EPA on December 19, 2008

I. General Comments

- A. Besides the comments listed below, please include any engineering related comments that could change the modeling assumptions and/or inputs prior to revising any analysis.
- B. Statements are made in the application that should identify a reference. A few have been identified below. Please review the application and identify references where necessary. A list of references should be included in the application
- C. Please incorporate any changes, additions and/or deletions in a revised permit application. Any revised modeling runs and air quality data should be provided on a CD-ROM.

II. Specific Comments

A. Section 1, Introduction

Shell has requested the flexibility to drill anywhere within Lease Sale Area 193 including lease blocks that it currently holds and future lease blocks in the Chukchi Sea. Additional discussion should be provided by Shell of the legality of this request.

B. Section 2, Project Description

- 1. Table 2-1, Discoverer and Associated Vessel Emission Units with Hourly Emissions, identify FD-8 (Emergency Generator) with no hourly emission rates. Please indicate if FD-8 will ever be tested during the exploratory drilling season. If yes, please provide its duration, frequency, hourly emission rates, and potential air quality impacts.
- 2. Either in the text and/or as a footnote, please identify the operating load of the hourly emission rates for each emission unit.

3. Please provide a table similar to Table 2-1 that breaks out the hazardous air pollutants (HAPS) emission rates.
4. According to the application, Shell identifies a large and a small ice management vessel. In the same paragraph, Shell indicates that the ice management fleet could consist of “more or less that two vessels.”
 - a. Please be more specific as that number of vessels will have a direct impact on the modeling analysis.
 - b. Because there is no guarantee by Shell that the same vessels will be used for ice management and oil spill response, what assurances are available that the vessels will have similar stack parameters and emission rates so as not to contribute or violate National Ambient Air Quality Standards (NAAQS), air quality increments, and permit conditions.
5. The Oil Spill Response (OSR) fleet will consist of several 37-foot long boats aboard a management vessel.
 - a. Please identify the exact number of these boats.
 - b. Please identify the number, duration and frequency of the water drill exercises for these boats.
 - c. If feasible, please quantify the emission rates of each boat during each exercise.
6. During the 12-hour period that it takes to replenish the Discoverer, the resupply ship will be running one propulsion engine to power the ship. Please quantify the propulsion engine emissions and model these emissions with the concurrent drilling operation emission to determine compliance with NAAQS and air quality increments.
7. In the application, Shell based its vessel emission rates and stack parameters on actual ice management vessels and OSR fleets. Please provide documents detailing this data including the operating conditions and fuels.
8. Please discuss and if applicable, quantify the emissions, during the repositioning the of Discoverer, anchor adjustments, well blow out, flaring, venting...etc.

9. Please confirm the annual calculations in Table 2-2. For example and using Table 2.1

Generator PM₁₀: (0.297 lb/dy)(168 dy/yr)(1/2000 lb/tn) =
0.225 tn/yr

Generator NO_x: (0.90 lb/dy)(168 dy/yr)(1/2000 lb/tn) =
0.075 tn/yr

10. Please include in Table 2-1 and Table 2-2, the potential emissions for PM_{2.5}.
11. Please provide a table comparing project concentration impacts with significant monitoring concentration thresholds.
12. Based on the annual potential emissions for NO_x and VOC detailed in Table 2-2, Shell is required to conduct an ambient air quality analysis and data gathering for ozone.
13. Please describe the ice management process including how, when and where it will control the ice floe.
14. Please discuss the possibility of ice management vessels operating at less than 1- and 5-kilometers.

C. Section 3, Regulatory Applicability

1. When the first anchor is laid, the Discoverer is considered a stationary source. However, seven additional anchors are dropped to correctly station and stabilize the location of the Discoverer.
 - a. Please discuss and quantify any emissions associated with the positioning of the Discoverer/anchors by the smaller OSR vessel.
 - b. Please include the smaller OSR vessel emissions in the modeling analysis to determine compliance with NAAQS.
2. During those occasions when the smaller OSR vessel is needed to reposition the Discoverer, please estimate the frequency, duration and associated emissions. In addition, please model the air quality impacts during these occurrences.
3. Please discuss the inclusion of the smaller OSR vessel emissions during anchoring and repositioning in the PSD applicability determination and other related thresholds.

4. Shell shows an annual PM_{2.5} emission rate in Table 3-1 based on the use of condensable and PM₁₀ emission factors. The emission factors ratio is “E.” Please provide justification that the use of “E” rated emission factors will not underestimate particulate matter emissions.

