



AIR SCIENCES INC.

DENVER • PORTLAND

**EPA Outer
Continental Shelf
(OCS) Operating
Permit Application**

**Shell Beaufort Sea,
Alaska Exploratory
Drilling Program:
Conical Drilling Unit
Kulluk**

**PREPARED FOR:
SHELL OFFSHORE INC.**

**PROJECT NO. 180-20-4
FEBRUARY 28, 2011**

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SECTION 1

GENERAL INFORMATION AND SUMMARY (GIS)

Federal Operating Permit Program (40 CFR Part 71)

GENERAL INFORMATION AND SUMMARY (GIS)

A. Mailing Address and Contact Information

Facility name Shell Offshore, Inc. – Conical Drilling Unit Kulluk

Mailing address: Street or P.O. Box 3601 C Street, Suite 1334

City Anchorage State AK ZIP 99503 - _____

Contact person: Susan Childs Title Alaska Venture Support Integrator Manager

Telephone (907) 646 - 7112 Ext. _____

Facsimile (907) 770 - 7145

B. Facility Location

Temporary source? Yes No Plant site location all OCS leases currently issued in the Beaufort Sea (see Appendix A: Beaufort Sea Lease Block Locations)

City _____ State AK County _____ EPA Region 10

Is the facility located within:

Indian lands? YES NO OCS waters? YES NO

Non-attainment area? YES NO If yes, for what air pollutants? _____

Within 50 miles of affected State? YES NO If yes, What State(s)? AK

C. Owner

Name Shell Offshore, Inc. Street/P.O. Box 3601 C Street, Suite 1334

City Anchorage State AK ZIP 99503 - _____

Telephone (907) 770 - 3700 Ext _____

D. Operator

Name Same as owner Street/P.O. Box _____

City _____ State _____ ZIP _____ - _____

Telephone (_____) _____ - _____ Ext _____

E. Application Type

Mark only one permit application type and answer the supplementary question appropriate for the type marked.

Initial Permit ___ Renewal ___ Significant Mod ___ Minor Permit Mod(MPM)

___ Group Processing, MPM ___ Administrative Amendment

For initial permits, when did operations commence? future / ___ / ___

For permit renewal, what is the expiration date of current permit? TBD / ___ / ___

F. Applicable Requirement Summary

Mark all types of applicable requirements that apply.

___ SIP ___ FIP/TIP ___ PSD ___ Non-attainment NSR

Minor source NSR ___ Section 111 ___ Phase I acid rain ___ Phase II acid rain

___ Stratospheric ozone OCS regulations ___ NESHAP ___ Sec. 112(d) MACT

___ Sec. 112(g) MACT ___ Early reduction of HAP ___ Sec 112(j) MACT ___ RMP [Sec.112(r)]

___ Tank Vessel requirements, sec. 183(f) ___ Section 129 Standards/Requirement

___ Consumer / comm.. products, ' 183(e) NAAQS, increments or visibility (temp. sources)

Has a risk management plan been registered? ___ YES NO Regulatory agency _____

Phase II acid rain application submitted? ___ YES NO If yes, Permitting authority _____

G. Source-Wide PTE Restrictions and Generic Applicable Requirements

Cite and describe any emissions-limiting requirements and/or facility-wide "generic" applicable requirements.

1. The permittee shall not have the Kulluk engage in its Mud Line Cellar activity for more than 480 hours, in aggregate, during a calendar year.
2. The permittee shall not have the Kulluk engage in its Well Drilling activity for more than 1,632 hours, in aggregate, during a calendar year.
3. The permittee shall not have the Kulluk occupy Drill Sites, in aggregate, for more than 2,880 hours, in aggregate during a calendar year.
4. The permittee shall not have the Kulluk incinerator operate for more than between 8 am and 8 pm (12 hours).
5. The permittee shall purchase only ultra low sulfur diesel (ULSD) and not combust any liquid fuel with sulfur content greater than 0.01 percent by weight in any emission unit on the Kulluk or a support vessel.
6. The permittee shall not allow the sum of NO_x emissions from the Kulluk and support vessels within 25 miles of that Exploratory Operation to equal or exceed 250.0 tons during a calendar year.
7. The permittee shall not allow the sum of NO_x emissions from the each specified source to exceed the limits set forth in Appendix B: GIS Table 1 during a calendar year.
8. The permittee shall not allow the sum of PM_{2.5} emissions from the each specified source to exceed the limits set forth in Appendix B: GIS Table 1 during a calendar year.
9. The permittee shall not allow the sum of PM₁₀ emissions from the each specified source to exceed the limits set forth in Appendix B: GIS Table 1 during a calendar year.
10. The permittee shall not allow more than 24 resupply and waste removal vessel trips to the Kulluk during a calendar year.

11. 40 CFR Part 60.4200, NSPS Subpart IIII: Applicable to certification of CI engines. Certifications are required according to year of manufacture.
12. 40 CFR Part 6-.110a, NSPS part Ka: Diesel fuel tanks manufactured prior to 1984.
13. Alaska 18AAC 50.050: Incinerator emission standards. Visibility through the exhaust effluent of an incinerator, including an air curtain incinerator, may not be reduced by visible emissions, excluding condensed water vapor, by more than 20 percent averaged over any six consecutive minutes.
14. Alaska 18AAC 50.055: Industrial processes and fuel-burning equipment. (a) Visible emissions, excluding condensed water vapor, from an industrial process or fuel-burning equipment may not reduce visibility through the exhaust effluent by more than 20 percent averaged over any six consecutive minutes. (b) Particulate matter emitted from an industrial process or fuel-burning equipment may not exceed, per cubic foot of exhaust gas corrected to standard conditions and averaged over three hours, 0.05 grains. (c) Sulfur-compound emissions, expressed as sulfur dioxide, from an industrial process or from fuel-burning equipment may not exceed 500 ppm averaged over a period of three hours.

H. Process Description

List processes, products, and SIC codes for the facility.

Process	Products	SIC
Exploratory Drilling for oil and gas	Information on oil & gas resource	1311

I. Emission Unit Identification

Assign an emissions unit ID and describe each emissions unit at the facility. Control equipment and/or alternative operating scenarios associated with emissions units should be listed on a separate line. Applicants may exclude from this list any insignificant emissions units or activities.

Emissions Unit ID	Description of Unit	Capacity Value
Kulluk – Gens	Generation	8,500 horsepower (hp)
Kulluk – MLCHPUs	MLC HPU's	1,500 hp
Kulluk – Comps	Air Compressors	1,500 hp
Kulluk – Cranes	Cranes	900 hp
Kulluk – Heaters	Heaters & Boilers	6 MMBtu/hour
Kulluk – Seldom	Seldom-used units	566 gallons/month
Kulluk – Egen	Emergency Generator	77 gallons/month
Kulluk – Incin	Incinerator	276 pounds(lb)/hour
Ice – P&G	Propulsion & Generation	32,200 hp
Ice – Heaters	Heaters & Boilers	10 MMBtu/hour
Ice – Seldom	Seldom-used units	100 gallons/week
Ice – Incin	Incinerator	154 lb/hr
AH – P&G	Propulsion & Generation	32,200 hp
AH – Heaters	Heaters & Boilers	10 MMBtu/hour
AH – Seldom	Seldom-used units	100 gallons/week
AH – Incin	Incinerator	154 lb/hr
Resupply – P&G	Propulsion & Generation	12,000 hp
Resupply – Seldom	Seldom-used units	20 gallons/week
OSR – P&G	Propulsion & Generation	3,487 hp
OSR – Seldom	Seldom-used units	100 gallons/week
OSR – Incin	Incinerator	125 lb/hr

Quarterming – P&G	Propulsion & Generation	10,061 hp
Quarterming – Seldom	Seldom-used units	100 gallons/week
Quarterming – Incin	Incinerator	125 lb/hr
OSR Work Boats	Work Boats	3,789 gallons/week

J. Facility Emissions Summary

Enter potential to emit (PTE) for the facility as a whole for each air pollutant listed below. Enter the name of the single HAP emitted in the greatest amount and its PTE. For all pollutants stipulations to major source status may be indicated by entering "major" in the space for PTE. Indicate the total actual emissions for fee purposes for the facility in the space provided. Applications for permit modifications need not include actual emissions information.

NOx <250 tons/yr VOC 50 tons/yr SO2 5 tons/yr
 PM-10 30 tons/yr CO 192 tons/yr Lead 0.09 tons/yr
 Total HAP 0.69 tons/yr
 Single HAP emitted in the greatest amount Formaldehyde PTE 0.18 tons/yr
 Total of regulated pollutants (for fee calculation), Sec. F, line 5 of form FEE 336 tons/yr

K. Existing Federally-Enforceable Permits

NONE

Permit number(s) _____ Permit type _____ Permitting authority _____

Permit number(s) _____ Permit type _____ Permitting authority _____

L. Emission Unit(s) Covered by General Permits

Emission unit(s) subject to general permit NONE

Check one: ___ Application made ___ Coverage granted

General permit identifier _____ Expiration Date ___/___/___

M. Cross-referenced Information

Does this application cross-reference information? YES ___ NO (If yes, see instructions)

[Appendix A: Beaufort Sea Lease Block Locations](#)

[Appendix B: GIS Table 1](#)

SECTION 2

EMISSION UNIT DESCRIPTION FOR FUEL COMBUSTION SOURCES (EUD-1)

Federal Operating Permit Program (40 CFR Part 71)

EMISSION UNIT DESCRIPTION FOR FUEL COMBUSTION SOURCES (EUD-1)

A. General Information

Emissions unit ID [Kulluk – Gens](#) Description [Diesel \(RICE\) engines](#)
SIC Code (4-digit) [1311](#) SCC Code [20100102](#)

B. Emissions Unit Description

Primary use [Electrical generation](#) Temporary Source Yes No
Manufacturer [N/A](#) Model No. [N/A](#)
Serial Number [N/A](#) Installation Date [N/A](#)
Boiler Type: Industrial boiler Process burner Electric utility boiler
Other (describe) _____
Boiler horsepower rating _____ Boiler steam flow (lb/hr) _____
Type of Fuel-Burning Equipment (coal burning only):
 Hand fired Spreader stoker Underfeed stoker Overfeed stoker
 Traveling grate Shaking grate Pulverized, wet bed Pulverized, dry bed
Actual Heat Input [TBD](#) MM BTU/hr Max. Design Heat Input [50.58](#) MM BTU/hr

C. Fuel Data

Primary fuel type(s) [Diesel](#) Standby fuel type(s) [None](#)

Describe each fuel you expected to use during the term of the permit.

Fuel Type	Max. Sulfur Content (%)	Max. Ash Content (%)	BTU Value (cf, gal., or lb.)
Diesel Fuel No. 1	0.010%	0%	135,000 Btu/gallon

D. Fuel Usage Rates

Fuel Type	Annual Actual Usage	Maximum Usage ¹	
		Hourly	Annual
Diesel Fuel No. 1	not yet operating	375 gallons	941,422 gallons

E. Associated Air Pollution Control Equipment

Emissions unit ID [Kulluk – Gens](#) Device type [Selective Catalytic Reduction \(SCR\), Oxidation Catalyst \(OxyCat\)](#)

Air pollutant(s) Controlled [NOx, PM, CO, VOC](#) Manufacturer [TBD](#)

Model No. [TBD](#) Serial No. [TBD](#)

Installation date [TBD](#) Control efficiency (%) [NOx-1.6 g/kW-hr, PM-50%, CO-80%, VOC-70%](#)

Efficiency estimation method [Manufacture Guarantee](#)

¹ To be updated based on actual NOx emission factors, to ensure PTE of <250 tons of NOx.

F. Ambient Impact Assessment

This information must be completed by temporary sources or when ambient impact assessment is an applicable requirement for this emissions unit (this is not common).

Stack height (ft) 45	Inside stack diameter (ft) 1.97
Stack temp(°F) 632	Design stack flow rate (ACFM) 18,273
Actual stack flow rate (ACFM) not yet operating	Velocity (ft/sec) 100.07

Federal Operating Permit Program (40 CFR Part 71)

EMISSION UNIT DESCRIPTION FOR FUEL COMBUSTION SOURCES (EUD-1)

A. General Information

Emissions unit ID [Kulluk – MLCHPUs](#) Description [Diesel \(RICE\) engines](#)
SIC Code (4-digit) [1311](#) SCC Code [20200102](#)

B. Emissions Unit Description

Primary use [Hydraulic pumps](#) Temporary Source Yes No

Manufacturer [N/A](#) Model No. [N/A](#)

Serial Number [N/A](#) Installation Date [N/A](#)

Boiler Type: Industrial boiler Process burner Electric utility boiler

Other (describe) _____

Boiler horsepower rating _____ Boiler steam flow (lb/hr) _____

Type of Fuel-Burning Equipment (coal burning only):

Hand fired Spreader stoker Underfeed stoker Overfeed stoker

Traveling grate Shaking grate Pulverized, wet bed Pulverized, dry bed

Actual Heat Input [TBD](#) MM BTU/hr Max. Design Heat Input [10.5](#) MM BTU/hr

C. Fuel Data

Primary fuel type(s) [Diesel](#) Standby fuel type(s) [None](#)

Describe each fuel you expected to use during the term of the permit.

Fuel Type	Max. Sulfur Content (%)	Max. Ash Content (%)	BTU Value (cf, gal., or lb.)
Diesel Fuel No. 1	0.010%	0%	135,000 Btu/gallon

D. Fuel Usage Rates

Fuel Type	Annual Actual Usage	Maximum Usage ²	
		Hourly	Annual
Diesel Fuel No. 1	not yet operating	78 gallons	37,333 gallons

E. Associated Air Pollution Control Equipment

<p>Emissions unit ID Kulluk – MLCHPUs Device type OxyCat</p> <p>Air pollutant(s) Controlled PM, CO, VOC Manufacturer TBD</p> <p>Model No. TBD Serial No. TBD</p> <p>Installation date TBD Control efficiency (%) PM-50%, CO-80%, VOC-70%</p> <p>Efficiency estimation method Manufacture Guarantee</p>
--

² To be updated based on actual NOx emission factors, to ensure PTE of <250 tons of NOx.

F. Ambient Impact Assessment

This information must be completed by temporary sources or when ambient impact assessment is an applicable requirement for this emissions unit (this is not common).

Stack height (ft) 34 Inside stack diameter (ft) 0.6

Stack temp(°F) 800 Design stack flow rate (ACFM) 2,243

Actual stack flow rate (ACFM) not yet operating Velocity (ft/sec) 131.23

Federal Operating Permit Program (40 CFR Part 71)

EMISSION UNIT DESCRIPTION FOR FUEL COMBUSTION SOURCES (EUD-1)

A. General Information

Emissions unit ID [Kulluk – Comps](#) Description [Diesel \(RICE\) engines](#)
SIC Code (4-digit) [1311](#) SCC Code [20200102](#)

B. Emissions Unit Description

Primary use [Compressors](#) Temporary Source Yes No

Manufacturer [N/A](#) Model No. [N/A](#)

Serial Number [N/A](#) Installation Date [N/A](#)

Boiler Type: Industrial boiler Process burner Electric utility boiler

Other (describe) _____

Boiler horsepower rating _____ Boiler steam flow (lb/hr) _____

Type of Fuel-Burning Equipment (coal burning only):

Hand fired Spreader stoker Underfeed stoker Overfeed stoker

Traveling grate Shaking grate Pulverized, wet bed Pulverized, dry bed

Actual Heat Input [TBD](#) MM BTU/hr Max. Design Heat Input [10.5](#) MM BTU/hr

C. Fuel Data

Primary fuel type(s) [Diesel](#) Standby fuel type(s) [None](#)

Describe each fuel you expected to use during the term of the permit.

Fuel Type	Max. Sulfur Content (%)	Max. Ash Content (%)	BTU Value (cf, gal., or lb.)
Diesel Fuel No. 1	0.010%	0%	135,000 Btu/gallon

D. Fuel Usage Rates

Fuel Type	Annual Actual Usage	Maximum Usage ³	
		Hourly	Annual
Diesel Fuel No. 1	not yet operating	78 gallons	37,333 gallons

E. Associated Air Pollution Control Equipment

<p>Emissions unit ID Kulluk – Comps Device type OxyCat</p> <p>Air pollutant(s) Controlled PM, CO, VOC Manufacturer TBD</p> <p>Model No. TBD Serial No. TBD</p> <p>Installation date TBD Control efficiency (%) PM-50%, CO-80%, VOC-70%</p> <p>Efficiency estimation method Manufacture Guarantee</p>
--

³ To be updated based on actual NOx emission factors, to ensure PTE of <250 tons of NOx.

F. Ambient Impact Assessment

This information must be completed by temporary sources or when ambient impact assessment is an applicable requirement for this emissions unit (this is not common).

Stack height (ft) 36	Inside stack diameter (ft) 1.97
Stack temp(°F) 632	Design stack flow rate (ACFM) 18,273
Actual stack flow rate (ACFM) not yet operating	Velocity (ft/sec) 100.07

Federal Operating Permit Program (40 CFR Part 71)

EMISSION UNIT DESCRIPTION FOR FUEL COMBUSTION SOURCES (EUD-1)

A. General Information

Emissions unit ID [Kulluk – Cranes](#) Description [Diesel \(RICE\) engines](#)
SIC Code (4-digit) [1311](#) SCC Code [20200102](#)

B. Emissions Unit Description

Primary use [Powering Cranes](#) Temporary Source Yes No

Manufacturer [N/A](#) Model No. [N/A](#)

Serial Number [N/A](#) Installation Date [N/A](#)

Boiler Type: Industrial boiler Process burner Electric utility boiler

Other (describe) _____

Boiler horsepower rating _____ Boiler steam flow (lb/hr) _____

Type of Fuel-Burning Equipment (coal burning only):

Hand fired Spreader stoker Underfeed stoker Overfeed stoker

Traveling grate Shaking grate Pulverized, wet bed Pulverized, dry bed

Actual Heat Input [TBD](#) MM BTU/hr Max. Design Heat Input [2.52](#) MM BTU/hr

C. Fuel Data

Primary fuel type(s) [Diesel](#) Standby fuel type(s) [None](#)

Describe each fuel you expected to use during the term of the permit.

Fuel Type	Max. Sulfur Content (%)	Max. Ash Content (%)	BTU Value (cf, gal., or lb.)
Diesel Fuel No. 1	0.010%	0%	135,000 Btu/gallon

D. Fuel Usage Rates

Fuel Type	Annual Actual Usage	Maximum Usage ⁴	
		Hourly	Annual
Diesel Fuel No. 1	not yet operating	19 gallons	20,787 gallons

E. Associated Air Pollution Control Equipment

<p>Emissions unit ID Kulluk – Cranes Device type OxyCat</p> <p>Air pollutant(s) Controlled PM, CO, VOC Manufacturer TBD</p> <p>Model No. TBD Serial No. TBD</p> <p>Installation date TBD Control efficiency (%) PM-50%, CO-80%, VOC-70%</p> <p>Efficiency estimation method Manufacture Guarantee</p>

⁴ To be updated based on actual NOx emission factors, to ensure PTE of <250 tons of NOx.

F. Ambient Impact Assessment

This information must be completed by temporary sources or when ambient impact assessment is an applicable requirement for this emissions unit (this is not common).

Stack height (ft) 79.75	Inside stack diameter (ft) 0.83
Stack temp(°F) 750	Design stack flow rate (ACFM) 2,154
Actual stack flow rate (ACFM) not yet operating	Velocity (ft/sec) 65.82

Federal Operating Permit Program (40 CFR Part 71)

EMISSION UNIT DESCRIPTION FOR FUEL COMBUSTION SOURCES (EUD-1)

A. General Information

Emissions unit ID [Kulluk – Heaters](#) Description [Heaters & Boilers](#)

SIC Code (4-digit) [1311](#) SCC Code [10300503](#)

B. Emissions Unit Description

Primary use [Heat](#) Temporary Source Yes No

Manufacturer [N/A](#) Model No. [N/A](#)

Serial Number [N/A](#) Installation Date [N/A](#)

Boiler Type: Industrial boiler Process burner Electric utility boiler

Other (describe) _____

Boiler horsepower rating _____ Boiler steam flow (lb/hr) _____

Type of Fuel-Burning Equipment (coal burning only):

Hand fired Spreader stoker Underfeed stoker Overfeed stoker

Traveling grate Shaking grate Pulverized, wet bed Pulverized, dry bed

Actual Heat Input [TBD](#) MM BTU/hr Max. Design Heat Input [6](#) MM BTU/hr

C. Fuel Data

Primary fuel type(s) [Diesel](#) Standby fuel type(s) [None](#)

Describe each fuel you expected to use during the term of the permit.

