ALASKA DEPARTMENT OF ENVIRONMENTAL CONSERVATION
Air Permits Program

TECHNICAL ANALYSIS REPORT
for
Air Quality Control Minor Permit AQ0923MSS10

eni US Operating Company Incorporated
Nikaitchuq Development

Revision of Emission Unit Inventory and Associated Emission Limits

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ABBREVIATIONS/ACRONYMS

AAAQS .....Alaska Ambient Air Quality Standards
AAC .....Alaska Administrative Code
CAT.....Caterpillar
DDR .....Doyon Drilling Rig
Department .....Alaska Department of Environmental Conservation
EF .....Emission Factor
Eni .....Eni US Operating Company Incorporated
EU.....Emission Unit
ICE .....Internal Combustion Engine
MR&R.....Monitoring, Recordkeeping, and Reporting
NA .....Not Applicable
Nikaitchuq .....Nikaitchuq Development
NRE.....Non-road Engine
ORL.....Owner Requested Limits
NSPS .....New Source Performance Standards
PSD.....Prevention of Significant Deterioration
PTE.....Potential to Emit
TAR.....Technical Analysis Report
ULSD .....Ultra Low Sulfur Diesel
VE.....Visible Emissions

Units and Measures

bhp.....brake horsepower or boiler horsepower
gal/hr.....gallons per hour
gal/yr.....gallons per year
g/hp-hr .....grams per horsepower-hour
g/kW-hr .....grams per kilowatt-hour
gr./dscf.....grains per dry standard cubic foot
hr/yr .....hours per year
hp.....horsepower
lb/gal.....pounds per gallon
kW .....kilowatts (electric)
lb/hr .....pounds per hour
lb/hphr .....pounds per horsepower hour
Mscf.....1,000 standard cubic feet
MMBtu/hr.....million British thermal units per hour
MMscf/yr.....million standard cubic feet per year
MMscf/day .....million standard cubic feet per day
ppmv.....parts per million by volume
ppmw.....parts per million by weight
tpy.....tons per year
$\mu g/m^3$ .....micrograms per cubic meter

Pollutants

CO .....Carbon Monoxide
NOx .....Oxides of Nitrogen
NO_2.....Nitrogen Dioxide
PM .....Particulate Matter
PM-10.....Particulate Matter with an aerodynamic diameter less than 10 microns
SO_2 .....Sulfur Dioxide
VOC .....Volatile Organic Compound

1. INTRODUCTION

This Technical Analysis Report (TAR) provides the Alaska Department of Environmental Conservation's (Department's) basis for issuing Air Quality Control Minor Permit AQ0923MSS10 to eni US Operating Company Incorporated (eni) for the Nikaitchuq Development. The permit is classified under 18 AAC 50.508(6). AQ0923MSS10 rescinds AQ0923MSS09. AQ0923MSS10 authorizes eni to revise its Emission Unit (EU) inventory, and results in changes in the emission limitations that apply to the units in that inventory. It continues to allow the Nikaitchuq Development to avoid classification as a Prevention of Significant Deterioration (PSD) major source. This TAR is only the basis for AQ0923MSS10.

1.1 Description of Source

The Nikaitchuq Development is an oil and gas production facility with six stations located on the North Slope of Alaska adjacent to the Kuparuk Seawater Treatment Plant at Oliktok Point. The six stations are designated as Oliktok Production Pad, Nikaitchuq Operations Camp, Spy Island Drillsite, On-Shore Development Drilling Rig, Off-Shore Development Drilling Rig, and Intermittent Well Servicing Emission Units. The Oliktok Construction Camp is no longer under eni's ownership and control. The area is unclassified in regards to compliance with Alaska ambient air quality standards. Appendix A presents the equipment, ratings, and emissions at the Nikaitchuq Development. The Nikaitchuq Development is an existing source and is not classified as PSD major.