D. Section 5, Ambient Impacts

1. Shell is using a 1000-m radius centered on the Discoverer to define ambient air with respect to public access and compliance with NAAQS and air quality increments. This radius is currently being reviewed and has not been accepted at this time for use in the air quality modeling analysis.
2. Please explain the necessity of the Discoverer orientation into the wind and how Shell intends to maintain this orientation.
3. Please provide a reference for the persistence factors.
4. Please provide justification for distributing two-thirds of the emissions to the primary ice management vessel and one-third of the emissions to the secondary ice management vessel.
5. Shell states in Section 2 that the exact number of ice management vessels is uncertain. Please justify the modeling of only a primary and secondary ice management vessel when the fleet “could consist of more or less than two vessels depending on availability of vessels and ice conditions.”
6. Please discuss the consequence if there are no ice management vessels available.
7. If the ice management vessels are controlling the ice floes, what is the expected minimum and maximum travel distance of the vessels in one hour? Please explain.
8. It is not clear in the application how the effective emission heights for the volume sources were obtained other than it was based on applying the SCREEN3 model. Please provide specific details on the derivation of the effective emission height for each vessel including the plume rise used, the calculation of the height and initial sigmas, and the hourly meteorology associated with the plume rise used.

Region 10 expects the lowest plume rise was used and would be associated wake effects with a wind speed of 20 m/sec using screening meteorology. If not, please explain.

9. Figure 5-1 shows the receptor locations used to obtain the maximum ground level concentration impacts. It is recommended that the downwind receptors be a mirror image of the upwind receptors to insure that the maximum concentration impacts are quantified.
10. Since the OSR and ice management fleets could include different vessels each year, how will Shell insure that the emissions from the vessels will not violate NAAQS or air quality increments each year?
11. As a courtesy, Shell should inform the applicable Federal Land Manager of the proposed project and obtain their concurrence that the impacts at Denali will be insignificant.
12. Provide a footnote to Table 5-3 which identifies a reference for the scaling factors.
13. Table 5-4 identifies which applicable criteria air pollutants will have a significant impact. Please provide the modeling input and output files supporting the predicted results, particularly the significant impact area radius.
14. Because its existing lease blocks are at least 90 kilometers from the Alaska shoreline, Shell has concluded that the NAAQS analysis will not include any nearby sources. Please confirm this conclusion with the State of Alaska.
15. Please confirm that the number and spacing between volume sources conform to Section 1.2 in the User's Guide for the Industrial Source Complex (ISC3) Dispersion Models, Volume II - Description of Model Algorithms, EPA-454/95-003b dated September 1995.
16. Please explain how a "plume thickness of 10 meters" was derived and where it is used.

E. Section 6, Baseline Concentrations

1. Region 10 disagrees with Shell that the air quality data collected at Badami and Kuparuk are representative. The basic concern is that

the two data sets were collected in 1999 at Badami and in 2001 to 2002 at Kuparuk.

Region 10 is aware that more recent air quality data sets are available from the State of Alaska and suggests that Shell use these data to represent background air quality level. The use of conservative air quality measurements in lieu of site specific data is acceptable to Region 10.

2. Region 10 urges Shell to use the air quality data collected at Wainwright as it is quality assured. This data should also be provided to Region 10.

Shell has the option to use the Wainwright data if they demonstrate the collected air quality data is representative of its drilling season (i.e., June to December). Any and all available Wainwright data should be assessed for conformance with assumptions in the analysis about background air quality.

3. Please explain the two “??” in the second paragraph, fourth sentence of this section. Provide reference for this sentence.
4. Shell derives the PM_{2.5} background by using particulate matter data measured at Denali National Park. Please provide the technical justification that the particulate matter data (i.e., PM_{2.5} and PM₁₀) measured at Denali is representative of the Chukchi Sea. The justification should include sources contributing to the measurements at Denali during the June to December drilling season.
5. Table 6-1 should include a footnote that carbon monoxide data is from the Kuparuk monitoring station.

F. Section 7, Impact Results

1. Table 7-1 lists the predicted concentration impacts during drilling operations. This implies that only FD-1 to FD-6, FD21-22, OSR fleet and ice management emissions were modeled. If this is incorrect, please add text to clarify this point.
2. At the point of maximum impact, please identify and discuss individual source contributions at the point of maximum impact.
3. Please provide a table showing the maximum concentration impacts from each of the two fleets and its locations.