Fuel Type	Max. Sulfur Content (%)	Max. Ash Content (%)	BTU Value (cf, gal., or lb.)
Diesel Fuel No. 1	0.010%	0%	135,000 Btu/gallon

D. Fuel Usage Rates

Fuel Type	Annual Actual Usage	Maximum Usage ⁵	
		Hourly	Annual
Diesel Fuel No. 1	not yet operating	44 gallons	128,000 gallons

E. Associated Air Pollution Control Equipment

<p>Emissions unit ID Kulluk – Heaters Device type NONE</p> <p>Air pollutant(s) Controlled NONE Manufacturer N/A</p> <p>Model No. N/A Serial No. N/A</p> <p>Installation date N/A Control efficiency (%) NONE</p> <p>Efficiency estimation method N/A</p>
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⁵ To be updated based on actual NOx emission factors, to ensure PTE of <250 tons of NOx.

F. Ambient Impact Assessment

This information must be completed by temporary sources or when ambient impact assessment is an applicable requirement for this emissions unit (this is not common).

Stack height (ft) 45 Inside stack diameter (ft) 0.5

Stack temp(°F) 200 Design stack flow rate (ACFM) 622

Actual stack flow rate (ACFM) not yet operating Velocity (ft/sec) 52.82

Federal Operating Permit Program (40 CFR Part 71)

EMISSION UNIT DESCRIPTION FOR FUEL COMBUSTION SOURCES (EUD-1)

A. General Information

Emissions unit ID [Kulluk – Seldom](#) Description [Diesel \(RICE\) engines](#)
SIC Code (4-digit) [1311](#) SCC Code [20200102](#)

B. Emissions Unit Description

Primary use [Power smaller engines](#) Temporary Source Yes No
 Manufacturer [N/A](#) Model No. [N/A](#)
 Serial Number [N/A](#) Installation Date [N/A](#)
 Boiler Type: Industrial boiler Process burner Electric utility boiler
 Other (describe) _____
 Boiler horsepower rating _____ Boiler steam flow (lb/hr) _____
 Type of Fuel-Burning Equipment (coal burning only):
 Hand fired Spreader stoker Underfeed stoker Overfeed stoker
 Traveling grate Shaking grate Pulverized, wet bed Pulverized, dry bed
 Actual Heat Input [TBD](#) MM BTU/hr Max. Design Heat Input [0.11](#) MM BTU/hr

C. Fuel Data

Primary fuel type(s) [Diesel](#) Standby fuel type(s) [None](#)

Describe each fuel you expected to use during the term of the permit.

Fuel Type	Max. Sulfur Content (%)	Max. Ash Content (%)	BTU Value (cf, gal., or lb.)
Diesel Fuel No. 1	0.010%	0%	135,000 Btu/gallon

D. Fuel Usage Rates

Fuel Type	Annual Actual Usage	Maximum Usage ⁶	
		Hourly	Annual
Diesel Fuel No. 1	not yet operating	0.79 gallons	2,264 gallons

E. Associated Air Pollution Control Equipment

<p>Emissions unit ID Kulluk – Seldom Device type NONE</p> <p>Air pollutant(s) Controlled NONE Manufacturer N/A</p> <p>Model No. N/A Serial No. N/A</p> <p>Installation date N/A Control efficiency (%) NONE</p> <p>Efficiency estimation method N/A</p>

⁶ To be updated based on actual NOx emission factors, to ensure PTE of <250 tons of NOx.

F. Ambient Impact Assessment

This information must be completed by temporary sources or when ambient impact assessment is an applicable requirement for this emissions unit (this is not common).

Stack height (ft) 42.9	Inside stack diameter (ft) 0.59
Stack temp(°F) 800	Design stack flow rate (ACFM) 2,157
Actual stack flow rate (ACFM) not yet operating	Velocity (ft/sec) 131.23

Federal Operating Permit Program (40 CFR Part 71)

EMISSION UNIT DESCRIPTION FOR FUEL COMBUSTION SOURCES (EUD-1)

A. General Information

Emissions unit ID [Kulluk – Egen](#) Description [Diesel \(RICE\) engines](#)
SIC Code (4-digit) [1311](#) SCC Code [20200102](#)

B. Emissions Unit Description

Primary use [Emergency generation](#) Temporary Source Yes No
Manufacturer [N/A](#) Model No. [N/A](#)
Serial Number [N/A](#) Installation Date [N/A](#)
Boiler Type: Industrial boiler Process burner Electric utility boiler
Other (describe) _____
Boiler horsepower rating _____ Boiler steam flow (lb/hr) _____
Type of Fuel-Burning Equipment (coal burning only):
 Hand fired Spreader stoker Underfeed stoker Overfeed stoker
 Traveling grate Shaking grate Pulverized, wet bed Pulverized, dry bed
Actual Heat Input [TBD](#) MM BTU/hr Max. Design Heat Input [5.2](#) MM BTU/hr

C. Fuel Data

Primary fuel type(s) [Diesel](#) Standby fuel type(s) [None](#)

Describe each fuel you expected to use during the term of the permit.

Fuel Type	Max. Sulfur Content (%)	Max. Ash Content (%)	BTU Value (cf, gal., or lb.)
Diesel Fuel No. 1	0.010%	0%	135,000 Btu/gallon

D. Fuel Usage Rates

Fuel Type	Annual Actual Usage	Maximum Usage ⁷	
		Hourly	Annual
Diesel Fuel No. 1	not yet operating	38.50 gallons	308 gallons

E. Associated Air Pollution Control Equipment

<p>Emissions unit ID Kulluk – Egen Device type NONE</p> <p>Air pollutant(s) Controlled NONE Manufacturer N/A</p> <p>Model No. N/A Serial No. N/A</p> <p>Installation date N/A Control efficiency (%) NONE</p> <p>Efficiency estimation method N/A</p>

⁷ To be updated based on actual NOx emission factors, to ensure PTE of <250 tons of NOx.

F. Ambient Impact Assessment

This information must be completed by temporary sources or when ambient impact assessment is an applicable requirement for this emissions unit (this is not common).

Stack height (ft) 42.9	Inside stack diameter (ft) 0.59
Stack temp(°F) 800	Design stack flow rate (ACFM) 2,157
Actual stack flow rate (ACFM) not yet operating	Velocity (ft/sec) 131.23

Federal Operating Permit Program (40 CFR Part 71)

EMISSION UNIT DESCRIPTION FOR FUEL COMBUSTION SOURCES (EUD-1)

A. General Information

Emissions unit ID Kulluk – Incin Description Incinerator
SIC Code (4-digit) 1311 SCC Code 50300101

B. Emissions Unit Description

Primary use Domestic Waste Temporary Source Yes No

Manufacturer N/A Model No. N/A

Serial Number N/A Installation Date N/A

Boiler Type: Industrial boiler Process burner Electric utility boiler

Other (describe) _____

Boiler horsepower rating _____ Boiler steam flow (lb/hr) _____

Type of Fuel-Burning Equipment (coal burning only):

Hand fired Spreader stoker Underfeed stoker Overfeed stoker

Traveling grate Shaking grate Pulverized, wet bed Pulverized, dry bed

Actual Heat Input TBD MM BTU/hr Max. Design Heat Input N/A MM BTU/hr

C. Fuel Data

Primary fuel type(s) [Diesel](#) Standby fuel type(s) [None](#)

Describe each fuel you expected to use during the term of the permit.

Fuel Type	Max. Sulfur Content (%)	Max. Ash Content (%)	BTU Value (cf, gal., or lb.)
Diesel Fuel No. 1	0.010%	0%	135,000 Btu/gallon

D. Fuel Usage Rates

Fuel Type	Annual Actual Usage	Maximum Usage ⁸	
		Hourly	Annual
Diesel Fuel No. 1	not yet operating	276 lbs of waste	199 tons of waste

E. Associated Air Pollution Control Equipment

Emissions unit ID [Kulluk – Incin](#) Device type [NONE](#)

Air pollutant(s) Controlled [NONE](#) Manufacturer [N/A](#)

Model No. [N/A](#) Serial No. [N/A](#)

Installation date [N/A](#) Control efficiency (%) [NONE](#)

Efficiency estimation method [N/A](#)

⁸ To be updated based on actual NOx emission factors, to ensure PTE of <250 tons of NOx.

F. Ambient Impact Assessment

This information must be completed by temporary sources or when ambient impact assessment is an applicable requirement for this emissions unit (this is not common).

Stack height (ft) 52.9	Inside stack diameter (ft) 1.5
Stack temp(°F) 662	Design stack flow rate (ACFM) 3,479
Actual stack flow rate (ACFM) not yet operating	Velocity (ft/sec) 32.81

Federal Operating Permit Program (40 CFR Part 71)

EMISSION UNIT DESCRIPTION FOR FUEL COMBUSTION SOURCES (EUD-1)

A. General Information

Emissions unit ID [Ice – P&G](#) Description [Diesel \(RICE\) engines](#)
SIC Code (4-digit) [1311](#) SCC Code [28000212](#)

B. Emissions Unit Description

Primary use [Propulsion & Generation](#) Temporary Source Yes No
Manufacturer [N/A](#) Model No. [N/A](#)
Serial Number [N/A](#) Installation Date [N/A](#)
Boiler Type: Industrial boiler Process burner Electric utility boiler
Other (describe) _____
Boiler horsepower rating _____ Boiler steam flow (lb/hr) _____
Type of Fuel-Burning Equipment (coal burning only):
 Hand fired Spreader stoker Underfeed stoker Overfeed stoker
 Traveling grate Shaking grate Pulverized, wet bed Pulverized, dry bed
Actual Heat Input [TBD](#) MM BTU/hr Max. Design Heat Input [225](#) MM BTU/hr

C. Fuel Data

Primary fuel type(s) [Diesel](#) Standby fuel type(s) [None](#)

Describe each fuel you expected to use during the term of the permit.

Fuel Type	Max. Sulfur Content (%)	Max. Ash Content (%)	BTU Value (cf, gal., or lb.)
Diesel Fuel No. 1	0.010%	0%	135,000 Btu/gallon

D. Fuel Usage Rates

Fuel Type	Annual Actual Usage	Maximum Usage ⁹	
		Hourly	Annual
Diesel Fuel No. 1	not yet operating	1,670 gallons	1,827,243 gallons

E. Associated Air Pollution Control Equipment

<p>Emissions unit ID Ice – P&G Device type SCR, OxyCat</p> <p>Air pollutant(s) Controlled NOx, PM, CO, VOC Manufacturer TBD</p> <p>Model No. TBD Serial No. TBD</p> <p>Installation date TBD Control efficiency (%) PM-50%, CO-80%, VOC-70%</p> <p>Efficiency estimation method Manufacture Guarantee</p>

⁹ To be updated based on actual NOx emission factors, to ensure PTE of <250 tons of NOx.

F. Ambient Impact Assessment

This information must be completed by temporary sources or when ambient impact assessment is an applicable requirement for this emissions unit (this is not common).

Various - see Supplemental Report, Section 3.3.4

Stack height (ft) _____ Inside stack diameter (ft) _____

Stack temp(°F) _____ Design stack flow rate (ACFM) _____

Actual stack flow rate (ACFM) _____ Velocity (ft/sec) _____

Federal Operating Permit Program (40 CFR Part 71)

EMISSION UNIT DESCRIPTION FOR FUEL COMBUSTION SOURCES (EUD-1)

A. General Information

Emissions unit ID Ice – Heaters Description Heaters & Boilers
SIC Code (4-digit) 1311 SCC Code 10300503

B. Emissions Unit Description

Primary use Heat Temporary Source Yes No
Manufacturer N/A Model No. N/A
Serial Number N/A Installation Date N/A
Boiler Type: Industrial boiler Process burner Electric utility boiler
Other (describe) _____
Boiler horsepower rating _____ Boiler steam flow (lb/hr) _____
Type of Fuel-Burning Equipment (coal burning only):
 Hand fired Spreader stoker Underfeed stoker Overfeed stoker
 Traveling grate Shaking grate Pulverized, wet bed Pulverized, dry bed
Actual Heat Input TBD MM BTU/hr Max. Design Heat Input 10 MM BTU/hr

C. Fuel Data

Primary fuel type(s) [Diesel](#) Standby fuel type(s) [None](#)

Describe each fuel you expected to use during the term of the permit.

Fuel Type	Max. Sulfur Content (%)	Max. Ash Content (%)	BTU Value (cf, gal., or lb.)
Diesel Fuel No. 1	0.010%	0%	135,000 Btu/gallon

D. Fuel Usage Rates

Fuel Type	Annual Actual Usage	Maximum Usage ¹⁰	
		Hourly	Annual
Diesel Fuel No. 1	not yet operating	74 gallons	81,067 gallons

E. Associated Air Pollution Control Equipment

<p>Emissions unit ID Ice – Heaters Device type NONE</p> <p>Air pollutant(s) Controlled NONE Manufacturer N/A</p> <p>Model No. N/A Serial No. N/A</p> <p>Installation date N/A Control efficiency (%) NONE</p> <p>Efficiency estimation method N/A</p>

¹⁰ To be updated based on actual NOx emission factors, to ensure PTE of <250 tons of NOx.

F. Ambient Impact Assessment

This information must be completed by temporary sources or when ambient impact assessment is an applicable requirement for this emissions unit (this is not common).

Various - see Supplemental Report, Section 3.3.4

Stack height (ft) _____ Inside stack diameter (ft) _____

Stack temp(°F) _____ Design stack flow rate (ACFM) _____

Actual stack flow rate (ACFM) _____ Velocity (ft/sec) _____

Federal Operating Permit Program (40 CFR Part 71)

EMISSION UNIT DESCRIPTION FOR FUEL COMBUSTION SOURCES (EUD-1)

A. General Information

Emissions unit ID [Ice – Seldom](#) Description [Diesel \(RICE\) engines](#)
SIC Code (4-digit) [1311](#) SCC Code [20200102](#)

B. Emissions Unit Description

Primary use [Power smaller engines](#) Temporary Source Yes No
Manufacturer [N/A](#) Model No. [N/A](#)
Serial Number [N/A](#) Installation Date [N/A](#)
Boiler Type: Industrial boiler Process burner Electric utility boiler
Other (describe) _____
Boiler horsepower rating _____ Boiler steam flow (lb/hr) _____
Type of Fuel-Burning Equipment (coal burning only):
 Hand fired Spreader stoker Underfeed stoker Overfeed stoker
 Traveling grate Shaking grate Pulverized, wet bed Pulverized, dry bed
Actual Heat Input [TBD](#) MM BTU/hr Max. Design Heat Input [0.08](#) MM BTU/hr

C. Fuel Data

Primary fuel type(s) [Diesel](#) Standby fuel type(s) [None](#)

Describe each fuel you expected to use during the term of the permit.

Fuel Type	Max. Sulfur Content (%)	Max. Ash Content (%)	BTU Value (cf, gal., or lb.)
Diesel Fuel No. 1	0.010%	0%	135,000 Btu/gallon

D. Fuel Usage Rates

Fuel Type	Annual Actual Usage	Maximum Usage ¹¹	
		Hourly	Annual
Diesel Fuel No. 1	not yet operating	0.60 gallons	651 gallons

E. Associated Air Pollution Control Equipment

<p>Emissions unit ID Ice – Seldom Device type NONE</p> <p>Air pollutant(s) Controlled NONE Manufacturer N/A</p> <p>Model No. N/A Serial No. N/A</p> <p>Installation date N/A Control efficiency (%) NONE</p> <p>Efficiency estimation method N/A</p>
--

¹¹ To be updated based on actual NOx emission factors, to ensure PTE of <250 tons of NOx.

F. Ambient Impact Assessment

This information must be completed by temporary sources or when ambient impact assessment is an applicable requirement for this emissions unit (this is not common).

Various - see Supplemental Report, Section 3.3.4

Stack height (ft) _____ Inside stack diameter (ft) _____

Stack temp(°F) _____ Design stack flow rate (ACFM) _____

Actual stack flow rate (ACFM) _____ Velocity (ft/sec) _____

Federal Operating Permit Program (40 CFR Part 71)

EMISSION UNIT DESCRIPTION FOR FUEL COMBUSTION SOURCES (EUD-1)

A. General Information

Emissions unit ID Ice – Incin Description Incinerator
SIC Code (4-digit) 1311 SCC Code 50300101

B. Emissions Unit Description

Primary use Domestic Waste Temporary Source Yes No

Manufacturer N/A Model No. N/A

Serial Number N/A Installation Date N/A

Boiler Type: Industrial boiler Process burner Electric utility boiler

Other (describe) _____

Boiler horsepower rating _____ Boiler steam flow (lb/hr) _____

Type of Fuel-Burning Equipment (coal burning only):

Hand fired Spreader stoker Underfeed stoker Overfeed stoker

Traveling grate Shaking grate Pulverized, wet bed Pulverized, dry bed

Actual Heat Input TBD MM BTU/hr Max. Design Heat Input N/A MM BTU/hr

C. Fuel Data

Primary fuel type(s) [Diesel](#) Standby fuel type(s) [None](#)

Describe each fuel you expected to use during the term of the permit.

Fuel Type	Max. Sulfur Content (%)	Max. Ash Content (%)	BTU Value (cf, gal., or lb.)
Diesel Fuel No. 1	0.010%	0%	135,000 Btu/gallon

D. Fuel Usage Rates

Fuel Type	Annual Actual Usage	Maximum Usage ¹²	
		Hourly	Annual
Diesel Fuel No. 1	not yet operating	154 lbs of waste	84 tons waste

E. Associated Air Pollution Control Equipment

Emissions unit ID [Ice – Incin](#) Device type [NONE](#)

Air pollutant(s) Controlled [NONE](#) Manufacturer [N/A](#)

Model No. [N/A](#) Serial No. [N/A](#)

Installation date [N/A](#) Control efficiency (%) [NONE](#)

Efficiency estimation method [N/A](#)

12 To be updated based on actual NOx emission factors, to ensure PTE of <250 tons of NOx.

F. Ambient Impact Assessment

This information must be completed by temporary sources or when ambient impact assessment is an applicable requirement for this emissions unit (this is not common).

Various - see Supplemental Report, Section 3.3.4

Stack height (ft) _____ Inside stack diameter (ft) _____

Stack temp(°F) _____ Design stack flow rate (ACFM) _____

Actual stack flow rate (ACFM) _____ Velocity (ft/sec) _____

Federal Operating Permit Program (40 CFR Part 71)

EMISSION UNIT DESCRIPTION FOR FUEL COMBUSTION SOURCES (EUD-1)

A. General Information

Emissions unit ID [AH – P&G](#) Description [Diesel \(RICE\) engines](#)
SIC Code (4-digit) [1311](#) SCC Code [28000212](#)

B. Emissions Unit Description

Primary use [Propulsion & Generation](#) Temporary Source Yes X
No

Manufacturer [N/A](#) Model No. [N/A](#)

Serial Number [N/A](#) Installation Date [N/A](#)

Boiler Type: Industrial boiler Process burner Electric utility boiler
Other (describe) _____

Boiler horsepower rating _____ Boiler steam flow (lb/hr) _____

Type of Fuel-Burning Equipment (coal burning only):

Hand fired Spreader stoker Underfeed stoker Overfeed stoker
 Traveling grate Shaking grate Pulverized, wet bed Pulverized, dry bed

Actual Heat Input [TBD](#) MM BTU/hr Max. Design Heat Input [225](#) MM BTU/hr

C. Fuel Data

Primary fuel type(s) [Diesel](#) Standby fuel type(s) [None](#)

Describe each fuel you expected to use during the term of the permit.