1.2 Permit History Relevant to Application

The Department issued AQ0923MSS01 under 18 AAC 50.502(c)(1), 18 AAC 50.502(c)(2)(A), and 18 AAC 50.508(5) on May 6, 2006 to Kerr McGee Oil and Gas Corporation to establish Phase I of an onshore oil and gas production pad at the Nikaitchuq Development. The project demonstrated compliance with ambient air quality standards for nitrogen oxides (NOx), sulfur dioxide (SO_2), and particulate matter with aerodynamic diameter not exceeding a nominal 10 micrometers (PM-10). The permit established owner requested limits (ORLs) for NOx and carbon monoxide (CO) under 18 AAC 508(5). The ORLs enabled the stationary source avoid PSD classification for CO and NOx. The Department administratively revised AQ0923MSS01 on March 30, 2007 to transfer ownership of Nikaitchuq Development to eni.

eni applied for AQ0923MSS02 and AQ0923MSS03 but subsequently withdrew the applications. The Department issued AQ0923MSS04 on April 30, 2010, which rescinded AQ0923MSS01 Revision 1. AQ0923MSS04 authorized eni to install an offshore oil and gas production pad at the Nikaitchuq Development. The permit revised the EU inventory, stack characteristics, operational scenarios, and included more EUs under the existing ORLs.

The Department issued AQ0923MSS05 on December 30, 2010 to rescind AQ0923MSS04. AQ0923MSS05 revised the EU inventory, increased the operation hours of several EUs, and organized the Nikaitchuq Development into eight stations. The permit continued to allow the Nikaitchuq Development to avoid classification as a PSD major source.

The Department issued AQ0923MSS06 on August 11, 2011 to rescind AQ0923MSS05. AQ0923MSS06 revised the EU inventory, stack characteristics, operating scenarios, included NOx and CO emissions from the incinerators in the existing ORLs, and required all diesel-fired

EUs to burn ultra low sulfur diesel (ULSD) fuel. The permit continued to allow the Nikaitchuq Development to avoid classification as a PSD major source.

The Department issued AQ0923MSS08 on October 1, 2012 to authorize eni to convert the gas-fired turbine, EU 32 (a Solar Taurus 70 Turbine), to a dual fuel-fired turbine. The owner requested annual limit of 600 hours for diesel fuel use in EU 32 limited the emissions increase for the project to less than 10 tons per year (tpy) for all pollutants and did not require minor permitting under 18 AAC 50.502(c).

The Department issued AQ0923MSS07 on November 27, 2012 to rescind and replace both AQ0923MSS06 and AQ0923MSS08. AQ0923MSS07 revised the EU inventory, stack parameters, and deadlines for calculating and recording emissions while continuing to avoid classification as a PSD major source.

The Department issued AQ0923MSS09 on July 23, 2013 to rescind and replace AQ0923MSS07. AQ0923MSS09 revised the EU inventory and associated emission limitations, including removing the inventory of the Oliktok Construction Camp (EUs 80 through 92). The three non-road diesel engines at the Spy Island Drillsite (EUs 64, 68, and 116) were re-designated as stationary sources.

1.3 Application Description

eni's Application for AQ0923MSS10 was received by the Department on August 3, 2015. eni requested the Department to revise the emission unit inventory and associated emission limitations. The permit continues to allow the Nikaitchuq Development to avoid classification as a PSD major source. Consistent with the application, this minor permit will:

(a) Change facility name from “Eni US Operating Co. Inc.” to “eni US Operating Co. Inc.”

(b) Change the ratings in Table 1 of the permit for EUs 1, 2, 32, and 33 to represent operating conditions of 100 percent load at 0 degrees Fahrenheit.

(c) Replace EU IDs 94 and 95, 1.082 MMBtu/hr boilers, with 2 MMBtu/hr boilers in the emission inventory.

(d) Add EUs 120, 121, and 122, three 12,000 gallon diesel tanks, to the emission inventory.

(e) Remove EU 48 from the emission inventory. The unit was shutdown and cold stacked on April 24, 2013.

(f) Remove diesel tanks, EU IDs 7, 42, and 119, from the emission inventory. They are no longer at the facility.

(g) Update the maximum engine rating of the Off-Shore Development Drilling Rig from 9,448 hp to 9,511 hp to include the 63 hp mud pump cold-start non-road engine (added in Minor Permit No. AQ0923MSS09).