4. Figure 5-2 shows two annual concentration impact modeling configurations while Tables 7-1 to 7-3 list the maximum annual impacts. Which configuration resulted in the greatest annual concentration impact?
5. Please indicate in the application that the short term maximum concentration impacts shown in Tables 7-1 and 7-1 include all the emission units identified in Table 2-1.
6. Because NO_x and VOC emission exceed 100 tn/yr, please provide a qualitative discussion on ozone impacts. For example, discuss the existing background ozone levels and the expected contributions of ozone from the Shell OCS sources.
7. Please conduct a Class II area visibility analysis in accordance with Section II.D in the October 1990 New Source Review Workshop Manual, Prevention of Significant Deterioration and Nonattainment Area Permitting.
8. For the shortest distance between a Shell awarded lease block and the State of Alaska coastline, quantify the air quality impacts and determine its compliance with NAAQS and air quality increments.
9. Shell used the same emission rate for each volume source in its modeling. Ship emissions can be normally distributed over the line of volume sources with the spread of the distribution based on the hourly standard deviation of wind direction. This suggestion was provided to Region 10 by ENVIRON representatives during our 8 January 2009 meeting.

G. Appendix A

1. Page 3-10 shows the Discoverer representative stack parameters for each emission unit.
 - a. Please provide the stack parameters at 100 percent load for each emission unit.
 - b. For each of the eight representative stack groups, please indicate the separation distance between the individual stacks.
 - c. Please confirm that stacks parameters are representative of the actual operating loads and not 100 percent load.
 - d. Please provide a reference for the stack parameters.

2. Page 3-10 shows the stack parameters for the vessels used in the determining the release height for the volume sources.
 - a. Please provide a reference for the stack data.
 - b. Please explain how the 60.9-m and 43.4-m were obtained and subsequently used to determine volume source release height.

H. CD ROM, Air Quality Modeling Files

Three SCREEN3 runs were performed to obtain final plume for the purpose of obtain an effective emission height for each volume source. Wake effects should have been considered in the model runs. Please rerun SCREEN and account for building wake effects.

Attachment B

Additional Comments to
Outer Continental Shelf Pre-Construction Air Permit Application
Frontier Discoverer Chukchi Sea Exploratory Drilling Program
Dated December 11, 2008 and Received by EPA on December 19, 2008

I. General Comments

Please provide copies of the Exploration Plan(s) and Drilling Plan(s) for the Chukchi Sea proposed operations.

II. Specific Comments

A. Section 1, Introduction

1. Please provide three color copies of a large-scale map (at least 24" x 36") of Figure 1-1.
2. Please provide complete details of Stipulations 4, 5 and 7 described in Figure 1-1.
3. Please provide complete details on the activities to be conducted at the shorebase locations identified in Figure 1-1.
4. Please provide complete details on any other secondary emissions potentially related to this project.
5. Please provide complete details on any associated growth potentially related to this project.

B. Section 2, Project Description

1. This section does not adequately describe the function of each emission unit. Describe how each piece of equipment is operated and how operation is related to operation of other equipment.
2. Please provide a detailed description of the critical, non-drilling loads that will be powered by the emergency generator when the main power supply is not operating, including a discussion of what other emission units will be operational when the emergency generator.
3. Page 4 of the application indicates that tables 2-1 and 2-2 only contain a summary of volatile HAPs. Please revise these tables to include emissions of all HAPs.

4. Tables 2-1 and 2-2 do not include all the pollutant-emitting activities associated with the project, e.g. drilling of relief wells, use of diverters, well control events, flares, well testing, fuel tanks etc. Please provide detailed descriptions, emissions quantification and include these emissions in the ambient air analysis, as appropriate.
5. Pages 4 and 5 indicate that emissions calculations are not based on maximum emissions possible from the project. In some instances, emissions of some pollutants are greater at lower loads. Please provide a list of each emissions unit and pollutant emitting activity addressed in no. 3, above, and the following information: maximum physical rated capacity, minimum operating load/rate, normal operating load/rate, maximum operating load/rate, fuel/material usage at each of the three loads, and for each pollutant, the maximum emission rate at each rate. For each emissions calculation method, please provide detailed references.
6. Table 2-3 does not provide adequate detail on exactly how the various limits will be documented. Please describe in greater detail exactly how each reading will be taken and the frequency and method of data recording. For example, will the day tank fuel consumption be monitored via a totalizing, nonresettable, fuel meter. Please also address the precision of each monitoring method.
7. Please explain how SOI proposes to demonstrate compliance with the restrictions proposed Table 2-4.

C. Section 3, Regulatory Applicability

1. The discussion in this section implies that the application does not reflect the requirements of 40 CFR 55.13(b) and (e) and of 40 CFR 55.21 (l), (n), (q) and (r). Please provide information that satisfies these requirements.
2. As has previously been communicated to SOI, and contrary to the discussion on page 14 of the application, in determining whether the project emits pollutants in significant amounts, emissions from vessels must also be considered. Please provide any information withheld as a result of the incorrect regulatory interpretation.