Fuel Type	Max. Sulfur Content (%)	Max. Ash Content (%)	BTU Value (cf, gal., or lb.)
Diesel Fuel No. 1	0.010%	0%	135,000 Btu/gallon

D. Fuel Usage Rates

Fuel Type	Annual Actual Usage	Maximum Usage ¹³	
		Hourly	Annual
Diesel Fuel No. 1	not yet operating	1,670 gallons	1,827,243 gallons

E. Associated Air Pollution Control Equipment

<p>Emissions unit ID AH – P&G Device type SCR, OxyCat</p> <p>Air pollutant(s) Controlled NOx, PM, CO, VOC Manufacturer TBD</p> <p>Model No. TBD Serial No. TBD</p> <p>Installation date TBD Control efficiency (%) PM-50%, CO-80%, VOC-70%</p> <p>Efficiency estimation method Manufacture Guarantee</p>
--

13 To be updated based on actual NOx emission factors, to ensure PTE of <250 tons of NOx.

F. Ambient Impact Assessment

This information must be completed by temporary sources or when ambient impact assessment is an applicable requirement for this emissions unit (this is not common).

Various - see Supplemental Report, Section 3.3.4

Stack height (ft) _____ Inside stack diameter (ft) _____

Stack temp(°F) _____ Design stack flow rate (ACFM) _____

Actual stack flow rate (ACFM) _____ Velocity (ft/sec) _____

Federal Operating Permit Program (40 CFR Part 71)

EMISSION UNIT DESCRIPTION FOR FUEL COMBUSTION SOURCES (EUD-1)

A. General Information

Emissions unit ID [AH – Heaters](#) Description [Heaters & Boilers](#)
SIC Code (4-digit) [1311](#) SCC Code [10300503](#)

B. Emissions Unit Description

Primary use [Heat](#) Temporary Source Yes No
 Manufacturer [N/A](#) Model No. [N/A](#)
 Serial Number [N/A](#) Installation Date [N/A](#)
 Boiler Type: Industrial boiler Process burner Electric utility boiler
 Other (describe) _____
 Boiler horsepower rating _____ Boiler steam flow (lb/hr) _____
 Type of Fuel-Burning Equipment (coal burning only):
 Hand fired Spreader stoker Underfeed stoker Overfeed stoker
 Traveling grate Shaking grate Pulverized, wet bed Pulverized, dry bed
 Actual Heat Input [TBD](#) MM BTU/hr Max. Design Heat Input [10](#) MM BTU/hr

C. Fuel Data

Primary fuel type(s) [Diesel](#) Standby fuel type(s) [None](#)

Describe each fuel you expected to use during the term of the permit.

Fuel Type	Max. Sulfur Content (%)	Max. Ash Content (%)	BTU Value (cf, gal., or lb.)
Diesel Fuel No. 1	0.010%	0%	135,000 Btu/gallon

D. Fuel Usage Rates

Fuel Type	Annual Actual Usage	Maximum Usage ¹⁴	
		Hourly	Annual
Diesel Fuel No. 1	not yet operating	74 gallons	81,067 gallons

E. Associated Air Pollution Control Equipment

<p>Emissions unit ID AH – Heaters Device type NONE</p> <p>Air pollutant(s) Controlled NONE Manufacturer N/A</p> <p>Model No. N/A Serial No. N/A</p> <p>Installation date N/A Control efficiency (%) NONE</p> <p>Efficiency estimation method N/A</p>
--

14 To be updated based on actual NOx emission factors, to ensure PTE of <250 tons of NOx.

F. Ambient Impact Assessment

This information must be completed by temporary sources or when ambient impact assessment is an applicable requirement for this emissions unit (this is not common).

Various - see Supplemental Report, Section 3.3.4

Stack height (ft) _____ Inside stack diameter (ft) _____

Stack temp(°F) _____ Design stack flow rate (ACFM) _____

Actual stack flow rate (ACFM) _____ Velocity (ft/sec) _____

Federal Operating Permit Program (40 CFR Part 71)

EMISSION UNIT DESCRIPTION FOR FUEL COMBUSTION SOURCES (EUD-1)

A. General Information

Emissions unit ID [AH – Seldom](#) Description [Diesel \(RICE\) engines](#)
SIC Code (4-digit) [1311](#) SCC Code [20200102](#)

B. Emissions Unit Description

Primary use [Power smaller engines](#) Temporary Source Yes No
Manufacturer [N/A](#) Model No. [N/A](#)
Serial Number [N/A](#) Installation Date [N/A](#)
Boiler Type: Industrial boiler Process burner Electric utility boiler
Other (describe) _____
Boiler horsepower rating _____ Boiler steam flow (lb/hr) _____
Type of Fuel-Burning Equipment (coal burning only):
 Hand fired Spreader stoker Underfeed stoker Overfeed stoker
 Traveling grate Shaking grate Pulverized, wet bed Pulverized, dry bed
Actual Heat Input [TBD](#) MM BTU/hr Max. Design Heat Input [0.08](#) MM BTU/hr

C. Fuel Data

Primary fuel type(s) [Diesel](#) Standby fuel type(s) [None](#)

Describe each fuel you expected to use during the term of the permit.

Fuel Type	Max. Sulfur Content (%)	Max. Ash Content (%)	BTU Value (cf, gal., or lb.)
Diesel Fuel No. 1	0.010%	0%	135,000 Btu/gallon

D. Fuel Usage Rates

Fuel Type	Annual Actual Usage	Maximum Usage ¹⁵	
		Hourly	Annual
Diesel Fuel No. 1	not yet operating	0.60 gallons	651 gallons

E. Associated Air Pollution Control Equipment

<p>Emissions unit ID AH – Seldom Device type NONE</p> <p>Air pollutant(s) Controlled NONE Manufacturer N/A</p> <p>Model No. N/A Serial No. N/A</p> <p>Installation date N/A Control efficiency (%) NONE</p> <p>Efficiency estimation method N/A</p>

15 To be updated based on actual NOx emission factors, to ensure PTE of <250 tons of NOx.

F. Ambient Impact Assessment

This information must be completed by temporary sources or when ambient impact assessment is an applicable requirement for this emissions unit (this is not common).

Various - see Supplemental Report, Section 3.3.4

Stack height (ft) _____ Inside stack diameter (ft) _____

Stack temp(°F) _____ Design stack flow rate (ACFM) _____

Actual stack flow rate (ACFM) _____ Velocity (ft/sec) _____

Federal Operating Permit Program (40 CFR Part 71)

EMISSION UNIT DESCRIPTION FOR FUEL COMBUSTION SOURCES (EUD-1)

A. General Information

Emissions unit ID [AH – Incin](#) Description [Incinerator](#)
SIC Code (4-digit) [1311](#) SCC Code [50300101](#)

B. Emissions Unit Description

Primary use [Domestic Waste](#) Temporary Source Yes No

Manufacturer [N/A](#) Model No. [N/A](#)

Serial Number [N/A](#) Installation Date [N/A](#)

Boiler Type: Industrial boiler Process burner Electric utility boiler

Other (describe) _____

Boiler horsepower rating _____ Boiler steam flow (lb/hr) _____

Type of Fuel-Burning Equipment (coal burning only):

Hand fired Spreader stoker Underfeed stoker Overfeed stoker

Traveling grate Shaking grate Pulverized, wet bed Pulverized, dry bed

Actual Heat Input [TBD](#) MM BTU/hr Max. Design Heat Input [N/A](#) MM BTU/hr

C. Fuel Data

Primary fuel type(s) [Diesel](#) Standby fuel type(s) [None](#)

Describe each fuel you expected to use during the term of the permit.

Fuel Type	Max. Sulfur Content (%)	Max. Ash Content (%)	BTU Value (cf, gal., or lb.)
Diesel Fuel No. 1	0.010%	0%	135,000 Btu/gallon

D. Fuel Usage Rates

Fuel Type	Annual Actual Usage	Maximum Usage ¹⁶	
		Hourly	Annual
Diesel Fuel No. 1	not yet operating	154 lbs of waste	84 tons waste

E. Associated Air Pollution Control Equipment

Emissions unit ID [AH – Incin](#) Device type [NONE](#)

Air pollutant(s) Controlled [NONE](#) Manufacturer [N/A](#)

Model No. [N/A](#) Serial No. [N/A](#)

Installation date [N/A](#) Control efficiency (%) [NONE](#)

Efficiency estimation method [N/A](#)

16 To be updated based on actual NOx emission factors, to ensure PTE of <250 tons of NOx.

F. Ambient Impact Assessment

This information must be completed by temporary sources or when ambient impact assessment is an applicable requirement for this emissions unit (this is not common).

Various - see Supplemental Report, Section 3.3.4

Stack height (ft) _____ Inside stack diameter (ft) _____

Stack temp(°F) _____ Design stack flow rate (ACFM) _____

Actual stack flow rate (ACFM) _____ Velocity (ft/sec) _____

Federal Operating Permit Program (40 CFR Part 71)

EMISSION UNIT DESCRIPTION FOR FUEL COMBUSTION SOURCES (EUD-1)

A. General Information

Emissions unit ID [Resupply – P&G](#) Description [Diesel \(RICE\) engines](#)
SIC Code (4-digit) [1311](#) SCC Code [28000217](#)

B. Emissions Unit Description

Primary use [Propulsion & Generation](#) Temporary Source Yes X
No

Manufacturer [N/A](#) Model No. [N/A](#)

Serial Number [N/A](#) Installation Date [N/A](#)

Boiler Type: Industrial boiler Process burner Electric utility boiler
Other (describe) _____

Boiler horsepower rating _____ Boiler steam flow (lb/hr) _____

Type of Fuel-Burning Equipment (coal burning only):

Hand fired Spreader stoker Underfeed stoker Overfeed stoker
 Traveling grate Shaking grate Pulverized, wet bed Pulverized, dry bed

Actual Heat Input [TBD](#) MM BTU/hr Max. Design Heat Input [84](#) MM BTU/hr

C. Fuel Data

Primary fuel type(s) [Diesel](#) Standby fuel type(s) [None](#)

Describe each fuel you expected to use during the term of the permit.

Fuel Type	Max. Sulfur Content (%)	Max. Ash Content (%)	BTU Value (cf, gal., or lb.)
Diesel Fuel No. 1	0.010%	0%	135,000 Btu/gallon

D. Fuel Usage Rates

Fuel Type	Annual Actual Usage	Maximum Usage ¹⁷	
		Hourly	Annual
Diesel Fuel No. 1	not yet operating	622 gallons	172,800 gallons

E. Associated Air Pollution Control Equipment

<p>Emissions unit ID Resupply – P&G Device type NONE</p> <p>Air pollutant(s) Controlled NONE Manufacturer N/A</p> <p>Model No. N/A Serial No. N/A</p> <p>Installation date N/A Control efficiency (%) NONE</p> <p>Efficiency estimation method N/A</p>
--

17 To be updated based on actual NOx emission factors, to ensure PTE of <250 tons of NOx.

F. Ambient Impact Assessment

This information must be completed by temporary sources or when ambient impact assessment is an applicable requirement for this emissions unit (this is not common).

Stack height (ft) 60	Inside stack diameter (ft) 1.97
Stack temp(°F) 709	Design stack flow rate (ACFM) 8,759
Actual stack flow rate (ACFM) not yet operating	Velocity (ft/sec) 47.97

Federal Operating Permit Program (40 CFR Part 71)

EMISSION UNIT DESCRIPTION FOR FUEL COMBUSTION SOURCES (EUD-1)

A. General Information

Emissions unit ID [Resupply – Seldom](#) Description [Diesel \(RICE\) engines](#)
SIC Code (4-digit) [1311](#) SCC Code [20200102](#)

B. Emissions Unit Description

Primary use [Power smaller engines](#) Temporary Source Yes No
 Manufacturer [N/A](#) Model No. [N/A](#)
 Serial Number [N/A](#) Installation Date [N/A](#)
 Boiler Type: Industrial boiler Process burner Electric utility boiler
 Other (describe) _____
 Boiler horsepower rating _____ Boiler steam flow (lb/hr) _____
 Type of Fuel-Burning Equipment (coal burning only):
 Hand fired Spreader stoker Underfeed stoker Overfeed stoker
 Traveling grate Shaking grate Pulverized, wet bed Pulverized, dry bed
 Actual Heat Input [TBD](#) MM BTU/hr Max. Design Heat Input [0.016](#) MM BTU/hr

C. Fuel Data

Primary fuel type(s) [Diesel](#) Standby fuel type(s) [None](#)

Describe each fuel you expected to use during the term of the permit.

Fuel Type	Max. Sulfur Content (%)	Max. Ash Content (%)	BTU Value (cf, gal., or lb.)
Diesel Fuel No. 1	0.010%	0%	135,000 Btu/gallon

D. Fuel Usage Rates

Fuel Type	Annual Actual Usage	Maximum Usage ¹⁸	
		Hourly	Annual
Diesel Fuel No. 1	not yet operating	0.12 gallons	686 gallons

E. Associated Air Pollution Control Equipment

<p>Emissions unit ID Resupply – Seldom Device type NONE</p> <p>Air pollutant(s) Controlled NONE Manufacturer N/A</p> <p>Model No. N/A Serial No. N/A</p> <p>Installation date N/A Control efficiency (%) NONE</p> <p>Efficiency estimation method N/A</p>

18 To be updated based on actual NOx emission factors, to ensure PTE of <250 tons of NOx.

F. Ambient Impact Assessment

This information must be completed by temporary sources or when ambient impact assessment is an applicable requirement for this emissions unit (this is not common).

Various - see Supplemental Report, Section 3.3.4

Stack height (ft) _____ Inside stack diameter (ft) _____

Stack temp(°F) _____ Design stack flow rate (ACFM) _____

Actual stack flow rate (ACFM) _____ Velocity (ft/sec) _____

Federal Operating Permit Program (40 CFR Part 71)

EMISSION UNIT DESCRIPTION FOR FUEL COMBUSTION SOURCES (EUD-1)

A. General Information

Emissions unit ID [OSR – P&G](#) Description [Diesel \(RICE\) engines](#)
SIC Code (4-digit) [1311](#) SCC Code [28000212](#)

B. Emissions Unit Description

Primary use [Propulsion & Generation](#) Temporary Source Yes X
No

Manufacturer [N/A](#) Model No. [N/A](#)

Serial Number [N/A](#) Installation Date [N/A](#)

Boiler Type: Industrial boiler Process burner Electric utility boiler
Other (describe) _____

Boiler horsepower rating _____ Boiler steam flow (lb/hr) _____

Type of Fuel-Burning Equipment (coal burning only):

Hand fired Spreader stoker Underfeed stoker Overfeed stoker
 Traveling grate Shaking grate Pulverized, wet bed Pulverized, dry bed

Actual Heat Input [TBD](#) MM BTU/hr Max. Design Heat Input [16](#) MM BTU/hr

C. Fuel Data

Primary fuel type(s) [Diesel](#) Standby fuel type(s) [None](#)

Describe each fuel you expected to use during the term of the permit.

Fuel Type	Max. Sulfur Content (%)	Max. Ash Content (%)	BTU Value (cf, gal., or lb.)
Diesel Fuel No. 1	0.010%	0%	135,000 Btu/gallon

D. Fuel Usage Rates

Fuel Type	Annual Actual Usage	Maximum Usage ¹⁹	
		Hourly	Annual
Diesel Fuel No. 1	not yet operating	117 gallons	201,600 gallons

E. Associated Air Pollution Control Equipment

<p>Emissions unit ID OSR – P&G Device type Catalyzed Diesel Particulate Filter (CDPF)</p> <p>Air pollutant(s) Controlled PM, CO, VOC Manufacturer TBD</p> <p>Model No. TBD Serial No. TBD</p> <p>Installation date TBD Control efficiency (%) PM-85%, CO, VOC-90%</p> <p>Efficiency estimation method Manufacture Guarantee</p>

19 To be updated based on actual NOx emission factors, to ensure PTE of <250 tons of NOx.

F. Ambient Impact Assessment

This information must be completed by temporary sources or when ambient impact assessment is an applicable requirement for this emissions unit (this is not common).

Various - see Supplemental Report, Section 3.3.4

Stack height (ft) _____ Inside stack diameter (ft) _____

Stack temp(°F) _____ Design stack flow rate (ACFM) _____

Actual stack flow rate (ACFM) _____ Velocity (ft/sec) _____

Federal Operating Permit Program (40 CFR Part 71)

EMISSION UNIT DESCRIPTION FOR FUEL COMBUSTION SOURCES (EUD-1)

A. General Information

Emissions unit ID [OSR – Seldom](#) Description [Diesel \(RICE\) engines](#)
SIC Code (4-digit) [1311](#) SCC Code [20200102](#)

B. Emissions Unit Description

Primary use [Power smaller engines](#) Temporary Source Yes No
 Manufacturer [N/A](#) Model No. [N/A](#)
 Serial Number [N/A](#) Installation Date [N/A](#)
 Boiler Type: Industrial boiler Process burner Electric utility boiler
 Other (describe) _____
 Boiler horsepower rating _____ Boiler steam flow (lb/hr) _____
 Type of Fuel-Burning Equipment (coal burning only):
 Hand fired Spreader stoker Underfeed stoker Overfeed stoker
 Traveling grate Shaking grate Pulverized, wet bed Pulverized, dry bed
 Actual Heat Input [TBD](#) MM BTU/hr Max. Design Heat Input [0.08](#) MM BTU/hr

C. Fuel Data

Primary fuel type(s) [Diesel](#) Standby fuel type(s) [None](#)

Describe each fuel you expected to use during the term of the permit.

Fuel Type	Max. Sulfur Content (%)	Max. Ash Content (%)	BTU Value (cf, gal., or lb.)
Diesel Fuel No. 1	0.010%	0%	135,000 Btu/gallon

D. Fuel Usage Rates

Fuel Type	Annual Actual Usage	Maximum Usage ²⁰	
		Hourly	Annual
Diesel Fuel No. 1	not yet operating	0.60 gallons	1,714 gallons

E. Associated Air Pollution Control Equipment

<p>Emissions unit ID OSR – Seldom Device type NONE</p> <p>Air pollutant(s) Controlled NONE Manufacturer N/A</p> <p>Model No. N/A Serial No. N/A</p> <p>Installation date N/A Control efficiency (%) NONE</p> <p>Efficiency estimation method N/A</p>
--

²⁰ To be updated based on actual NOx emission factors, to ensure PTE of <250 tons of NOx.

F. Ambient Impact Assessment

This information must be completed by temporary sources or when ambient impact assessment is an applicable requirement for this emissions unit (this is not common).

Various - see Supplemental Report, Section 3.3.4

Stack height (ft) _____ Inside stack diameter (ft) _____

Stack temp(°F) _____ Design stack flow rate (ACFM) _____

Actual stack flow rate (ACFM) _____ Velocity (ft/sec) _____

Federal Operating Permit Program (40 CFR Part 71)

EMISSION UNIT DESCRIPTION FOR FUEL COMBUSTION SOURCES (EUD-1)

A. General Information

Emissions unit ID [OSR – Incin](#) Description [Incinerator](#)
SIC Code (4-digit) [1311](#) SCC Code [50300101](#)

B. Emissions Unit Description

Primary use [Domestic Waste](#) Temporary Source Yes No

Manufacturer [N/A](#) Model No. [N/A](#)

Serial Number [N/A](#) Installation Date [N/A](#)

Boiler Type: Industrial boiler Process burner Electric utility boiler

Other (describe) _____

Boiler horsepower rating _____ Boiler steam flow (lb/hr) _____

Type of Fuel-Burning Equipment (coal burning only):

Hand fired Spreader stoker Underfeed stoker Overfeed stoker

Traveling grate Shaking grate Pulverized, wet bed Pulverized, dry bed

Actual Heat Input [TBD](#) MM BTU/hr Max. Design Heat Input [N/A](#) MM BTU/hr

C. Fuel Data

Primary fuel type(s) [Diesel](#) Standby fuel type(s) [None](#)

Describe each fuel you expected to use during the term of the permit.

Fuel Type	Max. Sulfur Content (%)	Max. Ash Content (%)	BTU Value (cf, gal., or lb.)
Diesel Fuel No. 1	0.010%	0%	135,000 Btu/gallon

D. Fuel Usage Rates

Fuel Type	Annual Actual Usage	Maximum Usage ²¹	
		Hourly	Annual
Diesel Fuel No. 1	not yet operating	125 lbs of waste	180 tons of waste

E. Associated Air Pollution Control Equipment

Emissions unit ID [OSR – Incin](#) Device type [NONE](#)

Air pollutant(s) Controlled [NONE](#) Manufacturer [N/A](#)

Model No. [N/A](#) Serial No. [N/A](#)

Installation date [N/A](#) Control efficiency (%) [NONE](#)

Efficiency estimation method [N/A](#)

21 To be updated based on actual NOx emission factors, to ensure PTE of <250 tons of NOx.

F. Ambient Impact Assessment

This information must be completed by temporary sources or when ambient impact assessment is an applicable requirement for this emissions unit (this is not common).

