

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

**STATEMENT OF BASIS
FOR MINOR MODIFICATION OF
OUTER CONTINENTAL SHELF
PERMIT TO CONSTRUCT and TITLE V AIR QUALITY OPERATING
PERMIT No. R10OCS030000**

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

Date of Minor Modification: September 28, 2012

TABLE OF CONTENTS

1	INTRODUCTION.....	4
1.1	INTRODUCTION	4
2	MODIFICATION OF PERMIT TERMS AND CONDITIONS.....	5
2.1	CLARIFICATION OF CONDITIONS	5
2.2	CORRECTIONS	7
2.2.1	<i>Units for Incinerator Rating</i>	7
2.2.2	<i>Cross References and Citations</i>	7
2.2.3	<i>Format</i>	7
2.3	USE OF CATALYZED DIESEL PARTICULATE FILTERS	8
2.4	KULLUK INCINERATOR EMISSION CALCULATIONS	9

ABBREVIATIONS AND ACRONYMS

CDPF.....	Catalyzed Diesel Particulate Filter
CFR.....	Code of Federal Regulation
CO.....	Carbon Monoxide
COA.....	Corresponding Onshore Area
EPA.....	Environmental Protection Agency
GHG.....	Green House Gas
NAAQS.....	National Ambient Air Quality Standards
NO _x	Oxides of Nitrogen
OCS.....	Outer Continental Shelf
OxyCat.....	Oxidation Catalysts
PM.....	Particulate Matter
PM _{2.5}	Particulate Matter with an Aerodynamic Diameter less than 2.5 microns
PM ₁₀	Particulate Matter with an Aerodynamic Diameter less than 10 microns
SO ₂	Sulfur Dioxide
SOB.....	Statement of Basis

1 INTRODUCTION

1.1 Introduction

The Environmental Protection Agency (EPA) issued a final Outer Continental Shelf (OCS) Minor Source/Title V air permit for Shell Offshore Inc.'s (referred to hereinafter as Shell, source, or permittee) Kulluk Conical Drilling Unit (Kulluk) on April 12, 2012. The permit authorizes air emissions from the Kulluk and its associated fleet during exploratory oil and gas drilling operations on specific lease blocks in the Beaufort Sea OCS off the North Slope of Alaska.

Shell submitted several applications for minor modifications to the Kulluk permit. A chronology of these submissions is provided in Table 1. The EPA has reviewed the applications submitted by Shell and determined that the requested changes meet the minor permit modification criteria at 40 CFR § 71.7(e), which has been incorporated into 18 AAC 50.326(k). Accordingly, the EPA is issuing this minor permit modification pursuant to 40 CFR §§ 71.7(e) and 71.11. The EPA is simultaneously amending the minor source permit to construct pursuant to the 18 AAC 50.546(b). The permitting procedures set forth in 40 CFR § 71.11(a)-(h) and (j), which include public notice and comment and the requirement to prepare a statement of basis, do not apply to minor permit modifications. To facilitate public understanding of the minor modifications to the permit, the EPA prepared this document, titled Statement of Basis (SOB) for the Minor Modification of Permit No. R10OCS03000, to describe the changes to specific permit conditions, which include the following:

- Clarification of several permit conditions;
- Corrections of a number of cross reference, typographical, and unit errors;
- Use of catalyzed diesel particulate filters (CDPF) in place of oxidation catalysts (OxyCat), and inclusion of CDPF in permit conditions requiring monitoring, recordkeeping, and reporting; and
- Revision of the Kulluk Incinerator emission calculation method to include the option of using actual waste combusted daily.

**Table 1: Minor Permit Modification Application Chronology
July 2012 to September 2012**

Submission Date	Document Description
July 5, 2012	Application for Minor Permit Modification
September 11, 2012	Update to the July 5, 2012 request for Minor Permit Modification
September 20, 2012	Application for Minor Permit Modification

This SOB discusses only the minor modifications to the permit. The project description, air quality impacts, and other analyses and actions relevant to the permit are addressed in the July 22, 2011 SOB and October 21, 2011 Response to Comments available at <http://yosemite.epa.gov/r10/airpage.nsf/Permits/kullukap/>. Note that it is the OCS/Title V permit, not the SOB, which is legally enforceable. Any errors or omissions in the summaries provided herein do not excuse Shell from complying with the requirements of its OCS/Title V permit.

