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Ms. Natasha Greaves
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1200 Sixth Avenue, Suite 900
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February 13, 2013

Re: Shell Gulf of Mexico Inc.
Noble Discoverer – Chukchi Sea
Response to Draft Revised OCS PSD Permit to Construct
No. R10OCS/PSD-AK-09-01

Shell Gulf of Mexico Inc. is providing the proposed revisions related to the draft revised OCS PSD Permit to Construct No. R10OCS/PSD-AK-09-01 submitted by you to Mr. Chris Lindsey et al. by email on February 1, 2013 and the proposed permit conditions submitted by you to Ms. Pauline Ruddy et al. by email on February 8, 2013. Air dispersion modeling files related to this submittal will be submitted on a future date under separate cover.

Based on information and belief formed after reasonable inquiry, I certify that the statements and information in this submission are true, accurate, and complete.

Please contact Pauline Ruddy (907-771-7243) or Chris Lindsey (907-771-7262) if you have any questions.

Susan Childs
Alaska Venture Support Integrator, Manager

Enclosure: *1) Proposed Revisions to Draft Permit Revision for Shell Noble Discoverer PSD Permit to Construct No. R10OCS/PSD-AK-09-01*

cc: Chris Lindsey, Shell
Pauline Ruddy, Shell
Lance Tolson, Shell
Eric Hansen, ENVIRON

Proposed Revisions to Draft Permit Revision for Shell Noble Discoverer PSD Permit to Construct No. R10OCS/PSD-AK-09-01

Note: Suggested language to include is underlined. Language to be removed is struck out.

1. **Table 1; Identification of Propulsion Engine –** Shell proposes to revise the table to generically list the make/model and rating for the propulsion engine, Emission Unit FD-7. Shell contends that it is not necessary to specifically identify the make/model and rating for a unit that is not authorized to operate while the Discoverer is an OCS Source.

2. **Table 2 through Table 5; Fleet Vessel and Engine Use Flexibility** – Shell proposes to include a footnote on Tables 2 through 5 in the draft permit to address the non-BACT sources.

   * Emission unit make, model, and ratings are not permit conditions.

3. **Condition B.6.4.1; Fuel Monitoring – S**hell proposes to revise the condition as follows to exclude the requirement to monitor fuel using a fuel meter for the FD-7, FD-8, and K-1 through K-9. Under the permit, FD-7 is not required to monitor fuel consumption while the Discoverer is an OCS Source and therefore, should not be required to install a fuel meter. Under Condition B.6.4.2, seldom used fuel combustion sources are required to monitor fuel by alternative methods other than using a fuel meter.

   6.4.1. Each fuel combustion source on the Discoverer and Associated Fleet, except for FD-7, FD-8, seldom used sources and K-1 through K-9, Kvichaks Nos. 1-3, with a diesel fuel flow meter to continuously measure and record the fuel flow rate:

4. **Condition B.10.4; Refueling in the Chukchi while an OCS Source – S**hell proposes to revise the condition as follows to allow refueling of the Discoverer as a resupply event. The resupply would be performed using a lightering vessel, specifically the Nanuq or resupply vessel or Aiviq. That vessel would approach the Discoverer, go into DP mode, and pass the hose from the Discoverer to the lightering vessel by crane, perhaps floating it on the surface. Booms would be deployed downstream of the hose. There would be no physical connection between the two vessels except for the hose. When finished, the lightering vessel would go off DP and move away as would a resupply vessel. The lightering vessel used for the fuel transfer would meet the same fuel allowances as any resupply event. By allowing this, the Discoverer would not need to lift anchors before refueling. Refueling while anchored is a safer routine.

10.4. Refuel any vessel ~~(including the Discoverer, and excluding the Kvichak workboats)~~ within 25 miles of the Discoverer, while the Discoverer is an OCS Source, excluding the Discoverer and the Kvichak workboats which can be refueled only by vessels authorized for use under this permit, or

5. Condition B.14.6, B.15.6, F.9.7; Alternative Portable CO Monitor Monitoring – Shell proposes to revise the condition as follows to allow for use of alternative methods for portable CO monitoring using the ASTM 6522-11 or an approved alternative method. ASTM 6522-11 was agreed for use and implemented during the 2012 drilling season.

B.14.6. Monitor and record NO_X emissions (ppm) from the exhaust of each SCR unit once per week using a portable NO_X monitor that meets the requirements of EPA OTM 13 found at http://www.epa.gov/ttn/emc/prelim/otm13.pdf, ASTM 6522-11, or an alternative method approved by EPA.

B.15.6. Monitor and record CO emissions (ppm) from the exhaust of each oxidation catalyst unit or combined CDPF and SCR system once per week using a portable CO monitor that meets the requirements of EPA OTM 13 found at http://www.epa.gov/ttn/emc/prelim/otm13.pdf, ASTM 6522-11, or an alternative method approved by EPA.