Various - see Supplemental Report, Section 3.3.4

Stack height (ft) _____ Inside stack diameter (ft) _____

Stack temp(°F) _____ Design stack flow rate (ACFM) _____

Actual stack flow rate (ACFM) _____ Velocity (ft/sec) _____

Federal Operating Permit Program (40 CFR Part 71)

EMISSION UNIT DESCRIPTION FOR FUEL COMBUSTION SOURCES (EUD-1)

A. General Information

Emissions unit ID [Quartering – P&G](#) Description [Diesel \(RICE\) engines](#)
SIC Code (4-digit) [1311](#) SCC Code [28000212](#)

B. Emissions Unit Description

Primary use [Propulsion & Generation](#) Temporary Source Yes No
Manufacturer [N/A](#) Model No. [N/A](#)
Serial Number [N/A](#) Installation Date [N/A](#)
Boiler Type: Industrial boiler Process burner Electric utility boiler
Other (describe) _____
Boiler horsepower rating _____ Boiler steam flow (lb/hr) _____
Type of Fuel-Burning Equipment (coal burning only):
 Hand fired Spreader stoker Underfeed stoker Overfeed stoker
 Traveling grate Shaking grate Pulverized, wet bed Pulverized, dry bed
Actual Heat Input [TBD](#) MM BTU/hr Max. Design Heat Input [27](#) MM BTU/hr

C. Fuel Data

Primary fuel type(s) [Diesel](#) Standby fuel type(s) [None](#)

Describe each fuel you expected to use during the term of the permit.

Fuel Type	Max. Sulfur Content (%)	Max. Ash Content (%)	BTU Value (cf, gal., or lb.)
Diesel Fuel No. 1	0.010%	0%	135,000 Btu/gallon

D. Fuel Usage Rates

Fuel Type	Annual Actual Usage	Maximum Usage ²²	
		Hourly	Annual
Diesel Fuel No. 1	not yet operating	200 gallons	345,600 gallons

E. Associated Air Pollution Control Equipment

Emissions unit ID [Quartering – P&G](#) Device type [NONE](#)

Air pollutant(s) Controlled [NONE](#) Manufacturer [N/A](#)

Model No. [N/A](#) Serial No. [N/A](#)

Installation date [N/A](#) Control efficiency (%) [NONE](#)

Efficiency estimation method [N/A](#)

²² To be updated based on actual NOx emission factors, to ensure PTE of <250 tons of NOx.

F. Ambient Impact Assessment

This information must be completed by temporary sources or when ambient impact assessment is an applicable requirement for this emissions unit (this is not common).

Various - see Supplemental Report, Section 3.3.4

Stack height (ft) _____ Inside stack diameter (ft) _____

Stack temp(°F) _____ Design stack flow rate (ACFM) _____

Actual stack flow rate (ACFM) _____ Velocity (ft/sec) _____

Federal Operating Permit Program (40 CFR Part 71)

EMISSION UNIT DESCRIPTION FOR FUEL COMBUSTION SOURCES (EUD-1)

A. General Information

Emissions unit ID [Quartering – Seldom](#) Description [Diesel \(RICE\) engines](#)
SIC Code (4-digit) [1311](#) SCC Code [20200102](#)

B. Emissions Unit Description

Primary use [Power smaller engines](#) Temporary Source Yes No
Manufacturer [N/A](#) Model No. [N/A](#)
Serial Number [N/A](#) Installation Date [N/A](#)
Boiler Type: Industrial boiler Process burner Electric utility boiler
Other (describe) _____
Boiler horsepower rating _____ Boiler steam flow (lb/hr) _____
Type of Fuel-Burning Equipment (coal burning only):
 Hand fired Spreader stoker Underfeed stoker Overfeed stoker
 Traveling grate Shaking grate Pulverized, wet bed Pulverized, dry bed
Actual Heat Input [TBD](#) MM BTU/hr Max. Design Heat Input [0.08](#) MM BTU/hr

C. Fuel Data

Primary fuel type(s) [Diesel](#) Standby fuel type(s) [None](#)

Describe each fuel you expected to use during the term of the permit.

Fuel Type	Max. Sulfur Content (%)	Max. Ash Content (%)	BTU Value (cf, gal., or lb.)
Diesel Fuel No. 1	0.010%	0%	135,000 Btu/gallon

D. Fuel Usage Rates

Fuel Type	Annual Actual Usage	Maximum Usage ²³	
		Hourly	Annual
Diesel Fuel No. 1	not yet operating	0.60 gallons	1,714 gallons

E. Associated Air Pollution Control Equipment

<p>Emissions unit ID Quartering – Seldom Device type NONE</p> <p>Air pollutant(s) Controlled NONE Manufacturer N/A</p> <p>Model No. N/A Serial No. N/A</p> <p>Installation date N/A Control efficiency (%) NONE</p> <p>Efficiency estimation method N/A</p>

²³ To be updated based on actual NOx emission factors, to ensure PTE of <250 tons of NOx.

F. Ambient Impact Assessment

This information must be completed by temporary sources or when ambient impact assessment is an applicable requirement for this emissions unit (this is not common).

Various - see Supplemental Report, Section 3.3.4

Stack height (ft) _____ Inside stack diameter (ft) _____

Stack temp(°F) _____ Design stack flow rate (ACFM) _____

Actual stack flow rate (ACFM) _____ Velocity (ft/sec) _____

Federal Operating Permit Program (40 CFR Part 71)

EMISSION UNIT DESCRIPTION FOR FUEL COMBUSTION SOURCES (EUD-1)

A. General Information

Emissions unit ID [Quartering – Incin](#) Description [Incinerator](#)
SIC Code (4-digit) [1311](#) SCC Code [50300101](#)

B. Emissions Unit Description

Primary use [Domestic Waste](#) Temporary Source Yes No

Manufacturer [N/A](#) Model No. [N/A](#)

Serial Number [N/A](#) Installation Date [N/A](#)

Boiler Type: Industrial boiler Process burner Electric utility boiler

Other (describe) _____

Boiler horsepower rating _____ Boiler steam flow (lb/hr) _____

Type of Fuel-Burning Equipment (coal burning only):

Hand fired Spreader stoker Underfeed stoker Overfeed stoker

Traveling grate Shaking grate Pulverized, wet bed Pulverized, dry bed

Actual Heat Input [TBD](#) MM BTU/hr Max. Design Heat Input [N/A](#) MM BTU/hr

C. Fuel Data

Primary fuel type(s) [Diesel](#) Standby fuel type(s) [None](#)

Describe each fuel you expected to use during the term of the permit.

Fuel Type	Max. Sulfur Content (%)	Max. Ash Content (%)	BTU Value (cf, gal., or lb.)
Diesel Fuel No. 1	0.010%	0%	135,000 Btu/gallon

D. Fuel Usage Rates

Fuel Type	Annual Actual Usage	Maximum Usage ²⁴	
		Hourly	Annual
Diesel Fuel No. 1	not yet operating	125 lbs of waste	180 tons of waste

E. Associated Air Pollution Control Equipment

Emissions unit ID [Quartering – Incin](#) Device type [NONE](#)

Air pollutant(s) Controlled [NONE](#) Manufacturer [N/A](#)

Model No. [N/A](#) Serial No. [N/A](#)

Installation date [N/A](#) Control efficiency (%) [NONE](#)

Efficiency estimation method [N/A](#)

²⁴ To be updated based on actual NOx emission factors, to ensure PTE of <250 tons of NOx.

F. Ambient Impact Assessment

This information must be completed by temporary sources or when ambient impact assessment is an applicable requirement for this emissions unit (this is not common).

Various - see Supplemental Report, Section 3.3.4

Stack height (ft) _____ Inside stack diameter (ft) _____

Stack temp(°F) _____ Design stack flow rate (ACFM) _____

Actual stack flow rate (ACFM) _____ Velocity (ft/sec) _____

Federal Operating Permit Program (40 CFR Part 71)

EMISSION UNIT DESCRIPTION FOR FUEL COMBUSTION SOURCES (EUD-1)

A. General Information

Emissions unit ID [OSR Work Boats](#) Description [Diesel \(RICE\) engines](#)
SIC Code (4-digit) [1311](#) SCC Code [28000212](#)

B. Emissions Unit Description

Primary use [Propulsion & Generation](#) Temporary Source Yes X
No

Manufacturer [N/A](#) Model No. [N/A](#)

Serial Number [N/A](#) Installation Date [N/A](#)

Boiler Type: Industrial boiler Process burner Electric utility boiler
Other (describe) _____

Boiler horsepower rating _____ Boiler steam flow (lb/hr) _____

Type of Fuel-Burning Equipment (coal burning only):

Hand fired Spreader stoker Underfeed stoker Overfeed stoker
 Traveling grate Shaking grate Pulverized, wet bed Pulverized, dry bed

Actual Heat Input [TBD](#) MM BTU/hr Max. Design Heat Input [3.05](#) MM BTU/hr

C. Fuel Data

Primary fuel type(s) [Diesel](#) Standby fuel type(s) [None](#)

Describe each fuel you expected to use during the term of the permit.

Fuel Type	Max. Sulfur Content (%)	Max. Ash Content (%)	BTU Value (cf, gal., or lb.)
Diesel Fuel No. 1	0.010%	0%	135,000 Btu/gallon

D. Fuel Usage Rates

Fuel Type	Annual Actual Usage	Maximum Usage ²⁵	
		Hourly	Annual
Diesel Fuel No. 1	not yet operating	23 gallons	64,960 gallons

E. Associated Air Pollution Control Equipment

Emissions unit ID [OSR Work Boats](#) Device type [NONE](#)

Air pollutant(s) Controlled [NONE](#) Manufacturer [N/A](#)

Model No. [N/A](#) Serial No. [N/A](#)

Installation date [N/A](#) Control efficiency (%) [NONE](#)

Efficiency estimation method [N/A](#)

²⁵ To be updated based on actual NOx emission factors, to ensure PTE of <250 tons of NOx.

F. Ambient Impact Assessment

This information must be completed by temporary sources or when ambient impact assessment is an applicable requirement for this emissions unit (this is not common).

Various - see Supplemental Report, Section 3.3.4

Stack height (ft) _____ Inside stack diameter (ft) _____

Stack temp(°F) _____ Design stack flow rate (ACFM) _____

Actual stack flow rate (ACFM) _____ Velocity (ft/sec) _____

SECTION 3

INSIGNIFICANT EMISSIONS (IE)

Federal Operating Permit Program (40 CFR Part 71)

INSIGNIFICANT EMISSIONS (IE)

On this page list each insignificant activity or emission unit. In the "number" column, indicate the number of units in this category. Descriptions should be brief but unique. Indicate which emissions criterion of part 71 is the basis for the exemption.

Number	Description of Activities or Emissions Units	RAP, except HAP	HAP
1	Kulluk Fuel Tank A, 680 m ³ *	X	X
1	Kulluk Fuel Tank B, 676 m ³ *	X	X
1	Kulluk Fuel Tank C, 247 m ³ *	X	X
1	Drilling Mud De-gassing **	X	X

* See Appendix C: TANKS 4.0 Reports

** See Appendix D: Drilling Mud De-gassing

SECTION 4

EMISSION CALCULATIONS (EMISS)

Federal Operating Permit Program (40 CFR Part 71)

EMISSION CALCULATIONS (EMISS)

Calculate potential to emit (PTE) for applicability purposes and actual emissions for fee purposes for each emissions unit, control device, or alternative operating scenario identified in section I of form **GIS**. If form **FEE** does not need to be submitted with the application, do not calculate actual emissions.

A. Emissions Unit ID [Kulluk and Associated Fleet \(See Appendix E: EMISS Tables for all units\)](#)

B. Identification and Quantification of Emissions

First, list each air pollutant that is either regulated at the unit or present in major amounts, then list any other regulated pollutant (for fee calculation) not already listed. HAP may be simply listed as "HAP." Next, calculate PTE for applicability purposes and actual emissions for fee purposes for each pollutant. Do not calculate PTE for air pollutants listed solely for fee purposes. Include all fugitives for fee purposes. You may round to the nearest tenth of a ton for yearly values or tenth of a pound for hourly values.

Air Pollutants	Emission Rates			CAS No.
	Actual Annual Emissions (tons/yr)	Potential to Emit		
		Hourly (lb/hr)	Annual (tons/yr)	
NO _x	<250	638	<250	NO ₂ - 10102-44-0
VOC		69	50	N/A
SO ₂		8	5	7446-09-5
PM ₁₀		54	30	N/A
CO		311	192	630-08-0
Lead		0.11	0.09	7439-92-1
HAP		1.29	0.69	Various
Formaldehyde		0.35	0.18	50-00-0

SECTION 5

POTENTIAL TO EMIT (PTE)

Federal Operating Permit Program (40 CFR Part 71)
POTENTIAL TO EMIT (PTE)

For each unit with emissions that count towards applicability, list the emissions unit ID and the PTE for the air pollutants listed below and sum them up to show totals for the facility. You may find it helpful to complete form **EMISS** before completing this form. Show other pollutants not listed that are present in major amounts at the facility on attachment in a similar fashion. You may round values to the nearest tenth of a ton. Also report facility totals in section **J** of form **GIS**.

Emissions Unit ID	Regulated Air Pollutants and Pollutants for which the Source is Major (tons/yr)						
	NOx	VOC	SO2	PM10	CO	Lead	HAP
Kulluk emission units							
Kulluk – Gens	23.9	1.7	6.7E-01	3.7	10.8	1.8E-03	7.7E-02
Kulluk – MLCHPUs	8.9	0.3	2.6E-02	0.4	0.5	7.3E-05	3.1E-03
Kulluk – Comps	7.1	0.1	2.6E-02	0.1	0.4	7.3E-05	3.1E-03
Kulluk – Cranes	4.9	0.1	1.5E-02	0.2	0.3	4.1E-05	1.7E-03
Kulluk – Heaters	1.3	0.1	9.1E-02	0.2	0.3	7.8E-05	2.8E-03
Kulluk – Seldom	5.4E-01	5.3E-02	1.6E-03	4.3E-02	1.5E-01	4.4E-06	6.0E-04
Kulluk – Egen	7.3E-02	7.3E-03	2.2E-04	5.9E-03	2.0E-02	6.0E-07	8.2E-05
Kulluk – Incin	0.3	9.9	2.5E-01	1.6	29.8	2.1E-02	2.5E-02
Ice Management							
Ice – P&G	46.3	3.3	1.3E+00	7.2	21.0	3.6E-03	1.5E-01
Ice – Heaters	0.8	0.0	5.7E-02	0.1	0.2	4.9E-05	1.8E-03
Ice – Seldom	1.5E-01	1.5E-02	4.6E-04	1.2E-02	4.2E-02	1.3E-06	1.7E-04
Ice – Incin	0.1	4.2	1.1E-01	0.7	12.6	9.0E-03	1.1E-02
Anchor Handler							
AH – P&G	46.3	3.3	1.3E+00	7.2	21.0	3.6E-03	1.5E-01
AH – Heaters	0.8	0.0	5.7E-02	0.1	0.2	4.9E-05	1.8E-03
AH – Seldom	1.5E-01	1.5E-02	4.6E-04	1.2E-02	4.2E-02	1.3E-06	1.7E-04
AH – Incin	0.1	4.2	1.1E-01	0.7	12.6	9.0E-03	1.1E-02
Resupply Ship - transport							
Resupply – P&G	11.0	0.3	4.1E-02	0.5	3.3	1.1E-04	1.5E-02
Resupply – Seldom	8.2E-02	8.1E-03	2.4E-04	6.5E-03	2.2E-02	6.7E-07	9.1E-05
Resupply Ship - DP mode							
Resupply – P&G	21.9	0.7	8.2E-02	0.9	6.6	2.3E-04	3.1E-02
Resupply – Seldom	8.2E-02	8.1E-03	2.4E-04	6.5E-03	2.2E-02	6.7E-07	9.1E-05
OSR vessel							
OSR – P&G	38.4	1.2	1.4E-01	1.6	11.6	3.9E-04	5.3E-02

	OSR – Seldom	4.1E-01	4.1E-02	1.2E-03	3.3E-02	1.1E-01	3.4E-06	4.5E-04
	OSR – Incin	0.3	9.0	2.3E-01	1.5	27.0	1.9E-02	2.3E-02
	Quartering vessel							
	Quartering – P&G	49.3	0.2	2.5E-01	0.4	2.0	6.8E-04	9.2E-02
	Quartering – Seldom	4.1E-01	4.1E-02	1.2E-03	3.3E-02	1.1E-01	3.4E-06	4.5E-04
	Quartering – Incin	0.3	9.0	2.3E-01	1.5	27.0	1.9E-02	2.3E-02
	OSR Work Boats							
	OSR Work Boats	15.4	1.5	4.6E-02	1.2	4.2	1.3E-04	1.7E-02
	FACILITY TOTALS:	<250	50	5	30	192	0.09	0.69

SECTION 6

FEE CALCULATION WORKSHEET (FEE)



OMB No. 2060-0336, Approval Expires 04/30/2012

Federal Operating Permit Program (40 CFR Part 71)

FEE CALCULATION WORKSHEET (FEE)

Use this form initially, or thereafter on an annual basis, to calculate part 71 fees.

A. General Information

Type of fee (Check one): Initial ___ Annual

Deadline for submitting fee calculation worksheet ____/____/____

For initial fees, emissions are based on (Check one): **No actual emissions yet emissions are based on PTE.**

___ Actual emissions for the preceding calendar year. (Required in most circumstances.)

___ Estimates of actual emissions for the current calendar year. (Required when operations commenced during the preceding calendar year.)

 Date commenced operations ____/____/____

___ Estimates of actual emissions for the preceding calendar year. (Optional after a part 71 permit was issued to replace a part 70 permit, but only if initial fee payment is due between January 1 and March 31; otherwise use actual emissions for the preceding calendar year.)

For annual fee payment, you are required to use actual emissions for the preceding calendar year.

B. Source Information: Complete this section only if you are paying fees but not applying for a permit.

Source or facility name _____

Mailing address: Street or P.O. Box _____

City _____ State _____ ZIP _____ - _____

Contact person _____ Title _____

Telephone (____) _____ - _____ Ext _____ Part 71 permit no. _____

C. Certification of Truth, Accuracy and Completeness: Only needed if not submitting a separate form CTAC.

I certify under penalty of law, based on information and belief formed after reasonable inquiry, the statements and information contained in this submittal (form and attachments) are true, accurate and complete.

Name (signed) _____

Name (typed) _____ Date: ____/____/____

D. Annual Emissions Report for Fee Calculation Purposes -- Non-HAP

You may use this to report actual emissions (tons per year) of regulated pollutants (for fee calculation) on a calendar-year basis for both initial and annual fee calculation purposes. Section E is designed to report HAP emissions. Quantify all actual emissions, including fugitives, but do not include insignificant emissions and certain regulated air pollutants that are not counted for fee purposes, such as CO (see instructions). You may round to the nearest tenth of a ton on this form. Sum the emissions in each column and enter a subtotal at the bottom of the page. If any subtotal exceeds 4,000 tons, enter 4,000 for that column.