2 MODIFICATION OF PERMIT TERMS AND CONDITIONS

2.1 Clarification of Conditions

Condition A.18.3.1: Clarify condition to make the corresponding onshore area (COA) excess emission and permit deviation reporting timeline consistent with the more stringent timeline for Outer OCS deviation reporting in Condition A.17.2.3 (i.e., within 30 days of the occurrence).

Condition A.18 applies on the Inner OCS and requires the permittee to comply with applicable State of Alaska excess emission and permit deviation reporting requirements. Condition A.18.3.1 requires the permittee to report excess emissions and permit deviations not reported under Conditions A.18.1 or A.18.2, within 30 days after the end of the month during which the emission or deviation occurred. The EPA is changing Condition A.18.3.1 to now require reporting of excess emissions and permit deviations within 30 days of the occurrence, consistent with the Outer OCS deviation reporting required by Condition A.17.2.3.

Conditions A.19.1 and A.19.2: Clarify the conditions to make the semi-annual operating reports due by October 1 and April 1, and the annual compliance certification due by April 1.

Condition A.19.1 requires the permittee to submit semi-annual operating reports by August 31 and February 28, and Condition A.19.2 requires the permittee to submit an annual compliance certification by February 28. Although the permittee requested to have the reporting date for the second semi-annual report and the annual compliance certification changed to March 31, the EPA is changing the reporting date for Conditions A.19.1 and A.19.2 to harmonize with Condition A.25 for efficient reporting and consistency with Part 71. As a result the semi-annual report for January 1 to June 30 is due by October 1, and the semi-annual report for July 1 to December 31 is due by April 1, six months later. The annual compliance certification is due by April 1 of each year.

Conditions A.19.1.1 and A.19.1.1.2: Clarify condition A.19.1.1 to require the permittee to include excess emissions and permit deviations not filed under the Outer OCS deviation report in the semi-annual operating report. Also, clarify that the permittee shall cite the date of reports submitted under the Outer OCS deviation report pursuant to Condition A.19.1.1.2.

Condition A.19 includes provisions requiring semi-annual monitoring reporting (called an “operating report” in the permit) and an annual compliance certification report as required by 40 CFR §§ 71.6(a)(3)(iii)(A) and 71.6(c)(5). Permit Condition A.19.1 only references COA excess emissions and permit deviations reports under Condition A.18. The EPA is clarifying that Condition A.19.1 applies to both COA excess emissions (Condition A.18) and Outer OCS deviations reports (Condition A.17). The EPA is also clarifying that Condition A.19.1.1.2 requires the permittee to cite the date or dates of Condition A.17 Outer OCS deviations reports.

Conditions A.25.1, A.25.2, and A.25.3: Clarify the Part 71 Annual Emission Report and Fee Calculation Worksheet reporting dates by changing the dates from February 28 to April 1.

Condition A.25 contains standard language regarding Part 71 fees for Title V sources pursuant to 40 CFR § 71.9. The Condition A.25 dates for submitting the annual emission report, fee calculation worksheet, and payment of fees were based on the Condition A.19.2 due date for the annual compliance certification. As explained above, the EPA is changing the date in Condition A.19.2 to require that the annual compliance certification be submitted by April 1 of each year. Therefore, the EPA is also changing Conditions A.25.1, A.25.2, and A.25.3 to require that the annual emission report, fee calculation worksheet and fee payment be submitted by April 1 of each year.

40 CFR § 71.9(h) states that the annual emission reports and fee payments shall be submitted on the anniversary date of the initial fee calculation worksheet. Sources that submitted an initial fee calculation worksheet between January 1 and March 1 inclusive shall submit subsequent annual emission reports, fee calculation worksheets, and full payment of fees by April 1. The permittee submitted an initial fee calculation worksheet between January 1 and March 1, therefore the EPA is changing the Annual Emission Report (Condition A.25.1), Fee Calculation Worksheet (Condition A.25.2), and Annual Fee Payment (Condition A.25.3) submittal dates to April 1.