(h) Update the maximum engine rating of the On-shore Development Drilling Rig from 5,393 hp to 5,330 hp.

(i) Remove EU 113 from the Intermittent Well Servicing Equipment. EU 113 is no longer in use.

(j) Remove obsolete conditions related to the initial installation of various emissions units. The applicable units have all been installed and all initial requirements are completed.

(k) Remove the procedure for revised emission factors. The emission factors are included in the permit in Appendix A. As such, a permit amendment or revision is required. The condition was unnecessary.

(l) Corrected the emission factors for EU 3, 47, 49, 50, 64, and 93, based on manufacturer information.

2. EMISSIONS SUMMARY AND PERMIT APPLICABILITY

Existing ORLs limit the Nikaitchuq Development potential to emit (PTE) to 225 tons per year (tpy) of CO and 225 tpy of NOx. eni did not request changes to the ORLs to avoid classification as a PSD major source. Table 1 shows the PTE for the source. The PTE is based on ORLs of 225 tpy for NOx and CO and for other pollutants it was conservatively based on the dual fuel fired turbine (EU 32) burning fuel gas for 8160 hours and diesel for 600 hours that was part of the application for AQ0923MSS08.

The PTE does not include emissions from the drill rig engines, well servicing engines, the construction power generators, and the new mud pump engine, since they are non-road engines (NREs). Per 18 AAC 50.100, emissions of NREs are not included when determining the classification of a modification.

Table 1 summarizes the potential tons per year (tpy) emissions of NOx, CO, PM-10, SO_2, and volatile organic compounds (VOC). Table A of Appendix A of the TAR provide details about the emission calculations. There is no increase in emissions for any pollutants as a result of this permit action.

Table 1: Potential Emissions Summary with ORLs in Place (tpy)

Parameter	**Emissions (tpy)**							
Description of Scenario	NOx	CO	PM[2]	PM-10	PM-2.5[3]	VOC	SO_2	**Total**
Assessable Emission[1]	225	225		39.7		93.7	64.4	**648**

Table Note:
1 Assessable emissions are the sum of the emissions of each individual regulated air pollutant for which the stationary source has the potential to emit quantities of 10 TPY or greater.
2 Potential emissions of PM are assumed to equal potential emissions of PM-10.
3 PM-2.5 emissions are included in the assessable emissions for PM-10.

2.1 Permit Applicability and Assessable Emissions

The assessable emissions are 648 tpy.

2.2 Department Findings

The Department made the following findings regarding eni's application:

(1) Revising the existing Title I permit conditions as described in the application requires a minor permit under 18 AAC 50.508(6).

(2) Other than editorial changes, eni is not requesting that any conditions in AQ0923MSS10 established to protect ambient air quality be revised; therefore an ambient analysis is not required under 18 AAC 50.540(k)(3)(C).

(3) The application is complete because it includes each of the elements listed in 18 AAC 50.540(k).

(4) The Department is not removing the 600 hour per year limit for firing ULSD in EU 32, to avoid source testing for NOx and CO. As eni correctly stated in the application, EU 32 is subject to the NOx emission limits in 40 CFR 60 Subpart KKKK and source testing for NOx is required at least once every two years to verify the NOx emission factor. However, 40 C.F.R. 60 Subpart KKKK does not require biennial source testing to verify the CO emission factor. Therefore, the limit is still necessary to ensure that any discrepancy in the vendor provided CO emission factor will not result in emissions above the 250 tpy PSD threshold.

(5) The Department revised the emission unit inventory Table 1 to specify the ratings for gas turbines (EUs 1, 2, 32, and 33) from 7,700 kW to 8,250 kW and the dual-fuel fired turbine (EU 32) from 6,950 kW to 7,700 kW when firing diesel fuel. The minor permit application indicates these increased ratings reflect operating conditions based on 100 percent load at 0 degrees Fahrenheit as indicated in the vendor data, rather than 100 percent load at 15 degrees Fahrenheit as included with the initial permit application.