This data is for 2012 (year)

Emission Unit ID	NOx	VOC	SO2	PM10	Lead	Other
Kulluk emission units						
Kulluk – Gens	23.9	1.7	6.7E-01	3.7	1.8E-03	
Kulluk – MLCHPUs	8.9	0.3	2.6E-02	0.4	7.3E-05	
Kulluk – Comps	7.1	0.1	2.6E-02	0.1	7.3E-05	
Kulluk – Cranes	4.9	0.1	1.5E-02	0.2	4.1E-05	
Kulluk – Heaters	1.3	0.1	9.1E-02	0.2	7.8E-05	
Kulluk – Seldom	5.4E-01	5.3E-02	1.6E-03	4.3E-02	4.4E-06	
Kulluk – Egen	7.3E-02	7.3E-03	2.2E-04	5.9E-03	6.0E-07	
Kulluk – Incin	0.3	9.9	2.5E-01	1.6	2.1E-02	
Ice Management						
Ice – P&G	46.3	3.3	1.3E+00	7.2	3.6E-03	
Ice – Heaters	0.8	0.0	5.7E-02	0.1	4.9E-05	
Ice – Seldom	1.5E-01	1.5E-02	4.6E-04	1.2E-02	1.3E-06	
Ice – Incin	0.1	4.2	1.1E-01	0.7	9.0E-03	
Anchor Handler						
AH – P&G	46.3	3.3	1.3E+00	7.2	3.6E-03	
AH – Heaters	0.8	0.0	5.7E-02	0.1	4.9E-05	
AH – Seldom	1.5E-01	1.5E-02	4.6E-04	1.2E-02	1.3E-06	
AH – Incin	0.1	4.2	1.1E-01	0.7	9.0E-03	
Resupply Ship - transport						
Resupply – P&G	11.0	0.3	4.1E-02	0.5	1.1E-04	
Resupply – Seldom	8.2E-02	8.1E-03	2.4E-04	6.5E-03	6.7E-07	
Resupply Ship - DP mode						
Resupply – P&G	21.9	0.7	8.2E-02	0.9	2.3E-04	
Resupply – Seldom	8.2E-02	8.1E-03	2.4E-04	6.5E-03	6.7E-07	
OSR vessel						
OSR – P&G	38.4	1.2	1.4E-01	1.6	3.9E-04	
OSR – Seldom	4.1E-01	4.1E-02	1.2E-03	3.3E-02	3.4E-06	
OSR – Incin	0.3	9.0	2.3E-01	1.5	1.9E-02	

Quartering vessel						
Quartering – P&G	49.3	0.2	2.5E-01	0.4	6.8E-04	
Quartering – Seldom	4.1E-01	4.1E-02	1.2E-03	3.3E-02	3.4E-06	
Quartering – Incin	0.3	9.0	2.3E-01	1.5	1.9E-02	
OSR Work Boats						
OSR Work Boats	15.4	1.5	4.6E-02	1.2	1.3E-04	
SUBTOTALS:	<250	50	5	30	0.09	

E. Annual Emissions Report for Fee Calculation Purposes -- HAP

HAP Identification. Identify individual HAP emitted at the facility, identify the CAS number, and assign a unique identifier for use in the second table in this section. Whenever assigning identifier codes, use "HAP1" for the first, "HAP2" for the second, and so on.

Name of HAP	CAS No	Identifier
Formaldehyde	50-00-0	HAP 1

HAP Emissions. Report the actual emissions of individual HAP identified above. Use the identifiers assigned in the table above. Include all emissions, including fugitives, and do not include insignificant emissions. You may round to the nearest tenth of a ton. Sum the emissions in each column and enter a subtotal at the bottom of the page. If any subtotal exceeds 4,000 tons, enter 4,000.

This data is for 2012 (year)

Emissions Unit ID	Actual Emissions (Tons/Year)							
	Total HAPs	HAP 1	HAP__	HAP__	HAP__	HAP__	HAP__	HAP__
See PTE Form	0.69	0.18						
SUBTOTALS	0.69	0.18						

F. Fee Calculation Worksheet

This section is used to calculate the total fee owed for both initial and annual fee payment purposes. Reconciliation is only for cases where you are paying the annual fee and you used any type of estimate of actual emissions when you calculated the initial fee. If you do not need to reconcile fees, only complete line 1-5 and then skip down to lines 21 – 26. See instructions for more detailed explanation.

1. Sum the emissions from section D of this form (non-HAP) and enter the total (tons).	335.09
2. Sum the emissions from section E of this form (HAP) and enter the total (tons).	0.69
3. Sum lines 1 and 2.	335.78
4. Enter the emissions that were counted twice. If none, enter "0."	0.09 (Lead)
5. Subtract line 4 from line 3, round to the nearest ton, and enter the result here.	336
RECONCILIATION (WHEN INITIAL FEES WERE BASED ON ESTIMATES FOR THE "CURRENT" CALENDAR YEAR)	
<p>Only complete lines 6-10 if you are paying the first annual fee and initial fees were based on estimated actual emissions for the calendar year in which you paid initial fees; otherwise skip to line 11 or to line 21.</p>	
6. Enter the total estimated actual emissions for the year the initial fee was paid (previously reported on line 5 of the initial fee form).	
7. If line 5 is greater than line 6, subtract line 6 from line 5, and enter the result. Otherwise enter "0."	
8. If line 6 is greater than line 5, subtract line 5 from line 6, and enter the result. Otherwise enter "0."	
9. If line 7 is greater than 0, multiply line 7 by last year's fee rate (\$/ton) and enter the result here. This is the underpayment. Go to line 21.	
10. If line 8 is greater than 0, multiply line 8 by last year's fee rate (\$/ton) and enter the result here. This is the overpayment. Go to line 21.	
RECONCILIATION (WHEN INITIAL FEES WERE BASED ON ESTIMATES FOR THE "PRECEDING" CALENDAR YEAR)	
<p>Only complete lines 11-20 if you are paying the first annual fee and initial fees were based on estimated actual emissions for the calendar year preceding initial fee payment; otherwise skip to line 21. If completing this section, you will also need to complete sections D and E to report actual emissions for the calendar year preceding initial fee payment.</p>	
11. Sum the actual emissions from section D (non-HAP) for the calendar year preceding initial fee payment and enter the result here.	
12. Sum the actual emissions from section E (HAP) for the calendar year preceding initial fee payment and enter the result here.	
13. Add lines 11 and 12 and enter the total here. These are total actual emissions for the calendar year preceding initial fee payment.	
14. Enter double counted emission from line 13 here. If none, enter "0."	
15. Subtract line 14 from line 13, round to the nearest ton, and enter the result here.	
16. Enter the total estimated actual emissions previously reported on line 5 of the initial fee form. These are estimated actual emissions for the calendar year preceding initial fee payment.	

17. If line 15 is greater than line 16, subtract line 16 from line 15, and enter the result here. Otherwise enter "0."	
18. If line 16 is greater than line 15, subtract line 15 from line 16, and enter the result here. Otherwise enter "0."	
19. If line 17 is greater than 0, multiply line 17 by last year's fee rate (\$/ton) and enter the result here. This is the underpayment.	
20. If line 18 is greater than 0, multiply line 18 by last year's fee rate (\$/ton) and enter the result on this line. This is the overpayment.	
FEE CALCULATION	
21. Multiply line 5 (tons) by the current fee rate (\$/ton) and enter the result here.	\$15,456
22. Enter any underpayment from line 9 or 19 here. Otherwise enter "0."	0
23. Enter any overpayment from line 10 or 20 here. Otherwise enter "0."	0
24. If line 22 is greater than "0," add it to line 21 and enter the result here. If line 23 is greater than "0," subtract this from line 21 and enter the result here. Otherwise enter the amount on line 21 here. This is the fee adjusted for reconciliation.	\$15,456
25. If your account was credited for fee assessment error since the last time you paid fees, enter the amount of the credit here. Otherwise enter "0."	0
26. Subtract line 25 from line 24 and enter the result here. Stop here. This is the total fee amount that you must remit to EPA.	\$15,456

SECTION 7

FILING FEE FORM (FF)

Federal Operating Permit Program (40 CFR Part 71)

FEE FILING FORM (FF)

Complete this form each time you prepare form FEE and send this form to the appropriate lockbox bank address, along with full payment. This form required at time of initial fee payment, and thereafter, when paying annual fees.

Source or Facility Name [Shell Offshore, Inc. – Conical Drilling Unit Kulluk](#)

Mailing Address:

Street/P.O. Box [3601 C Street, Suite 1334](#) City [Anchorage](#)

State [AK](#) ZIP [99503](#)

Contact Person: [Susan Childs](#) Title [Alaska Venture Support Integrator Manager](#)

Telephone [\(907\) 646 - 7112](#) Ext. _____

Total Fee Payment Remitted: \$ [15,456.00](#)

SECTION 8

**INITIAL COMPLIANCE PLAN AND COMPLIANCE
CERTIFICATION (I-COMP)**

Federal Operating Permit Program (40 CFR Part 71)

INITIAL COMPLIANCE PLAN AND COMPLIANCE CERTIFICATION (I-COMP)

SECTION A - COMPLIANCE STATUS AND COMPLIANCE PLAN

Complete this section for each unique combination of applicable requirements and emissions units at the facility. List all compliance methods (monitoring, recordkeeping and reporting) you used to determine compliance with the applicable requirement described above. Indicate your compliance status at this time for this requirement and compliance methods and check "YES" or "NO" to the follow-up question.

Emission Unit ID(s): Kulluk and Associated Fleet

Applicable Requirement (Describe and Cite):

The permittee shall not have the Kulluk engage in its Mud Line Cellar activity for more than 480 hours, in aggregate, during a calendar year.

Compliance Methods for the Above (Description and Citation):

To be demonstrated by recording beginning and end time of activity while the Kulluk is an OCS source.

Compliance Status:

In Compliance: Will you continue to comply up to permit issuance? Yes No

Not In Compliance: Will you be in compliance at permit issuance? Yes No

Future-Effective Requirement: Do you expect to meet this on a timely basis? Yes No

Emission Unit ID(s): Kulluk and Associated Fleet

Applicable Requirement (Describe and Cite):

The permittee shall not have the Kulluk engage in its Well Drilling activity for more than 1,632 hours, in aggregate, during a calendar year.

Compliance Methods for the Above (Description and Citation):

To be demonstrated by documentation of each event while the Kulluk is an OCS source.

Compliance Status:

In Compliance: Will you continue to comply up to permit issuance? Yes No

Not In Compliance: Will you be in compliance at permit issuance? Yes No

Future-Effective Requirement: Do you expect to meet this on a timely basis? Yes No

Emission Unit ID(s): **Kulluk and Associated Fleet**

Applicable Requirement (Describe and Cite):

The permittee shall not have the Kulluk occupy Drill Sites, in aggregate, for more than 2,880 hours, in aggregate during a calendar year.

Compliance Methods for the Above (Description and Citation):

To be demonstrated by documentation of each event while the Kulluk is an OCS source.

Compliance Status:

In Compliance: Will you continue to comply up to permit issuance? Yes No

Not In Compliance: Will you be in compliance at permit issuance? Yes No

Future-Effective Requirement: Do you expect to meet this on a timely basis? Yes No

Emission Unit ID(s): **Kulluk – Incin**

Applicable Requirement (Describe and Cite):

The permittee shall not have the Kulluk incinerator operate for more than between 8 am and 8 pm (12 hours).

Compliance Methods for the Above (Description and Citation):

To be demonstrated by recording of start and stop times while the Kulluk is an OCS source.

Compliance Status:

In Compliance: Will you continue to comply up to permit issuance? Yes No

Not In Compliance: Will you be in compliance at permit issuance? Yes No

Future-Effective Requirement: Do you expect to meet this on a timely basis? Yes No

Emission Unit ID(s): [Kulluk and Associated Fleet](#)

Applicable Requirement (Describe and Cite):

[The permittee shall purchase only ULSD and not combust any liquid fuel with sulfur content greater than 0.01 percent by weight in any emission unit on the Kulluk or a support vessel.](#)

Compliance Methods for the Above (Description and Citation):

[To be demonstrated by fuel purchase records and / or representative fuel sampling and determination of sulfur content using ASTM D 5453-08b, prior to the beginning of each drilling season and thereafter each fuel shipment. To be determined while the Kulluk is an OCS source.](#)

Compliance Status:

In Compliance: Will you continue to comply up to permit issuance? Yes No

Not In Compliance: Will you be in compliance at permit issuance? Yes No

Future-Effective Requirement: Do you expect to meet this on a timely basis? Yes No

Emission Unit ID(s): [Kulluk and Associated Fleet](#)

Applicable Requirement (Describe and Cite):

[The permittee shall not allow the sum of NO_x emissions from the Kulluk and support vessels within 25 miles of that Exploratory Operation to equal or exceed 250.0 tons during a calendar year.](#)

Compliance Methods for the Above (Description and Citation):

[To be demonstrated by documentation of the annual rolling weekly sum of NO_x emissions.](#)

Compliance Status:

In Compliance: Will you continue to comply up to permit issuance? Yes No

Not In Compliance: Will you be in compliance at permit issuance? Yes No

Future-Effective Requirement: Do you expect to meet this on a timely basis? Yes No

Emission Unit ID(s): [Kulluk and Associated Fleet](#)

Applicable Requirement (Describe and Cite):

The permittee shall not allow the sum of NO_x emissions from the each specified source to exceed the limits set forth in Appendix B: GIS Table 1 during a calendar year.

Compliance Methods for the Above (Description and Citation):

To be demonstrated by documentation of daily and/or weekly NO_x emissions, calculated from fuel consumption records and acceptable NO_x emission factors for the fuel-burning equipment, and calculated from time interval of incineration assumed to be at capacity rate and the acceptable NO_x emission factor.

Compliance Status:

In Compliance: Will you continue to comply up to permit issuance? Yes No

Not In Compliance: Will you be in compliance at permit issuance? Yes No

Future-Effective Requirement: Do you expect to meet this on a timely basis? Yes No

Emission Unit ID(s): [Kulluk and Associated Fleet](#)

Applicable Requirement (Describe and Cite):

The permittee shall not allow the sum of PM_{2.5} emissions from the each specified source to exceed the limits set forth in Appendix B: GIS Table 1 during a calendar year.

Compliance Methods for the Above (Description and Citation):

To be demonstrated by documentation of daily and/or weekly PM_{2.5} emissions, calculated from fuel consumption records and acceptable PM emission factors.

Compliance Status:

In Compliance: Will you continue to comply up to permit issuance? Yes No

Not In Compliance: Will you be in compliance at permit issuance? Yes No

Future-Effective Requirement: Do you expect to meet this on a timely basis? Yes No

Emission Unit ID(s): [Kulluk and Associated Fleet](#)

Applicable Requirement (Describe and Cite):

[The permittee shall not allow the sum of PM₁₀ emissions from the each specified source to exceed the limits set forth in Appendix B: GIS Table 1 during a calendar year.](#)

Compliance Methods for the Above (Description and Citation):

[To be demonstrated by documentation of daily and/or weekly PM₁₀ emissions, calculated from fuel consumption records and acceptable PM emission factors.](#)

Compliance Status:

In Compliance: Will you continue to comply up to permit issuance? Yes No

Not In Compliance: Will you be in compliance at permit issuance? Yes No

Future-Effective Requirement: Do you expect to meet this on a timely basis? Yes No

Emission Unit ID(s): [Kulluk and Associated Fleet](#)

Applicable Requirement (Describe and Cite):

[The permittee shall not allow more than 24 resupply and waste removal vessel trips to the Kulluk during a calendar year.](#)

Compliance Methods for the Above (Description and Citation):

[To be demonstrated by manual recording of resupply and waste removal events while the Kulluk is an OCS source.](#)

Compliance Status:

In Compliance: Will you continue to comply up to permit issuance? Yes No

Not In Compliance: Will you be in compliance at permit issuance? Yes No

Future-Effective Requirement: Do you expect to meet this on a timely basis? Yes No

Emission Unit ID(s): Kulluk – Gens, MLCHPUs, Comps, Cranes, Seldom, Egen

Applicable Requirement (Describe and Cite):

40 CFR Part 60.4200, NSPS Subpart IIII: Applicable to certification of CI engines. Certifications are required according to year of manufacture.

Compliance Methods for the Above (Description and Citation):

Shell will maintain the applicable certification for the size and model year of CI engines.

Compliance Status:

In Compliance: Will you continue to comply up to permit issuance? Yes No

Not In Compliance: Will you be in compliance at permit issuance? Yes No

Future-Effective Requirement: Do you expect to meet this on a timely basis? Yes No

Emission Unit ID(s): Kulluk Fuel tank A, B, and C

Applicable Requirement (Describe and Cite):

40 CFR Part 6-.110a, NSPS part Ka: Diesel fuel tanks manufactured prior to 1984.

Compliance Methods for the Above (Description and Citation):

Vapor pressure of diesel fuel is less than 1.5 psia (60.112 (a)). Diesel fuel MSDS lists vapor pressure at 0.4 mm Hg (<0.01 psia). Shell will maintain a record of these tank sizes.

Compliance Status:

In Compliance: Will you continue to comply up to permit issuance? Yes No

Not In Compliance: Will you be in compliance at permit issuance? Yes No

Future-Effective Requirement: Do you expect to meet this on a timely basis? Yes No

Emission Unit ID(s): Kulluk – Incin

Applicable Requirement (Describe and Cite):

Alaska 18AAC 50.050: Incinerator emission standards. Visibility through the exhaust effluent of an incinerator, including an air curtain incinerator, may not be reduced by visible emissions, excluding condensed water vapor, by more than 20 percent averaged over any six consecutive minutes.

Compliance Methods for the Above (Description and Citation):

Opacity by EPA Method 9 as part of the initial stack testing.

Compliance Status:

In Compliance: Will you continue to comply up to permit issuance? Yes No

Not In Compliance: Will you be in compliance at permit issuance? Yes No

Future-Effective Requirement: Do you expect to meet this on a timely basis? Yes No

Emission Unit ID(s): Kulluk – Gens, MLCHPUs, Comps, Cranes, Heaters, Seldom, Egen

Applicable Requirement (Describe and Cite):

Alaska 18AAC 50.055: Industrial processes and fuel-burning equipment. (a) Visible emissions, excluding condensed water vapor, from an industrial process or fuel-burning equipment may not reduce visibility through the exhaust effluent by more than 20 percent averaged over any six consecutive minutes.

(b) Particulate matter emitted from an industrial process or fuel-burning equipment may not exceed, per cubic foot of exhaust gas corrected to standard conditions and averaged over three hours, 0.05 grains.

(c) Sulfur-compound emissions, expressed as sulfur dioxide, from an industrial process or from fuel-burning equipment may not exceed 500 ppm averaged over a period of three hours.

Compliance Methods for the Above (Description and Citation):

Opacity by EPA Method 9 as part of the initial stack testing.

Particulate matter emission rate to be demonstrated as met by meeting the requested limits within this application.

Sulfur-compound emissions – met through the use of ULSD fuel

Compliance Status:

In Compliance: Will you continue to comply up to permit issuance? Yes No

Not In Compliance: Will you be in compliance at permit issuance? Yes No

Future-Effective Requirement: Do you expect to meet this on a timely basis? Yes No

B. SCHEDULE OF COMPLIANCE – To start in the future

Complete this section if you answered “NO” to any of the questions in section A. Also complete this section if required to submit a schedule of compliance by an applicable requirement. Please attach copies of any judicial consent decrees or administrative orders for this requirement.

Unit(s) _____ Requirement _____

Reason for Noncompliance. Briefly explain reason for noncompliance at time of permit issuance or that future-effective requirement will not be met on a timely basis:

Narrative Description of how Source Compliance Will be Achieved. Briefly explain your plan for achieving compliance:

Schedule of Compliance. Provide a schedule of remedial measures, including an enforceable sequence of actions with milestones, leading to compliance, including a date for final compliance.

Remedial Measure or Action	Date to be Achieved

C. SCHEDULE FOR SUBMISSION OF PROGRESS REPORTS – To start in the future

Only complete this section if you are required to submit one or more schedules of compliance in section B or if an applicable requirement requires submittal of a progress report. If a schedule of compliance is required, your progress report should start within 6 months of application submittal and subsequently, no less than every six months. One progress report may include information on multiple schedules of compliance.

Contents of Progress Report (describe):

First Report ___/___/___ Frequency of Submittal _____

Contents of Progress Report (describe):

First Report ___/___/___ Frequency of Submittal _____

D. SCHEDULE FOR SUBMISSION OF COMPLIANCE CERTIFICATIONS

This section must be completed once by every source. Indicate when you would prefer to submit compliance certifications during the term of your permit (at least once per year).

Frequency of submittal Annual Beginning ___/___/___

E. COMPLIANCE WITH ENHANCED MONITORING & COMPLIANCE CERTIFICATION REQUIREMENTS

This section must be completed once by every source. To certify compliance with these, you must be able to certify compliance for every applicable requirement related to monitoring and compliance certification at every unit.

Enhanced Monitoring Requirements: ____ In Compliance ____ Not In Compliance

Compliance Certification Requirements: ____ In Compliance ____ Not In Compliance

SECTION 9

**CERTIFICATION OF TRUTH, ACCURACY, AND
COMPLETENESS (CTAC)**

Federal Operating Permit Program (40 CFR Part 71)

CERTIFICATION OF TRUTH, ACCURACY, AND COMPLETENESS (CTAC)

This form must be completed, signed by the "Responsible Official" designated for the facility or emission unit, and sent with each submission of documents (i.e., application forms, updates to applications, reports, or any information required by a part 71 permit).