F.9.7. Monitor and record CO emissions (ppm) from the exhaust of each oxidation catalyst unit once per week using a portable CO monitor that meets the requirements of EPA OTM 13 found at http://www.epa.gov/ttn/emc/prelim/otm13.pdf, ASTM 6522-11, or an alternative method approved by EPA.

6. Condition B.15.8; Oxidation Catalyst and Combined Catalyzed Diesel Particulate Filter (CDPF) Control – Shell proposes to revise the condition as follows to remove the requirement to report permit deviations for measured carbon monoxide (CO) concentrations of 20 ppmv or less. Based on an analysis of 2012 source test data, exhaust concentrations less than 20 ppmv demonstrate compliance with the applicable CO limits for units subject to the requirement (FD-1 through FD-6; 0.1790 g/kW-hr).

15.8. Report as a permit deviation under Condition A.~~0~~15 except during engine startup periods as defined under Condition B.18. any periods during which the inlet temperature is less than 300°C (572°F), or the CO concentration, measured pursuant to Condition B.15.6, is 120 percent or more than the CO concentration measured during the most recent previous source test that produced compliance

data or emission factors for this permit. For measured CO concentrations less than or equal to 20 ppmv, reporting a permit deviation is not required.

7. Condition B.17.1, B.17.2, B.17.4; NO_X BACT for SCR Device Shutdown – Shell proposes to revise the language as follows in the draft permit to be specific to SCR systems, reflect a one-quarter hour period for shutdown, and correct typographical errors.

17.1. For engines equipped with SCR, e~~E~~ngine shutdown periods are defined as the time the urea pump is shut off to the time fuel is no longer introduced to the engine, not to exceed one-quarter hour;

17.2. The permittee shall minimize the duration of an engine's shutdown to a period needed for appropriate and safe de-loading of the engine, not to exceed one-quarter hour; and

17.4. Monitoring, Recordkeeping and Reporting. For each SCR device ~~startup~~ shutdown event the permittee shall record the following:

8. Condition C.3.1; BACT Limits – Shell proposes to revise the permit condition as follows .

3.1	**Nitrogen oxides (NO_X)** ~~FD-1~~:	3.7~~X.X~~ grams (g) per kilowatt-hour (kW-hr), 24-hour average
	~~FD-2:~~	~~X.X grams (g) per kilowatt-hour (kW-hr), 24-hour average~~
	~~FD-3:~~	~~X.X grams (g) per kilowatt-hour (kW-hr), 24-hour average~~
	~~FD-4:~~	~~X.X grams (g) per kilowatt-hour (kW-hr), 24-hour average~~
	~~FD-5:~~	~~X.X grams (g) per kilowatt-hour (kW-hr), 24-hour average~~
	~~FD-6:~~	~~X.X grams (g) per kilowatt-hour (kW-hr), 24-hour average~~

Justifications for 3.7 g/kW-hr:

1. This is new ground for Shell, EPA, and the industry. Shell is unaware of a similar application of emissions limits to the marine drilling applications. In view of efforts extended on the Discoverer engines, Shell believes it grossly overestimated BACT for these engines. It is unreasonable to require Shell to meet

limits that recent experience shows it might not be able to meet on a continuous basis.

2. After-treatment is controlled in real time based on current engine parameters. The CAT CleanAir emission control systems installed on the Discoverer generator engines are a retrofit product that employ a closed loop control system with a 40 second adjustment cycle. Furthermore, the NOx Out sensors can be confused by excess urea.
3. EPA's proposal relies too heavily on limited data. Shell operated the engines for a limited amount of time in 2012. Engines and emission control systems were commissioned in May, 2012. The 6 generator engines operated for a combined total of only 128 days during the drilling season. No well was drilled to depth during the season. Shell contends that there has been insufficient time and experience to set tight emission limits.
4. The same engine and same E-POD technology is applied on all units. Based on our limited operational data set, Shell believes it is not possible to differentiate between each of the units and only one limit should apply for the 6 units.
5. Engines FD-02 and FD-06 are the same engines and use the exact same E-POD designs and EPA is proposing 2.9 and 2.1 g /kW-hr, respectively. Shell and Noble cannot account for the difference in performance between these units and believe all units can easily drift between these limits. Inadequate data are available to substantiate any distinction.
6. Because the precision in achieving performance of these units is 2.9 - 2.1 = 0.8 g/kW-hr, Shell asks that this margin be added to envelop all other units. Hence 2.9 + 0.8 = 3.7 g/kW-hr.