(6) The Department revised Table A-3 to include updated emission factors, as provided on October 6, 2015 by Ann Mason of SLR Consulting. See Appendix A of this TAR for additional information.

(7) The Department is not removing the requirements to place reflective boundary markers along the eastern production pad border between Oliktok Rd. and the Oliktok Point Processing Facility or along the southern edge of the NOC pad edge and the DS 3Q access road. Eni has not provided a sufficient basis for removal of these requirements from the Public Access Control Pad.

3 PERMIT CONDITIONS AND REQUIREMENTS

18 AAC 50.544 describes what the Department must include in minor permits. This section provides a basis for the permit requirements in AQ0923MSS09.

3.1 All Minor Permits

As described in 18 AAC 50.544(a), each minor permit issued under 18 AAC 50.542 must:

(1) Identify the stationary source, the project, the Permittee, and contact information. The permit cover page identifies each of these.

(2) Include the requirements to pay fees in accordance with 18 AAC 50.400 through 18 AAC 50.499. Section 5 (Assessable Emissions and Estimates) of the permit contains fee requirements and assessable emissions.

(3) Include conditions established by air quality modeling, if the Department determines that the project requires an analysis. No new modeling analysis was required for AQ0923MSS10, so no modeling memorandum is included in this TAR. Permit conditions for ambient protection that were established through previous minor permits are retained.

Section 4 (Ambient Air Quality Protection Requirements) of the permit lists conditions for ambient protection carried over from a previous permit.

(4) Include the requirements of an ORL described under 18 AAC 50.225 that are applicable to the source. Section 3 (Requirements to Avoid PSD Classification) of the permit contains ORL terms and conditions that enable the source to avoid PSD classification. However, these conditions were established under 18 AAC 50.508(5) in a previous permit action and carried over to this minor permit.

(5) Include the standard permit conditions in 18 AAC 50.345, as applicable. Section 8 (Terms to Make Permit Enforceable) of the permit contains standard conditions needed to make the permit enforceable.

(6) The Department intends to add the requirements of Permit No. AQ0923MSS10 to the Title V permit by significant revision.

3.2 Permits Issued under 18 AAC 50.508(6)

As required by 18 AAC 50.544(i), AQ0923MSS10 includes terms and conditions necessary to ensure the Permittee will construct and operate the stationary source, or proposed modification, in accordance with 18 AAC 50. AQ0923MSS10 revises and rescinds AQ0923MSS09, which allowed Nikaitchuq to avoid classification as a PSD major source. As required by 18 AAC 50.544(i)(1)(B), AQ0923MSS10 contains limits that continue to enable the stationary source to continue to avoid PSD classification. Section 3 (Requirements to Avoid PSD Classification) of the permit lists these requirements. AQ0923MSS10 carries forward all terms and conditions rescinded in AQ0923MSS09, except where eni requests revisions as described in Section 1.3 of this TAR.

4 PERMIT ADMINISTRATION

eni currently operates under AQ0923TVP01 Revision 1. eni may not operate under the terms and conditions of this permit until the Department issues a renewed operating permit containing the applicable requirements of AQ0923MSS10.

APPENDIX A – EU INVENTORY AND EMISSIONS

Table A presents details of the EUs, their characteristics, and emissions. The Department obtained the emissions data from Attachment E of the August 3, 2015 permit application. Maximum annual operation for all units based on full-time operation, or permit operating limits, where applicable.