A. Responsible Official

Name: (Last) Childs (First) Susan (MI) _____

Title Alaska Venture Support Integrator Manager

Street or P.O. Box 3601 C Street, Suite 1334

City Anchorage State AK ZIP 99503 - _____

Telephone (907) 646 - 7112 Ext. _____ Facsimile (907) 770 - 7145

B. Certification of Truth, Accuracy and Completeness (to be signed by the responsible official)

I certify under penalty of law, based on information and belief formed after reasonable inquiry, the statements and information contained in these documents are true, accurate and complete.

Name (signed) /s/

Name (typed) Susan Childs Date: 2/28/2011

APPENDIX A

Beaufort Sea Lease Block Locations

Figure A-1: Beaufort Sea Lease Block Locations

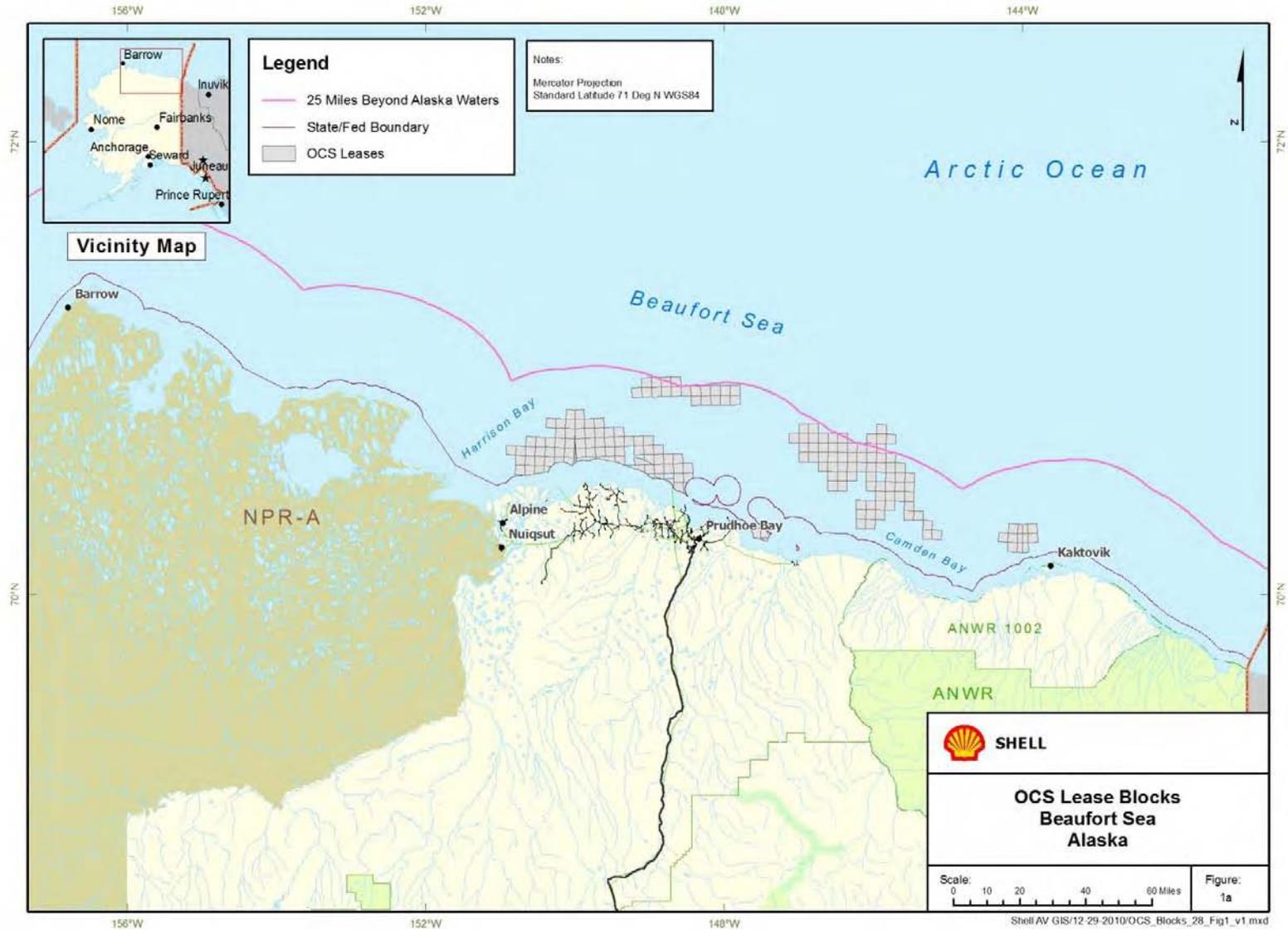


Table A-1: Beaufort Sea Lease Blocks

Sale	Lease Blocks									
Sale 186:	6352	6369	6370	6402A	6403B	6419	6420	6421		
Sale 195:	6152	6173	6202	6203	6204	6222	6223	6251	6252	6253
	6254	6255	6256	6272	6273	6301	6302	6303	6304	6305
	6306	6307	6308	6309	6320	6321	6322	6323	6351	6353
	6354	6355	6356	6358	6359	6360	6371	6372	6373	6374
	6401C	6404	6405	6406	6409	6410	6411	6412	6418	6422
	6423	6424	6460	6461	6462	6463	6468	6469	6512	6513
	6518	6657	6658	6659	6707	6708	6709	6712	6713	6751
	6752	6757	6758	6764	6773	6774	6801	6802	6814	6815
	6822	6823	6824	6851	6873	6874				
Sale 202:	6009	6010	6011	6012	6058	6059	6060	6061	6062	6063
	6064	6065	6066	6067	6068	6114	6115	6116	6117	6118
	6221	6259	6308	6309	6310	6359	6406	6407	6409	6410
	6457	6459	6460	6461	6508	6510	6511	6512	6558	6559
	6560	6561	6562	6609	6610	6611	6612	6660	6662	

APPENDIX B

General Information and Summary (GIS) Table 1



Air Sciences Inc.

ENGINEERING CALCULATIONS

PROJECT TITLE: Shell OCS Permit		BY: S. Pryor		
PROJECT NO: 180-20-6		PAGE: 1	OF: 1	APPENDIX B
SUBJECT: Title V Form Tables		DATE: February 27, 2011		

Conical Drilling Unit Kulluk OCS Source - Daily Maximum Emissions for each source group

GIS TABLE 1

Source Group by Vessel	MLC			Drill			C/L		
	NO _x lb/day	NO _x lb/day	NO _x lb/day	PM _{2.5} lb/day	PM _{2.5} lb/day	PM _{2.5} lb/day	PM ₁₀ lb/day	PM ₁₀ lb/day	PM ₁₀ lb/day
Kulluk									
Generation	456.1	456.1	322.0	71.3	71.3	50.3	71.3	71.3	50.3
MLC HPU'S	887.8	0.0	0.0	35.5	0.0	0.0	35.5	0.0	0.0
Air compressors	710.2	0.0	0.0	14.8	0.0	0.0	14.8	0.0	0.0
Cranes	63.9	63.9	106.5	2.6	2.6	4.3	2.6	2.6	4.3
Heaters & Boilers	21.3	21.3	21.3	3.5	3.5	3.5	3.5	3.5	3.5
Seldom-used units	9.0	9.0	9.0	0.7	0.7	0.7	0.7	0.7	0.7
Emergency Generator	36.6	36.6	36.6	2.9	2.9	2.9	2.9	2.9	2.9
Incinerator	5.0	5.0	5.0	23.2	23.2	23.2	27.2	27.2	27.2
Primary Ice Management									
Propulsion & Generation	2,032.8	2,032.8	2,032.8	317.6	317.6	317.6	317.6	317.6	317.6
Heaters & Boilers	35.6	35.6	35.6	5.9	5.9	5.9	5.9	5.9	5.9
Seldom-used units	6.8	6.8	6.8	0.5	0.5	0.5	0.5	0.5	0.5
Incinerator	5.5	5.5	5.5	25.9	25.9	25.9	30.3	30.3	30.3
Secondary Ice Management / Anchor Handler									
Propulsion & Generation	2,032.8	2,032.8	2,032.8	317.6	317.6	317.6	317.6	317.6	317.6
Heaters & Boilers	35.6	35.6	35.6	5.9	5.9	5.9	5.9	5.9	5.9
Seldom-used units	6.8	6.8	6.8	0.5	0.5	0.5	0.5	0.5	0.5
Incinerator	5.5	5.5	5.5	25.9	25.9	25.9	30.3	30.3	30.3
Resupply Ship - transport mode									
Propulsion & Generation	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Seldom-used units	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Resupply Ship - DP mode									
Propulsion & Generation	1,826.2	1,826.2	1,826.2	76.1	76.1	76.1	76.1	76.1	76.1
Seldom-used units	1.4	1.4	1.4	0.1	0.1	0.1	0.1	0.1	0.1
OSR vessel									
Propulsion & Generation	1,065.3	1,065.3	1,065.3	44.4	44.4	44.4	44.4	44.4	44.4
Seldom-used units	6.8	6.8	6.8	0.5	0.5	0.5	0.5	0.5	0.5
Incinerator	4.5	4.5	4.5	21.0	21.0	21.0	24.6	24.6	24.6
Quartermaster vessel									
Propulsion & Generation	1,369.7	1,369.7	1,369.7	11.4	11.4	11.4	11.4	11.4	11.4
Seldom-used units	6.8	6.8	6.8	0.5	0.5	0.5	0.5	0.5	0.5
Incinerator	4.5	4.5	4.5	21.0	21.0	21.0	24.6	24.6	24.6
OSR work boats									
Work boats	257.4	257.4	257.4	20.6	20.6	20.6	20.6	20.6	20.6
TOTAL- (lb/day)	10,894	9,296	9,204	1,050	1,000	980	1,070	1,020	1,000
TOTAL- (lb/day)-w/o Egen	10,600	9,002	8,910	1,026	976	957	1,046	996	977

shading represents proposed requested limit to be demonstrated on a daily basis
shading represents requested limit to be demonstrated by on weekly basis

MLC=Mud-line Cellar Activity
Drill=Well Drilling Activity
C/L=Cementing/Logging Activity

APPENDIX C

Insignificant Emissions (IE) – TANKS 4.0 Reports



Air Sciences Inc.

ENGINEERING CALCULATIONS

PROJECT TITLE: Shell Offshore, Inc.		BY: S. Pryor		
PROJECT NO: 180-20-6		PAGE: 1	OF: 1	APPENDIX: C
SUBJECT: Kulluk TANKS Data		DATE: February 23, 2011		

Source ID	Tank capacity (m ³)	Tank capacity (ft ³)	Tank capacity (gal)	%	Tank Diameter (ft)	Tank Height (ft)	Max Tank Height (ft)	Avg Tank Height (ft)	Turnovers per Year	Net Throughput (gal/yr)
Tank A	680	24,014	179,637	42%	25	48.9	48.9	48.9	3	495,237
Tank B	676	23,873	178,581	42%	25	48.6	48.6	48.6	3	492,324
Tank C	247	8,723	65,251	15%	25	17.8	17.8	17.8	3	179,888
			423,469	Assumed						1,167,448

Source ID	Heated	Vertical or Horizontal	Shell Color	Shell Paint Condition	Roof Color	Roof Paint Condition	Roof Type	Roof Height	Roof Radius	Vacuum Setting (psig)	Pressure Setting (psig)
Tank A	No	Vertical	White	Good	White	Good	Dome	0	25.00	-0.03	0.03
Tank B	No	Vertical	White	Good	White	Good	Dome	0	25.00	-0.03	0.03
Tank C	No	Vertical	White	Good	White	Good	Dome	0	25.00	-0.03	0.03
Assumed		Assumed	Default	Default	Default	Default	Assumed	Assumed	Default	Default	Default

Nearest Major city: Anchorage, AK

TANKS Data

Source ID	TANKS Net Throughput (gal/yr)	Working Losses (lb/yr)	Breathing Losses (lb/yr)	Total Losses (lb/yr)
Tank A	495,236.87	5.46	0.25	5.71
Tank B	492,323.71	5.43	0.25	5.68
Tank C	179,887.51	1.98	0.25	2.23
	1,167,448.09	12.87	0.75	13.62

Conversions

2.83E-02 m³/ft³
7.48 gal/ft³

Maximum Fuel Use

1,167,448 gal/yr
120 days/yr

From Kulluk Only

TANKS 4.0.9d
Emissions Report - Brief Format
Individual Summaries

Emissions Report for: Annual

Kulluk Tank A - 680 cubic meters - Vertical Fixed Roof Tank

Components	Losses(lbs)		
	Working Loss	Breathing Loss	Total Emissions
Distillate fuel oil no. 2	5.46	0.25	5.71

Kulluk Tank B - 676 cubic meters - Vertical Fixed Roof Tank

Components	Losses(lbs)		
	Working Loss	Breathing Loss	Total Emissions
Distillate fuel oil no. 2	5.43	0.25	5.68

Kulluk Tank C - 247 cubic meters - Vertical Fixed Roof Tank

Components	Losses(lbs)		
	Working Loss	Breathing Loss	Total Emissions
Distillate fuel oil no. 2	1.98	0.25	2.23

TANKS 4.0.9d
Emissions Report - Brief Format
Total Emissions Summaries - All Tanks in Report

Emissions Report for: Annual

Tank Identification				Losses (lbs)
Kulluk Tank A - 680 cubic meters	Shell Offshore, Inc.	Vertical Fixed Roof Tank	Anchorage, Alaska	5.71
Kulluk Tank B - 676 cubic meters	Shell Offshore, Inc.	Vertical Fixed Roof Tank	Anchorage, Alaska	5.68
Kulluk Tank C - 247 cubic meters	Shell Offshore, Inc.	Vertical Fixed Roof Tank	Anchorage, Alaska	2.23
Total Emissions for all Tanks:				13.62

TANKS 4.0.9d
Emissions Report - Summary Format
Tank Identification and Physical Characteristics

Identification

User Identification:	Kulluk Tank A - 680 cubic meters
City:	Anchorage
State:	Alaska
Company:	Shell Offshore, Inc.
Type of Tank:	Vertical Fixed Roof Tank
Description:	Kulluk Tank A - 680 cubic meters

Tank Dimensions

Shell Height (ft):	48.90
Diameter (ft):	25.00
Liquid Height (ft) :	48.90
Avg. Liquid Height (ft):	48.90
Volume (gallons):	179,637.00
Turnovers:	3.00
Net Throughput(gal/yr):	495,237.00
Is Tank Heated (y/n):	N

Paint Characteristics

Shell Color/Shade:	White/White
Shell Condition:	Good
Roof Color/Shade:	White/White
Roof Condition:	Good

Roof Characteristics

Type:	Dome
Height (ft)	0.00
Radius (ft) (Dome Roof)	25.00

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meteorological Data used in Emissions Calculations: Anchorage, Alaska (Avg Atmospheric Pressure = 14.56 psia)

TANKS 4.0.9d
Emissions Report - Summary Format
Liquid Contents of Storage Tank

Kulluk Tank A - 680 cubic meters - Vertical Fixed Roof Tank
Anchorage, Alaska

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F)			Liquid Bulk Temp (deg F)	Vapor Pressure (psia)			Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
		Avg.	Min.	Max.		Avg.	Min.	Max.					
Distillate fuel oil no. 2	Jul	47.81	43.64	51.99	35.93	0.0042	0.0036	0.0049	130.0000			188.00	Option 1: VP40 = .0031 VP50 = .0045
Distillate fuel oil no. 2	Aug	46.38	42.61	50.14	35.93	0.0040	0.0035	0.0045	130.0000			188.00	Option 1: VP40 = .0031 VP50 = .0045
Distillate fuel oil no. 2	Sep	42.37	39.08	45.66	35.93	0.0034	0.0031	0.0039	130.0000			188.00	Option 1: VP40 = .0031 VP50 = .0045
Distillate fuel oil no. 2	Oct	35.82	33.28	38.36	35.93	0.0031	0.0031	0.0031	130.0000			188.00	Option 1: VP40 = .0031
Distillate fuel oil no. 2	Nov	29.61	27.27	31.95	35.93	0.0031	0.0031	0.0031	130.0000			188.00	Option 1: VP40 = .0031

TANKS 4.0.9d
Emissions Report - Summary Format
Individual Tank Emission Totals

Emissions Report for: Annual

Kulluk Tank A - 680 cubic meters - Vertical Fixed Roof Tank
Anchorage, Alaska

Components	Losses (lbs)		
	Working Loss	Breathing Loss	Total Emissions
Distillate fuel oil no. 2	5.46	0.25	5.71

TANKS 4.0.9d
Emissions Report - Summary Format
Tank Identification and Physical Characteristics

Identification

User Identification:	Kulluk Tank B - 676 cubic meters
City:	Anchorage
State:	Alaska
Company:	Shell Offshore, Inc.
Type of Tank:	Vertical Fixed Roof Tank
Description:	Kulluk Tank B - 676 cubic meters

Tank Dimensions

Shell Height (ft):	48.60
Diameter (ft):	25.00
Liquid Height (ft) :	48.60
Avg. Liquid Height (ft):	48.60
Volume (gallons):	178,581.00
Turnovers:	3.00
Net Throughput(gal/yr):	492,324.00
Is Tank Heated (y/n):	N

Paint Characteristics

Shell Color/Shade:	White/White
Shell Condition:	Good
Roof Color/Shade:	White/White
Roof Condition:	Good

Roof Characteristics

Type:	Dome
Height (ft)	0.00
Radius (ft) (Dome Roof)	25.00

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meteorological Data used in Emissions Calculations: Anchorage, Alaska (Avg Atmospheric Pressure = 14.56 psia)

TANKS 4.0.9d
Emissions Report - Summary Format
Liquid Contents of Storage Tank

Kulluk Tank B - 676 cubic meters - Vertical Fixed Roof Tank
Anchorage, Alaska

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F)			Liquid Bulk Temp (deg F)	Vapor Pressure (psia)			Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
		Avg.	Min.	Max.		Avg.	Min.	Max.					
Distillate fuel oil no. 2	Jul	47.81	43.64	51.99	35.93	0.0042	0.0036	0.0049	130.0000			188.00	Option 1: VP40 = .0031 VP50 = .0045
Distillate fuel oil no. 2	Aug	46.38	42.61	50.14	35.93	0.0040	0.0035	0.0045	130.0000			188.00	Option 1: VP40 = .0031 VP50 = .0045
Distillate fuel oil no. 2	Sep	42.37	39.08	45.66	35.93	0.0034	0.0031	0.0039	130.0000			188.00	Option 1: VP40 = .0031 VP50 = .0045
Distillate fuel oil no. 2	Oct	35.82	33.28	38.36	35.93	0.0031	0.0031	0.0031	130.0000			188.00	Option 1: VP40 = .0031
Distillate fuel oil no. 2	Nov	29.61	27.27	31.95	35.93	0.0031	0.0031	0.0031	130.0000			188.00	Option 1: VP40 = .0031

TANKS 4.0.9d
Emissions Report - Summary Format
Individual Tank Emission Totals

Emissions Report for: Annual

Kulluk Tank B - 676 cubic meters - Vertical Fixed Roof Tank
Anchorage, Alaska

Components	Losses (lbs)		
	Working Loss	Breathing Loss	Total Emissions
Distillate fuel oil no. 2	5.43	0.25	5.68

TANKS 4.0.9d
Emissions Report - Summary Format
Tank Identification and Physical Characteristics

Identification

User Identification:	Kulluk Tank C - 247 cubic meters
City:	Anchorage
State:	Alaska
Company:	Shell Offshore, Inc.
Type of Tank:	Vertical Fixed Roof Tank
Description:	Kulluk Tank C - 247 cubic meters

Tank Dimensions

Shell Height (ft):	17.80
Diameter (ft):	25.00
Liquid Height (ft) :	17.80
Avg. Liquid Height (ft):	17.80
Volume (gallons):	62,251.00
Turnovers:	3.00
Net Throughput(gal/yr):	179,888.00
Is Tank Heated (y/n):	N

Paint Characteristics

Shell Color/Shade:	White/White
Shell Condition:	Good
Roof Color/Shade:	White/White
Roof Condition:	Good

Roof Characteristics

Type:	Dome
Height (ft)	0.00
Radius (ft) (Dome Roof)	25.00

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meteorological Data used in Emissions Calculations: Anchorage, Alaska (Avg Atmospheric Pressure = 14.56 psia)