9. Condition C.3.1.2; E-POD Sensor Bias – Shell proposes to revise the language drafted by EPA for a new condition C.3.1.2 to address E-POD sensor bias. These proposed changes allow the use of more data to determine bias and allow more frequent, monthly evaluations of sensor bias.

3.1.2. BACT Limit Correction for Bias. Bias correction for enhanced emissions monitoring system and SCR internal sensors. After each of the generator engines (Units FD-1 – 6) has ~~been~~ operated long enough to produce ~~200~~1,000 valid data pairs each, Shell shall conduct and submit to the EPA an analysis of the bias between the EPA-approved enhanced emissions monitoring system and the SCR ~~internal~~ outlet NOx sensor in each of the SCR units. A valid data pair is defined as a non-overlapping period of time consistent with the EPA approved enhanced NOx monitoring system (e.g., six clock minutes) for which at least 75% of the instrument samples are available for both the enhanced emissions monitoring

system and the internal NOx outlet sensor of an SCR unit. For the purposes of this condition, bias is defined as the mean of the differences in NOx emissions for each data pair, in terms of g/kW-hr. Upon EPA approval of the analysis, the bias for each generator engine shall be applied to the NOx BACT limit for that engine in Condition C.3.1 and the resulting NOx BACT limit shall be applicable for the ~~entire drill season~~ following 30 days. The bias for each subsequent 30-day period will be recalculated using the most recent 1,000 valid data pairs prior to that 30-day period.

10. Condition C.7.1; Electrical Power Output – Shell proposes to revise the condition as follows to reflect the correct power output for Emission Units FD-1 through FD-6 that is consistent with the request made under Section 3.2 of the Noble Discoverer Permit Revision Application submitted on November 29, 2012.

7.1. The permittee shall not operate Units FD-1 – 6 such that electrical power output from the individual attached generators is in excess of 800~~1,927~~ kWe for any hour that these units are operated.

11. Condition C.10; Adjustment of NO_X BACT Limit – Shell proposes to revise the condition drafted by EPA for a new condition C.10 to address a potential future adjustment of the NO_X BACT Limit. These proposed changes exclude the requirement for the analysis to include a complete data set that may not be available because of data collection malfunctions.

10. Reanalysis of NOx BACT emission limits. Within 60 days after the completion of the next drilling season, Shell shall conduct and submit to EPA an analysis of the performance of the SCR units on each of the generator engines (Units FD-1 – 6) with respect to NO_x emissions using emissions data from the enhanced emissions monitoring system. The analysis must include all data collected while the Discoverer is an OCS source during the next drilling season and must identify and explain all screening of the data, including startup and shutdown periods as well as any periods when an SCR unit is not operating or is malfunctioning. The analysis must include all raw data and any calculations performed to integrate the data (e.g., the calculation of 5-minute averages from 1-second data). For each generator engine, the analysis shall identify the highest rolling 24-hour average emissions in terms of g/kW-hr. The analysis must include ~~a complete data set for~~ the following information for each generator engine:

- Exhaust temperature (C)

- Inlet and outlet NOx concentrations from the SCR internal sensors (ppm)
- NOx concentrations from the enhanced emissions monitoring system (ppm)
- Urea injection rates (l/hr)
- Generator output (kWe)
- Fuel consumption rates (gal/hr)
- Date, time and duration of SCR maintenance and/or cleaning events, including copies of any reports, photographs, or other information describing each cleaning event

EPA will review the analysis and, as appropriate, will reopen the permit to revise the NO_x BACT limits.

12. **Condition F.1, F.2, F.2.1, F.2.2, G.1, G.1.1, and G.1.2; Operation of Oxidation Catalysts and Catalyzed Diesel Particulate Filter (CDPF) –** Shell proposes to delete Conditions F.1, F.2, F.2.1, F.2.2, G.1, G.1.1, and G.1.2 for the MLC Compressor Engines (FD-9 through FD-11) and the HPU Engines (FD-12 and FD-13). Because of the duty cycle of these engines, observed and expected transient load demand during normal operation, and low ambient conditions, Shell contends that the control technology for these units will not operate according to manufacturer recommendations because of inadequate exhaust temperature. Therefore, these control technologies should not be required to be applied as BACT. This request is consistent with the request made under Section 3.2 of the Noble Discoverer Permit Revision Application submitted on November 29, 2012.

13. **Condition F.3.2, F.3.3, F.3.4, F.3.6; F.6.1, F.6.2 Emission Limits -** Shell proposes to revise these MLC compressor engine conditions as follows to increase the associated emission limits. Increases in emission limits are required to reflect the request to remove the requirement to use Oxidation Catalyst and CDPF emission control technology under Request No. 11 listed above. The effect of these impacts is provided as part of a revised air dispersion modeling analysis that demonstrates compliance with NAAQS and increment consumption.