Table A: Characteristics and Emissions of Criteria Pollutants for Stationary EUs

EU	Description of Emission Units	Rating	Units	NOx		CO		PM-2.5/PM-10/PM		VOC		SO_2	
				EF	TPY	EF	TPY	EF	TPY	EF	TPY	EF	TPY
1	Gas Turbine #1	8,250	kW (Fuel Gas)	5.1 lb/hr	22.34	5.2 lb/hr	22.78	0.01 lb/MMBtu	2.41	3.00 lb/hr	13.14	0.0378 lb/MMBtu	13.80
2	Gas Turbine #2	8,250	kW (Fuel Gas)	5.1 lb/hr	22.34	5.2 lb/hr	22.78	0.01 lb/MMBtu	2.41	3.00 lb/hr	13.14	0.0378 lb/MMBtu	13.80
32	Dual Fuel Turbine #3 (fuel gas)	8,250	kW (Fuel Gas)	5.1 lb/hr	20.81	5.2 lb/hr	21.22	0.01 lb/MMBtu	2.24	3.00 lb/hr	12.24	0.0378 lb/MMBtu	12.85
32	Dual Fuel Turbine #3 (ULSD)	7,700	kW (ULSD)	31.5 lb/hr	9.45	10 lb/hr	3.00	0.01 lb/MMBtu	0.28	2.90 lb/hr	0.87	0.0017 lb/MMBtu	0.04
33	Gas Turbine #4	8,250	kW (Fuel Gas)	5.1 lb/hr	22.34	5.2 lb/hr	22.78	0.01 lb/MMBtu	2.41	3.00 lb/hr	13.14	0.0378 lb/MMBtu	13.80
3	Standby Generator RICE	2,500	kW	7.17 g/kWh	49.43	0.94 g/kWh	6.50	0.19 g/kWh	0.64	0.70 lb/hr	0.70	0.0017 lb/MMBtu	0.04
4A	Daily Purge & Pilot Operation	131	MMscf/yr	0.07 lb/MMBtu	4.98	0.31 lb/MMBtu	22.69	40 µg/liter	1.93	0.06 lb/MMBtu	4.61	42.1 lb/MMscf	2.77
4B	Low Pressure Emergency Op.	98	MMscf/yr	0.07 lb/MMBtu	3.69	0.31 lb/MMBtu	16.84	40 µg/liter	1.43	0.06 lb/MMBtu	3.42	42.1 lb/MMscf	2.05
69	OPP WIF Boiler #1	1	MMBtu/hr	20 lb/1,000 gal	0.85	5 lb/1,000 gal	0.21	3.30 lb/1000 gal	0.14	0.34 lb/1000 gal	0.01	0.0017 lb/MMBtu	0.01
70	OPP WIF Boiler #2	1	MMBtu/hr	20 lb/1,000 gal	0.85	5 lb/1,000 gal	0.21	3.30 lb/1000 gal	0.14	0.34 lb/1000 gal	0.01	0.0017 lb/MMBtu	0.01
71	OPP WIF Boiler #3	1	MMBtu/hr	20 lb/1,000 gal	0.85	5 lb/1,000 gal	0.21	3.30 lb/1000 gal	0.14	0.34 lb/1000 gal	0.01	0.0017 lb/MMBtu	0.01
106	Standby Heater	11	MMBtu/hr	100 lb/MMscf	4.13	84 lb/MMscf	4.33	7.60 lb/MMscf	0.39	5.50 lb/MMscf	0.28	0.0378 lb/MMBtu	2.17
93	Standby Generator RICE	1,115	kW	20.6 lb/hr	5.15	1.63 g/kWh	0.50	0.20 g/kWh	0.09	0.25 lb/hr	0.06	0.0017 lb/MMBtu	0.00
94	NOC Camp Boiler #1	2	MMBtu/hr	13 lb/1,000 gal	1.57	7.5 lb/1,000 gal	0.91	0.70 lb/1000 gal	0.08	1.00 lb/1000 gal	0.12	0.0170 lb/MMBtu	0.19