D. Section 4, Emission Control Technology Review

1. As has previously been noted, in determining whether the project emits pollutants in significant amounts, emissions from vessels must also be considered. As a result, this application should contain BACT analyses for CO, NO_x, PM_{2.5}, PM₁₀, SO₂ and VOC.

2. Section 4.1 of the application provides SOI's conclusions in the BACT review, yet does not provide enough information on the BACT analysis process. For each pollutant and emission unit, please provide the full details on each step of the 5-step, top-down BACT process. For each emission unit/pollutant scenario, please list the available control technologies identified, justification on how available technologies were deemed infeasible, how the feasible technologies were ranked, and the economic analyses. Please include all assumptions made in conducting the review.
 3. Section 4.3 of the application addresses major source MACTs. As noted earlier, it appears that the HAP emissions calculations only account for volatile HAPs and not for all HAPs emitted. Please update the HAP PTE to confirm that the project is not a major HAP source. In addition, please indicate whether any area-source MACTs might apply to this project.
- E. Section 5, Ambient Impacts
1. Please provide a description of the legal authority for the ambient air boundary proposed by SOI.
 2. Please provide a description of how SOI proposes to monitor the ambient air boundary and ensure that public access is prevented.
- F. Appendix A, Emission Calculations
1. Please label all columns on tables.
 2. Please describe the ratings presented in the fifth and sixth columns of page 1 – are these instantaneous maximum physical ratings?
 3. How were the maximum fuel consumption values determined?
 4. For each emission unit, please list the minimum, normal and maximum loads during the project. List separately any usage that SOI believes is outside a “normal” operating scenario.
 5. For each emission unit/pollutant combination, please list the emission factor or emission rate at each of the minimum, normal and maximum loads during the project. List separately any usage that is of an unpredicted emergency basis.
 6. Please confirm that the emergency generator will never be operated while any of the other emission units are in use. Otherwise, please describe scenarios and related emissions and analyses for occasions when the generator may be in operation.

7. Please list logging winch emissions separately from cementing unit emissions.
8. Please ensure that emission unit and stack nomenclature is consistent across all pages of Appendix A – currently nomenclature can change from page to page.
9. Show detail of all assumptions in the calculation, e.g. catalyst reduction efficiencies, operating capacity restrictions.
10. Please update the appendix to include all other pollutant-emitting activities addressed earlier in these comments.
11. Please confirm that the logging winches will never be operated while any of the other emission units are in use. Otherwise, please describe scenarios and related emissions and analyses for occasions when these winches may be in operation.
11. Please describe how the incinerator will be operated: batch vs. continuous operation, duration of each run, no. of runs per day etc.
13. Please explain how ship utilities will be powered during drilling operations, e.g. heat for quarters, lighting etc.
14. Please describe the bases for reduction in certain pollutants for small engines (other than Tier 3 engines).
15. Please provide a copy of the density and heat content analyses for the liquid fuels to be used on this project.
16. Please provide a list of all source tests performed on the emission units currently on the Discoverer. Include copies of all test reports.
17. As has been documented in the record for recent OCS permits (see Kulluk permit in Beaufort Sea) AP-42 does not provide a worst case assessment of emissions from the equipment associated with this project. The introduction to AP-42 cautions against using these values for permitting. SOI should contact manufacturers to determine worst case emission factors at each load (please provide copies of such communications) and conduct a review of other emission factors/rates to identify worst case emission factors and use those values in its analyses.
18. Please provide emission factors and calculation methodology for all HAPs.
19. Please include emissions of PM_{2.5} in this appendix. Please also address the impact of ammonia emissions on PM_{2.5} and PM₁₀.

20. Please explain why certain ICE meet Tier II requirements while others do not.
21. Please provide a copy of the operational parameters transmitted to DEC Marine.
22. Please provide more information on the complexity of VOC exhausted from the D399s and an expected VOC destruction rate as BACT.
23. Please address whether an hourly reading of engine emissions by the SCR control is adequate to control emissions from the engines if loads are expected to vary.
24. Please describe how ammonia slip will be minimized.
25. Please provide schematics showing how the SCR system will be installed into the Discoverer.

G. Appendix B, Emission Control Technology Review

The information presented in this Appendix is not clear:

1. It appears that Section II is missing.
2. Cost analyses should be presented separately for each emission unit.
3. Please provide emissions performance/guarantees from the vendor rather than generic estimates from older EPA literature.
4. For each cost category, please describe in greater detail, e.g. for labor explain the basis for the \$1600/day expense.
5. Please provide vendor quotes and shipping quotes for the filters.
6. Please explain how the 7-year filter life was arrived at.
7. Cost analyses should be provided for all other emission unit/pollutant combinations.