Condition A.26.5: Clarify Condition A.26.5 to exempt visible emissions observations from complying with Conditions E.1.1 and E.1.9, except when visible emission source tests are requested by the EPA.

Condition A.26.5 applies on the Inner OCS when the source exhaust is observed for visible emissions and is subject to the standard permit conditions in 18 AAC 50.345(a). As provided in 18 AAC 50.345(a) the COA requirements for submitting source test plans, notifications prior to conducting source tests, and submission of source tests results do not apply to visible emissions observations by smoke readers, except in connection with required particulate matter testing. Visible emission monitoring, recordkeeping, and reporting requirements are addressed in Permit Conditions B.3 (COA Visible Emissions Recordkeeping), B.4 (COA Visible Emission Reporting), B.6.3 (COA Particulate Matter Monitoring for Diesel Engines), B.7.3 (COA Particulate Matter Record Keeping and Reporting for Diesel Engines), B.9 (COA Particulate Matter Recordkeeping for Liquid-Fired Boilers and Heaters), and B.13 (COA Incinerator Visible Emissions). As a result, the EPA is changing Condition A.26.5 to be consistent with 18 AAC 50.345(a) by exempting visible emissions observations from Condition E.1.1 which requires the permittee to provide the EPA with at least 30 days prior notice of any stack test, and Condition E.1.9 which requires the permittee to submit emission test reports to the EPA within 45 days of completing any emission test. This change to Condition A.26.5 does not affect any of the permit conditions established specifically to assure ongoing visible emission monitoring, recordkeeping, or reporting requirements as set forth in Conditions B.3, B.4, B.6.3, B.7.3, B.9, and B.13.

Conditions F.2.5.1, F.3.7, and F.4.7: Clarify conditions F.2.5.1, F.3.7, and F.4.7 to require the permittee to report permit deviations under the Outer OCS deviation report condition or the COA excess emission and permit deviation report condition.

Conditions F.2.5.1, F.3.7, and F.4.7 require the permittee to report any instances when operational parameters (incinerator exit temperature; urea pump; selective catalytic reduction, OxyCat, and CDPF inlet temperature; and oxides of nitrogen (NO_x) and carbon monoxide (CO) concentration) have exceeded specific thresholds under both Condition A.17 (Outer OCS deviation reports) and Condition A.18 (COA excess emission and permit deviation reports). The EPA is clarifying that the permittee is only required to report under Condition A.17 (Outer OCS deviation reports) if the deviation occurred while the Kulluk was an OCS source on the Outer OCS, and to report under Condition A.18 (COA excess emission and permit deviation reports) if the permit deviation occurred while the Kulluk was an OCS source on the Inner OCS.

Condition F.2.6: Clarify that the permittee shall record the duration of waste burned for each batch charged to the incinerator daily.

Condition F.2.6 requires the permittee to record the number of hours the Kulluk incinerator operates each day. The EPA clarified this condition to explicitly require the permittee to record the time it takes to burn each batch charged to the incinerator daily, which is necessary to comply with the requirement to record the total number of hours operated each day.

2.2 Corrections

2.2.1 Units for Incinerator Rating

Condition C.3.3 and Table D.2.1: Correct Condition C.3.3 and Table D.2.1 by changing the incinerator rating units from tons per hour (tons/hr) to pounds per hour (lb/hr) to be consistent with the correct incinerator rating unit.

2.2.2 Cross References and Citations

Condition A.23 and A.24: Correct the citation reference by including 18 AAC 50.346(b)(1) and removing 18 AAC 50.420.

Conditions B.1.3, B.6.1, B.6.1.2, B.6.2, B.6.4, B.7.1.1.2, B.7.2, B.7.3.1, B.7.3.3, B.8.3.2, B.9.1.1, B.11.1, B.12.1, D.3.10, D.4.5, D.6.15, and F.3.7: Correct these conditions to address cross referencing errors identified in the final permit.

2.2.3 Format

Condition B.5.3: Reformat the condition to place the mathematical equation in the correct location on the page.