95	NOC Camp Boiler #2	2	MMBtu/hr	13 lb/1,000 gal	1.57	7.5 lb/1,000 gal	0.91	0.70 lb/1000 gal	0.08	1.00 lb/1000 gal	0.12	0.0170 lb/MMBtu	0.19
111	NOC Warm Storage Boiler #1	1	MMBtu/hr	13 lb/1,000 gal	0.74	7.5 lb/1,000 gal	0.42	0.70 lb/1000 gal	0.04	1.00 lb/1000 gal	0.06	0.0170 lb/MMBtu	0.09
112	NOC Warm Storage Boiler #2	1	MMBtu/hr	13 lb/1,000 gal	0.74	7.5 lb/1,000 gal	0.42	0.70 lb/1000 gal	0.04	1.00 lb/1000 gal	0.06	0.0170 lb/MMBtu	0.09
47	Standby Generator E04 RICE	3,351	hp	6.71 g/bhp-hr	217.2	0.88 g/bhp-hr	28.31	0.06 g/bhp-hr	2.02	0.00 lb/hp-hr	9.42	0.0017 lb/MMBtu	0.17
49	Standby Generator E07 RICE	3,635	hp	42.46 lb/hr	42.46	3.92 lb/hr	3.92	0.31 g/hp-hr	2.48	1.15 lb/hr	1.15	0.0017 lb/MMBtu	0.04
50	Fire Water Pump	183	hp	2.50 g/bhp-hr	0.05	1.1 g/bhp-hr	0.02	0.09 g/bhp-hr	0.00	0.20 g/bhp-hr	0.00	0.0017 lb/MMBtu	0.00
96	Multiple Chamber Incinerator	300	lb/hr	3 lb/ton	1.97	10 lb/ton	6.57	7.00 lb/ton	4.60	3.00 lb/ton	1.97	2.5 lb/ton	1.64
107	Tent Heating Boiler #1	2	MMBtu/hr	20 lb/1,000 gal	2.22	5 lb/1,000 gal	0.55	3.30 lb/1000 gal	0.37	0.34 lb/1000 gal	0.04	0.0017 lb/MMBtu	0.02
108	Tent Heating Boiler #2	2	MMBtu/hr	20 lb/1,000 gal	2.22	5 lb/1,000 gal	0.55	3.30 lb/1000 gal	0.37	0.34 lb/1000 gal	0.04	0.0017 lb/MMBtu	0.02
109	WIF Boiler #1	2	MMBtu/hr	20 lb/1,000 gal	1.58	5 lb/1,000 gal	0.39	3.30 lb/1000 gal	0.26	0.34 lb/1000 gal	0.03	0.0017 lb/MMBtu	0.02
110	WIF Boiler #2	2	MMBtu/hr	20 lb/1,000 gal	1.58	5 lb/1,000 gal	0.39	3.30 lb/1000 gal	0.26	0.34 lb/1000 gal	0.03	0.0017 lb/MMBtu	0.02
114	Mud Tank Farm Boiler #1	1	MMBtu/hr	20 lb/1,000 gal	0.59	5 lb/1,000 gal	0.15	3.30 lb/1000 gal	0.10	0.34 lb/1000 gal	0.01	0.0017 lb/MMBtu	0.01
115	Mud Tank Farm Boiler #2	1	MMBtu/hr	20 lb/1,000 gal	0.59	5 lb/1,000 gal	0.15	3.30 lb/1000 gal	0.10	0.34 lb/1000 gal	0.01	0.0017 lb/MMBtu	0.01
64	WIF Generator RICE	422	bhp	3.45 g/bhp-hr	14.06	0.54 g/bhp-hr	2.19	0.08 g/bhp-hr	0.33	0.00 lb/bhp-hr	4.57	0.0017 lb/MMBtu	0.02
68	WIF Cement Pump Engine #1	320	bhp	0.031 lb/bhp-hr	43.45	.0067 lb/bhp-hr	9.36	0.002 lb/bhp-hr	3.08	0.00 lb/bhp-hr	3.46	0.0017 lb/MMBtu	0.02