3.2.	**PM:**	0.20 ~~0.10~~ g/kW-hr
3.3.	**PM_{10}:**	0.20~~0.10~~ g/kW-hr
3.4.	**$PM_{2.5}$:**	0.20~~0.10~~ g/kW-hr
3.6.	**CO:**	3.5~~1.86~~ g/kW-hr
6.1	PM10:	8.52 lb/day, aggregate
6.2	PM2.5:	8.52 lb/day, aggregate

14. Condition G.2.2, G.2.3, G.2.4, G.2.6, G.6.1, G.6.2 Emission Limits - Shell proposes to revise these HPU engine conditions as follows to increase the associated emission limits. Increases in emission limits are required to reflect the request to remove the requirement to use CDPF emission control technology under Request No. 11 listed above. The effect of these impacts is provided as part of a revised air dispersion modeling analysis that demonstrates compliance with NAAQS and increment consumption.

2.2.	**PM:**	0.20 ~~0.03~~ g/kW-hr
2.3.	**PM_{10}:**	0.20~~0.03~~ g/kW-hr
2.4.	**$PM_{2.5}$:**	0.20~~0.03~~ g/kW-hr
2.6.	**CO:**	3.5 ~~0.7~~ g/kW-hr
6.1	**PM10:**	3.93 ~~0.59~~ lb/day, aggregate
6.2	**PM2.5:**	3.93 ~~0.59~~ lb/day, aggregate

15. Condition G.2.1.2; Compliance Method – Shell proposes to include the new condition as follows for determining compliance with NMHC. This compliance method is consistent with Condition F.3.1.2.

2.1.2. For Compliance with Condition G.2.1, measurement of NMHC shall be determined using EPA Method 25A.

16. Condition Q.10.1; Monitoring, Recordkeeping and Reporting – Shell proposes to revise the condition as follows to correct a typographical error.

10.1 Equip each of Units ~~FD-~~N-1 - 4 with a diesel fuel flow meter, or install a single fuel meter for all of Units ~~FD-~~N-1 - 4:

17. Statement of Basis; Determining Compliance with BACT Limit for Main Generators, FD-1 through FD-6 – Shell proposes to include the following description in the Statement of Basis to accompany the revised permit. The description provides the basis for determining compliance with BACT limit for FD-1 through FD-6.

1. NOx emissions in grams per kilowatt hour is calculated as follows:

$$EF_{NOx} = (46.0055)(453.592)(60)C_{NOx}V_f/[(1{,}000{,}0000(0.7302)(459.67 + T_{\circ F})L]$$

Where: EF_{NOx} is the emission factor in g/kW-hr

C_{NOx} is the concentration of NO_x in the exhaust leaving the e-Pod in ppm

V_f is the volumetric flow rate of the exhaust gases in DSCFM

$T_{°F}$ is the standard temperature assumed to be 68 degrees F

L is the engine load in kW

All the above parameters should be available from the CMS system with the exception of the exhaust gas flow rate, which can be estimated from engine load and the stack test data

2. The 24-hour rolling average is calculated once per hour based on previous twenty-four 1-hour average values.
3. Hourly average data are in turn calculated from 5-minute CMS data. The 5 minute data should fall into 3 categories:
   Category 1. Engine off, NOx emissions assumed to be zero during engine off conditions
   Category 2. Engine on, NOx emission not included in average
   Category 3. Engine on, NOx emission included in average
4. Determination of which category each 5-minute data point falls into is determined as follows:
   a. If no fuel is flowing to the engine, the engine is assumed to be "Engine off" (Category 1) condition and a value of zero is used in the averaging calculation.
   b. If the engine is in start-up mode, defined as the first 60 minutes from the time when fuel begins flowing to the engine, or when the temperature reaches 300 degrees C, whichever occurs first, the NOx emissions are not included in the average for that hour (Category 2).
   c. If the CMS system data fall outside of valid measurement ranges (e.g.; negative NOx concentrations) the data are not included in the average for the hour (Category 2).
   d. For all other cases, the data are included in the average calculation (Category 3).
5. In order for an hourly average to be calculated from the 5-minute data, at least 9 of the previous 12 5-minute must be either Category 1 or Category 3. If more than 3 5-minute periods are classified as Category 2, the hourly average is classified as Category 2. In all other cases, the hourly average is classified as Category 1 or 3.
6. In order for a 24-hour rolling average to be calculated from the hourly data, a minimum of 18 of the previous one-hour average must be either Category 1 or

Category 3. If more than 6 of the hourly averages in the preceding 24-hours is classified as Category 2, the 24-hour average is marked as invalid and cannot be compared against the BACT limit.

7. A rolling 24-hour average is calculated for each engine and, unless invalidated as described in 6 above, is compared to the BACT criteria defined above to determine compliance.