Tables D.2.1 and D.2.2: The following formatting errors appear in the PDF version of the Final permit on the EPA website.

Table D.2.1

- Emission Unit ID K-1A – 1D: Emission Factor Units and N₂O emission rate are truncated.
- Emission Unit ID K-2A – 2Z, K-3A – 3Z, K-4A – 4C: N₂O emission rate is truncated.
- Emission Unit ID K-5A – 5Z: N₂O emission rate is truncated.
- Emission Unit ID K-6: Description and NO_x emission rate are truncated.
- Emission Unit ID K-7A – 7D: CO and PM₁₀ emission rates are truncated.
- Emission Unit ID K-8: Description and CO emission rates are truncated.

Table D.2.2

- Emission Unit ID IB1-1A – 1Z, IB2-1A – 1Z: Emission Factor Units and N₂O emission rate are truncated.
- Emission Unit ID IB1-2A – 2Z, IB2-2A – 2Z: Emission Factor Units, CO emission rate and N₂O emission rate are truncated.
- Emission Unit ID RV/BT-1A – 1Z, OSRV-1A – 1Z: CO and PM₁₀ emission rates are truncated.
- Emission Unit ID IB1-3A – 3Z, IB2-3A – 3Z, RV/BT-2A – 2Z, OSRV-2A – 2Z: CO and PM₁₀ emission rate are truncated.
- Emission Unit IB1-4, IB2-4, OSRV-3: Emission Factor Units is truncated.

2.3 Use of Catalyzed Diesel Particulate Filters

Condition D.11: Change Condition D.11 to require the use of an operating OxyCat or CDPF control device at all times for several emission units on the Kulluk and the Aiviq Icebreaker generator engines.

Condition D.11 requires that the exhaust from several emission units on the Kulluk and from the propulsion and generation engines on Icebreakers No. 1 and No. 2 to be directed to an operating OxyCat control device. Instead of installing an OxyCat control devices, the permittee installed CDPFs on the Kulluk Generator Engines (K-1A – K1D), Kulluk HPU engines (K-2A – K-2B), Kulluk Cranes (K-4A – K-4C) and the four Aiviq Icebreaker generator engines. The CDPFs are installed in the same location and with the same configuration permitted for the OxyCat units and contain a filter membrane for the removal of particulate matter in addition to an oxidizing catalyst. Therefore, the CPDFs are expected to achieve equivalent or better control efficiencies for PM, CO, and VOCs than using only OxyCat controls. Table 2 provides a comparison of the expected effectiveness of each control device.

Table 2 Control Effectiveness Used for OxyCat and CDPFs

Device	PM _{2.5}	CO	VOC
OxyCat	50%	80%	70%
CDPF	85%	80%	90%

Given that the control efficiencies of the CDPF are equal to or greater than the OxyCat, a reduction in the overall emissions from the source is expected; however no changes to the

National Ambient Air Quality Standard (NAAQS) based emission limits have been requested, nor are such changes needed. Condition D.11 is being changed to allow exhaust from the listed emission units to be directed to either an operating OxyCat or CDPF control device.

Condition E.3.1.4: Include CDPF control devices in the requirement to report the average inlet temperature recorded during source tests that represent the worst case emission factor.

Condition E.3.1.4 specifies which emission units and pollutants must be tested to develop emission factors for ensuring compliance with synthetic minor and NAAQS-based emission limits. The permit condition is being changed to include a requirement to report the average inlet temperature to the catalyst recorded during source tests that represent the worst case emission factor for emission units controlled with a CDPF.

Conditions F.4 and F.4.6: Include CDPF control devices in the requirement to conduct monitoring of the control device, including the requirement to monitor CO emissions from the exhaust once per week using a portable CO monitor.

Conditions F.4 and F.4.6 establish parametric monitoring requirements to ensure the OxyCat pollution control systems required on most engines on the Kulluk and the large engines on the icebreakers are operating properly and achieving the anticipated pollutant reductions. To ensure each catalyst is still active, the permit requires weekly measurements of CO concentrations downstream of the oxidation catalyst with a portable monitoring device. These oxidation catalyst parametric monitoring requirements are also applicable to emission units controlled with a CDPF. Therefore, Condition F.4 is being changed to apply parametric monitoring requirements to emission units equipped with a CDPF.