TANKS 4.0.9d
Emissions Report - Summary Format
Liquid Contents of Storage Tank

Kulluk Tank C - 247 cubic meters - Vertical Fixed Roof Tank
Anchorage, Alaska

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F)			Liquid Bulk Temp (deg F)	Vapor Pressure (psia)			Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
		Avg.	Min.	Max.		Avg.	Min.	Max.					
Distillate fuel oil no. 2	Jul	47.81	43.64	51.99	35.93	0.0042	0.0036	0.0049	130.0000			188.00	Option 1: VP40 = .0031 VP50 = .0045
Distillate fuel oil no. 2	Aug	46.38	42.61	50.14	35.93	0.0040	0.0035	0.0045	130.0000			188.00	Option 1: VP40 = .0031 VP50 = .0045
Distillate fuel oil no. 2	Sep	42.37	39.08	45.66	35.93	0.0034	0.0031	0.0039	130.0000			188.00	Option 1: VP40 = .0031 VP50 = .0045
Distillate fuel oil no. 2	Oct	35.82	33.28	38.36	35.93	0.0031	0.0031	0.0031	130.0000			188.00	Option 1: VP40 = .0031
Distillate fuel oil no. 2	Nov	29.61	27.27	31.95	35.93	0.0031	0.0031	0.0031	130.0000			188.00	Option 1: VP40 = .0031

TANKS 4.0.9d
Emissions Report - Summary Format
Individual Tank Emission Totals

Emissions Report for: Annual

Kulluk Tank C - 247 cubic meters - Vertical Fixed Roof Tank
Anchorage, Alaska

Components	Losses (lbs)		
	Working Loss	Breathing Loss	Total Emissions
Distillate fuel oil no. 2	1.98	0.25	2.23

TANKS 4.0.9d
Emissions Report - Summary Format
Total Emissions Summaries - All Tanks in Report

Emissions Report for: Annual

Tank Identification				Losses (lbs)
Kulluk Tank A - 680 cubic meters	Shell Offshore, Inc.	Vertical Fixed Roof Tank	Anchorage, Alaska	5.71
Kulluk Tank B - 676 cubic meters	Shell Offshore, Inc.	Vertical Fixed Roof Tank	Anchorage, Alaska	5.68
Kulluk Tank C - 247 cubic meters	Shell Offshore, Inc.	Vertical Fixed Roof Tank	Anchorage, Alaska	2.23
Total Emissions for all Tanks:				13.62

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Identification and Physical Characteristics

Identification

User Identification:	Kulluk Tank A - 680 cubic meters
City:	Anchorage
State:	Alaska
Company:	Shell Offshore, Inc.
Type of Tank:	Vertical Fixed Roof Tank
Description:	Kulluk Tank A - 680 cubic meters

Tank Dimensions

Shell Height (ft):		48.90
Diameter (ft):		25.00
Liquid Height (ft) :		48.90
Avg. Liquid Height (ft):		48.90
Volume (gallons):		179,637.00
Turnovers:		3.00
Net Throughput(gal/yr):		495,237.00
Is Tank Heated (y/n):	N	

Paint Characteristics

Shell Color/Shade:	White/White
Shell Condition:	Good
Roof Color/Shade:	White/White
Roof Condition:	Good

Roof Characteristics

Type:	Dome	
Height (ft)		0.00
Radius (ft) (Dome Roof)		25.00

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meteorological Data used in Emissions Calculations: Anchorage, Alaska (Avg Atmospheric Pressure = 14.56 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

Kulluk Tank A - 680 cubic meters - Vertical Fixed Roof Tank
Anchorage, Alaska

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F)			Liquid Bulk Temp (deg F)	Vapor Pressure (psia)			Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
		Avg.	Min.	Max.		Avg.	Min.	Max.					
Distillate fuel oil no. 2	Jul	47.81	43.64	51.99	35.93	0.0042	0.0036	0.0049	130.0000			188.00	Option 1: VP40 = .0031 VP50 = .0045
Distillate fuel oil no. 2	Aug	46.38	42.61	50.14	35.93	0.0040	0.0035	0.0045	130.0000			188.00	Option 1: VP40 = .0031 VP50 = .0045
Distillate fuel oil no. 2	Sep	42.37	39.08	45.66	35.93	0.0034	0.0031	0.0039	130.0000			188.00	Option 1: VP40 = .0031 VP50 = .0045
Distillate fuel oil no. 2	Oct	35.82	33.28	38.36	35.93	0.0031	0.0031	0.0031	130.0000			188.00	Option 1: VP40 = .0031
Distillate fuel oil no. 2	Nov	29.61	27.27	31.95	35.93	0.0031	0.0031	0.0031	130.0000			188.00	Option 1: VP40 = .0031

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

Kulluk Tank A - 680 cubic meters - Vertical Fixed Roof Tank
Anchorage, Alaska

Month:	January	February	March	April	May	June	July	August	September	October	November	December
Standing Losses (lb):							0.0755	0.0640	0.0463	0.0324	0.0291	
Vapor Space Volume (cu ft):							841.7315	841.7315	841.7315	841.7315	841.7315	
Vapor Density (lb/cu ft):							0.0001	0.0001	0.0001	0.0001	0.0001	
Vapor Space Expansion Factor:							0.0289	0.0257	0.0222	0.0164	0.0150	
Vented Vapor Saturation Factor:							0.9996	0.9996	0.9997	0.9997	0.9997	
Tank Vapor Space Volume:												
Vapor Space Volume (cu ft):							841.7315	841.7315	841.7315	841.7315	841.7315	
Tank Diameter (ft):							25.0000	25.0000	25.0000	25.0000	25.0000	
Vapor Space Outage (ft):							1.7148	1.7148	1.7148	1.7148	1.7148	
Tank Shell Height (ft):							48.9000	48.9000	48.9000	48.9000	48.9000	
Average Liquid Height (ft):							48.9000	48.9000	48.9000	48.9000	48.9000	
Roof Outage (ft):							1.7148	1.7148	1.7148	1.7148	1.7148	
Roof Outage (Dome Roof)												
Roof Outage (ft):							1.7148	1.7148	1.7148	1.7148	1.7148	
Dome Radius (ft):							25.0000	25.0000	25.0000	25.0000	25.0000	
Shell Radius (ft):							12.5000	12.5000	12.5000	12.5000	12.5000	
Vapor Density												
Vapor Density (lb/cu ft):							0.0001	0.0001	0.0001	0.0001	0.0001	
Vapor Molecular Weight (lb/lb-mole):							130.0000	130.0000	130.0000	130.0000	130.0000	
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):							0.0042	0.0040	0.0034	0.0031	0.0031	
Daily Avg. Liquid Surface Temp. (deg. R):							507.4839	506.0455	502.0405	495.4887	489.2810	
Daily Average Ambient Temp. (deg. F):							58.4500	56.2500	48.4000	34.6000	21.1500	
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):							10.731	10.731	10.731	10.731	10.731	
Liquid Bulk Temperature (deg. R):							495.6025	495.6025	495.6025	495.6025	495.6025	
Tank Paint Solar Absorptance (Shell):							0.1700	0.1700	0.1700	0.1700	0.1700	
Tank Paint Solar Absorptance (Roof):							0.1700	0.1700	0.1700	0.1700	0.1700	
Daily Total Solar Insulation Factor (Btu/sqft day):							1,469.5946	1,119.3286	709.0985	351.8524	136.1088	
Vapor Space Expansion Factor												
Vapor Space Expansion Factor:							0.0289	0.0257	0.0222	0.0164	0.0150	
Daily Vapor Temperature Range (deg. R):							16.7153	15.0480	13.1673	10.1708	9.3599	
Daily Vapor Pressure Range (psia):							0.0013	0.0011	0.0008	0.0000	0.0000	
Breather Vent Press. Setting Range (psia):							0.0600	0.0600	0.0600	0.0600	0.0600	
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):							0.0042	0.0040	0.0034	0.0031	0.0031	
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):							0.0036	0.0035	0.0031	0.0031	0.0031	
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):							0.0049	0.0045	0.0039	0.0031	0.0031	
Daily Avg. Liquid Surface Temp. (deg R):							507.4839	506.0455	502.0405	495.4887	489.2810	
Daily Min. Liquid Surface Temp. (deg R):							503.3050	502.2835	498.7487	492.9460	486.9410	
Daily Max. Liquid Surface Temp. (deg R):							511.6627	509.8075	505.3323	498.0314	491.6210	
Daily Ambient Temp. Range (deg. R):							13.5000	13.5000	13.6000	11.8000	12.1000	
Vented Vapor Saturation Factor												
Vented Vapor Saturation Factor:							0.9996	0.9996	0.9997	0.9997	0.9997	
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):							0.0042	0.0040	0.0034	0.0031	0.0031	
Vapor Space Outage (ft):							1.7148	1.7148	1.7148	1.7148	1.7148	
Working Losses (lb):							1.2858	1.2240	1.0521	0.9504	0.9504	
Vapor Molecular Weight (lb/lb-mole):							130.0000	130.0000	130.0000	130.0000	130.0000	
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):							0.0042	0.0040	0.0034	0.0031	0.0031	
Net Throughput (gal/mo.):							99,047.4000	99,047.4000	99,047.4000	99,047.4000	99,047.4000	
Annual Turnovers:							3.0000	3.0000	3.0000	3.0000	3.0000	
Turnover Factor:							1.0000	1.0000	1.0000	1.0000	1.0000	
Maximum Liquid Volume (gal):							179,637.0000	179,637.0000	179,637.0000	179,637.0000	179,637.0000	
Maximum Liquid Height (ft):							48.9000	48.9000	48.9000	48.9000	48.9000	
Tank Diameter (ft):							25.0000	25.0000	25.0000	25.0000	25.0000	
Working Loss Product Factor:							1.0000	1.0000	1.0000	1.0000	1.0000	
Total Losses (lb):							1.3612	1.2881	1.0985	0.9828	0.9795	

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

Kulluk Tank A - 680 cubic meters - Vertical Fixed Roof Tank
Anchorage, Alaska

Components	Losses (lbs)		
	Working Loss	Breathing Loss	Total Emissions
Distillate fuel oil no. 2	5.46	0.25	5.71

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Identification and Physical Characteristics

Identification

User Identification:	Kulluk Tank B - 676 cubic meters
City:	Anchorage
State:	Alaska
Company:	Shell Offshore, Inc.
Type of Tank:	Vertical Fixed Roof Tank
Description:	Kulluk Tank B - 676 cubic meters

Tank Dimensions

Shell Height (ft):	48.60
Diameter (ft):	25.00
Liquid Height (ft) :	48.60
Avg. Liquid Height (ft):	48.60
Volume (gallons):	178,581.00
Turnovers:	3.00
Net Throughput(gal/yr):	492,324.00
Is Tank Heated (y/n):	N

Paint Characteristics

Shell Color/Shade:	White/White
Shell Condition:	Good
Roof Color/Shade:	White/White
Roof Condition:	Good

Roof Characteristics

Type:	Dome
Height (ft)	0.00
Radius (ft) (Dome Roof)	25.00

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meteorological Data used in Emissions Calculations: Anchorage, Alaska (Avg Atmospheric Pressure = 14.56 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

Kulluk Tank B - 676 cubic meters - Vertical Fixed Roof Tank
Anchorage, Alaska

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F)			Liquid Bulk Temp (deg F)	Vapor Pressure (psia)			Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
		Avg.	Min.	Max.		Avg.	Min.	Max.					
Distillate fuel oil no. 2	Jul	47.81	43.64	51.99	35.93	0.0042	0.0036	0.0049	130.0000			188.00	Option 1: VP40 = .0031 VP50 = .0045
Distillate fuel oil no. 2	Aug	46.38	42.61	50.14	35.93	0.0040	0.0035	0.0045	130.0000			188.00	Option 1: VP40 = .0031 VP50 = .0045
Distillate fuel oil no. 2	Sep	42.37	39.08	45.66	35.93	0.0034	0.0031	0.0039	130.0000			188.00	Option 1: VP40 = .0031 VP50 = .0045
Distillate fuel oil no. 2	Oct	35.82	33.28	38.36	35.93	0.0031	0.0031	0.0031	130.0000			188.00	Option 1: VP40 = .0031
Distillate fuel oil no. 2	Nov	29.61	27.27	31.95	35.93	0.0031	0.0031	0.0031	130.0000			188.00	Option 1: VP40 = .0031

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

Kulluk Tank B - 676 cubic meters - Vertical Fixed Roof Tank
Anchorage, Alaska

Month:	January	February	March	April	May	June	July	August	September	October	November	December
Standing Losses (lb):							0.0755	0.0640	0.0463	0.0324	0.0291	
Vapor Space Volume (cu ft):							841.7315	841.7315	841.7315	841.7315	841.7315	
Vapor Density (lb/cu ft):							0.0001	0.0001	0.0001	0.0001	0.0001	
Vapor Space Expansion Factor:							0.0289	0.0257	0.0222	0.0164	0.0150	
Vented Vapor Saturation Factor:							0.9996	0.9996	0.9997	0.9997	0.9997	
Tank Vapor Space Volume:												
Vapor Space Volume (cu ft):							841.7315	841.7315	841.7315	841.7315	841.7315	
Tank Diameter (ft):							25.0000	25.0000	25.0000	25.0000	25.0000	
Vapor Space Outage (ft):							1.7148	1.7148	1.7148	1.7148	1.7148	
Tank Shell Height (ft):							48.6000	48.6000	48.6000	48.6000	48.6000	
Average Liquid Height (ft):							48.6000	48.6000	48.6000	48.6000	48.6000	
Roof Outage (ft):							1.7148	1.7148	1.7148	1.7148	1.7148	
Roof Outage (Dome Roof)												
Roof Outage (ft):							1.7148	1.7148	1.7148	1.7148	1.7148	
Dome Radius (ft):							25.0000	25.0000	25.0000	25.0000	25.0000	
Shell Radius (ft):							12.5000	12.5000	12.5000	12.5000	12.5000	
Vapor Density												
Vapor Density (lb/cu ft):							0.0001	0.0001	0.0001	0.0001	0.0001	
Vapor Molecular Weight (lb/lb-mole):							130.0000	130.0000	130.0000	130.0000	130.0000	
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):							0.0042	0.0040	0.0034	0.0031	0.0031	
Daily Avg. Liquid Surface Temp. (deg. R):							507.4839	506.0455	502.0405	495.4887	489.2810	
Daily Average Ambient Temp. (deg. F):							58.4500	56.2500	48.4000	34.6000	21.1500	
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):							10.731	10.731	10.731	10.731	10.731	
Liquid Bulk Temperature (deg. R):							495.6025	495.6025	495.6025	495.6025	495.6025	
Tank Paint Solar Absorptance (Shell):							0.1700	0.1700	0.1700	0.1700	0.1700	
Tank Paint Solar Absorptance (Roof):							0.1700	0.1700	0.1700	0.1700	0.1700	
Daily Total Solar Insulation Factor (Btu/sqft day):							1,469.5946	1,119.3286	709.0985	351.8524	136.1088	
Vapor Space Expansion Factor												
Vapor Space Expansion Factor:							0.0289	0.0257	0.0222	0.0164	0.0150	
Daily Vapor Temperature Range (deg. R):							16.7153	15.0480	13.1673	10.1708	9.3599	
Daily Vapor Pressure Range (psia):							0.0013	0.0011	0.0008	0.0000	0.0000	
Breather Vent Press. Setting Range (psia):							0.0600	0.0600	0.0600	0.0600	0.0600	
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):							0.0042	0.0040	0.0034	0.0031	0.0031	
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):							0.0036	0.0035	0.0031	0.0031	0.0031	
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):							0.0049	0.0045	0.0039	0.0031	0.0031	
Daily Avg. Liquid Surface Temp. (deg R):							507.4839	506.0455	502.0405	495.4887	489.2810	
Daily Min. Liquid Surface Temp. (deg R):							503.3050	502.2835	498.7487	492.9460	486.9410	
Daily Max. Liquid Surface Temp. (deg R):							511.6627	509.8075	505.3323	498.0314	491.6210	
Daily Ambient Temp. Range (deg. R):							13.5000	13.5000	13.6000	11.8000	12.1000	
Vented Vapor Saturation Factor												
Vented Vapor Saturation Factor:							0.9996	0.9996	0.9997	0.9997	0.9997	
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):							0.0042	0.0040	0.0034	0.0031	0.0031	
Vapor Space Outage (ft):							1.7148	1.7148	1.7148	1.7148	1.7148	
Working Losses (lb):							1.2782	1.2168	1.0459	0.9448	0.9448	
Vapor Molecular Weight (lb/lb-mole):							130.0000	130.0000	130.0000	130.0000	130.0000	
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):							0.0042	0.0040	0.0034	0.0031	0.0031	
Net Throughput (gal/mo.):							98,464.8000	98,464.8000	98,464.8000	98,464.8000	98,464.8000	
Annual Turnovers:							3.0000	3.0000	3.0000	3.0000	3.0000	
Turnover Factor:							1.0000	1.0000	1.0000	1.0000	1.0000	
Maximum Liquid Volume (gal):							178,581.0000	178,581.0000	178,581.0000	178,581.0000	178,581.0000	
Maximum Liquid Height (ft):							48.6000	48.6000	48.6000	48.6000	48.6000	
Tank Diameter (ft):							25.0000	25.0000	25.0000	25.0000	25.0000	
Working Loss Product Factor:							1.0000	1.0000	1.0000	1.0000	1.0000	
Total Losses (lb):							1.3537	1.2809	1.0923	0.9772	0.9739	

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

Kulluk Tank B - 676 cubic meters - Vertical Fixed Roof Tank
Anchorage, Alaska

Components	Losses (lbs)		
	Working Loss	Breathing Loss	Total Emissions
Distillate fuel oil no. 2	5.43	0.25	5.68

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Identification and Physical Characteristics

Identification

User Identification:	Kulluk Tank C - 247 cubic meters
City:	Anchorage
State:	Alaska
Company:	Shell Offshore, Inc.
Type of Tank:	Vertical Fixed Roof Tank
Description:	Kulluk Tank C - 247 cubic meters

Tank Dimensions

Shell Height (ft):	17.80
Diameter (ft):	25.00
Liquid Height (ft) :	17.80
Avg. Liquid Height (ft):	17.80
Volume (gallons):	62,251.00
Turnovers:	3.00
Net Throughput(gal/yr):	179,888.00
Is Tank Heated (y/n):	N

Paint Characteristics

Shell Color/Shade:	White/White
Shell Condition:	Good
Roof Color/Shade:	White/White
Roof Condition:	Good

Roof Characteristics

Type:	Dome
Height (ft)	0.00
Radius (ft) (Dome Roof)	25.00

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meteorological Data used in Emissions Calculations: Anchorage, Alaska (Avg Atmospheric Pressure = 14.56 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

Kulluk Tank C - 247 cubic meters - Vertical Fixed Roof Tank
Anchorage, Alaska

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F)			Liquid Bulk Temp (deg F)	Vapor Pressure (psia)			Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
		Avg.	Min.	Max.		Avg.	Min.	Max.					
Distillate fuel oil no. 2	Jul	47.81	43.64	51.99	35.93	0.0042	0.0036	0.0049	130.0000			188.00	Option 1: VP40 = .0031 VP50 = .0045
Distillate fuel oil no. 2	Aug	46.38	42.61	50.14	35.93	0.0040	0.0035	0.0045	130.0000			188.00	Option 1: VP40 = .0031 VP50 = .0045
Distillate fuel oil no. 2	Sep	42.37	39.08	45.66	35.93	0.0034	0.0031	0.0039	130.0000			188.00	Option 1: VP40 = .0031 VP50 = .0045
Distillate fuel oil no. 2	Oct	35.82	33.28	38.36	35.93	0.0031	0.0031	0.0031	130.0000			188.00	Option 1: VP40 = .0031
Distillate fuel oil no. 2	Nov	29.61	27.27	31.95	35.93	0.0031	0.0031	0.0031	130.0000			188.00	Option 1: VP40 = .0031