EU	Description of Emission Units	Rating	Units	NOx		CO		PM-2.5/PM-10/PM		VOC		SO_2	
				EF	TPY	EF	TPY	EF	TPY	EF	TPY	EF	TPY
116	WIF Cement Pump Engine #2	320	bhp	0.031 lb/bhp-hr	43.45	.0067 lb/bhp-hr	9.36	0.002 lb/bhp-hr	3.08	0.00 lb/bhp-hr	3.46	0.0017 lb/MMBtu	0.02
9	Rig Boiler #1	4	MMBtu/hr	20 lb/1,000 gal	3.83	5 lb/1,000 gal	0.96	3.3 lb/1000 gal	0.63	0.34 lb/1000 gal	0.07	0.0017 lb/MMBtu	0.04
10	Rig Boiler #2	4	MMBtu/hr	20 lb/1,000 gal	3.83	5 lb/1,000 gal	0.96	3.3 lb/1000 gal	0.63	0.34 lb/1000 gal	0.07	0.0017 lb/MMBtu	0.04
11	Rig Heaters #1	4	MMBtu/hr	20 lb/1,000 gal	3.83	5 lb/1,000 gal	0.96	3.3 lb/1000 gal	0.63	0.34 lb/1000 gal	0.07	0.0017 lb/MMBtu	0.04
12	Rig Heaters #2	4	MMBtu/hr	20 lb/1,000 gal	3.83	5 lb/1,000 gal	0.96	3.3 lb/1000 gal	0.63	0.34 lb/1000 gal	0.07	0.0017 lb/MMBtu	0.04
13	Rig Heaters #3	3	MMBtu/hr	20 lb/1,000 gal	2.28	5 lb/1,000 gal	0.57	3.3 lb/1000 gal	0.38	0.34 lb/1000 gal	0.04	0.0017 lb/MMBtu	0.02
98	Rig Boiler #1	4	MMBtu/hr	20 lb/1,000 gal	3.82	5 lb/1,000 gal	0.95	3.3 lb/1000 gal	0.63	0.34 lb/1000 gal	0.06	0.0017 lb/MMBtu	0.04
99	Rig Boiler #2	4	MMBtu/hr	20 lb/1,000 gal	3.82	5 lb/1,000 gal	0.95	3.3 lb/1000 gal	0.63	0.34 lb/1000 gal	0.06	0.0017 lb/MMBtu	0.04
100	Rig Heater #1	4	MMBtu/hr	20 lb/1,000 gal	3.19	5 lb/1,000 gal	0.80	3.3 lb/1000 gal	0.53	0.34 lb/1000 gal	0.05	0.0017 lb/MMBtu	0.03
101	Rig Heater #2	5	MMBtu/hr	20 lb/1,000 gal	4.56	5 lb/1,000 gal	1.14	3.3 lb/1000 gal	0.75	0.34 lb/1000 gal	0.08	0.0017 lb/MMBtu	0.05
23	Hot Oiler Boiler / Heater #1	6	MMBtu/hr	20 lb/1,000 gal	5.48	5 lb/1,000 gal	1.37	3.3 lb/1000 gal	0.90	0.34 lb/1000 gal	0.09	0.0017 lb/MMBtu	0.06
24	Hot Oiler Boiler / Heater #2	10	MMBtu/hr	20 lb/1,000 gal	8.67	5 lb/1,000 gal	2.17	3.3 lb/1000 gal	1.43	0.34 lb/1000 gal	0.15	0.0017 lb/MMBtu	0.09
	Tanks										6.68		
Total Potential to Emit with 225 tpy ORLs for NOx and CO (tpy)					**225**		**225**						
Total Potential to Emit without ORLs (tpy)					590.39		220.43		**39.74**		**93.68**		**64.38**

Table Notes:

Diesel sulfur content (development drilling rig)	0.3	wt pct. S
Diesel sulfur content (intermittent emission units)	0.000015	wt pct. S
BSFC from AP-42, October 1996, Section 3.4, Page 3.4-5	7,000	Btu/hp-hr
Fuel gas heat content based on 2014 gas analysis	1,114	Btu/scf
Arctic diesel fuel heat content	120,000	Btu/gal
Solar turbine heat rate	10,100	Btu/kW-hr
Efficiency of heaters	80	%
Fuel gas sulfur content	250	ppm
Density of Arctic Diesel	7	lb/gal
Density of Propane	4	lb/gal
Heating value of propane	90,500	Btu/gal

Development drill rig parameters are based on Nabors Rig 245E; the development drilling will either be the same size or smaller than Rig 245E.

Workover drill rig parameters are based on Nordic Rig No. 3; the workover rig will either be the same size or smaller than Nordic No.3.

Potential emissions of PM are assumed to equal potential emissions of PM-10.

The source for the emission factors located in Table A are found in the minor permit application.