2.4 Kulluk Incinerator Emission Calculations

Conditions D.4.1.2, D.4.2.2, and D.4.3.3: Change Conditions D.4.1.2, D.4.2.2, and D.4.3.3 to provide an option of calculating Kulluk incinerator NO_x, CO, and GHG emissions using the maximum incinerator capacity multiplied by 12 or the actual waste combusted measured per batch per day.

Condition D.4 imposes synthetic minor limits (tons per “year”) to restrict source emissions to below the levels that would make it a PSD major source and subject to (PSD) permitting. Only pollutants that would otherwise (without the permit) be potentially emitted at rates above the PSD thresholds must be limited. Condition D.4 limits the Kulluk’s potential to emit for NO_x, CO, SO₂ and GHG emissions to below the thresholds at which it would be subject to PSD permitting, or subject to regulation in the case of GHG emissions.

The permit currently requires that daily emissions of NO_x, CO, and Green House Gases from the Kulluk incinerator (K-8) be calculated using the maximum rated capacity of the incinerator multiplied by 12 (maximum authorized hours of operation in a day). The permittee requested a revision to the NO_x, CO, and (GHG) daily emissions calculation method for the Kulluk incinerator to provide an option for calculating emissions based on the actual waste combusted. The permittee requested the flexibility to weigh each batch added to the Kulluk incinerator and

to use source test-derived emission factors when calculating hourly and daily mass emissions from the incinerator. Permit Condition G.5.2.2 requires the permittee to comply with NSPS CCCC monitoring, recordkeeping and reporting requirements for each batch of waste charged to the Kulluk incinerator, which includes the requirement to record the date and time each batch of waste is charged to the incinerator and a requirement to weigh and record the mass of each batch of waste. In addition, Condition G.5.2.3 requires the permittee to calculate the percent of Municipal Solid Waste/Refuse-Derived Fuel (MSW/RDF) incinerated each day. The EPA is changing Conditions D.4.1.2, D.4.2.2, and D.4.3.3 to provide the permittee with the option of calculating emissions using the maximum incinerator capacity multiplied by 12, or the actual waste combusted measured per batch per day pursuant to Conditions G.5.2.2 and G.5.2.3.

Conditions D.6.14.2 and D.6.15.2: Change Conditions D.6.14.2 and D.6.15.2 to provide an option of calculating Kulluk incinerator hourly NO_x and daily PM₁₀ and PM_{2.5} emissions using the maximum incinerator capacity or the actual waste combusted.

Condition D.6 establishes limits and calculation requirements necessary to ensure that the project does not cause or contribute to a violation of any NAAQS under authorized operational scenarios. The NAAQS protection limits in Condition D.6 include emission limits on specific emission units or groups of specific emission units (including whole vessels) that reflect emission rates used in the modeling analysis conducted in support of the initial permit application. The emission limits in Conditions D.6.1 through D.6.12 rely on the monitoring, recordkeeping, and reporting requirements in Conditions D.13 through D.15 to document compliance.

Condition D.6.14.2 was changed to remove the reference to the Kulluk incinerator and Condition D.6.14.3 was added to provide the permittee with an option of calculating emissions using the maximum incinerator capacity as reported to the EPA seasonally (Condition C.3.3) or the actual waste combusted measured per batch pursuant to Conditions G.5.2.2. Unlike the other Kulluk incinerator permit conditions (D.4.1.2, D.4.2.2, D.4.3.3, and D.6.15.2) Condition D.14.2 does not cross reference Condition G.5.2.3. Condition G.5.2.3 requires the summation of all of the waste incinerated for the day while Condition D.6.14.3 is used to demonstrate compliance with the hourly NO_x emission limit.

Condition D.6.15.2 is being changed to provide the permittee with an option of calculating emissions using the maximum incinerator capacity multiplied by 12, or the actual waste combusted measured per batch per day pursuant to Conditions G.5.2.2 or G.5.2.3.