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

Kulluk Tank C - 247 cubic meters - Vertical Fixed Roof Tank
Anchorage, Alaska

Month:	January	February	March	April	May	June	July	August	September	October	November	December
Standing Losses (lb):							0.0755	0.0640	0.0463	0.0324	0.0291	
Vapor Space Volume (cu ft):							841.7315	841.7315	841.7315	841.7315	841.7315	
Vapor Density (lb/cu ft):							0.0001	0.0001	0.0001	0.0001	0.0001	
Vapor Space Expansion Factor:							0.0289	0.0257	0.0222	0.0164	0.0150	
Vented Vapor Saturation Factor:							0.9996	0.9996	0.9997	0.9997	0.9997	
Tank Vapor Space Volume:												
Vapor Space Volume (cu ft):							841.7315	841.7315	841.7315	841.7315	841.7315	
Tank Diameter (ft):							25.0000	25.0000	25.0000	25.0000	25.0000	
Vapor Space Outage (ft):							1.7148	1.7148	1.7148	1.7148	1.7148	
Tank Shell Height (ft):							17.8000	17.8000	17.8000	17.8000	17.8000	
Average Liquid Height (ft):							17.8000	17.8000	17.8000	17.8000	17.8000	
Roof Outage (ft):							1.7148	1.7148	1.7148	1.7148	1.7148	
Roof Outage (Dome Roof)												
Roof Outage (ft):							1.7148	1.7148	1.7148	1.7148	1.7148	
Dome Radius (ft):							25.0000	25.0000	25.0000	25.0000	25.0000	
Shell Radius (ft):							12.5000	12.5000	12.5000	12.5000	12.5000	
Vapor Density												
Vapor Density (lb/cu ft):							0.0001	0.0001	0.0001	0.0001	0.0001	
Vapor Molecular Weight (lb/lb-mole):							130.0000	130.0000	130.0000	130.0000	130.0000	
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):							0.0042	0.0040	0.0034	0.0031	0.0031	
Daily Avg. Liquid Surface Temp. (deg. R):							507.4839	506.0455	502.0405	495.4887	489.2810	
Daily Average Ambient Temp. (deg. F):							58.4500	56.2500	48.4000	34.6000	21.1500	
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):							10.731	10.731	10.731	10.731	10.731	
Liquid Bulk Temperature (deg. R):							495.6025	495.6025	495.6025	495.6025	495.6025	
Tank Paint Solar Absorptance (Shell):							0.1700	0.1700	0.1700	0.1700	0.1700	
Tank Paint Solar Absorptance (Roof):							0.1700	0.1700	0.1700	0.1700	0.1700	
Daily Total Solar Insulation Factor (Btu/sqft day):							1,469.5946	1,119.3286	709.0985	351.8524	136.1088	
Vapor Space Expansion Factor												
Vapor Space Expansion Factor:							0.0289	0.0257	0.0222	0.0164	0.0150	
Daily Vapor Temperature Range (deg. R):							16.7153	15.0480	13.1673	10.1708	9.3599	
Daily Vapor Pressure Range (psia):							0.0013	0.0011	0.0008	0.0000	0.0000	
Breather Vent Press. Setting Range (psia):							0.0600	0.0600	0.0600	0.0600	0.0600	
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):							0.0042	0.0040	0.0034	0.0031	0.0031	
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):							0.0036	0.0035	0.0031	0.0031	0.0031	
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):							0.0049	0.0045	0.0039	0.0031	0.0031	
Daily Avg. Liquid Surface Temp. (deg R):							507.4839	506.0455	502.0405	495.4887	489.2810	
Daily Min. Liquid Surface Temp. (deg R):							503.3050	502.2835	498.7487	492.9460	486.9410	
Daily Max. Liquid Surface Temp. (deg R):							511.6627	509.8075	505.3323	498.0314	491.6210	
Daily Ambient Temp. Range (deg. R):							13.5000	13.5000	13.6000	11.8000	12.1000	
Vented Vapor Saturation Factor												
Vented Vapor Saturation Factor:							0.9996	0.9996	0.9997	0.9997	0.9997	
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):							0.0042	0.0040	0.0034	0.0031	0.0031	
Vapor Space Outage (ft):							1.7148	1.7148	1.7148	1.7148	1.7148	
Working Losses (lb):							0.4670	0.4446	0.3822	0.3452	0.3452	
Vapor Molecular Weight (lb/lb-mole):							130.0000	130.0000	130.0000	130.0000	130.0000	
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):							0.0042	0.0040	0.0034	0.0031	0.0031	
Net Throughput (gal/mo.):							35,977.6000	35,977.6000	35,977.6000	35,977.6000	35,977.6000	
Annual Turnovers:							3.0000	3.0000	3.0000	3.0000	3.0000	
Turnover Factor:							1.0000	1.0000	1.0000	1.0000	1.0000	
Maximum Liquid Volume (gal):							62,251.0000	62,251.0000	62,251.0000	62,251.0000	62,251.0000	
Maximum Liquid Height (ft):							17.8000	17.8000	17.8000	17.8000	17.8000	
Tank Diameter (ft):							25.0000	25.0000	25.0000	25.0000	25.0000	
Working Loss Product Factor:							1.0000	1.0000	1.0000	1.0000	1.0000	
Total Losses (lb):							0.5425	0.5086	0.4285	0.3776	0.3743	

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

Kulluk Tank C - 247 cubic meters - Vertical Fixed Roof Tank
Anchorage, Alaska

Components	Losses (lbs)		
	Working Loss	Breathing Loss	Total Emissions
Distillate fuel oil no. 2	1.98	0.25	2.23

TANKS 4.0.9d
Emissions Report - Detail Format
Total Emissions Summaries - All Tanks in Report

Emissions Report for: Annual

Tank Identification				Losses (lbs)
Kulluk Tank A - 680 cubic meters	Shell Offshore, Inc.	Vertical Fixed Roof Tank	Anchorage, Alaska	5.71
Kulluk Tank B - 676 cubic meters	Shell Offshore, Inc.	Vertical Fixed Roof Tank	Anchorage, Alaska	5.68
Kulluk Tank C - 247 cubic meters	Shell Offshore, Inc.	Vertical Fixed Roof Tank	Anchorage, Alaska	2.23
Total Emissions for all Tanks:				13.62

APPENDIX D

Insignificant Emissions (IE) – Drilling Mud De-gassing

Hydrocarbon Gas Volume released from drill mud - Estimated for the Chukchi and Beaufort Seas

Keith Craik, Shell

May 4, 2009

Background:

The wells Shell proposes to drill in the Chukchi and Beaufort Seas will employ the conventional rotary drilling and fluids circulating systems. The fluids circulating system is comprised of drilling fluid, which is pumped down the drill string, through orifices in the bit, and back to the surface where it is directed into storage pits on the rig. After, solids removal and mud conditioning, the drilling fluid is directed from the pits back down the drill string. The drilling fluid cools and lubricates the drill bit, carries cutting out of the hole and exerts hydrostatic pressure which prevents an influx of formation fluids into the well bore. The required hydrostatic pressure is determined from offset wells and electric logs and while drilling, using tools attached to the drillstring and monitoring the gas content in the returning drilling fluid, measured in ppm. As the ppm's of the gas increase, the mud weight is adjusted to maintain a safe overbalance. Therefore, the only appreciable gas that will be circulated to surface in the drilling mud is that which is contained in the rock ground up by the bit.

Estimated Volume and Composition of Drilled-up Downhole Gas

The bit which will be used to drill the potentially hydrocarbon bearing portion of the wells has a 12 1/4" diameter. The combination of estimated rock void space (porosity) and estimated thickness of hydrocarbon bearing rock results in a potential downhole volume of 37 cubic feet. The volume at surface conditions, if all the potential hydrocarbon rock is gas bearing (an unlikely case), is 9,208 cubic feet. This gas will break out of the drilling fluid as it crosses the shale shakers or as the mud passes through a vacuum degasser. The composition of the gas, based on tests at the Burger location shows the gas to be 97% C1-C2 and 3% C3+. The associated volumes per well are C1-C2, 8932 cubic ft, and C3+, 276 cubic ft. As propane at 20C, this volume represents 32 lb of C3+ hydrocarbons from a single well. Shell believes that it could drill no more than four wells in one season for a total of 128 lb of non-methane, non-ethane hydrocarbon gas. This is to be viewed as an upper limit calculation for the purpose of bounding the emissions.

Assumptions

1. Anticipated length of hydrocarbon bearing rock, associated porosity, depth of occurrence, and bottom hole pressure is confidential information and as such cannot be released. Actual data was, however, used to develop the anticipated volume of hydrocarbon bearing rock, and is representative of the wells planned to be drilled in the Chukchi Sea. The volume is greater than that anticipated in the Beaufort Sea and as such represents a worst case for the Beaufort Sea wells.
2. The resulting volume is assumed to be 100% gas bearing, an unlikely scenario based on the results of the offset wells, but the worst case from a gas emissions standpoint.

3. The gas breakdown is based on the gas chromatograph results from the offset well in the anticipated pay interval in the Chukchi Sea. Seven samples were taken in the sands throughout the interval with virtually identical gas component ratios. The gas fractions in the Beaufort Sea offset wells, appear to be about 98% C1/C2, and 2% C3+, however the Chukchi Sea gas ratios are used as they represent a worst case scenario for the Beaufort Sea.



Air Sciences Inc.

ENGINEERING CALCULATIONS

PROJECT TITLE: Shell Offshore, Inc.		BY: S. Pryor		
PROJECT NO: 180-15-7		PAGE: 1	OF: 1	SHEET: 1
SUBJECT: Propane Mass Calc		DATE: May 1, 2009		

Ideal gas constant: $0.022415 \text{ m}^3/\text{mol}$ (273 K (0°C), 1 atm)

Elementary Principles of Chemical Processes, 2 ed.
Table 5.2-1, page 188

Ideal gas constant: $359.050 \text{ ft}^3/\text{lb mol}$ (492 R (32°F), 1 atm)

Elementary Principles of Chemical Processes, 2 ed.
Table 5.2-1, page 188

Molecular Weight of C_3H_8 44.0956 g/mol

Propane Volume 276 ft^3

at 273K (0°C), 1 atm

$$\frac{276 \text{ ft}^3}{0.022415 \text{ m}^3} \times \frac{\text{mol}}{44.0956 \text{ g}} \times \frac{\text{m}^3}{35.3167 \text{ ft}^3} \times \frac{\text{lb}}{453.59 \text{ g}} = 33.9 \text{ lb}$$

at 492 R (32°F), 1 atm

$$\frac{276 \text{ ft}^3}{359.05 \text{ ft}^3} \times \frac{\text{lb mol}}{44.0956 \text{ lb}} = 33.90 \text{ lb}$$

Ideal gas constant: $0.024069 \text{ m}^3/\text{mol}$ (20°C, 1 atm) 293.15 K 20 °C

at 20°C, 1 atm

$$\frac{276 \text{ ft}^3}{0.024069 \text{ m}^3} \times \frac{\text{mol}}{44.0956 \text{ g}} \times \frac{\text{m}^3}{35.3167 \text{ ft}^3} \times \frac{\text{lb}}{453.59 \text{ g}} = 31.6 \text{ lb}$$

Conversions

$35.3167 \text{ ft}^3/\text{m}^3$

453.59 g/lb

APPENDIX E

Emission Calculations (EMISS) – Tables 1 & 2



Air Sciences Inc.

ENGINEERING CALCULATIONS

PROJECT TITLE: Shell OCS Permit		BY: S. Pryor		
PROJECT NO: 180-20-6		PAGE: 1	OF: 2	APPENDIX E
SUBJECT: Title V Form Tables		DATE: February 27, 2011		

Conical Drilling Unit Kulluk OCS Source - Hourly and Annual Emissions

EMISS TABLE 1

Source Group by Vessel	NO _x lb/hr	NO _x tons/year	VOC lb/hr	VOC tons/year	SO ₂ lb/hr	SO ₂ tons/year	PM ₁₀ lb/hr	PM ₁₀ tons/year
Kulluk								
Generation	19.0	23.9	1.4	1.7	5.3E-01	6.7E-01	3.0	3.7
MLC HPU'S	37.0	8.9	1.1	0.3	1.1E-01	2.6E-02	1.5	0.4
Air compressors	29.6	7.1	0.3	0.1	1.1E-01	2.6E-02	0.6	0.1
Cranes	8.9	4.9	0.3	0.1	2.6E-02	1.5E-02	0.4	0.2
Heaters & Boilers	0.9	1.3	0.0	0.1	6.3E-02	9.1E-02	0.1	0.2
Seldom-used units	3.7E-01	5.4E-01	3.7E-02	5.3E-02	1.1E-03	1.6E-03	3.0E-02	4.3E-02
Emergency Generator	1.8E+01	7.3E-02	1.8E+00	7.3E-03	5.5E-02	2.2E-04	1.5E+00	5.9E-03
Incinerator	0.4	0.3	13.8	9.9	3.5E-01	2.5E-01	2.3	1.6
Primary Ice Management								
Propulsion & Generation	84.7	46.3	6.1	3.3	2.4E+00	1.3E+00	13.2	7.2
Heaters & Boilers	1.5	0.8	0.1	0.0	1.1E-01	5.7E-02	0.2	0.1
Seldom-used units	2.8E-01	1.5E-01	2.8E-02	1.5E-02	8.4E-04	4.6E-04	2.3E-02	1.2E-02
Incinerator	0.2	0.1	7.7	4.2	1.9E-01	1.1E-01	1.3	0.7
Secondary Ice Management / Anchor Handler								
Propulsion & Generation	84.7	46.3	6.1	3.3	2.4E+00	1.3E+00	13.2	7.2
Heaters & Boilers	1.5	0.8	0.1	0.0	1.1E-01	5.7E-02	0.2	0.1
Seldom-used units	2.8E-01	1.5E-01	2.8E-02	1.5E-02	8.4E-04	4.6E-04	2.3E-02	1.2E-02
Incinerator	0.2	0.1	7.7	4.2	1.9E-01	1.1E-01	1.3	0.7
Resupply Ship - transport mode								
Propulsion & Generation	0.0	11.0	0.0	0.3	0.0E+00	4.1E-02	0.0	0.5
Seldom-used units	0.0E+00	8.2E-02	0.0E+00	8.1E-03	0.0E+00	2.4E-04	0.0E+00	6.5E-03
Resupply Ship - DP mode								
Propulsion & Generation	236.7	21.9	7.6	0.7	8.8E-01	8.2E-02	9.9	0.9
Seldom-used units	5.7E-02	8.2E-02	5.6E-03	8.1E-03	1.7E-04	2.4E-04	4.5E-03	6.5E-03
OSR vessel								
Propulsion & Generation	44.4	38.4	1.4	1.2	1.7E-01	1.4E-01	1.8	1.6
Seldom-used units	2.8E-01	4.1E-01	2.8E-02	4.1E-02	8.4E-04	1.2E-03	2.3E-02	3.3E-02
Incinerator	0.2	0.3	6.3	9.0	1.6E-01	2.3E-01	1.0	1.5
Quarterming vessel								
Propulsion & Generation	57.1	49.3	0.2	0.2	2.8E-01	2.5E-01	0.5	0.4
Seldom-used units	2.8E-01	4.1E-01	2.8E-02	4.1E-02	8.4E-04	1.2E-03	2.3E-02	3.3E-02
Incinerator	0.2	0.3	6.3	9.0	1.6E-01	2.3E-01	1.0	1.5
OSR work boats								
Work boats	10.7	15.4	1.1	1.5	3.2E-02	4.6E-02	0.9	1.2
Total - without NOx Limit	638	279	69	50	8	5	54	30
Total - PTE	638	<250	69	50	8	5	54	30



Air Sciences Inc.

ENGINEERING CALCULATIONS

PROJECT TITLE: Shell OCS Permit		BY: S. Pryor		
PROJECT NO: 180-20-6		PAGE: 2	OF: 2	APPENDIX E
SUBJECT: Title V Form Tables		DATE: February 27, 2011		

Conical Drilling Unit Kulluk OCS Source - Hourly and Annual Emissions

EMISS TABLE 2

Source Group by Vessel	CO lb/hr	CO tons/year	Lead lb/hr	Lead tons/year	HAP lb/hr	HAP tons/year	CH ₂ O lb/hr	CH ₂ O tons/year
Kulluk								
Generation	8.6	10.8	1.5E-03	1.8E-03	6.2E-02	7.7E-02	1.8E-02	2.2E-02
MLC HPU'S	2.0	0.5	3.0E-04	7.3E-05	1.3E-02	3.1E-03	3.7E-03	8.9E-04
Air compressors	1.8	0.4	3.0E-04	7.3E-05	1.3E-02	3.1E-03	3.7E-03	8.9E-04
Cranes	0.5	0.3	7.3E-05	4.1E-05	3.1E-03	1.7E-03	8.9E-04	5.0E-04
Heaters & Boilers	0.2	0.3	5.4E-05	7.8E-05	2.0E-03	2.8E-03	1.5E-03	2.1E-03
Seldom-used units	1.0E-01	1.5E-01	3.1E-06	4.4E-06	4.2E-04	6.0E-04	1.3E-04	1.8E-04
Emergency Generator	4.9E+00	2.0E-02	1.5E-04	6.0E-07	2.0E-02	8.2E-05	6.1E-03	2.5E-05
Incinerator	41.4	29.8	2.9E-02	2.1E-02	3.5E-02	2.5E-02	0.0E+00	0.0E+00
Primary Ice Management								
Propulsion & Generation	38.3	21.0	6.5E-03	3.6E-03	2.7E-01	1.5E-01	8.0E-02	4.4E-02
Heaters & Boilers	0.4	0.2	9.0E-05	4.9E-05	3.3E-03	1.8E-03	2.4E-03	1.3E-03
Seldom-used units	7.6E-02	4.2E-02	2.3E-06	1.3E-06	3.2E-04	1.7E-04	9.5E-05	5.2E-05
Incinerator	23.1	12.6	1.6E-02	9.0E-03	1.9E-02	1.1E-02	0.0E+00	0.0E+00
Secondary Ice Management / Anchor Handler								
Propulsion & Generation	38.3	21.0	6.5E-03	3.6E-03	2.7E-01	1.5E-01	8.0E-02	4.4E-02
Heaters & Boilers	0.4	0.2	9.0E-05	4.9E-05	3.3E-03	1.8E-03	2.4E-03	1.3E-03
Seldom-used units	7.6E-02	4.2E-02	2.3E-06	1.3E-06	3.2E-04	1.7E-04	9.5E-05	5.2E-05
Incinerator	23.1	12.6	1.6E-02	9.0E-03	1.9E-02	1.1E-02	0.0E+00	0.0E+00
Resupply Ship - transport mode								
Propulsion & Generation	0.0	3.3	0.0E+00	1.1E-04	0.0E+00	1.5E-02	0.0E+00	4.6E-03
Seldom-used units	0.0E+00	2.2E-02	0.0E+00	6.7E-07	0.0E+00	9.1E-05	0.0E+00	2.7E-05
Resupply Ship - DP mode								
Propulsion & Generation	71.4	6.6	2.4E-03	2.3E-04	3.3E-01	3.1E-02	9.9E-02	9.2E-03
Seldom-used units	1.5E-02	2.2E-02	4.7E-07	6.7E-07	6.3E-05	9.1E-05	1.9E-05	2.7E-05
OSR vessel								
Propulsion & Generation	13.4	11.6	4.6E-04	3.9E-04	6.2E-02	5.3E-02	1.9E-02	1.6E-02
Seldom-used units	7.6E-02	1.1E-01	2.3E-06	3.4E-06	3.2E-04	4.5E-04	9.5E-05	1.4E-04
Incinerator	18.8	27.0	1.3E-02	1.9E-02	1.6E-02	2.3E-02	0.0E+00	0.0E+00
Quartering vessel								
Propulsion & Generation	2.3	2.0	7.8E-04	6.8E-04	1.1E-01	9.2E-02	3.2E-02	2.8E-02
Seldom-used units	7.6E-02	1.1E-01	2.3E-06	3.4E-06	3.2E-04	4.5E-04	9.5E-05	1.4E-04
Incinerator	18.8	27.0	1.3E-02	1.9E-02	1.6E-02	2.3E-02	0.0E+00	0.0E+00
OSR work boats								
Work boats	2.9	4.2	8.8E-05	1.3E-04	1.2E-02	1.7E-02	3.6E-03	5.2E-03
Total - without NOx Limit	311	192	0.11	0.09	1.29	0.69	0.35	0.18
Total - PTE	311	192	0.11	0.09	1.29	0.69	0.35	0.18

APPENDIX F

Supplement to EPA Operating Permit Application
